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sisxlis wnevis cirkaduli profilis gavlena hipertenziul pacientTa mikro- da makrocirkulaciaze

disertacia

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Sesavali

naSromis aqtualoba

aTwleulebis ganmavlobaSi janmrTelobis dominantur problemad kardiovaskuluri daavadebebi rCeba. 80-ian wlebSi, aSS-Si kardiovaskuluri sikvdilobis wili saerTo sikvdilobis struqturaSi 50%-s aRemateboda. sazogadoebrivi jandacvisa da farmacevtuli industriis didi mcdelobis Sedegad, 1999 wlisaTvis aRniSnuli procenti daaxloebiT 40%-mde Semcirda. aSS-Si, kardiovaskuluri daavadebebiT miyenebuli zarali 2002 wlisTvis 199.5 miliard dolars Seadgenda; Sesabamisad, daavadebaTa risk-faqtorebis kvleva prioritetul mimarTulebad Camoyalibda rogorc aSS-Si, ise mTels msoflioSi [272].

kardiovaskuluri daavadebebiT gamowveuli sikvdilobis did nawilSi aRiniSneba normaluri qolesterinis done. amasTan, mwvave sisxlZarRvivani garTulebebi, iseTi rogoricaa miokardiumis infarqti, uecari kardiuli sikvdili da insulti, upiratesad (70%-Si) viTardeba sisxlZarRvebSi, romelTa okluziis xarisxi 50%-ze naklebia [293]. amdenad, mecnierTa yuradReba mimarTulia axali risk-faqtorebis Ziebisaken, romelTa roli vaskulur garTulebaTa ganviTarebaSi wamyvania, raTa mizanmimarTuli CareviT Tavidan iqnas acilebuli avadobisa da sikvdilobis maRali procenti.

warmoadgens ra vaskuluri garTulebebis ganviTarebis umTavres risk-faqtors, ah ganixileba rogorc sikvdilobis ZiriTadi mizezi mTels msoflioSi. misi gavrcelebis maCvenebeli mzardia da dReisaTvis daaxloebiT 1 miliard adamians moicavs.

miuxedavad bolo wlebSi Catarebuli klinikur-eqsperimentuli kvlevebis simravlisa, ah-iT gamowveuli garTulebebis sixSire ar iklebs. amasTan, vlindeba zrdadobis tendenciac. Sesabamisad, vaskulur garTulebaTa ganviTarebis axali risk-faqtorebis gamovlenas gansakuTrebuli mniSvneloba eniWeba.

dReisaTvis arsebuli monacemebi endoTeliumis funqciuri mdgomareobis Sesaxeb esenciuri hipertenziis dros araerTgvarovania; amasTan, es ukanasknели ganixileba, rogorc saerTo da kardiovaskuluri

sikvdilobis ganviTarebis damoukidebel prediqtori [42,44,58,59,61]. Sesabamisad, misi Seswavla ah-is dros Semdgom kvlevebs saWiroebs.

bolo wlebSi gansakuTrebuli yuradReba eqceva aw-is cirkaduli profilis Seswavlas, amasTan sakiTxi misi monawileobis Sesaxeb ah-is vaskulur garTulebaTa ganviTarebaSi jer kidev diskutabeluria.

winamdebare naSromSi Seswavlilia aw-is cirkaduli profilis gavlena hipertenziul pacientTa hemoreologiasa da endoTeliumis funqciaze. hemoreologiuri da endoTeliumis disfunqciis SesaZlo gamovlenas non-diper individebSi didi praqtikuli mniSvneloba eniWeba. aRniSnuli saSualebas mogvcems gamovavlinoT ah-is vaskulur garTulebaTa ganviTarebis axali, potenciuri risk-faqtori da SevimuSavoT mizanmimarTuli prevenciuli strategia.

zemoTqmulidan gamomdinare, vaskuluri garTulebebis maRali riski ah-is mqone pacientebSi, TviT tradiciuli risk-faqtorebis ararsebobis SemTxvevaSic ki, gansazRvravs axali "savaraudo" risk-faqtorebis gamovlenisa da dadgenis aucileblobas, romlebic SesaZloa wamyvan rols TamaSobdnen vaskulur garTulebaTa ganviTarebaSi da SesaZloa realizdebodnen mikro- da makrocirkulatoruli darRvevebis gziT.

kvlevis mizani

hemoreologiisa da endoTeliumis funqciis cvlilebebis Seswavla sisxlis wnevis sxxvadasxva cirkaduli profilis esenciuri hipertenziis mqone pacientebSi sisxlZarRvovan garTulebaTa ganviTarebis axal, damatebiT risk-faqtorTa gamovlenisa da dazustebis mizniT.

am miznis misaRwevad saWiro iyo Semdegi amocanebis gadawyveta:

1. endoTeliumis funqciur maxasiaTebelTa kvleva Trombozuli bunebis garTulebaTa ganviTarebis Seswavlis mizniT diper da non-diper esenciuri hipertenziis mqone pacientebSi.
2. hemoreologiuri parametrebis (eriTrocitebis agregadoba da deformacia, Trombocitebis agregadoba da adheziuroba, hematokriti, fibrinogenis plazmuri koncentracia, plazmisa da sisxlis siblante) Seswavla diper da non-diper esenciuri hipertenziis mqone pacientebSi.

3. dagvedgina kavSiri esenciuri hipertenziis xangrZlivobasa da endoTelur disfunqciasa da hemoreologiur darRvevebs Soris.
4. Segveswavla damokidebuleba hemoreologiur da endoTeliumis funqciur maxasiaTeblebs Soris esenciuri hipertenziis mqone pacientebSi.
5. gadanacvlebis daZabulobasa da sisxlZarRvis diameters Soris damokidebulebis dadgena da sisxlZarRvis diametris sididis gavlenis Seswavla nakad-damokidebuli vazodilataciis procentul maCvenebelze.
6. Segveswavla damokidebuleba erTis mxriv arteriuli wnevis cirkadul profilsa da meores mxriv esenciuri hipertenziis xarisxsa da xangrZlivobas Soris.

mecnieruli siaxle

1. novacias warmoadgens Sromis Sedegad dadgenili kanonzomiereba: esenciuri hipertenziis pacientebSi xdeba arteriuli wnevis diperi cirkaduli profilis non-diperi profiliT Canacvleba, romelTac diperisagan gansxvavebiT gaaCniaT ufro mkveTrad gamoxatuli hemoreologiuri darRvevebi da endoTeliumis disfunqcia.
2. dadginda, rom arteriuli hipertenziis xangrZlivoba ar korelirebs endoTeliumis disfunqciis xarisxTan.
3. kvlevaSi gamovlinda mxolod sisxlZarRvTa kunTovani Sris disfunqciis sarwmunod maRali korelacia arteriuli wnevis xarisxTan da garkveulwilad xangrZlivobasTanac.
4. normotenziul non-diper individebSi (rodesac Ramis saaTebSi ar xdeba arteriuli wnevis daqveiTeba 10-20%-iT) aRiniSna agreTve hemoreologiuri parametrebisa da endoTeliumis disfunqciis xarisxis matebis tendencia, romelmac sarwmunoebas ver miaRwia; magram Cveni azriT, es tendencia sagulisxmo faqtad unda miviCnioT, radganac normotenziul pacientebSic sisxlZarRvovani garTulebebis ganviTareba SesaZlebelia garkveulwilad axsnili iqnas. ra sakvirvelia, aRniSnuli faqti Semdgom kvlevas saWiroebs.

praqtikuli Rirebuleba

1. esenciuri hipertenziis mqone pacientebSi non-diperi cirkaduli profilis mqone pirebi miuxedavad arteriuli wnevis xangrZlivobis, xarisxisa da sqesisa saWiroeben intensiur meTvalyureobas. pacientTa am jgufSi gamovlenili hemoreologiuri darRvevebi da endoTeliumis disfunqcia xdeba prevenciuli RonisZiebebis da adeqvaturi medikamenturi koreqciis samizne sisxlZarRvovani garTulebebis Tavidan acilebis mizniT Ramisa da dilis e.w. kritikuli saaTebis dros.
2. non-diperi cirkaduli profili hipertenziul pacientebSi SesaZlebelia ganixilebodes, rogorc damoukidebeli risk-faqtori, romelic mZime sisxlZarRvovani garTulebebis ganmsazRvrelia, rac saWiroebs Semdgom dakvirvebas prospeqtuli kvlevis reJimSi.
3. reaqtiuli hiperemiiT gamowveuli vazodilataciis xarisxis gamokvleva miCneul unda iqnas sisxlZarRvTa reaqtiulobis gamomavlinebel da Semafasebel stres-testad esenciuri hipertenziis mqone pacientebSi.

naSromis aprobacia

disertaciaSi asaxuli kvlevis monacemebi avtorma warmoadgina moxsenebebis saxiT samecniero konferenciebsa da kongresebze:

- evropis hipertenziis sazogadoebis me-19 Sexvedra. 12-16 ivnisi, 2009. milani, italia.
- xmelTaSua zRvis qveynebis me-6 saerTaSoriso kongresi. 24-28 marti, 2009. antalia, TurqeTi.
- kardiovaskuluri kvlevis refleqsuri jgufis 26-e saerTaSoriso Sexvedra. 2-3 aprili, 2009. nensi, safrangeTi.
- safrangeTis hipertenziis sazogadoebis me-2 saerTaSoriso kongresi. 18-19 dekemberi, 2008. Parizi, safrangeTi.
- evropis hipertenziis sazogadoebis me-18 Sexvedra. hipertenziis saerTaSoriso sazogadoebis 22-e samecniero kongresi. germaniis hipertenziis ligis yovelwliuri Sexvedra. 11-19 ivnisi, 2008. berlini, germania.
- kardiologTa msoflio kongresi. 18-21 maisi, 2008. buenos-airesi, argentina.

- xmelTaSua zRvis qveynebis me-5 saerTaSoriso kongresi. 23-27 aprili, 2008. izmiri, TurqeTi.
- safrangeTis hipertenziis sazogadoebis I saerTaSoriso kongresi. 13-14 dekemberi, 2007. parizi, safrangeTi.
- evropis hipertenziis sazogadoebis me-17 Sexvedra. 15-19 ivnisi, 2007. milani, italia.
- hipertenziisa da kardiovaskulur daavadebaTa prevenciis centraluri evropis Sexvedra. 11-13 oqtombri, 2007. krakovi, poloneTi.
- azia-wynari okeanis hipertenziis me-6 kongresi. hipertenziisa da masTan dakavSirebuli daavadebebis me-9 saerTaSoriso simpoziumi. 16-19 noemberi, 2007. pekini, CineTi.

publikaciebi

sadisertacio Temis irgvliv gamoqveynebulia 25 samecniero Sroma.

disertaciis struqtura da moculoba

disertacia warmoadgens nabeWd Sromas, romelic Seicavs Sesavals, literaturis mimoxilvas, kvlevis masalas da meTodebs, kvlevis Sedegebsa da maT ganxilvas, daskvnebs. naSromi moicavs nabeWd teqsts 142 gverdze, ilustrirebulia 29 cxriliT da 11 grafikiT. Seicavs 5 damatebis furcels.

Tavi 1. literaturuli mimoxilva

1.1. arteriuli hipertenziis gavrceleba da prognozuli aspeqtebi

arteriuli hipertenzia (ah) aris erT-erTi yvelaze adre aRwerili klinikuri mdgomareoba (Nei Jin by Huang Ti, Cvens weliTaRricxvamde 2600 wlis win). dReisaTvis ah ganixileba, rogorc neirohumoralur, hemodinamikur da metabolur faqtorTa erTobliooba, romelTa urTierTqmedebac iwvevs ara marto arteriuli wnevis (aw) maRali cifrebis SenarCunebas, aramed samizne organoebis paTologiur cvlilebebs da Sesabamisad prognozis gauaresebas.

ah mniSvnelovnad aCqarebs aTeroskleruli procesis progresirebas da Sesabamisad, warmoadgens aTeroTrombogenuli insultisa da miokardiumis infarqtis ganviTarebis safuZvels [1]. epidemiologiurma kvlevebma aCvena Zlieri wrfivi damokidebuleba fardobiT kardiovaskulur risksa da mosvenebis sisxlis wnevis dones Soris populaciur doneze [2]. Framingham-is kvlevam [3], romelic emyareboda 12 wliani dakvirvebis monacemebs, aCvena rom optimaluri wnevis cifrebis mqone individebTan SedarebiT, maRali normuli wnevis mqone mamakacebs gaaCniaT 1.6-jer, da qalebs 2.8-jer ufro maRali kardiovaskuluri garTulebebis ganviTarebis riski.

amerikis SeerTebuli Statebis JNC 7 “gaidlainis” mixedviT ah gavrceleba msoflioSi daaxloebiT erT miliard adamians moicavs da ah Tanmxlebi sikvdilobis wliuri maCvenebeli 7.1 milions Seadgens. msoflio jandacvis organizaciis monacemebiT, suboptimaluri sisxlis wneva (sistoluri wneva >115 mm.vwy.sv.) pasuxismgebelia cerebrovaskulur daavadebaTa 62%-sa da gulis iSemiuri daavadebis 49%-is ganviTarebaze, mcire sqesTaSorisi variaciiT. cnobilia, rom 40-dan 89 wlamde asakis pirebSi arteriuli wnevis 20/10 mm.vwy.sv.-iT mateba asocirebulia insultiTa da gulis iSemiuri daavadebiT ganpirobebuli sikvdilobis gaormagebasTan. ah-is gavrceleba izrdeba asakis matebasTan erTad; misi gavrceleba 50%-s aWarbebs 60-69 wlis asakis pacientTa Soris, da individTa 3/4-ze mets moicavs 70 wels gadaSorebul asakSi.

bolo dros gansakuTrebuli yuradReba eqceva ah da endoTeliumis funqciuri mdgomareobis Seswavlas rasobriv-eTnikuri kuTxiT [4-6]. aSS-Si mcxovrebi populaciis epidemiologiuri kvlevebiT gamovlinda, rom Savkanian pirebs TeTrkanian subieqtebTan SedarebiT aReniSnebaT ah-is [3,7, 8], Saqriani diabetisa da sxva kardiovaskuluri risk-faqtorebis gavrcelebis maRali done [363]. ah-Tan asocirebuli kardiovaskuluri da cerebrovaskuluri garTulebebis ganviTarebis albaTobac statistikurad sarwmunod maRalia SavkanianTa populaciaSi [8]. Treiber et al. [5,9] kvlevam gamoavlina mniSvnelovani eTnikuri da sqesobrivi gansxvaveba mwvave stresis sapasuxod ganviTarebuli vazokonstriqciis mxriv. mkvlevarebma gamoavlines rom axalgazrda, janmrTel Savkanian pirebs aReniSnebaT rogorc endoTelium-damokidebuli, ise endoTelium-damoukidebeli vazodilataciis darRveva [3,10]. aRniSnulis sawinaaRmdegod, Gokce et al. [11] kvlevisas ar gamovlinda rasobrivi sxvaoba kunTovani tipis arteriebis nakad-damokidebuli vazodilataciis (FMD) procentul maCveneblebs Soris. miuxedavad intensiuri kvlevebisa, eTnikuri winaswarganwyoba hipertenziisa da misi garTulebebis ganviTarebis mxriv ar aris srulad Seswavlili [12].

1.2. sisxlZarRvTa endoTeliumi da misi disfunqcia

1.2.1. sisxlZarRvTa endoTeliumis struqtura da funqcia

sisxlZarRvis sxva SreebTan SedarebiT, endoTeliums ukavia strategiulad mniSvnelovani pozicia da ganicdis meqanikuri da hormonuli faqtorebis pirdapir zemoqmedebas. 70 kg. wonis mamakacSi endoTeliumi daaxloebiT 7 km. sigrZisa da 1600-1900 gr. masis organoa [13,14]. endoTeliumi moiazreba rogorc endokrinuli, autokrinuli da parakrinuli organo, romelic mTavar rols TamaSobs sisxlZarRvovani tonusis SenarCunebaSi.

20 welze meti gavida mas Semdeg, rac Furchgott da Zawadzki kurdRlis aortis magaliTze aCvenes endoTeliumis aucilebloba acetilqoliniT ganpirobebul vazodilataciaSi [15]. maT aRmoaCines axali substancia, romelsac endoTelium-damokidebuli relaqsaciuri faqtori uwodes; aRniSnuli SemdgomSi identificirda, rogorc azotis oqsidi (NO).

NO gamoiyofa endoTeluri ujredebidan sisxlis nakadiT Seqmnili gadanacvlebis daZabulobis sapasuxod da pasuxismgebelia mravali receptoris aqtivaciaze [15,16]. NO aris biologiuri membranebis gavlis unaris mqone, Tavisufalradikaluri airi ramdenime wami *in vivo* sicocxlis xangrZlivobiT [15]. endoTeliumidan gluvkunTovan SreSi difuziis Semdeg, NO iwvevs intracelularuli cikluri guanozin-monofosfatis koncentraciis matebas enzim guanilatciklazas aqtivaciis gziT da Sesabamisad gluvkunTovani ujredebis relaqsacias anu vazodilatacias. sisxlZarRvebSi NO mudmivad sinTezirdeba L-argininisagan, da Sesabamisad NO-s mudmivi bazaluri gamoyofa gansazRvravs periferiul sisxlZarRvovan tonuss [17].

funqciuri TvalsazrisiT, NO-s ZiriTadi antagonisti endoTelinia. endoTelini aRmoCenil iqna 1988 wels Yanagisawa et coworkers mier [18,19], rogorc endogenuri 21 aminomJavasagan Semdgari Zlieri vazokonstriqtoruli peptidi. endoTelini-1 uSualo monawileobas iRebs NO-s, aldosteronis, vazopresinis da adrenomedulinis sekreciis autoparakrinul kontrolSi.

endoTeliumis funqciebidan aRsaniSnavia [15,20,21,22,322]:

- sisxlZarRvTa tonusze momqmedi vazoaqtiuri agentebis gamonTavisufleba;
- antikoagulaciuri moqmedeba;
- fibrinolizSi monawileoba;
- imunuri funqciebi;
- fermentuli aqtivoba;
- gluvkunTovani ujredebis zrdis procesSi monawileoba;
- gluvkunTovani ujredebis dacva vazokonstriqtoruli zegavlenisagan.

endoTeliumis gansakuTrebuli poziciis gamo, endoTeliocitebi ganicdian 3 ZiriTadi xasiaTis meqanikur zemoqmedebas: a) wneva – rasac qmnis sisxlis hidrostatikuri Zala sisxlZarRvis SigniT; b) garSemoweriobiTi anu periferiuli gaWimva da g) gadanacvlebis daZabuloba anu sisxlis nakadiT Seqmnili gamwevi xaxunis Zala. mocemul

ZalTa Soris gadanacvlebis daZabuloba ganixileba, rogorc yvelaze mniSvnelovani hemodinamikuri Zala, rameTu igi astimulirebs vazoaqtiuri substanciebis gamonTavisuflebas, genTa eqspresias, ujredTa metabolizmsa da morfologiur cvlilebebs [23].

cnobilia, rom endoTeluri ujredebi mgrZnobiarea sisxlis nakadis siCqaris mimarT. gadanacvlebis daZabuloba iwvevs endoTeliocitebis deformacias. aRniSnul deformacias aRiqvaven gaWimvisadmi mgrZnobiare endoTeliocitebis ionuri arxebi, rac iwvevs citoplazmaSi Ca^{2+} Semadgenlobis zrdas da NO-s produqcias [14]. Sesabamisad, sisxlis nakadis zrdisas magistraluri arteriebi farTovdebian, xolo Semcirebisas – viwrovdebian. aRniSnuli fenomeni lokaluri xasiaTisaa da ar aris damokidebuli arc humoralur da arc nervul zemoqmedebaze.

normalur pirobebSi, janmrTeli endoTeliumis vazodilatatoruli substanciebiT stimulacia iwvevs NO-s sinTezis aqtivacias da lokalurad azotis oqsidis koncentraciis zrdas. NO SeaRwevs ra subendoTelur SreebSi, mohyveba sisxlZarRvTa relaqsacia, anu vazodilatacia [2].

nakad-damokidebuli dilatacia damokidebulia ara mxolod NO-s warmoqmnaze, aramed aseve NO-s inaqtivaciasa da qvemdebare gluvkunTovani ujredebis mgrZnobelobaze mis mimarT.

1.2.2. endoTeliumis disfunqcia

endoTeluri disfunqcia (ed) – es upirveles yovlisa disbalansia vazodilatatorul, angioproteqtorul, antiproliferaciul faqtorebsa (prostaciklini, qsovilovani plazminogenis aqtivatori, natriurezuli peptidis C tipi, endoTeluri hiperpolarizaciuli faqtori) da vazokonstriqtorul, proTrombozul, proliferaciul faqtorebs (endoTelini, superoqsid-anioni, Tromboqsani A, qsovilovani plazminogenis aqtivatoris inhibitori) Soris [20,24].

vazodilataciur stimulaciaze sisxlZarRvTa relaqsaciis uunaroba an Sesusteba SesaZloa ganpirobebuli iyos vazokonstriqtoruli substanciebis gazrdili aqtivobiT da/an vazodilatatoruli substanciebis mimarT endoTeliumis mgrZnobelobis daqveiTebiT.

Mitchell et al. [25] aCvenes, rom mxris arteriis FMD-s Semcireba SesaZloa aixsnas ara sisxlZarRvTa endoTeliumidan NO-s gamoyofis darRveviT, aramed reaqtiuli hiperemiis dros endoTeliumis stimulaciis arasakmarisi doniT, rac Tavis mxriv sisxlis nakadis siCqarisa da gadanacvlebis daZabulobis daqveiTebis Sedegia.

endoTeluri disfunqciis mTavari komponentebia:

1. NO-s bioSeRwevadobis darRveva:
   - eNOS-s eqspresia/inaqtivaciis darRveva da NO-s sinTezis Semcireba;
   - endoTeluri ujredebis zedapirze receptorebis ganlagebis raodenobis/simWidrovis Semcireba, romelTa gaRizianeba normaSi NO-s warmoqmnis stimulacias iwvevs;
2. NO-s degradaciis gazrda;
3. endoTeliocitebis mier endoTelini-1-isa da sxva vazokonstriqtoruli substanciebis produqciis zrda;

endoTeliumis mZime dazianebisas irRveva endoTeliumis mTlianobac da intimaSi Cndeba deendoTelizebuli ubnebi, romelTa gavliT neirohormonebi uSualod zemoqmedeben gluvkunTovan ujredebze da iwveven maT SekumSvas.

1.2.3. endoTeliumis funqciis kvlevis istoria da meTodebi

vazomotoruli tonusis regulaciis Seswavlis mizniT, 1980 wlamde kvlevebi izolirebulad gluvkunTovani ujredebis Sreze fokusirdeboda. endoTeliumi ganixileboda, rogorc sisxlZarRvis hemostatikuri barieri. Furchgott da Zawadzki iyvnen pirvelebi, romelTac aCvenes sisxlZarRvovani endoTeliumis mniSvneloba acetilqolinis mimarT ganviTarebul vazodilataciaSi [15,26]. U. Phol, J. Holtz (1985w.) gamoavlines endoTeliumis wamyvani roli in vivo sisxlZarRvis sanaTuris regulaciis procesSi [14].

pirveli aRwera epikardiuli koronaruli arteriebis ed-sa ekuTvnis Ludmer et al. (1986 w). mas Semdeg ed-is Sefasebis koronarografiuli meTodi, damyarebuli acetilqolinis intrakoronarul infuziaze, iTvleba ed-is kvlevis “oqros standartad” [27]. Celermajer et al. iyo pirveli, romelmac 1992 wels, aTeroskleroziss riskis mqone bavSvebsa da zrdasrulebSi aRwera

arainvaziuri ultrabgeriTi nakad-damokidebuli dilatacia endoTeliumis funqciuri mdgomareobis Sefasebis mizniT [28].

endoTeliumis funqciuri mdgomareoba SesaZloa Sefasdes sxvadasxva midgomiT, kerZod:

(1) sisxlZarRvis kedlis morfologiuri da meqanikuri maxasiaTeblebis gazomva (kerZod, intima-medias sisqe, damyoloba, gaWimvadoba, remodelirebis indeqsi);

(2) laboratoriuli meTodi, anu endoTeluri markereebis gansazRvra sisxlis Sratsa da SardSi. biologiur sistemebSi NO warmoadgens ukiduresad arastabilur SenaerTs, romelic swrafad gardaimneba nitritis ionad, xolo rkinis arsebobisas ki ufro stabilur, nitratis ionad. laboratoriuli meTodis ZiriTadi naklia is, rom sisxlSi arsebuli nitratebisa da nitritebis daaxloebiT 50% organizmSi sakvebTan erTad xvdeba da gamoiyofa Sardis gziT [29,30].

(3) cirkulatoruli sistemis konkretul ubanze sisxlZarRvTa tonusis endoTelium-damokidebuli regulaciis Sefaseba, romelic izomeba, rogorc sisxlZarRvis vazodilatatoruli pasuxi fizikur da farmakologiur stimulaciaze (gadanacvlebis daZabuloba, acetilqolini, bradikinini, substancia P, serotonini) [31]. arsebobs sisxlZarRvTa tonusis endoTeluri regulaciis Sesafasebeli 2 ZiriTadi meTodi: invaziuri, anu pirdapiri (koronaruli da periferiuli arteriebis) da araivaziuri, anu arapirdapiri (venuri okluziuri pletizmografia; maRali rezoluciis ultrabgera; fazur-kontrastuli magnituri rezonansi).

miuxedavad imisa, rom arsebobs FMD-s kvlevis angiografiuli da fazur-kontrastuli magnitur rezonansuri meTodebi [32,33], ultrasonografiuli meTodi kvlav rCeba yvelaze farTod gamoyenebad meTodad endoTeliumis funqciis Sefasebis mizniT [28,34,35,36]. realur droSi gamokvleva, dabali fasi, meTodis simartive, gamosaxulebis simkveTris gaZlierebis mizniT kontrastuli nivTierebebis gamoyenebis saWiroebis ar arseboba, pacientis riskisa da diskomfortis dabali done aris is ZiriTadi faqtorebi, romelTa gamoc ultrasonografiul meTods mkvlevarTa umravlesoba upiratesobas aniWebs [37].

1992 wlidan 2001 wlamde gamoqveynebuli 250 kvlevis Sedegebze dayrdnobiT, Bots et al. [38] Seiswavles endoTeliumis funqciuri mdgomareobis kvlevis ultrasonografiuli meTodis teqnikuri aspeqtebi. maT gamoavlines, rom kvlevaTa Soris FMD-s mniSvneloba saSualod 1.9%-dan 19.2%-is farglebSi varirebs (janmrTelebi, gulis iSemiuri daavadeba, Saqriani diabeti); arsebuli sxvaoba avtorebma gazomvaTa teqnikuri aspeqtebiT axsnes, kerZod okluziis xangrZlivobiTa da okluziuri manJetis lokalizaciiT. maTive daskvniT, aparaturis tips, gazomvis adgilsa da okluziur wnevas wamyvani mniSvneloba ar eniWeba.

Silber et al. [33,39] fazur-kontrastuli magnituri rezonansis gamoyenebiT daadastures puazelis kanonis gamoyenebis SesaZlebloba tranzitoruli postiSemiuri hiperemiis dros.

1.2.4. endoTeluri disfunqciis prognozuli aspeqtebi

ed-is prognozuli mniSvnelobis Sesaxeb pirveli monacemebi literaturaSi prospeqtuli kvlevis "Men born in 1914" kogortis kvlevis Sedegad gaCnda, sadac 1968-1970 wlebis periodSi venuri okluziuri teqnikis gamoyenebiT Seiswavles pulsuri talRis amplituda reaqtiuli hiperemiis dros. 21 wliani dakvirvebis Sedegad, mkvlevarebma daadgines, rom darRveuli endoTeluri funqcia asocirebulia kardiovaskuluri garTulebebis ganviTarebisa da saerTo sikvdilobis maRal sixSiresTan [40]. Neunteufel et al. [41] gamoikvlies nakad-damokidebuli vazodilataciis 5-wliani prognozuli mniSvneloba gulmkerdis areSi tkivilis mqone pacientebisaTvis. kvlevis Sedegad gamovlinda, rom pacientebs 10%-ze naklebi nakad-damokidebuli dilataciiT aReniSnebaT statistikurad sarwmunod maRali kardiovaskuluri riski. mWidro korelacia koronaruli arteriebis disfunqciasa da kardiovaskuluri garTulebebis ganviTarebis albaTobas Soris gamovlinda sxva [42-55] kvlevebSic. Fathi et al. [56] mniSvnelovani kardiovaskuluri riskis mqone 444 pacientis mxris arteriis endoTelium-damokidebul funqciis kvleviT daadgines, rom pacientebs romelTa FMD% naklebia 2%-ze, aReniSnebaT normalur (>6.3%) da mcired darRveul (2.1 dan 6.3%-mde) FMD% maCveneblis mqone individebTan SedarebiT kardiovaskuluri garTulebebis ganviTarebis mniSvnelovnad maRali riski.

Suwaidi et al. [42] acetilqolinis intrakoronaruli infuziis safuZvelze aCvenes, rom koronarul pacientebs mZime ed-iT gaaCniT kardialuri garTulebebis ganviTarebis 14%-iT gazrdili riski. paTogenezuri kavSiri koronarul endoTelur disfunqciasa da kardiovaskulur garTulebebs Soris naCvenebi iqna Suwaidi et al [42] da Schachinger et al. [43] mier. Lind et al. [57] Seiswavles endoTeliumis funqciis kvlevis invaziuri da arainvaziuri teqnikuri midgoma da daaskvnes, rom rogorc winamxris invaziuri, ise arainvaziuri ultrasonografiuli kvleva damoukideblad korelirebs momatebul koronarul riskTan.

dadgenilia, rom rezistentuli [44,58,59] da kunTovani tipis arteriebis [60], maT Soris koronaruli arteriebis [42,61] ed saerTo da kardiovaskuluri sikvdilobis damoukidebeli prediqtoria. kardiovaskuluri risk-faqtorebi, kerZod asaki [62], hipertenzia [44,63,64,65], simsuqne [58], hiperqolesterinemia, diabeti [66,67], homocisteinemia [38] da mwevaloba [68] asocirebulia sistemur endoTelur disfunqciasTan. Clarkson et al. [69] daadgines, rom adreuli kardiovaskuluri avadobis ojaxuri istoriis mqone janmrTel axalgazrdebs aReniSnebaT FMD-s darRveva kardiovaskuluri risk-faqtorebis ar qonis SemTxvevaSic ki. Celermajer et al. [70] kvlevebi miuTiTebs, rom ed-is ganviTarebis riski izrdeba risk-faqtorebis raodenobriv zrdasTan erTad. Celermajer et al. [70] da Deng et al. [71] mkvlevarebma gamoavlines pirdapiri korelacia asaksa da FMD-s Soris, rac ar gamovlinda Schroeder et al. [72] kvlevaSic.

amasTan, avtorTa meore jgufi risk-faqtorTa diferencialuri midgomis momxrea, rac gulisxmobs imas, rom zogierT risk-faqtors SesaZloa erTad aRebul ramdenime risk-faqtorTan SedarebiT bevrad ufro didi mniSvneloba gaaCndes ed-is ganviTarebis mxriv. avtorTa garkveuli jgufi endoTelur disfunqcias ganixilavs, rogorc klinikur sindroms, romelic *per se* asocirebulia kardiovaskuluri garTulebebis ganviTarebis momatebul riskTan [73]. Shroeder et al. [74] monacemebiT, FMD xasiaTdeba gulis koronaruli daavadebis prediqciis mimarT 71%-iani sensitiurobiTa da 81%-iani specifikurobiT. Perticone et al. [44] gamoavlines endoTeliumis funqciuri mdgomareobis korelacia hipertenziul pacientTa prognozTan.

Stenborg et al. [75], Volpe et al. [76], Targonski et al. [77] avtorebi endoTelur disfunqcias ganixilaven, rogorc insultis ganviTarebis erT-erT umniSvnelovanes risk-faqtors. Targonski et al. [77] Seiswavles kavSiri koronarebis endoTelur disfunqciasa da cerebrovaskuluri garTulebebis ganviTarebis risks Soris. kvlevis Sedegebze dayrdnobiT, maT daaskvnes rom koronaruli arteriebis ed damoukidebel kavSirSia cerebrovaskuluri garTulebebis ganviTarebis momatebul riskTan. kerZod, pacientebs endoTelium-damokidebuli vazodilataciis darRveviT aReniSnaT insultisa da tranzitoruli iSemiuri Setevis ganviTarebis 4-jer ufro maRali riski normaluri endoTeluri funqciis mqone individebTan SedarebiT.

1.2.5. gadanacvlebis daZabuloba

sxvadasxva nivTierebebSi meqanikur zewolasa da gaWimvas Soris aresbuli kavSiris sabaziso principebis aRweris pirveli mcdeloba Robert Hooke-s ekuTvnis (1635-1703).

endoTeliumi moqmedebs rogorc meqanogadamcemi, romelic aRiqvavs gd-is cvlilebebs da SemdgomSi gamoyofs dilatatorul faqtorebs [25]. sakiTxi imis Sesaxeb Tu ra meqanizmiT xdeba meqanikuri Zalebis deteqcia da biologiur impulsebad gardaqmna dReisaTvis auxsnelia. mravali mkvlevaris azriT, meqanikuri Zalebis deteqciasa da biologiur impulsebad gardaqmnas axorcieleben e.w. “meqanoreceptorebi” [104].

Jean Poiseuille (1799-1869) iyo pirveli, romelmac aRwera siTxis moZraoba cilindrul milSi, rac cnobilia puazelis kanonis saxelwodebiT. puazelis kanoni sisxlZarRvebSi sisxlis nakads ganixilavs, rogorc swor, myari kedlebis mqone milSi, arapulsirebad, mudmivi gadanacvlebis daZabulobis pirobebSi niutonuri siTxis moZraobas [105]. Haagen-Poisseuille-s toloba *in vivo* pirobebSi gamosadegia mxolod Semdeg daSvebaTa pirobebSi:

- sisxli unda CaiTvalos niutonur siTxed;
- sisxlZarRvis ganivi kveTis farTobi aris cilindruli;
- sisxlZarRvi aris swori mili araelastikuri kedlebiT;
- sisxlis nakadi aris mdore da laminaruli.

literaturaSi arsebobs gadanacvlebis daZabulobisa da gadanacvlebis siCqaris gamosaTvleli formulebis garkveuli simravle. avtorTa erTi jgufi Dammers et al. [105] sisxlZarRvTa kedlis gadanacvlebis siCqarisa da gadanacvlebis daZabulobis Sesafaseblad upiratesobas puazelis kanonze dafuZnebul formulas aniWebs, kerZod:

$$\gamma_P = \frac{2n \cdot MV}{D}$$

sadac γ_P aris sisxlZarRvTa kedlis gadanacvlebis siCqaris saSualo maCvenebeli, MV – sisxlZarRvis centrSi sisxlis nakadis saSualo siCqare, n – gasadavebis faqtori dadgenili siCqaris profilisaTvis da D - sisxlZarRvis diametri. miRebulia, rom roca n-is mniSvneloba udris 2, siCqaris profili iZens parabolur formas, rac Seesabameba puazelis kanons.

sisxlZarRvTa kedlis gadanacvlebis daZabulobis gamosaTvlelad Dammers et al. [105] iyeneben formulas:

$$\tau = WBV \cdot \dot{\gamma}$$

sadac τ aris sisxlZarRvTa kedlis daZabulobis saSualo maCvenebeli, WBV – sisxlis saerTo siblante da $\dot{\gamma}$ – gadanacvlebis siCqare.

saerTo sisxlis siblantis gamosaTvleli formula SemuSavebulia Weaver et al. mier. aRniSnuli parametris gamosaTvlelad avtorebi iyenebdnen, minis kapilaruli viskozimetrebis saSualebiT gazomil plazmis webovanebas (η_0; mPa ·s), hematokrits (Hct, %) da sisxlZarRvTa kedlis gadanacvlebis siCqaris saSualo maCvenebels ($\dot{\gamma}_P$; s^{-1}).

$$\log WBV = \log \eta_0 + (0.030 - 0.0076 \log \dot{\gamma}) \cdot Hct$$

gd-is gansazRvrisaTvis amerikuli skolis mecnierebi upiratesobas Hagen-Poiseuille-is formulis Semdegnair interpretacias aniWeben [106]:

$$\tau = 4\,\mu Q/\pi r$$

sadac τ – gadanacvlebis daZabulobaa, Q sisxlis nakadi, μ - arapirdapiri gziT gazomili siblante, r - sisxlZarRvis radiusi.

berZnuli skola gadanacvlebis siCqarisa da daZabulobis gamosaTvlelad upiratesobas Hagen-Poiseuille-is kanonze damyarebul Semdeg formulebs aniWebs:

$$\gamma = 32\ Q / \pi d^3$$

sadac γ - gadanacvlebis siCqarea, Q - saSualo moculobiTi siCqare da d – sisxlZarRvis diametri da,

$$\tau = 32 \cdot \eta \cdot Q/\pi d^3 \quad \text{an} \quad \tau = 8 \cdot \eta \cdot u/d$$

sadac τ - gadanacvlebis daZabulobaa, Q - volumetruli nakadis saSualo siCqare, u – saSualo siCqare da d – sisxlZarRvis diametri.

Pyke et al. [107], Gnasso et al. [108] avtorebi mocemul parametrTa gamoTvlisaTvis upiratesobas Semdeg formulebs aniWeben:

$$\gamma = V/D; \quad \text{da} \quad \tau = \eta V/D;$$

sadac γ -gadanacvlebis siCqarea; τ - gadanacvlebis daZabuloba, η – sisxlis siblante, D – sisxlZarRvis diametri, V – sisxlis nakadis saSualo siCqare.

sisxlZarRvis SigniT momqmedi yvela Zala zegavlenas axdens sisxlZarRvis samive Sreze. am mxriv gamonaklisia gd, romelic izolirebulad sisxlZarRvis endoTeluri ujredebis Sreze zemoqmedebs [332]. sisxlZarRvis diametris cvlileba sisxlis nakadis cvlilebis mixedviT ganisazRvreba gd-is doniT, rac damokidebulia kedlis elastiurobasa da endoTeliumis funqcionalur mdgomareobaze [104]. Verbeke et al. [109] wamoayenes hipoTeza, rom daqveiTebuli nakad-damokidebuli vazodilataciis maCvenebeli SesaZloa ganpirobebuli iyos aramarto endoTeliumis dazianebiT, aramed asaxavdes gd-is Semcirebul mniSvnelobasac. amasTan, gd ZiriTadi faqtoria, romelic CarTulia sisxlZarRvTa remodelirebis procesSi da zegavlenas axdens arteriaTa meqanikur maxasiaTeblebze [110,111]. Dammers et al. [105] kvlevam gamoavlina pirdapirproporciuli damokidebuleba sisxlis wnevis simaRlesa da gadanacvlebis daZabulobas Soris.

Dammers et al. [105] mier Catarebulma kvlevam janmrTel individebze gamoavlina, rom gd-is, iseve rogorc sisxlis siblantis mniSvneloba sisxlZarRvovani sistemis sxvadasxva doneze gansxvavebulia da gd-is regulacia lokalurad xorcieldeba. fiziologiuri TvalsazrisiT, siTxis gd pasuxismgebelia endoTeluri ujredebis sicocxlis

unarianobasa da maT mier substanciebis produqciaze [106]. Sesabamisad, gd-is mudmiv doneze SenarCuneba wamyvania sisxlZarRvTa normaluri struqturuli da funqciuri Taviseburebebis SesanarCuneblad [106,110,111,319].

Kamaya da Togawa eqsperimentulad gamoavlines kavSiri gadanacvlebis daZabulobis mateba-Semcirebasa da arteriis diametris cvlilebas Soris. Sesabamisad, sisxlZarRvis kedlis gd aris arteriuli diametris umniSvnelovanesi determinanti, romelic mniSvnelovania gd-is saSualo maCveneblis mudmiv doneze SesanarCuneblad [112-115].

Framingham Heart Study Offspring Cohort kvlevam gamoavlina mxris arteriis sawyis da gansakuTrebiT reaqtiuli hiperemiis Semdgom arsebul lokalur gd-sa da mxris arteriis FMD-s Soris Zlieri korelacia [25].

1.2.6. nakad-damokidebuli vazodilatacia

endoTeliumi ukiduresad mniSvnelovania sisxlZarRvTa tonusis mudmivobisaTvis. igi monawileobs qsovilovani da organuli moTxovnilebebis Sesabamisad sisxlis nakadis regulaciaSi. nakad-ganpirobebuli vazodilatacia ganixileba, rogorc endoTelium-damokidebuli procesi, romelic asaxavs kunTovani tipis sisxlZarRvTa relaqsacias gazrdili sisxlis nakadis sapasuxod, romelic Tavis mxriv asocirebulia gd-is zrdasTan.

sisxlZarRvis SigniT sisxlis nakadis zrdis sapasuxod ganviTarebul vazodilatacias nakad-ganpirobebuli vazodilatacia ewodeba [108]. aRniSnuli fenomeni pirvelad Schretzenmayer et al. mier iqna aRwerili. nakad-damokidebuli dilatacia aris lokaluri sisxlZarRvovani pasuxi, romelic axasiaTebs adamianTa yvela msxvil arterias [16,116,320].

erT-erTi umniSvnelovanesi meqanikuri stimuli, romelic iwvevs endoTelium-damokidebul vazodilatacias aris gd, rac endoTeluri ujredebis gaswvriv sisxlis moZraobiT ganisazRvreba [117]. amasTan, kvlevebiT dadasturda, rom mxris arteriis nakad-damokidebuli dilatacia damokidebulia rogorc gd-is cvlilebebze, ise sisxlis webovanebis doneze [118].

Leeson et al. [98] kvlevam gamoavlina, rom sisxlis nakadis cvlilebis piki maqsimalur mniSvnelobas sisxlZarRvis 1.5 wuTiani okluziis Semdeg

aRwevs, maSin roca sisxlZarRvis maqsimaluri dilatacia miiRweva mxolod 4.5 wuTiani okluziis Semdeg. amas garda, Sorenson et al. [36] gamoavlines, rom arteriis 4.5–5 wuTze ufro xangrZlivi okluzia ar zrdis vazodilataciis maqsimalur mniSvnelobas. Sesabamisad, eqspertTa rekomendaciiT nakad-damokidebuli vazodilataciis misaRebad mizanSewonilia arteriis 4.5-5 wuTiani okluzia.

Stenborg et al. [75] Seiswavles endoTelium-damokidebuli vazodilatacia insultian pacientebSi. dazianebuli endoTelium-damokidebuli vazodilatacia aRiniSna rogorc insultian, aseve hipertenziis mqone sakontrolo jgufis pacientebSi; amasTan dazianebuli endoTelium-damoukidebeli vazodilatacia gamovlinda mxolod insultian jgufSi. aRniSnuli miuTiTebs insultian pacientebSi vazodilataciis ufro mZime xarisxis dazianebis arsebobaze, rac avtorebma axsnes aw-is ufro maRali cifrebis arsebobiT insultianTa qvejgufSi.

mravalgzis dadginda, rom nakad-damokidebuli dilatacia mniSvnelovnadaa damokidebuli arteriaTa zomaze [28,72,119,120]. es ukanaskneli ki farTod varirebs TviT janmrTel populaciaSic ki [34,121]. mkvlevarebma gamoavlines damokidebuleba kunTovani tipis sisxlZarRvis sawyis diametrsa da nakad-damokidebuli vazodilataciis procentul maCvenebels Soris [33,70,72,108]. kerZod, rac ufro mcirea arteriis diametri, miT ufro Zleria misi dilatacia. Silber et al. [39] monacemebiT, aRniSnuli aixsneba erTidaigive stimulze ufro didi hiperemiuli gd-is warmoqmniT mcire zomis arteriebSi. Silber et al. [33] avtorTa mtkicebiT, aRniSnuli ar asaxavs mcire diametris sisxlZarRvis mqone populaciaSi endoTeliumis funqciis ukeTes statuss. Mitchell et al. [25] da Pyke et al. [107] monacemebiT, FMD maCvenebelze garda sisxlZarRvis diametrisa, gavlenas axdens gd-is donec mosvenebul mdgomareobaSi. amasTan, rac ufro maRalia gd-is mniSvneloba mosvenebul mdgomareobaSi, miT ufro didia nakad-ganpirobebuli vazodilataciis maCvenebelic. Celermajer et al. [28] kvleviT aCvenes, rom hiperemiul sisxlis nakadTan, da Sesabamisad gd-Tan SedarebiT nakad-damokidebuli vazodilataciis procentuli maCvenebeli xasiaTdeba ufro maRali mgrZnobelobiT.

Harris et al. [89] aCvenes, rom nakad-ganpirobebuli vazodilataciis mniSvneloba praqtikulad ar icvleba kvlevis 2 saaTiani periodis ganmavlobaSi; da meorec, ganmeorebiT reaqtiul hiperemias dilis 2 saaTiani periodis ganmavlobaSi (30 wuTSi erTjer) aranairi efeqti ar gaaCnia FMD-s mniSvnelobaze.

literaturaSi ar arsebobs normuli nakad-damokidebuli vazodilataciis procentuli maCveneblis mkacri mtkicebuleba. amasTan, dadgenilia, rom janmrTel moxaliseebis mxris arteriis maqsimaluri cvlileba nakad-damokidebuli dilataciis dros meryeobs 10-20%-is farglebSi [34].

sisxlZarRvTa funqciuri mdgomareobis Sesafaseblad, eqspertebis mier rekomendirebulia nakad-ganpirobebuli vazodilataciis paralelurad endoTelium-damoukidebeli vazodilataciis gamokvlevac, rac sisxlZarRvTa gluvkunTovani ujredebis funqciuri mdgomareobis ganmsazRvrelia [122]. dadgenilia, rom kardiovaskuluri risk-faqtorebis raodenobrivi mateba asocirebulia nitroglicerinis efeqtis SemcirebasTan, miuxedavad endoTelium-damokidebuli vazodilataciis donisa, rac gansakuTrebiT mniSvnelovania riskis stratificirebisaTvis.

1.2.7. endoTeluri funqciis ritmuli variabeloba

ZuZumwovrebSi, da Sesabamisad adamianSic cirkaduli ritmi ganisazRvreba endogenur “peismeikerSi”, kerZod hipoTalamusSi moTavsebul supraTalamur birTvSi. pinealuri jirkvali aris neiroendokrinuli gadamcemi, romelic retinaluri fotoreceptorebidan retinohipoTalamuri traqtiT miRebuli informaciis sapasuxod informacias pirdapir supraTalamuri birTvidan iRebs. retinadan mowodebuli informaciis sapasuxod supraTalamuri birTvi astimulirebs pinealur jirkvals, romelic Tavis mxriv gamoyofs hormonebs: serotonins – dRisiT da melatonins – RamiT [123].

dadgenilia, rom sisxlZarRvovani sistemis zogierTi komponentis (mag. endoTeluri ujredebis aqtivoba, leikocitebisa da Trombocitebis urTierTqmedeba, lipoproteinebis metabolizmi) aqtivoba dRe-Ramur regulacias eqvemdebareba. Sesabamisad, aRniSnuli procesebi eqvemdebarebian

endogenur cirkadul saaTsa da egzogenur faqtorebs, rogoricaa sinaTle-sibnelis cikli. endoTelium-damokidebuli vazodilataciac meryeobs dRis ganmavlobaSi. aRniSnuli ritmuloba dakargulia dadgenili koronaruli daavadebis mqone individebSi da TviT aTerosklerozis adreul safexurebzec ki [123].

cirkaduli ritmi CarTulia kardiovaskuluri da cerebrovaskuluri daavadebebis ganviTarebis paTogenezSi. miokardiumis infarqtis, kardialuri ariTmiis, uecari kardiuli sikvdilisa da insultis SemTxvevaTa pikuri maCvenebeli dilis saaTebSi aRiniSneba (06:00-dan 12.00-mde), xolo yvelaze dabali maCvenebeli Ramis saaTebSi [124]. kvlevebma aseve gamoavlina leikocitebis aqtivaciisa da endoTeluri funqciis droze damokidebuli cvlilebebi, rac SesaZloa wamyvan rols TamaSobdes Trombozsa da anTebiTi cvlilebebis ganviTarebaSi. zemoaRniSnuli SesaZloa aixsnas avtonomiuri nervuli sistemis momatebuli aqtivobiTa da mocirkulire kateqolaminebis gazrdili doniT dilis saaTebSi, rac asocirebulia gazrdil sisxlZarRvovan tonusTan, mocirkulire sisxlis moculobasa da wnevasTan.

Walters [123] mier naCvenebi iqna, rom estradiolis fiziologiuri done iwvevs koronaruli arteriebis relaqsacias da astimulirebs endoTeluri ujredebis mier NO-s produqcias. Hashimoto et al. [125], Taddei et al. [325] avtorebma ki gamoavlines, rom mxris arteriis endoTelium-damokidebuli vazodilatacia izrdeba menstruaciis fazidan gvian folikulur fazamde, mcirdeba adreuli luTeinuri fazidan da kvlav izrdeba gviani luTeinuri fazisas. aRniSnuli absoluturad Seesabameba sisxlSi estrogenebis Semcvelobis dones menstrualuri ciklis ganmavlobaSi.

endoTeliumis funqciuri mdgomareobis Sesafasebeli dReisaTvis momqmedi gaidlainis mixedviT, yvela zemoaRniSnuli faqtori unda iqnas maqsimaluri sizustiT gaTvaliswinebuli realuri Sedegebisa da kvlevis maRali sarwmunoobis misaRebad.

1.2.8. sisxlZarRvTa endoTeliumis funqciuri mdgomareoba arteriuli hipertenziisa da kardio-vaskuluri risk-faqtorebis arsebobis dros

mecnierTa Soris ar arsebobs erTiani azri da sarwmuno mtkicebuleba ed-is arsebobis Sesaxeb ah-is dros [17,52,78,79,80,81,82,371]. avtorTa umravlesoba adasturebs, rom nakad-damokidebuli vazodilatacia darRveulia ah-is mqone periferiul da koronaruli cirkulaciis kunTovani tipis arteriebSi [56,83]. amasTan, literaturaSi arsebobs aRniSnulis sawinaaRmdego monacemebic. Cockcroft et al. [84] avtorTa jgufma kvlevis Sedegad aCvena, rom ah-is mqone pacientebs SenarCunebuli aqvs endoTelium-damokidebuli vazodilataciis unari da ed-is arsebobis ganzogadeba yvela hipertenziul pacientze, arakoreqtulad miiCnies. sawinaaRmdego daskvnamde mividnen Sainani da Maru [85], romelTac kvlevis Sedegebze dayrdnobiT daadgines, rom ed Tan axlavs ah-is TviT msubuq formebsac ki. amasTn, bolo drois Framingham Heart Study-m [86] ver gamoavlina ed-is mizezobrivi kavSiri ah-is ganviTarebaSi.

mkvlevarTa Soris ar arsebobs erTiani azri ed-s, ah-is xangrZlivobasa da xarisxs Soris damokidebulebis Sesaxeb. Lauer et al. [87] kvlevisas ar gamovlinda kavSiri nakad-ganpirobebul vazodilataciasa da aw-is xangrZlivobas Soris. aRniSnuli avtorebma axsnes imiT, rom ah-is xangrZlivoba fardobiTi sididea da misi zusti gansazRvra praqtikulad SeuZlebeli.

ed-is ganviTarebis paTogenezuri meqanizmi ah-is dros ar aris srulad axsnili. literaturaSi cnobilia, rom ed SesaZloa win uswrebdes da monawileobdes ah-is ganviTarebaSi.

Plavnik et al. [88] daaskvnes, rom janmrTel, aTerosklerozis tradiciuli risk-faqtorebis armqone normotenziul populaciaSi sistoluri wnevis mcire matebasac ki SeuZlia endoTeliumis funqciuri mdgomareobis gauareseba. Bonetti et al. [73], Harris et al. [89] ed-s ganixilaven, rogorc maRali riskis pacientebis identifikaciisaTvis saWiro diagnostikur iaraRs. Iiyama et al. [79], Palmieri et al. [90], Zizek et al. [91] monacemebiT, erT-erTi yvelaze adreuli cvlileba romelic vlindeba TviT 1 xarisxis ah-is dros an hipertenziis ojaxuri istoriis mqone maRali

normuli wnevis mqone individebSi, aris endoTeliumis dazianebuli pasuxi reaqtiul hiperemiaze. Lauer et al. [87] kvlevis Sedegad daaskvnes, rom ah-is mqone pacientebs aReniSnebaT nakadis Semcirebuli rezervi. Rizzoni et al. [92] kvlevis Sedegebze dayrdnobiT gaakeTes daskvna, rom ed damokidebulia ara sisxlZarRvTa struqturul dazianebasa da hipertenziis etiologiaze, aramed hemodinamikur cvlilebebze. Gokce et al. [11] avtorebma gamoavlines, rom ah-is dros aRiniSneba rogorc endoTelium-damokidebuli, aseve endoTelium-damoukidebeli vazodilataciis darRveva, rac metyvelebs sruliad sisxlZarRvovan da ara romelime konkretuli Sris disfunqciaze. Lauer et al. [87] azriT, ah-is dros mxris arteriis endoTelium-damoukidebeli vazodilataciis darRveva ganpirobebuli unda iyos ara sisxlZarRvTa gluvkunTovani ujredebis dilataciis unaris daqveiTebiT, aramed kunTovani tipis arteriebis remodelirebiT, kerZod sisxlZarRvis gazrdili sawyisi diametriT mosvenebis mdgomareobaSi. Perticone et al. [44] kvlevis Sedegad pirvelad dadginda, rom winamxris ed aris kardiovaskuluri garTulebebis ganviTarebis Zlieri prediqtori ah-is dros.

Dzau da Gibbons Teoriis mixedviT, kardiovaskulur daavadebaTa praqtikulad yvela risk-faqtors SeuZlia sisxlZarRvovani endoTeliumis dazianeba, NO-s qronikuli deficitis gamowveva da aTeroTrombozisa da aTerosklerozis sruli kaskadis CarTva [14]. dReisaTvis ar arsebobs erTiani azri endoTeluri disfunqciis pirveladi Tu meoradi ganviTarebis Sesaxeb ah-is dros. ed ganixileba rogorc faqtori, romelic amZimebs ah-is mimdinareobas da auaresebs prognozs [14]. endoTelium-damokidebuli vazodilataciis dazianebis meqanizmi ah-is mqone pacientebSi SesaZloa aixsnas [1,25,87]: a) NO-s Semcirebuli warmoqmna da gamoyofa; b) NO-s gazrdili inaqtivacia/degradacia Tavisufali radikalebis mier; g) membranuli receptorebis mgrZnobelobis Semcireba gadanacvlebis daZabulobis mimarT; d) vazokonstriqtoruli substanciebis momatebul sinTezi.

endoTeluri funqcia SesaZloa gauaresdes kardiovaskuluri sistemis tradiciuli risk-faqtorebis [93-96,328], ojaxuri hiperqolesterinemiis [97], mwevelobis, Saqriani diabetis da hiperhomocisteinemiis [56], aqtiuri da pasiuri mwevelobis [98] Tanaarsebobis dros. Vita et al. [99] mtkicebiT,

kunTovani da rezisitiuli tipis arteriebis vazodilatatoruli funqciis darRvevas gaaCnia udidesi prognozuli mniSvneloba.

Taddei et al. [100] ed-is arseboba gamoavlines hipertenziul pacientTa janmrTel STamomavlobaSi. Taddei et al. [101,102], Некрутенко и др. [103] kvlevis Sedegad mividnen daskvnamde, rom asakis mateba kavSirSia endoTeliumis acetilqolinze pasuxis SesustebasTan rogorc hipertenziul aseve normotenziul pacientebSi.

1.3. arteriuli wnevis cirkaduli variabeloba da misi klinikur-prognozuli mniSvneloba arteriuli hipertenziis mqone pacientebisaTvis

1.3.1. arteriuli wnevis gazomvis istoria da meTodebi

arteriuli wnevis gazomvis istoria 1733 wlidan iwyeba Reverend Stephen Hales-is aRmoCeniT, romelmac cxenis arteriaze dadebul minis milakSi sisxlis donis matebis tendencia gamoavlina. aw-is sazomi xelsawyos Seqmnis pirveli mcdeloba S. Basch-s (1876w) ekuTvnis. meTodis daxvewili versia da gaumjobesebuli manJeti SemoTavazebuli iqna italieli mecnieris Scipione Riva-Rocci-is (1896) mier, romelic iTvleba tradiciuli sfigmomanometris Semqmnelad. riva-roCis manJeti sul raRac 4-5 sm siganis iyo da iZleoda 30 mm.vwy.sv-iT ufro maRal monacemebs realurTan SedarebiT. manJetis modifikacia F. Reckling-hausen-is mier ganxorcielda, romelic 12 sm. siganis iyo da praqtikulad bolo wlebamde ar Secvlila [126]. 1905 wlamde, aw-is gazomva izolirebulad palpaciur meTods efuZneboda. korotkovi aris aw-is gazomvis auskultaciuri meTodis fuZemdebeli, romelmac garkveulwilad Caanacvla palpaciuri meTodi da farTod dainerga klinikur praqtikaSi. aw-is 24-saaTiani intraarteriuli invaziuri ambulatoriuli monitoringi ganixileba rogorc “oqros” standarti da yvela arainvaziuri monitoringis aparatebi saWiroeben masTan validacias.

arteriuli wnevis ambulatoriuli monitorirebis (awam) meTodis fuZemdeblad Maurice Sokolow, San Francisco, California (1950-iani wlebi) iTvleba.

aw-is ambulatoriulad gasazomi pirveli arainvaziuri aparati gamogonebul iqna 1962 wels. meTodi naxevrad-avtomaturi iyo, ramdenadac haeris Catumbva manJetSi uSualod pacientis mier manualurad xdeboda. aparatis moqmedebis principi auskultaciur fenomenze, kerZod korotkovis tonebis aRqmaze iyo dafuZnebuli. inglisSi, oqsfordis universitetSi eqim Frank Stott-is mier Seiqmna pirveli srulad avtomaturi sisxlis wnevis sazomi monitori, romelis saSualebiTac pirvelad ganxorcielda wnevis gazomva Zilis periodSi.

1.3.1.1. arteriuli wnevis ambulatoriuli monitorirebis aparatTa tipebi

dRes arsebuli awam-is aparatebi msubuqia, advilad satarebeli, zusti, uxmauro, avtomaturi, programirebadi da kompiuterTan adaptirebuli [127,128]. awam-is teqnika emyareba oscilometrul an auskultaciur princips. awam-is auskultatiur principze dafuZnebuli aparatebis dadebiT mxared iTvleba is, rom xelis moZraoba ar asocirdeba cdomilebasTan. amasTan, garemoSi arsebuli bgerebis mimarT aparati mgrZnobiarea, rac cdomilebis mizezi SesaZloa gaxdes. oscilometruli awam-is aparatebi mgrZnobiarea aw-iT ganpirobebuli sisxlZarRvTa vibraciis mimarT. oscilometruli meTodi ar reagirebs garemoSi arsebul xmaurze, Tumca xelis sivrceSi gadaadgileba an izometruli datvirTva SesaZloa cdomilebis mizezi gaxdes. orive teqnikis gamoyenebisas manJetSi haeris Catumbvisa da gamoSvebis siCqare, gazomvaTa sixSire, maqsimaluri da minimaluri Catumbvis wnevis programireba sistemaSi SesaZlebelia eqimi-mkvlevaris SexedulebaTa mixedviT [129].

1.3.1.2. arteriuli wnevis ambulatoriuli monitorirebis Catarebis Cvenebebi da rekomendaciebi

awam-is Catarebis Cvenebebi araerTgvarovania meTodur rekomendaciebsa da eqspertTa mosazrebebSi. amasTan, miuxedavad garkveuli SezRudvebis arsebobisa, pacientTa kontingenti, sadac unda Catardes awam, mzardi xasiaTisaa. klinikuri mdgomareobani, romelTa dros rekomendirebulia

awam-is Catareba, garkveulwilad gansxvavebulia JNC 7-isa da ESH/ESC 2007-is gaidlainebSi. amasTan, klinikur mdgomareobaTa CamonaTvali, romelic saWiroebs awam-is Catarebas, ufro vrcelia evropis gaidlainSi (*ix. damateba 1*).

garda gaidlainebiT gaTvaliswinebuli Cvenebebisa, hipertenziis dargSi momuSave eqspertebis rekomendaciebiT, awam unda Catardes Semdeg SemTxvevebSi [130]:

- yvela axlad diagnostirebul hipertenziul pacientSi, romelTac diagnozi daesvaT klinikur gazomvebze dayrdnobiT [127];
- mosazRvre da labiluri hipertenziis mqone pacientebSi [131,132,133];
- pacientebSi, sadac aRiniSneba samizne organoTa dazianebis progresireba, miuxedavad adeqvaturi sisxlis wnevis kontrolisa, ofisis sisxlis wnevis gasinjvebis monacemebiT [131,132,133];
- maRali riskis pacientebSi (mag. gadatanili insulti, Saqriani diabeti) ah-is kontrolis donis Sesafaseblad [131];
- mkurnalobis taqtikis gansazRvris mizniT moxuc pacientebSi [131];
- "TeTri xalaTis normotenziis" anu "SeniRbuli hipertenziis" gamosaricxad [134].

imisaTvis, rom monacemebs gaaCndeT maRali sizuste, awam-is Catarebisas mkvlevarTa mier daculi unda iqnas eqspertTa rekomendaciebi awam-is Catarebis Sesaxeb, rac mocemulia Sesabamis gaidlainSi (ix. *damateba 2*).

1.3.1.3. arteriuli wnevis 24-saaTiani monitorirebis Catarebis teqnikuri aspeqtebi

dadgenilia, rom awam wnevis klinikur gazomvebTan SedarebiT ukeT korelirebs samizne organoTa dazianebasTan [135,136]. amasTan, is erTaderTi meTodia, romelic iZleva Ramisa da cirkaduli wnevis variabelobis Sefasebis saSualebas.

T. Pang and M. Brown [137] mier Catarebuli kvlevis Sedegebma aCvena, rom pacientis asaki, wona, sqesi, mxris garSemowerioba da hipertenziis xarisxi korelirebs awam-is aparaturis SecdomasTan, amasTan aRniSnuli cdomileba Zalian mcirea imisaTvis, rom zegavlena moaxdinos klinikur Sedegebze. arteriuli wnevis mateba asocirebulia sifxizles, mentalur da fizikur aqtivobasTan; xolo daqveiTeba mosvenebasa da Zilis periodTan [135,138]. awam-as mniSvnelovania Zilisa da RviZilis periodebis zusti Sefaseba. amisaTvis zogi avtori upiratesobas dRiuris Sevsebas aniWebs, zogic drois fiqsirebuli intervalebiT kvlevas [139]. O'Brien [140], Rachmani et al. [141] rekomendacias uweven msubuqi sedativebis gamoyenebas awam-is Catarebis periodSi, diskomfortis Tavidan acilebis mizniT.

Conen et al. [142] hospitalizebul pacientze Seiswavles aw-is 24-saaTiani monitoringis meTodis Catarebis upiratesobani hospitalur pirobebSi. kvlevis Sedegad maT daaskvnes, rom hospitalur pirobebSi monitorireba ufro Sedegiania aradiagnozirebuli hipertenziis gamosavlenad. maT mier gakeTebul daskvnas hyavs mravali oponenti, romelnic sxvadasxva kvlevebze dayrdnobiT upiratesobas ambulatoriul pirobebSi Catarebul monitorirebas aniWeben da mocemul avtorTa SemoTavazebas "moulodnels" uwodeben.

dargis eqspertebis daskvniT, awam klinikur-prognozuli aspeqtebidan gamomdinare ufro farTod unda gamoiyenebodes yoveldRiur klinikur praqtikaSi. amasTan, aucilebelia misi Catareba pacientisaTvis Cveul garemoSi da ara klinikur pirobebSi [142,143].

eqspertTa rekomendaciiT imisaTvis, rom awam-iT miRebuli Sedegebi flobdes did klinikur da prediqtorul mniSvnelobas, aucilebelia gamoyenebuli aparati zustad Seesabamebodes 1987 wels The Association for the Advancement of Medical Instrumentation (AAMI) mier gamoqveynebul rekomendaciebs eleqtruli an aneroiduli sfigmomanometrebis standartebis Sesaxeb, romelic British Hypertension Society-s [144,350] 1990 wlis protokolis Semadgenlobasia Sesuli. 1993 wels arsebuli reviziis dros, standartebi mowonebul iqna da dResac aqtualuria mocemul dargSi [145]. amas garda, Blood Pressure Monitoring Group of the European Society of Hypertension-ma gamoaqveyna

gamartiveburi protokoli awam-is standartizaciis Sesaxeb mwarmoebel TaTvis da mkvlevar TaTvis [146].

1.3.1.4. arteriuli wnevis cirkadul ritmze momqmedi faqtorebi

aw metad variabeluri parametria. maRalia misi fluqtuacia dRe-Ramis ganmavlobaSi; gansakuTrebiT maRalia dilas, gaRviZebis saaTebSi da minimalur mniSvnelobas Ramis saaTebSi, Zilis dros aRwevs [143]. normaSi, dRis wnevis maCveneblebi aRemateba Ramis wnevis dones. aRniSnuli asocirebulia simpaTikuri nervuli sistemis aqtivobis matebasTan sifxizlis saaTebSi. dadgenilia, rom 24 saaTian sisxlis wnevis profilze gavlenas axdens garemosa da qceviTi faqtorebi [349]. janmrTel pirebze Catarebulma kvlevebma, sadac minimumamde iyo dayvanili garemos zegavlena individze, gamoavlina rom egzogenuri faqtorebi wamyvania aw-is ritmulobaSi [147,364].

Cavelaars et al. [148] aw-is 24-saaTiani invaziuri gamokvleviT Seiswavles fizikuri aqtivobis (wola, jdoma, dgoma da siaruli) gavlena aw-is cirkadul ritmze. kvlevis Sedegad gamovlinda, rom dRis aw mniSvnelovnad aris damokidebuli fizikuri aqtivobis tipze. kerZod, siaruli dakavSirebulia sistoluri wnevis dRe-Ramuri variabelobis zrdasTan da diastoluri sisxlis wnevis cirkaduli variabelobis SemcirebasTan. Cavelaars et al. [148] Sedegebis analizisas miuTiTes, rom diperobis fenomeni ar aris dakavSirebuli fizikuri aqtivobis tipsa da raodenobasTan, romelic Seasrula pirma dRis ganmavlobaSi; Sesabamisad, fizikuri aqtivoba ar aris wamyvani faqtori diperoba/non-diperobis statusis gansazRvraSi. amasTan aRsaniSnavia, rom calkeul individSi sisxlis wnevis Ramis dawevis xarisxi mniSvnelovnadaa damokidebuli droze, romelic daixarja calkeuli aqtivobis Sesasruleblad dRis ganmavlobaSi. garda aRniSnulisa, Cavelaars et al. kvlevis Sedegad daaskvnes, rom aw-is Ramis dawevis xarisxze moqmedebs Ramis ganmavlobaSi arsebuli fizikuri aqtivoba, uZiloba, Zilis apnoes sindromi, xvrinva, Zilis sxvadasxva saxis darRvevebi. da bolos, non-diperebSi arsebuli cirkaduli profili SesaZloa ganpirobebuli iyos manJetis gabervisas Seqmnili diskomfortiT Zilis ganmavlobaSi.

cnobilia, rom garda fizikuri aqtivobisa, aw-ze gavlenas axdens fsiqo-emociuri gadaZabva da stresebi. pirovnebis fsiqologiuri tipi garkveulwilad gansazRvravs e.w. “TeTri xalaTis” anu “izolirebuli ofisis” hipertenziisa [149-151] da e.w. “TeTri xalaTis normotenziis” anu “SeniRbuli hipertenziis” gamovlinebasac [152,153].

1.3.1.5. arteriuli wnevis ambulatoriuli monitorirebis upiratesobani arteriuli wnevis diagnostikis sxva meTodebTan SedarebiT

mravalma kvlevam gamoavlina aw-is 24-saaTiani ambulatoriuli monitorirebisa da saxlis pirobebSi gazomili wnevis klinikur-prognozuli upiratesoba e.w. “ofisis wnevasTan” SedarebiT [143]. hipertenziis mocemuli dargis eqspertebi mkacr rekomendacias uweven, rogorc aw-is 24-saaTiani ambulatoriuli monitoringis, ise saxlis pirobebSi wnevis TviTgazomvis ganxorcielebas ah-is diagnostirebis mizniT, gansakuTrebiT im pirebSi, sadac arsebobs eWvi “TeTri xalaTis hipertenziis arsebobaze” [154]. riskis Sefasebisas da mkurnalobis taqtikis SerCevisaTvis mniSvnelovania izolirebuli klinikuri hipertenziis anu e.w. “TeTri xalaTis hipertenziis” diagnostireba. misi prognozuli mniSvnelobis Sesaxeb azri eqspertebs Soris urTierTsawinaaRmdegoa. zogierTi avtori aRniSnuli hipertenziis gavrcelebis did procentze miuTiTebs, rac Mancia and Parati [155] azriT realobas moklebulia da gazomvebSi daSvebuli Secdomebis bralia.

pirovnebis individualuri riskis SefasebisaTvis da prognozuli TvalsazrisiT Seucvlel meTods awam warmoadgens, radgan aw-is cirkadul variabelobas dReisaTvis udidesi prediqtoruli mniSvneloba eniWeba. amasTan, dReisaTvis, aw-is SemTxveviTi klinikuri gazomvebi hipertenziis skriningisa da diagnostikis qvakuTxedad rCeba.

1.3.2. arteriuli wnevis cirkaduli profili normasa da paTologiis dros

O'Brien [139] da Stolarza [156] aw-is 24 saaTian profilSi ganasxvaveben 3 fanjaras, kerZod: a) saRamos b) Ramis anu bazaluri da g) gaRviZebiswina anu dilis fanjara. normaSi, saRamos fanjaraSi aRiniSneba aw-is daqveiTeba dRis wnevasTan SedarebiT, romelic platos bazalur fanjaraSi aRwevs ("diperi" profili) da Semdgom isev imatebs dilis fanjaraSi da aRwevs dRis wnevis dones.

TiTqmis yvela individs axasiaTebs aw-is erTidaigive variabeloba, kerZod aw-is piki viTardeba dilas, gaRviZebis momentSi, Semdeg TandaTan iklebs da minimalur mniSvnelobas SuaRamisas aRwevs [138].

rogorc janmrTel, ise hipertenziul pirebSi sistoluri da diastoluri wnevis cifrebi Ramis periodTan SedarebiT ufro maRalia dRis ganmavlobaSi [157]. normaSi, saRamos dadgomasTan erTad iwyeba wnevis mdgradi daqveiTeba, ise rom minimalur mniSvnelobas SuaRamis 0^{00}-dan 2^{00} saaTamde aRwevs. Ramis 2^{00}-saaTidan iwyeba wnevis neli, magram myari mateba, romelic 4^{00} saaTis Semdeg xdeba ufro mkveTri manam, sanam ar miaRwevs dRis dones. wnevis dilis mateba iSviaTad aRemateba 20/15 mm.vwy.sv-s da praqtikulad ar aWarbebs 140/90 maCvenebels. awam aris erTaderTi meTodi, romelic iZleva dilis hipertenziisa da wnevis dilis matebis detalurad Seswavlis SesaZleblobas.

arteriuli wnevis Ramis daqveiTebis xarisxis gamosaTvlelad eqspertTa mier [138] mowodebulia formula: wnevis Ramis daqveiTebis xarisxi = (1 - saSualo Ramis wneva/saSualo dRiuri wneva) x 100.

dilis presoruli aweva, anu e.w. "dilis presoruli talRa" aris sisxlis wnevis moulodneli mateba diliT, adamianis gaRviZebis momentSi [158]. dReisaTvis eqspertTa Soris ar arsebobs konsensusi "dilis presoruli talRis" gansazRvris Sesaxeb. upiratesad igi ganisazRvreba orgvarad: a) Ramis ganmavlobaSi wnevis yvelaze Zlieri vardnisa (dilis sistolur wnevas minus umdablesi sistoluri wneva Ramis ganmavlobaSi) da b) gaRviZebiswina (dilis sistolur wnevas minus gaRviZebamde arsebuli wneva) wnevis cifrebis mixedviT. mkvlevarTa umetesoba meore variants aniWebs upiratesobas [138]:

“dilis presoruli talRa” = gaRviZebidan 2 saaTis ganmavlobaSi arsebuli saSualo sistoluri wneva - gaRviZebamde 2 saaTis ganmavlobaSi arsebuli saSualo sistoluri wneva.

Gibson et al. [159] ganixilavs ori saxis dilis hipertenzias: 1) pacientebi, romelTac aReniSnebaT dilis hipertenzia, rogorc Ramis saaTebSi momatebuli wnevis uwyveti komponenti, anu e.w. nondiperi pacientebi da 2) e.w. “dilis presoruli talRa”, rac garkveulwilad kavSirSia aw-is zezRurblovan daqveiTebasTan Ramis saaTebSi. am pacientebisaTvis, Ramis wnevis daqveiTebis xarisxi dRis wnevasTan SedarebiT aRemateba 20%. normaSi janmrTel, normotenziul individebs aReniSnebaT aw-is dilis mateba gaRviZebis saaTebSi, rac gaRviZebidan ramdenime saaTSi ganicdis normalizacias [160].

1.3.3. arteriuli wnevis klasifikacia 24-saaTiani ambulatoriuli monitorirebis mixedviT

1.3.3.1. klasifikacia arteriuli wnevis dRe-Ramuri ritmis mixedviT

dadgenilia, rom sisxlis wneva mniSvnelovnad varirebs dRe-Ramis ganmavlobaSi, magram am cvlilebaTa prognozuli mniSvneloba jer kidev diskusiis sagnad rCeba [129,161]. individTa umetesobas Ramis saaTebSi, kerZod Zilis dros aReniSneba aw-is daqveiTeba, rasac Tan axlavs guliscemis sixSiris gaiSviaTebac [154,162]. normaSi, Zilis rem-fazis (Tvalis kaklebis swrafi moZraobis faza) dros, romelic xasiaTdeba xSiri gamoRviZebebiT, aw imatebs daaxloebiT 5%-iT. xolo Zilis non-rem-fazis dros, romelic Seadgens Zilis 75-80%-s da Warbobs Ramis pirvel naxevarSi, aRiniSneba arteriuli wnevis 5-14%-iani daqveiTeba dRis wnevasTan SedarebiT [163]. amasTan gamovlinda, rom individTa garkveul nawilSi ara Tu ar aRiniSneba wnevis daqveiTeba Zilis periodSi, aramed SeiniSneba matebis tendenciac ki. aRniSnuli faqti daedo safuZvlad aw-is cirkaduli profilis mixedviT SemuSavebul klasifikacias.

sisxlis wnevis diperi/non-diperi klasifikacia pirvelad 1988 wels, O’Brien et al. mier iqna SemoRebuli, mas Semdeg rac retrospeqtuli analiziT

pacientebSi non-diperi wnevis profiliT diper profilTan SedarebiT insultis maRali riski gamovlinda.

diperisa da non-diperis gansazRvra araerTgvarovania sxvadasxva kvlevaSi [164-166]. klasifikaciisaTvis arsebobs ramdenime meTodologiuri midgoma. kerZod, Verdecchia et al. [167] azriT klasifikaciur struqturas safuZvlad unda edos wnevis 10%-iani daqveiTeba Ramis saaTebSi dRis wnevasTan SedarebiT. dReisaTvis normad miCneulia aw-is Ramis dawevis xarisxi 10-19%, anu diperi sisxlis wnevis cirkaduli profili.

dReisaTvis momqmedi aw-is cirkaduli profilis klasifikacia aseTia [157]: eqstremdiperi (sistoluri wnevis Ramis dawevis xarisxi ≥20%); diperi (sistoluri wnevis Ramis dawevis xarisxi 10%-dan 19%-mde); aradiperi (sistoluri wnevis Ramis dawevis xarisxi 0%-dan 9%-mde) da Sebrunebuli diperi (sistoluri wnevis Ramis dawevis xarisxi <0% an aRiniSneba misi mateba).

25-dan 74 wlamde asakis pirTa wnevis cirkaduli profilis Seswavlam gamoavlina, rom wnevis dawevis saSualo maCvenebeli Ramis saaTebSi erTgvarovania sxvadasxva asakobriv jgufSi [168,169]. Verdecchia et al. [170] monacemebiT, mosaxleobis 10-40%-Si aRiniSneba nondiperi sisxlis wnevis cirkaduli profili.

kvlevaTa umravlesobam aCvena, rom is pacientebi romlebic iyvnen diperi sistoluri wnevis cifrebis mixedviT, miekuTvnebodnen aradiperi sisxlis wnevis cirkadul profils diastoluri wnevis cifrebis mixedviT. Sesabamisad, mecnierTa Soris arsebobs araerTgvarovani azri diperobisa da non-diperobis gansazRvraSi; diskusiis sagans warmoadgens, Tu romeli wneva – diastoluri Tu sistoluri – unda iqnas aRebuli klasifikaciisaTvis.

Staessen et al. [169] diperoba/non-diperobis gansazRvrisaTvis iyenebdnen sistolur wnevas; maTi mTavari argumenti iyo is, rom non-diperi wnevis profili ufro xSirad aisaxeba sistolur wnevaze diastolurTan SedarebiT. O'Shea et al. [172] mosazrebiT, Ramis ganmavlobaSi anomaluri unda iyos rogorc diastoluri, ise sistoluri wnevis daqveiTebis xarisxi, raTa pacienti miekuTvnos non-diperi klasifikaciur erTeuls. Grote et al. [171], Mansoor et al. [173] klasifikaciisaTvis saSualo wneva gamoiyenes.

ukanaskne l ma “Consensus Conference on Ambulatory Blood Pressure Monitoring” aw-is cirkaduli profilis mixedviT klasifikaciisaTvis daamtkica sistoluri wnevis gamoyenebis aucilebloba [165].

diper/non-diper klasifikacias hyavs Tavisi mowinaaRmdegenic, romelnic gaumarTleblad miiCneven individTa aseT diqotomiur dayofas. magram bolo drois kvlevebma gamoavlina kavSiri nondiperobasa da marcxena parkuWis hipertrofias [167,174,175,176,177], cerebrovaskulur daavadebebs [178,179], mikroalbuminurias [180,181], Tirkmlis dazianebas [182], kardiovaskuluri avadobasa [183] da sikvdilobas [184] Soris, ramac gaamyara arsebuli klasifikaciis sandooba da gamoyenebis aucilebloba klinikur praqtikaSi. diperobis profilis waSla aseve dafiqsirda pacientebSi Tirkmlis ukmarisobiTa da Saqriani diabetiT, romlebic aseve asocirdebian maRal kardiovaskulur avadobasa da sikvdilobasTan [185-187].

1.3.3.2. klasifikacia arteriuli wnevis dRe-Ramuri cifrebis mixeviT

miuxedavad klinikuriAarteriuli wnevis klasifikaciaTa simravlisa (ESH 2007, JNC 7, British, WHO-ISH da a.S.), dReisaTvis ar arsebobs awam-is klasifikacia, damyarebuli wnevis doneze.

mravalma kvlevam [188-193] aCvena, rom rogorc hipertenziis mqone, ise normotenziuli individebis saSualo dRe-Ramuri wneva klinikur wnevasTan SedarebiT ufro dabalia, rac ganpirobebuli unda iyos wnevis daqveiTebiT Ramis saaTebSi. Sesabamisad, awam-iT miRebuli Sedegebis analizisas, dauSvebelia klinikuri wnevis klasifikaciebiT sargebloba.

Bur et al. [194] iyvenen pirvelebi, romelnic klinikuri hipertenziis klasifikaciaze dayrdnobiT Seecadnen awam-is klasifikaciis SemuSavebas. maT mier aw-is normis zeda zRvrad 132/81 mm.vwy.sv. CaiTvala. Staessen et al. [195] belgiis mosaxleobisaTvis normis zeda zRvrad 129/80 mm.vwy.sv. miiCnies, kvleva PAMELA-Si ki normad 128/82 mm.vwy.sv. CaiTvala [196,197]. amasTan saerTaSoriso monacemTa bazaSi normis zeda zRvrad dafiqsirebulia 133/82 mm.vwy.sv. [198]. McGrath et al. [250] rekomendaciaTa Tanaxmad, sisxlis wnevis normaluri cifrebi zrdasruli adamianisaTvis aris <135/85 mmHg dRis

ganmavlobaSi, <120/75 mmHg Ramis ganmavlobaSi da <130/80 mmHg dRe-Ramis (24-saaTis) ganmavlobaSi.

O'Brien et al. [145] SemuSavebuli rekomendaciebis mixedviT, ambulatoriulad gazomili wnevis klasificireba aseTia:

a) dRis wnevis mixedviT:
- optimaluri wneva - <130/80
- normuli wneva - <135/85
- hipertenzia - >140/90

b) Ramis wnevis mixedviT:
- optimaluri wneva - <115/75
- normuli wneva - <120/70
- hipertenzia - >125/75

Sejerebuli klasifikaciis ararsebobis gamo, miuxedavad awam-is saWiroebisa, ah-is xarisxi unda ganisazRvros klinikuri wnevis gazomviT miRebuli cifrebis mixedviT.

1.3.4. arteriuli wnevis cirkaduli profilis prognozuli aspeqtebi

kardiovaskuluri garTulebebis ganviTarebis sixSire dReRamis ganmavlobaSi variabeluria. miokardiumis infarqtis, uecari kardiuli sikvdilis, iSemiuri da hemoragiuli insultis ganviTarebis piki dilis saaTebze modis (6^{00}-dan 12^{00}-mde), amasTan minimaluri sixSire Ramis saaTebSi registrirdeba [326,366]. Framingham Heart Study-s monacemebiT 7^{00}-dan 9^{00}-mde uecari kardiuli sikvdilis ganviTarebis albaToba 70%-iT imatebs. Kario et al. [199], Fagard et al. [367] gamoTqves varaudi, rom dilis saaTebSi kardiovaskuluri garTulebebis albaTobis zrda SesaZlebelia ganpirobebuli iyos Trombocitebis agregaciis, hematokritis, fibrinogenis donis matebiT da Sesabamisad, Trombogenuri garemos SeqmniT.

Perloff et al. 1983 wels Catarebuli kvleva iyo pirveli, romelmac gamoavlina arteriuli wnevis ambulatoriuli monitorirebis klinikur gazomvebTan SedarebiT ufro Zlieri prediqtoruli mniSvneloba. Dolan et al. [200] kvlevis mizans warmoadgenda awam-is prediqtoruli mniSvnelobis gansazRvra saerTo da kardiovaskulur sikvdilobaSi. saSualod 8.4 wliani prospeqtuli kvlevis Semdeg maT daaskvnes, rom awam-iT miRebuli Sedegebi klinikur gazomvebTan SedarebiT kardiovaskuluri sikvdilobis ufro

Zlieri prediqtoria. SYST-EUR (The European Study on Isolated Systolic Hypertension in the Elderly) kvlevaSi [201] wnevis klinikur gazomvebTan SedarebiT sikvdilobisa da kardiovaskulur garTulebaTa ganviTarebis prediqciis mxriv upiratesoba awam-s mieniWa. igive dadasturda iseT kvlevebSi, rogoricaa ELSA (European Lacidipine Study on Atherosclerosis), PHYLLIS (The Plaque HYpertension Lipid-Lowering Italian Study) da INSIGHT (International Nifedipine Study Intervention as a Goal in Hypertension Treatment (INSIGHT) study) [202]. klinikur gazomvebTan SedarebiT, aw-is 24-saaTiani ambulatoriuli monitoringis SemTxveviT klinikur gazomvebTan SedarebiT ukeTes prediqtorul mniSvnelobaze gamosavlis prediqciis TvalsazrisiT miuTiTebs mravali sxva kvlevac [203-210]. amasTan, kvlevaTa umetesoba mcire masStabebiT gamoirCeva.

organoTa dazianebisa da 24-saaTiani awam-iT miRebul monacemebs Soris kavSiris gamovlenas mieZRvna mravali kvleva [211,212]. maT Soris aRsaniSnavia kvleva SAMPLE (the Study on Ambulatory Monitoring of Pressure and Lisinopril Administration), romelmac gamoavlina kavSiri aw-is 24-saaTiani ambulatoriuli monitoringis Sedegad miRebul dRis, Ramis da 24 saaTian saSualo wnevasa da samizne organoTa dazianebas Soris hipertenziis mqone pacientebSi.

mravalma kvlevam daadastura dRis wnevasTan SedarebiT Ramis wnevis ukeTesi prediqtoruli mniSvneloba [177,184,213,214,215]. amasTan, pacientebi aw-is non-diperi cirkaduli profiliT, diperebTan SedarebiT xasiaTdebian kardio- da cerebrovaskuluri garTulebebis ganviTarebis ufro maRali albaTobiT [216,217].

R. Khattar et al. [218] kvlevis mizans warmoadgenda 24-saaTiani invaziuri intraarteriuli sisxlis wnevis ambulatoriuli monitoringiT miRebuli dRe-Ramuri sistoluri, diastoluri, pulsuri da saSualo wnevis prognozuli mniSvnelobis gansazRvra saSualo da asakovan hipertenziul pacientebSi. 688 pacientze 10 wliani meTvalyureobis Sedegad mkvlevarebma gamoavlines, rom ambulatoriuli sisxlis wnevis prognozuli mniSvneloba damokidebulia asakze. diastolur wnevas gaaCnda ukeTesi prognozuli mniSvneloba saSualo asakis individebisaTvis, xolo pulsuri wneva yvelaze Zlier prediqtorul xasiaTs moxucebSi avlenda, rac SesaZloa

ganpirobebuli iyos hipertenziisas hemodinamikis Tavisebur ebebiT sxvadasxva asakobrivi jgufis pacientebSi.

aw-is 24-saaTiani monacemebis sqesobriv gansxvavebaTa Seswavlas mieZRvna [219,220] kvlevebi, sadac gamovlinda rom mamakacebSi qalebTan SedarebiT ufro maRalia saSualo 24-saaTiani arteriuli wneva.

Scholze et al. [221] fotopletizmografiuli meTodis gamoyenebiT, aCvenes rom janmrTel kontrolTan SedarebiT ah-is mqone pacientebSi Ramis pirvel naxevarSi aRiniSneba sistemuri sisxlZarRvovani tonusis mniSvnelovani zrda. Panza et al. [222], Taddei et al. [329] monacemebiT, endoTeliumis disfunqciis xarisxi korelirebs aw-is zrdasTan. Higashi et al. [223] gamoavlines darRveuli endoTelium-damokidebuli vazodilatacia non-diper pacientebSi. amasTan, endoTelium-damoukidebeli vazodilatacia praqtikulad ar gansxvavdeboda diperebsa da nondiperebs Soris. miuxedavad calekeul mkvlevarTa mcdelobisa, dReisaTvis naklebadaa Seswavlili kavSiri aw-is 24-saaTian profilsa da endoTeliumis funqciur mdgomareobas Soris, rac Semdgom kvlevas saWiroebs.

awam-is irgvliv arsebuli kvlevaTa umetesoba aris gamosavlis surogatul markerebze (mikroalbuminuria, marcxena parkuWis hipertrofia) damyarebuli da ara kardiovaskulur sikvdilobaze orientirebuli prolongirebuli kvleva [145], ris gamoc meTodis farTo, rutinul klinikur praqtikaSi danergva jer ver ganxorcielda.

1.3.4.1. arteriuli wnevis Ramis dawevis xarisxis prognozuli mniSvneloba

monacemebi Ramis wnevis profilis prognozuli mniSvnelobis Sesaxeb xangrZlivi drois ganmavlobaSi diskusiis sagans warmoadgenda, Tumca bolo drois gamokvlevebze dayrdnobiT eWvs ar iwvevs misi damoukidebeli risk-faqtoruli mniSvneloba kardiovaskulur sikvdilobaSi [145,224]. aRweril iqna, rom aw-is Ramis dawevis xarisxi SesaZloa atarebdes insultiT avadobisa da sikvdilobisaTvis prediqtorul mniSvnelobas [225,339]. amasTan, non-diperi sisxlis wnevis cirkaduli profilis paTogenezuri meqanizmi bolomde gaurkvevelia da ucnobia, SesaZlebelia

Tu ara darRveuli dRe-Ramuri wneviTi ciklis mkurnalobiT pacientis prognozis gaumjobeseba [165,166,226].

aw-is Ramis daqveiTebis xarisxis risk-faqtoruli mniSvneloba dReisaTvis ucnobia da mosazrebani mis Sesaxeb urTierTsawinaaRmdegoa. pirveli prospeqtuli kvleva, romelmac aCvena non-diperi profilis risk-faqtoruli mniSvneloba kardiovaskulur sikvdilobaSi miuxedavad aw-is cifrebisa 24 saaTis ganmavlobaSi, iyo Ohasama Study (2002w), romelmac iaponel mosaxleobaze aCvena rom Ramis wnevis dawevis xarisxis yoveli 5%-iT Semcireba asocirebulia kardiovaskuluri sikvdilobis 20%-iT zrdasTan. Ohkubo and colleagues 4.1 wliani dakvirvebis Semdeg, gamoaqveynes Ohasama Study-is, iaponiis 1542 macxovrebelze 9.2 wliani dakvirvebis Sedegebi. maT gamoavlines xazobrivi ukukavSiri aw-is Ramis dawevis xarisxsa da kardiovaskulur sikvdilobas Soris, TviT normotenziul individebSic ki [227]. aRniSnulis sawinaaRmdegod, Kario et al. [138] aCvenes Ramis saaTebSi aw-is mniSvnelovani daqveiTebis risk-faqtoruli mniSvneloba insultis ganviTarebaSi.

Dublin Outcome Study-Si gamovlinda, rom Ramis saSualo sistoluri wnevis 10 mm.vwy.sv-iT zrda sikvdilobas 21%-iT zrdis [200]. mcire kvlevaSi, romelic grZeldeboda 31 Tve da moicavda 116 hipertenziul pacients, Zweiker et al. [183] gamoavlines statistikurad mniSvnelovani kavSiri nondiper cirkadul profilsa da kardiovaskulur garTulebaTa ganviTarebas Soris.

Stergiou et al. [228] Seiswavles awam-is monacemebi da gamoavlines, rom gamokvleul pacientTa 75%-Si aRiniSna SuadRis Zili. mocemuli periodi asocirebuli iyo wnevis mniSvnelovan daqveiTebasTan da TiTqmis utoldeboda Ramis Zilis dros wnevis daqveiTebis maCvenebels [229,230]. Sesabamisad, aRniSnul pirebSi vlindeboda ori piki – dilisa da saRamos piki. kvlevis Sedegebze dayrdnobiT avtorebma daaskvnes, rom fizikuri aqtivobis uecari Sewyveta aris ara marto dRe-Ramuri variabelobis 2 pikis ZiriTadi determinanti, aramed aseve cerebrovaskuluri garTulebebis ganviTarebis mniSvnelovani xelSemwyobic.

1.3.4.2. dilis wnevis/dilis presoruli talRis prognozuli mniSvneloba

dadgenilia, rom dilis saaTebSi maRali aw asocirdeba kardiovaskuluri daavadebebis arsebobis maRal albaTobasTan [157,348]. amasTan, dilis saaTebSi maRali aw SesaZloa ganpirobebuli iyos ara marto dilis presoruli talRiT, aramed non-diperi an e.w. naiTpikeri (anu SebrunebiTi diperi, reversdiperi) wnevis cirkaduli profiliT [231]. bolo drois klinikurma kvlevebma aCvena gazrdili dilis wneviTi talRis risk-faqtoruli mniSvneloba iSemiuri da hemoragiuli insultis ganviTarebaSi [158,232,233,234].

Ohasama Study (2006w) [157,368] saSualod 10.4 wliani prospeqtuli kvleva iyo, romelic moicavda 40 welze meti asakis 1430 pacients; kvlevis dros ar gamovlinda mniSvnelovani kavSiri insultis saerTo risksa da aw-is Ramis dawevis xarisxs Soris, iseve rogorc kavSiri insultis saerTo risksa da dilis wneviT talRas Soris. Tavis tvinis infarqtis ganviTarebis riski mniSvnelovnad maRali iyo pacientebSi Ramis wnevis dawevis xarisxiT <10%, SedarebiT im pirTagan, romelTac aReniSnebodaT Ramis aw-is 10%-ze maRali xarisxiT daweva. mocemul kvlevaSi kavSiri dilis wneviTi talRis mniSvnelobasa da cerebraluri infarqtis ganviTarebis risks Soris ar gamovlenila.

Kario et al. [179] kvlevaSi, Ramis ganmavlobaSi wnevis yvelaze Zlieri vardnis mixedviT gansazRvrulma dilis wneviTi talRis matebam gamoavlina damoukidebeli Zlieri kavSiri insultis ganviTarebis riskTan. amasTan, dilis wneviTi talRis 10 mm.vwy.sv-iT mateba asocirdeboda insultis riskis 22%-ian zrdasTan. gaRviZebamde 2 saaTis ganmavlobaSi arsebulis wnevis mixedviT gamoTvlilma dilis wneviTma talRam aseve gamoavlina insultis ganviTarebis riskTan asocicia, TumcaRa aRniSnulma ststistikur sarwmunoebas ver miaRwia (P=0.07). kvlevis Sedegad avtorebma gaakeTes daskvna, rom Ramis ganmavlobaSi wnevis yvelaze Zlieri vardnis mixedviT gansazRvruli dilis wneviTi talRa ukeT asaxavs aRniSnuli parametris klinikur mniSvnelobas.

Marfella et al. [235] gamoavlines dilis wneviTi talRis matebis kavSiri aTeroskleruli folaqis destabilizaciasTan. miuxedavad imisa, rom aw-is dilis mateba, anu dilis talRa fiziologiuri fenomenia, hipertenziul

pacientebSi aRiniSneba misi mkveTri zrda, rac warmoadgens aTeroskleruli procesisa da samizne organoebis dazianebis damoukidebel risk-faqtors [232]. Head et al. [236] kvlevis ZiriTadi Sedegi iyo is, rom avtorebma normotenziul individebisagan gansxvavebiT, hipertenziul pacientebSi gamoavlines sisxlis wnevis 30-40%-iani zrda dilis saaTebSi, rac SesaZloa kardiovaskuluri riskis zrdasTan iyos asocirebuli.

Gosse et al. [233] aRweres, rom dilis arteriuli wneviTi talRis yoveli 1 mm-iT mateba asocirebulia kardiovaskuluri garTulebebis ganviTarebis riskis 3.3%-ian zrdasTan. Kario et al. [199] kvlevam ki aCvena, rom aw-is dilis yoveli 10 mm.vwy.sv-iT mateba insultis ganviTarebis risks 22%-iT zrdis. aRniSnulis sawinaaRmdegod, Staessen et al. [201] kvlevis Sedegad aCvenes, rom gazrdili dilis wneviTi talRa asocirdeba kardiovaskulur garTulebaTa ganviTarebis dabal riskTan.

Tatasciore et al. [237] kvlevis mizans warmoadgenda "gaRviZebis" sistoluri wnevis variabelobasa da samizne organoebis dazianebas Soris kavSiris gamovlena hipertenziul pacientebSi. kvlevis Sedegebze dayrdnobiT, mkvlevarebma daaskvnes, rom sisxlis wnevis arainvaziuri ambulatoriuli monitorirebiT miRebuli gaRviZebis sistoluri wneva, saSualo wnevis mniSvnelobisagan damoukideblad korelirebs samizne organoebis subklinikur dazianebasTan. kvlevis avtorebis mtkicebiT, ah TviT daavadebis adreul etapzec ki ukve asocirdeba samizne organoebis (vaskuluri da kardiuli) dazianebasTan, rac ganpirobebulia erTis mxriv uSualod sistoluri wnevis gazrdili variabelobiT da meores mxriv, saSualo aw-is matebiT. mocemul kvlevaSi kavSiri wnevis Ramis variabelobasa da samizne organoTa dazianebas Soris ar gamovlinda. Sesabamisad, aRniSnulis axsna SesaZlebelia erTis mxriv 30 wuTiani intervalebiT wnevis zomvis araefeqturobiT da meorec, dRisa da Ramis wnevebis sxvadasxva prognozuli da diagnostikuri mniSvnelobebiT [237].

Mancia et al. [155] azriT, prognozis gaumjobesebis mizniT, mkurnaloba mimarTuli unda iyos ara dilis wnevis Semcirebisaken, aramed 24 saaTis ganmavlobaSi wnevis saerTo daqveiTebisa da kontrolisaken, raTa ar aRiniSnos mkveTri wneviTi gadasvlebi cirkadul ritmebTan dakavSirebiT.

1.3.4.3. sistoluri da diastoluri wnevis prognozuli mniSvneloba

jer kidev 1971 wels, Framingham Study-s monacemebi miuTiTebdnen, rom 45 wlamde asakis mamakacebSi diastoluri sisxlis wneva yvelaze ukeT korelirebs koronaruli gulis daavadebis riskTan; xolo aRniSnul asaks zeviT izrdeba sistoluri wnevis prognozuli mniSvneloba orive sqesis individebSi.

dReisaTvis, klinikuri sisxlis wnevis pirdapiri kavSiri sisxlZarRvovan sikvdilobasTan dadasturebulia; kerZod, sistoluri wnevis yoveli 20 mm.vwy.sv-iT zrda 115 mm.vwy.sv -s zeviT da diastoluri sisxlis wnevis 10 mm.vwy.sv-iT zrda 75 mm.vwy.sv zeviT minimum 2-jer zrdis insultiTa da koronaruli daavadebiT gamowveul sikvdilobas [238,239]. amas garda, 61 prospeqtuli kvlevis metaanaliziT, romelSic CarTuli iyo 1 milion adamianze meti gamovlinda, rom sistoluri wnevis 10 mm.vwy.sv-iT da distoluri wnevis 5 mm.vwy.sv-iT mateba asocirebulia insultiT ganpirobebuli sikvdilobis riskis 40%-ian da kardiovaskuluri daavadebebiT ganpirobebuli sikvdilobis 30%-ian zrdasTan [238].

The Dublin Outcome Study [240] iyo pirveli didi masStabis, dasavleTis hipertenziuli populaciis 8.4 wliani kvleva, romlis drosac gamovlinda awam-is upiratesoba klinikur gazomvebTan SedarebiT 5 wliani kardiovaskuluri sikvdilobis riskis stratificirebis mizniT. aRniSnulma kvlevam daadastura da daakonkreta Ohasama Study-iT miRebuli Sedegebi, kerZod kardiovaskuluri sikvdilobis mniSvnelovani kavSiri 24- saaTian sistolur, 24- saaTian diastolur, dRis sistolur, dRis diastolur da Ramis diastoluri wnevasTan [204].

1.3.4.4. pulsuri wnevis prognozuli mniSvneloba

Multiple Risk Factor Intervention Trial (MRFIT) iyo kvleva, romelic daiwyo aSS-Si 1975-1977 wlebSi. kvlevis mizans warmoadgenda pulsuri wnevis prognozuli mniSvnelobis gaanalizeba kardiovaskulur sikvdilobaSi 342 815 mamakacis magaliTze, romelTac anamnezSi ar aReniSnebodaT miokardiumis infarqti da Saqriani diabeti. analizisas gamovlinda, rom kardiovaskulur sikvdilobasTan pulsur wnevaze ukeT korelirebda sistoluri da diastoluri aw; amasTan, sistoluri da diastoluri aw-is

erTdrouli mateba kardiovaskuluri sikvdilobis ganviTarebis risks mniSvnelovnad zrdida.

epidemiologiur kvlevebze dayrdnobiT gamoiTqva mosazreba pulsuri wnevis damoukidebeli risk-faqtoruli mniSvnelobis Sesaxeb kardiovaskulur sikvdilobasa da avadobaSi [241-244]. Madhavan et al. [245], Benetos et al. [246], Franklin et al. [247], Khattar et al [341] kvlevebma gamoavlina sistoluri da diastoluri wnevis cifrebisagan damoukidebli kavSiri pulsur wnevasa da kardiovaskuluri garTulebebis ganviTarebas Soris. kvleva PIUMA [207] iyo pirveli, romelmac SedarebiT janmrTel hipertenziul populaciaSi gamoavlina saSualo dRe-Ramuri pulsuri wnevis damoukidebeli prediqtoruli mniSvneloba kardiovaskuluri avadobisa da sikvdilobis mxriv. P. Verdecchia et al. [207] PIUMA-s monacemTa bazis safuZvelze Seiswavles arasdrosnamkurnalebi da garTulebebis armqone 2010 arteriuli hipertenziis mqone pacienti da daaskvnes pulsuri wnevis prediqtoruli mniSvneloba kardiovaskulur sikvdilobasa da garTulebaTa ganviTarebaSi. Benetos et al. [248] normotenziul da hipertenziul mamakacebSi gamoavlines saSualo aw-isa da pulsuri wnevis damoukidebeli prediqtoruli mniSvneloba saerTo kardiovaskulur, koronarul, yvela mizeziT ganpirobebul da arakardiovaskulur sikvdilobasTan mimarTebaSi. Madin et al. [249] avtorTa monacemebiT, axalgazrda individebSi arc ofisis da arc ambulatoriul pulsur wnevas ar eniWeba prediqtoruli mniSvneloba.

1.4. sisxlis reologia

hemoreologia rTuli kompleqsia, romelic upiratesad ganisazRvreba sisxlis siblantiT, hematokritiT, eriTrocitebis agregaciiTa da deformaciiT. eriTrocitebis agregacia hemoreologiis erT-erTi umniSvnelovanesi determinantia, romelic problemebs upiratesad mikrocirkulatorul doneze qmnis.

kardiovaskulur garTulebaTa umetesoba Trombozulia Tavisi paTogenezis mixedviT. miuxedavad imisa, rom Trombocitebis agregacia TamaSobs mTavar rols arteriul sistemaSi Trombis formirebis meqanizmSi, eriTrocitebis agregaciis rolis ignorireba praqtikulad

SeuZlebelia. dabali gadanacvlebis pirobebSi, eriTrocitebis agregaciis pirdapiri zegavlena Trombis formaciaze dReisaTvis eWvs ar iwvevs [250].

1.4.1. sisxlis reologiuri darRvevebi kardiovaskulur daavadebaTa dros

De Simone et al. [251], Razavian et al. [252], Yarnell et al. [253] kvlevebma gamoavlina sisxlis reologiur parametrebsa da kardiovaskulur risk-faqtorebs Soris Zlieri kavSiris arseboba. McMillan et al. [254] kvlevaSi dadasturda Saqriani diabetis kavSiri plazmisa da sisxlis siblantis zrdasTan, eriTrocitebis agregadobis matebasTan da deformadobis SemcirebasTan.

sisxlis gazrdili siblante, eriTrocitebis deformaciis unaris gauareseba da gazrdili agregadoba aRwerilia zogierTi kardiovaskuluri daavadebis dros Kesmarky et al. [255], Demiroglu et al. [256], Koenig et al. [257], Lowe et al. [258]. kerZod, periferiul sisxlZarRvTa daavadebebis, gulis iSemiuri daavadebis da a.S. dros [255,259].

kardiovaskulur daavadebaTa dros arsebuli hemoreologiuri darRvevebi ganixileba, rogorc darRveuli cirkulaciis indikatori, rac savaraudod zegavlenas axdens qsovilovan perfuziaze da Sesabamisad, xels uwyobs cirkulatoruli darRvevebis manifestacias [260].

eqsperimentul da klinikur kvlevebze dayrdnobiT, mkvlevarTa erTi jgufi hemoreologiur darRvevebs kardiovaskuluri daavadebebis ganviTarebis mniSvnelovan risk-faqtorad moiazrebs [261-264].

1.4.2. hemoreologiuri cvlilebebi arteriuli hipertenziis mqone pacientebSi

mravali epidemiologiuri da kohortuli kvlevebiT dadasturebulia ah-is kavSiri hemoreologiur darRvevebTan [265-269]. amasTan, gaurkvevelia reologiuri darRvevebis ganviTarebis pirveladi xasiaTi ah-is dros.

hipertenzia aris klinikuri mdgomareoba, romelic asocirebulia vaskulur dazianebasTan. avtorTa erTi jgufi sisxlZarRvovan dazianebas ganixilavs hemoreologiur darRvevaTa ganviTarebis mizezad. amasTan, dazianebuli reologia TavisTavad SesaZloa gaxdes aw-is matebis mizezi

periferiuli rezistentobis matebis safuZvelze [270,271]. dadebiTi kavSiri sisxlis wnevasa da sisxlis viskozurobas an mis komponentebs Soris gamovlenilia rogorc esenciuri, ise reno-vaskuluri hipertenziis dros [262,263,264,272].

1.4.2.1. eriTrocitebis agregaciuli aqtivoba da deformadoba

Gamzu et al. [273], Meisekman et al. [343] monacemebiT, eriTrocitebis agregacia aris hemoreologiis erT-erTi umniSvnelovanesi determinanti da mis Seswavlas ah dros SesaZloa hqondes Rrma paTofiziologiuri mniSvneloba, ramdenadac agregirebuli eriTrocitebi monawileobas iReben kapilarul doneze sisxlis dinebis Senelebasa da periferiuli winaaRmdegobis zrdaSi, rac SesaZloa gaxdes qsovilTa SefardebiTi iSemis mizezi.

eriTrocitebis samganzomilebiani agregatebis warmoqmna damokidebulia eriTrocitebis formasa da koncentraciaze, plazmis proteinebze, eriTrocitebis membranis muxtsa da deformaciis unarianobaze [273,274,275]. stazis pirobebSi mimdinareobs didi zomis agregatebis formireba, rac zrdis sisxlis viskozurobas mikrocirkulatorul doneze da Sesabamisad amZimebs sxvadasxva daavadebis mimdinareobas [274]. De Simone et al. [251] monacemebiT, eriTrocitebis agregadoba damokidebulia hematokritsa da plazmaSi proteinebis koncentraciaze. Ciuffetti et al. [276] mtkicebiT, ah dros eriTrocitebis agregadobisa da deformadobis darRvevebi SesaZloa ganpirobebuli iyos ujredebSi natriumis transportis defeqtiT.

eriTrocitebis deformacia mniSvnelovani fiziologiuri parametria, romelic aucilebelia qsovilebamde Jangbadis misatanad da cirkulatorul sistemaSi ujredTa gadasaadgileblad [274,277]. aRniSnuli maxasiaTebeli mxolod ZuZumwovarTa eriTrocitebSi gvxvdeba da pasuxismgebelia sisxlis nakadurobis maRal maCvenebelze rogorc mikro, ise makrocirkulaciaSi [274].

turbulenturi nakadis dros, iseve rogorc retikuloendoTelialuri sistemis sinusebSi gavlisas, aRiniSneba adenozin difosfatis (adf) gamonTavisuflebis unaris mqone rigiduli

eriTrocitebis dazianeba, Sesabamisad savaraudoa maTi monawileoba Trombocitebisa da leikocitebis aqtivaciasa da hiperkoagulaciis ganviTarebaSi [274,276]. jer kidev 1910 wels Duke werda, rom eriTrocitebis deficiti asocirebuli iyo prolongirebul sisxldenis drosTan. Semdgomma kvlevebma aCvena, rom Trombocitebis adheziis aqtivacia xdeba gaSiSvlebul endoTeliumze eriTrocitebis zemoqmedebiT.

Gamzu et al. [273] hipertenziul da normotenziul orsulTa kvlevis magaliTze aCvena eriTrocitebis agregaciuli aqtivobis statistikurad sarwmuno mateba ah mqone pirTa jgufSi. eriTrocitebis agregaciuli aqtivobis mateba hipertenziul pacientebSi gamoavlina sxva kvlevebmac [278-280]. arsebul klinikur-eqsperimentul monacemebze dayrdnobiT gaCnda mosazreba, rom eriTrocitebis agregadobis mateba monawileobs sisxlZarRvTa rezistiulobisa da Sesabamisad, aw-is matebaSi. eqspertTa azriT, eriTrocitebis agregaciis zrda win unda uZRodes hipertenziis gamovlenas da Sesabamisad unda gaaCndes prognozuli mniSvnelobac [273].

Baskurt et al. [278] gamoavlines korelacia eriTrocitebis agregaciisa da periferiuli winaaRmdegobis zrdas Soris. Cicco et al. [279] hipertenziul da sisxlZarRvovani daavadebis mqone pacientebSi aCvenes eriTrocitebis gazrdili agregaciuli aqtivobis kavSiri qsovilovani oqsigenaciisa da sisxlis nakadis donis SemcirebasTan.

ah-is gavrcelebis albaToba matulobs asakis matebasTan erTad. Sesabamisad, mniSvnelovania Jayavanth da Singh kvleva [274], romelic daigegma eriTrocitebis agregadoba/deformadobasa da asakis matebas Soris kavSiris gamosavlenad. kvlevis Sedegebma cxadhyo, rom asakTan erTad aRiniSneba eriTrocitebis agregadobis aqtivobis zrda da deformaciis unarianobis Semcireba. amasTan, mkvlevarTa azriT, aRniSnuli cvlilebebi SesaZloa gansazRvravdes kardiovaskulur da cerebrovaskulur risks asakovan pirebSi [274].

1.4.2.2. plazmisa da sisxlis siblante

mecnierTa mier sisxlis siblantis faqtori wlebis ganmavlobaSi ignorirdeboda. viskozuroba ganixileboda rogorc konstanta da ara rogorc cvladi. miuxedavad zogierTi mecnieris didi mcdelobisa (mag.

Robin Fahraeus), sisxlis siblantis kvleva me-20 saukunis 60-ian wlebamde yuradRebis miRma rCeboda [344].

kvlevebma aCvena, rom zogadad populaciur doneze sisxlis siblante korelirebs aw-Tan [264,276], Tumca sisxlis gazrdili siblantis paTofiziologiuri mniSvneloba ah-s dros ucnobia. Teoriulad, igi monawileobs gazrdili periferiuli winaaRmdegobis formirebaSi, rac garkveulwilad xsnis sistolur wnevasTan SedarebiT diastoluri wnevisa da sisxlis siblantes Soris Zlieri korelaciis arsebobas [276]. hiperviskozuroba SesaZloa asocirebuli iyos hipertenziuli pacientebis mZime prognozTan, ramdenadac igi korelirebs hipertenziiT ganpirobebul organoTa dazianebis simZimesa da garTulebebTan [276,281,345]. Ciuffetti et al. [276] 50 aranamkurnaleb ah-is mqone mamakacis kvlevis Sedegebze dayrdnobiT daskvnes, rom hiperviskozuroba asocirebulia momatebul diastolur wnevasTan da uaryofiT hemoreologiur profilTan. De Simone et al. [251] mier normotenziul individebSi Catarebulma kvlevam gamoavlina saerTo sisxlis siblantis damoukidebeli asociacia diastolur da/an saSualo wnevasTan, ramac ganapiroba mTliani sisxlis siblantis Seswavlis aqtualoba ah-isa da sxva kardiovaskuluri risk-faqtorebis mqone pirebSi.

bolo drois kvlevebs Soris aRsaniSnavia Lip et al. [282] kvleva, sadac avtorebma gamoavlines plazmis webovanebis korelacia saSualo dRiur da Ramis sistolur wnevebTan [223]. amasTan, kavSiri aw-is Ramis dawevis xarisxsa da siblantes Soris daudgenelia.

De Simone et al. [283] kvlevam gamoavlina sisxlis siblantisa da hematokritis statistikuri kavSiri sqesTan, simsuqnesTan, cximovani safarvelis distribuciasa da mwevelobasTan. amasTan, kvlevis dros ar gamovlinda aRniSnul parametrTa sxvaoba hipertenziul da normotenziul, aseve diabetian da aradiabetian pacientebs Soris. kvlevam gamoavlina pulsur wnevasa da sisxlis siblantes Soris ukuproporciuli damokidebuleba, rac vlindeboda mxolod janmrTel populaciaSi, samizne organoTa dazianebis gareSe. ah-is dros aRniSnuli korelacia ar vlindeboda.

klinikur kvlevaTa umravlesobaSi hipertenzia asocirebulia fardobiT hiperviskozurobasTan [262,264,284,285], magram ucnobia es aris

maRali aw-is Sedegi Tu mizezi [286,287], an ra zegavlenas axdens masze mkurnaloba. Tarazi et al. aCvenes, rom momatebuli hematokriti romelic gazrdili mTliani sisxlis siblantis ZiriTadi mizezia, pirveladi xasiaTisaa pacientebSi diastoluri wneviT ≥105 mm.vwy.sv. [283]. Bogar et al. [288] azriT, ar arsebobs pirdapiri kavSiri ah-sa da mTliani sisxlis siblantes Soris.

The Edinburgh Artery Study iyo kvleva, romelmac gamoavlina kardiovaskuluri daavadebaTa ganviTarebis sixSiris mkveTri diferenciacia pacientebSi sisxlis maRali (55%) da dabali siblantiT (4%) [253]. msgavsi Sedegebi iqna miRebuli Danesh et al. [289] kvlevaSi, sadac CarTuli iyvnen rogorc janmrTeli, ise kardiovaskuluri daavadebis mqone pirebi. Lowe et al. [290] kvlevaSi gamovlinda korelacia plazmisa da sisxlis siblantesa da kardiovaskuluri garTulebebis ganviTarebis maRal albaTobas Soris. amasTan, plazmis siblantis done korelirebda fibrinogenis donesTan, romelic Tavis mxriv kardiovaskuluri daavadebebis ganviTarebis damoukidebel prediqtorad moiazreba [290,291]. Danesh et al. [289] sisxlis momatebul siblantes ganixilaven, rogorc kardiovaskuluri garTulebebis ganviTarebis Zlier risk-faqtors. plazmis siblantis mniSvnelobas mniSvnelovnad ganapirobebs masSi proteinebis, kerZod fibrinogenisa da albuminebis Semcveloba, rac zemoqedebs mTliani sisxlis siblantis mniSvnelobazec [105,292]. zogadad, mTliani sisxlis siblanteze momqmedi faqtorebidan mniSvnelovania eriTrocitebis koncentracia, Tavisufali fibrinis raodenoba, plazmis siblante, eriTrocitebis drekadoba, sisxlis formiani elementebis tendencia Seqmnan didi jgufebi, leikocitebisa da Trombocitebis koncentracia sisxlSi [293]. amasTan, maRali gadanacvlebis Zalebis ararsebobisas, eriTrocitebs, leikocitebsa da Trombocitebs SeuZliaT stabiluri agregatebis Seqmna erTmaneTTan an endoTeliocitebTan, romlebic garda sisxlZarRvis kedlis dazianebisa, adgilobrivad zrdian sisxlis siblantes da Sesabamisad zrdian garTulebaTa ganviTarebis albaTobas [294,323].

1.4.2.3. hematokriti

kavSiri hematokritis donesa da kardiovaskuluri daavadebebis ganviTarebas Soris gamovlenilia [289,290]. amasTan, momatebuli hematokritis maCvenebeli uaryofiTad zemoqmedebs cerebralur sisxlis nakadze da zrdis insultis risks [251]. De Simone et al. [251] kvlevam gamoavlina statistikurad sarwmuno kavSiri sisxlis wnevasa da hematokritis dones Soris, iseve rogorc plazmis siblantesa da sisxlis wnevis dones Soris. amasTan gamovlinda, rom eriTrocitebis agregadoba damokidebulia hematokritis doneze, romelic Tavis mxriv sisxlis siblantis mTavari ganmsazRvrelia. Letcher et al. [264] avtorTa monacemebiT, hipertenziul pacientebs normotenziul individebTan SedarebiT gaaCniaT ufro maRali hematokritis done.

hematokritis done aris dinamikuri parametri da SesaZloa gansxvavebuli iyos cirkulatoruli sistemis sxvadasxva doneze, rac damokidebulia siTxis balansze. sxvadasxva fiziologiur da/an paTologiur pirobebSi hematokritma SesaZloa miaRwios sakmaod maRal mniSvnelobebs da Sesabamisad gazardos sisxlis siblantec [275].

1.4.2.4. TrombocitTa agregaciuli da adheziuri aqtivoba

jer kidev 150 wlis win, virxovma aRwera venuri Trombwarmoqmnisa Tvis aucilebeli triada, romelic moicavda sisxlis nakadis, sisxlis Semadgenlobisa da sisxlZarRvis kedlis cvlilebebs [295,296]. virxovis Teoriis Tanamedrove Sexeduleba triadaSi moiazrebs hemoreologiur darRvevebs, turbulentur nakads bifurkaciisa da stenozur ubnebSi da endoTeliumis darRvevebs [297].

umniSvnelovanesi fiziologiur paradoqsi, romelic Tan axlavs ah-s da cnobilia “hipertenziis Trombozuli paradoqsis” anu “birmingemis paradoqsis” saxelwodebiT, warmoadgens Seusabamobas sisxlZarRvis kedlebze sisxlis maRali wneviT zewolasa da hemoragiis nacvlad Trombozuli garTulebebis ganviTarebas Soris [297].

Minuz et al. [298] aCvenes Trombocitebis aqtivaciis maRali maCvenebeli ah-is mqone pacientebSi. Sedegad, avtorebma gamoTqves mosazreba, rom rekomendirebulia maRali riskis hipertenziuli pacientebis identifikacia

da drouli antiTrombocituli mkurnalobis dawyeba garTulebaTa ganviTarebis prevenciis mizniT.

klinikur da laboratoriul monacemebze dayrdnobiT, hipertenzia *per se* asocirebulia gazrdil proTrombozul an hiperkoagulaciur statusTan, rac gamoixateba koagulaciis, Trombocitebisa da endoTeliumis mxrivi cvlilebebiT [296]. kerZod, hipertenziis dros darRveulia fardoba vazokonstriqtorebsa da vazodilatatorebs Soris. procesi vaskuluri dazianebiT iwyeba da mimarTulia aw-is mudmivad maRal doneze SesanarCuneblad. amasTan, aqtivirebul endoTeliums didi mniSvneloba eniWeba ah-is dros Trombwarmoqmnis aqtivaciaSi [346].

1.4.2.5. fibrinogeni

fibrinogenis donis mateba plazmaSi ganixileba, rogorc kardiovaskuluri sikvdilobis prediqtori [299]. amasTan, fibrinogenis gazrdili done korelirebs vaskuluri dazianebis albaTobasTan ah-is dros [300].

The Edinburgh Artery Study-Si [301], sadac CarTuli iyo 55-dan 74 wlamde asakis 1592 randomulad SerCeuli orive sqesis piri, gamovlinda rom fibrinogenis sabaziso plazmuri done damoukideblad korelirebda cerebrovaskuluri garTulebebis ganviTarebis albaTobasTan. kvlevis Sedegad fibrinogens mieniWa Zlieri prediqtoruli mniSvneloba insultis ganviTarebisaTvis.

Qiziblash et al. [302] kvleviT dadginda, rom fibrinogens gaaCnia damoukidebeli risk-faqtoruli mniSvneloba tranzitoruli iSemiisa da mcire iSemiuri insultebis ganviTarebisaTvis. amas garda, Resch et al. [303] kvlevis avtorebma aCvenes, rom fibrinogens gaaCnia prediqtoruli mniSvneloba ganmeorebiTi kardiovaskuluri garTulebebis ganviTarebisaTvis iSemiuri insultis ganviTarebidan 2 wlis ganmavlobaSi.

Svid longitudinalur kohortul kvlevaSi, fibrinogenis elevirebulma plazmurma donem ZiriTadi kardio-vaskuluri risk-faqtorebisagan damoukideblad gamoavlina Zlieri prediqtoruli mniSvneloba gulis iSemiuri daavadebisa da Tavis tvinis insultis ganviTarebisaTvis [253,301,304,305].

kvleva ECAT-Si gamnovlinda, rom pacientebs plazmuri fibrinogenisa da Sratis qolesterinis maRali doniT, gaaCniaT kardiovaskuluri garTulebebis ganviTarebis maRali riski. Leigh General Practice Study-im aCvena, rom pacientebs fibrinogenisa da qolesterinis maRli doniT, fibrinogenis dabali mniSvnelobis mqone populaciasTan SedarebiT gaaCniaT kardiovaskuluri garTulebebis ganviTarebis 6-jer ufro maRali riski; amasTan, hipertenziul pacientebs, romelTac aReniSnebaT plazmuri fibrinogenis done >3.5g/l gaaCniaT 12-jer ufro maRali kardiovaskuluri riski pacientebTan SedarebiT, romelTa plazmuri fibrinis done 2.9g/l-ze naklebia [296].

1.4.3. hemoreologiur maxasiaTebelTa sqesobrivi gansxvavebani

Kameneva et al. [306] aCvenes, rom qalebis sisxlTan SedarebiT, mamakacis sisxli xasiaTdeba siblantisa da eriTrocitebis agregaciis ufro maRali doniT. amasTan, mamakacebSi qalebTan SedarebiT statistikurad sarwmunod dabalia eriTrocitebis deformadoba. aRniSnuli hemoreologiuri komponentebi (eriTrocitebis daqveiTebuli deformadoba, gazrdili sisxlis siblante da eriTrocitebis agregadoba) SesaZloa monawileobdes kardiovaskuluri daavadebebis ganviTarebis mimarT mamakacebis maRali riskis formirebaSi.

eriTrocitebis fiziologiur daberebasTan erTad imatebs maTi meqanikuri sixiste da agregaduli aqtivoba. amasTan, cnobilia rom mamakacebis sisxlSi qalebTan SedarebiT sWarbobs daberebuli eriTrocituli formebi, romlebic fagocitozs eqvemdebarebian. Sesabamisad, plazmaSi xdeba Tavisufali hemoglobinis gamonTavisufleba, romelic flobs Zlier vazokonstriqtorul unars azotis oqsidze zemoqmedebisa da misi inaqtivaciis gziT [306,342]. imdenad, ramdenadac daberebuli eriTrocitebi ufro xistia da drekadobis unardakarguli, maT aReniSnebaT ufro Zleri mgrZnobeloba e.w. gadanacvlebis daZabulobis mimarT. Sesabamisad, eriTrocitebis daSla yvelaze intensiurad cirkulatoruli sistemis im ubnebSi viTardeba, sadac ufro maRalia gadanacvlebis daZabuloba. igive ubnebi xasiaTdebian azotis oqsidis warmoqmnis maRali intensivobiT [307-309].

arsebobs hipoTeza, rom gansxvaveba mamakacebsa da qalebs Soris eriTrocitebis agregadobas, deformadobasa da siblantes Soris ganpirobebulia menstrualuri ciklis arsebobiT qalebSi; aRniSnuli garkveulwilad xsnis Tu ratomaa premenopauzalur qalebSi kardiovaskuluri daavadebebis ganviTarebis riski ufro dabali igive asakis mamakacebTan SedarebiT [310]. Kameneva et al. [306] avtorebma gamoavlines, rom mamakacebis sisxlSi premenopauzalur qalebTan SedarebiT aRiniSneba hematokritis, sisxlis siblantis, eriTrocitebis agregadobisa da rigidobis ufro maRali done. premenopauzalur qalebSi kardiovaskuluri garTulebebis ganviTarebis ufro dabali sixSire SesaZloa ganpirobebuli iyos maT sisxlSi eriTrocitebis axalgazrda formebis simravliT, eriTrocitebis daSlis dabali maCvenebliTa da Sesabamisad Tavisufali hemoglobinis plazmuri koncentraciis minimaluri maCvenebliT. amas adasturebs isic, rom qalebSi mamakacebTan SedarebiT aRiniSneba azotis oqsidis statistikurad sarwmunod maRali plazmuri done.

Zeltser et al. [311] kvlevis mizans warmoadgenda eriTrocitebis adheziuri da agregaciuli aqtivobis sqesobriv gansxvavebaTa Seswavla periferiul sisxlSi. maT gamoavlines eriTrocitebis agregadobis mniSvnelovani sqesobrivi diferenciacia. mamakacebSi qalebTan SedarebiT ufro maRali aRmoCnda hematokritis, plazmis siblantisa da mTliani sisxlis siblantis donec [251].

Tavi 2. masala da meTodebi

2.1. klinikuri masala

ZiriTadi kvleviTi jgufi Seadgina orive sqesis (30 mamakaci da 27 qali), arasdros namkurnalebma, arteriuli hipertenziis mqone 57 ambulatoriulma pacientma. kvlevaSi CarTul pacientTa saSualo asaki ganisazRvra 35-dan 60 wlamde (saSualo asaki±SD, 51.26±1.94 weli).

kvlevaSi CarTvis kriteriumebi iyo:

- asaki – 35-60 weli
- sqesi – orive
- pacientebi arteriuli hipertenziiT
- mkurnalobis statusi – arasdros namkurnalebi

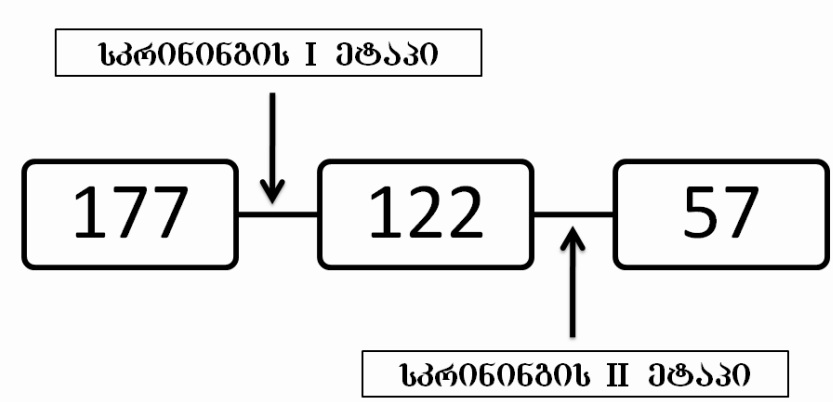
kvlevidan gamoricxvis kriteriumebi iyo:

- hiperqolesterinemia
- mweveloba
- Saqriani diabeti
- simsuqne
- reinos fenomeni
- manifestirebuli gulis ukmarisoba
- gulis iSemiuri daavadeba
- gulis sarqvlovani daavadeba
- cerebrovaskuluri daavadeba
- periferiul sisxlZarRvTa daavadebebi
- koagulopaTia
- Tirkmlisa da RviZlis daavadebebi
- Zilis apnoes sindromi
- dadgenili meoradi hipertenzia

sakontrolo jgufi Seadgina orive sqesis, 35-dan 60 wlamde asakis, ah-is armqone, praqtikulad janmrTelma 17 pirma. sakontrolo jgufis arcerTi individi ar imyofeboda medikamentur mkurnalobaze. amasTan, sakontrolo jugufis pirebi ZiriTadi jgufis Sesabamisad, SeirCnen igive principiT – aramweveli, normaluri sxeulis masis indeqsiT. kvlevidan gamorTvis kriteriumebi srulad Seesabameboda ah-is mqone pacientTa kvlevidan gamorTvis kriteriumebs.

ah-ad CaiTvala sul mcire sami sxvadasxva SemTxveviTi gazomvisas aranamkurnalebi sistoluri wneva meti vidre 140 mm.vwy.sv. mjdomare poziciaSi 5 wuTiani dasvenebis Semdeg. kvlevis protokoli mowonebul iqna lokaluri eTikuri komitetis mier. informaciuli Tanxmobis furceli kvlevaSi monawileobaze xelmowerili iqna kvlevaSi CarTuli yvela piris mier.

2.2. kvlevis dizaini



177 esenciuri hipertenziis mqone ambulatoriuli pacienti, romlebic identificirdnen ofisis wnevis gazomvebiT, CarTuli iqnen skriningis procesSi. pacientebi simsuqniT, 60 welze meti asakiT da is pirebi, vinc imyofebodnen vazoaqtiuri medikamentebiT Terapiaze, gamoiricxnen kvlevidan. skriningis I etapis dasrulebis Semdeg, 122 arasdros namkurnalebi ambulatoriuli pacienti, 35-dan 60 wlamde asakis, 64 kaci da

58 qali, dadgenili ah diagnoziT CarTuli iqna skriningis me-2 etapSi. pacientebi hiperqolesterinemiiT, diabetiT, mwevelebi, manifestirebuli gulis ukmarisobiT, reinos fenomeniT, stenokardiis klinikuri anamneziT, gadatanili miokardiumis infarqtiT, gulis sarqvlovani paTologiiT, periferiul sisxlZarRvTa daavadebebiT, cerebrovaskuluri daavadebebiT, Tirkmlisa da RviZlis paTologiiT, iseve rogor pacientebi dadgenili an manifestirebuli meoradi hipertenziiT gamoiricxnen kvlevidan.

ramdenadac ah xSir SemTxvevaSi asocirebulia kardiovaskulur da cerebrovaskulur daavadebebTan, skriningis me-2 etapis Semdeg, mxolod 57 ah-is mqone ambulatoriuli pacienti, 30 mamakaci da 27 qali iqna CarTuli kvlevaSi.

2.3. kvlevis meTodebi

yvela pacientsa da sakontrolo jgufSi CarTul individs Cautarda anTropometruli gazomvebi, fizikaluri gamokvleva, maTi samedicino istoriis Seswavla, arteriuli wnevis 24-saaTiani ambulatoriuli monitorireba, maRali rezoluciis sisxlZarRvovani dopler-eqoskopia da sisxlis reologiur parametrTa kvleva.

2.3.1. mxris arteriis dupleqs-skanireba

mxris arteriis ultrasonografiuli kvleva Catarda akad. d. tatiSvilis saswavlo-kvleviT centrSi.

gamokvleva tardeboda diliT, 9.00-10.00 saaTis periodSi. gamokvlevamde 24 saaTiT adre yvela pacients mieca rekomendacia, rom sisxlis aRebamde 8 saaTis ganmavlobaSi ar mieRoT sakvebi, kofeinis Semcveli produqtebi, alkoholi da vazoaqtiuri medikamentebi.

2.3.1.1. nakad-ganpirobebuli vazodilataciis kvlevis teqnika moqmedi gaidlainis rekomendaciebis mixedviT [37].

1. gamosakvlev pirTa momzadeba

sisxlZarRvTa reaqtiulobaze da kerZod FMD-ze momqmedi faqtorebis maqsimaluri SezRudvis mizniT, kvlevis dawyebamde gaTvaliswinebul unda iqnas Semdegi faqtorebi:

a) Zilis xarisxi gasuli Ramis ganmavlobaSi [312,313]);
b) menstrualuri ciklis faza [314,333];
g) gonebrivi gadaZabva Ramis saaTebSi [312,314];
d) dilis varjiSi;
e) Tambaqos moweva (pasiuri da aqtiuri) [337];
v) vazoaqtiuri medikamentebis miReba;
z) kvlevis Catarebamde pacients unda mieces rekomendacia, rom Sewyvitos medikamentebis meReba aranakleb 4 × medikamentis naxevardaSlis periodis xangrZlivobis ganmavlobaSi;
T) pacienti unda iyos mSieri da ar unda hqondes miRebuli kofeinis Semcveli sasmelebi gamokvlevamde sul cota 8 saaTis ganmavlobaSi;
i) gamokvleva unda Catardes kontrolirebuli temperaturis SesaZleblobis mqone wynar oTaxSi (23±1^{0}C oTaxis temperaturaze) [321];
k) mxris arteriis ultrasonografiuli kvleva xorcieldeba diliT, uzmoze 9-dan 10 saaTamde SualedSi;
l) gamokvleva iwyeba aklimatizaciis 15 wuTiani periodis Semdeg;
m) mxris arteriis diametrisa da sisxlis nakadis siCqaris zomva xorcieldeba marjvena xelze [324].

2. aRWurviloba

ultrabgeriTi sistema aRWurvili unda iyos sisxlZarRvis 2-gamzomilebiani gamosaxulebiT, feradi da speqtraluri dopleriT, Sida ekg monitoriT da maRal sixSiriani gadamwodiT (7-12 mhc) [334,338].

3. gamosaxulebis miReba

gamosakvlevi piri zurgze mwoliare mdgomareobaSia da xeli ganTavsebuli aqvs komfortul poziciaSi. mxris arteriis gamokvleva xorcieldeba antekubitaluri fosos zeviT longitudinaluri anu sigrZivi RerZis paralelurad. gamokvlevisaTvis SeirCeva sisxlZarRvis segmenti mkveTri wina da ukana kedlis gamosaxulebebiT.

4. endoTelium-damokidebuli nakad-ganpirobebuli vazodilatacia

- sfigmomanometris manJeti Tavsdeba antekubitaliri fosos zeviT an winamxarze [37,335];
- upirveles yovlisa xdeba gamosaxulebis mosvenebis mdgomareobaSi miReba;
- izomeba sanaTuris absoluturi diametri;
- pulsuri dopleris gamoyenebiT izomeba sisxlis nakadis siCqare;
- mosvenebis mdgomareobaSi ganxorcielebuli gazomvebis Semdeg, arteriuli wnevis sazomi manometris manJeti edeba mxarze an winamxarze da xdeba haeris Catumbva, ise rom manJetSida wneva sistolur wnevas aRematebodes 50 mm.vwy.-iT an metad [318,330,331];
- gaidlainis mixedviT, arteriis okluzia unda moicavdes 5 wuTs;
- mxris arteriis gamokvleva mimdinareobs manJetis moxsnidan 30 wm-is Semdeg da grZeldeba moxsnidan 2 wuTis ganmavlobaSi;
- uSualod reaqtiuli hiperemiis gamokvleva xdeba manJetis moxsnidan pirveli 15 wamis Semdeg.
- arteriaTa kvleva, romelTa diametri naklebia 2.5 mm-ze an aRemateba 5 mm-s ar aris rekomendirebuli maRali cdomilebis gamo [34,315,316,370].

5. endoTelium-damoukidebeli vazodilatacia nitrogliceriniT

endoTelium-damokidebuli vazodilataciis kvlevidan mxolod aranakleb 10 wuTis Semdeg aris SesaZlebeli endoTelium-damoukidebeli vazodilataciis (nitrogliceriniT) kvleva. maqsimalurad misaRebi vazodilatatoruli pasuxis misaRebad, kerZod gluvkunTovani pasuxis testirebis mizniT gamoiyeneba 0.4 mg nitroglicerini sublingvalurad an

aerozolis saxiT. vazodilataciuri piki miiRweva nitroglicerinis miRebidan 3-4 wuTis Semdeg; nitroglicerinis miReba ikrZaleba pirebSi nitratebis miRebis ukuCvenebaTa arsebobis SemTxvevaSi [336].

6. ***nakad-ganpirobebuli vazodilataciis Casatarebeli dro***

nakad-ganpirobebuli vazodilatacia asaxavs kunTovani tipis arteriebis dilatacias gazrdili gd-is sapasuxod. mraval kvlevaze dayrdnobiT gaidlainSi miTiTebulia, rom sisxlZarRvis maqsimaluri dilatacia vlindeba okluziuri manJetis moxsnidan 60 wamis Semdeg anu, rac igivea reaqtiuli hiperemiis momentidan 45-60 wamis Semdeg [34,317,327].

7. ***FMD-s maxasiaTeblebi***

nakad-ganpirobebuli dilatacia aris cvlileba sawyis diametrsa da reaqtiuli hiperemiiT ganpirobebul sisxlZarRvis diametrs Soris, rac rogorc wesi procentulad gamoisaxeba. radgan, nakad-damokidebuli vazodilataciis procentuli mniSvneloba damokidebulia sisxlZarRvis diametris zomaze, kvlevis dros aucilebelia sisxlZarRvis sanaTuris absoluturi cvlilebis dafiqsireba procentul maCvenebelTan erTad, radgan aixsnas zogierTi Seusabamobani.

8. ***trenirenireba da xarisxis gaumjobeseba***

gamokvlevas unda atarebdes maRalkvalificiuri specialisti, romelsac daxvewili aqvs klinikuri unar-Cvevebi da aqvs didi praqtika (aranakleb 100 vaskularuli doplerografia/weliwadSi).

2.3.1.2. mxris arteriis ultrasonografiuli kvlevis meTodika

rogorc aRwerili iyo Leeson et al. [98] kvlevaSi, Cvens SemTxvevaSic arteriuli wnevis gazomva xdeboda standartuli sfigmomanometris saSualebiT. B-mode skanireba marjvena mxris arteriisa xorcieldeboda idayvis sigrZivi Wrilidan 5-10 sm-is farglebSi 7 mhc sixSiris gadamwodiT, idayvis saxsarSi xelis 45^0-iani kuTxiT moxril poziciaSi, mtevnis ventraluri zedapiriT zeviT. arteriis centrad miiCneoda is pozicia, rodesac sisxlZarRvis wina da ukana kedlis intimis Sreebis yvelaze mkveTri da naTeli gamosaxuleba miiReboda. sisxlZarRvis diametris gazomva tardeboda sisxlZarRvis mimarT gadamwodis perpendikularuli

mdebareobis pirobebSi. sisxlis nakadis siCqare mocemul arteriaSi gaizoma gadamwodis 70^0-iani mdebareobis pirobebSi sisxlZarRvis sigrZivi RerZis mimarT.

sisxlis nakadis siCqare, da Sesabamisad gadanacvlebis daZabuloba diastolasTan SedarebiT ufro maRalia sistolis dros. imdenad, ramdenadac diastola ikavebs kardiuli ciklis daaxloebiT 2/3-s, gd-is saSualo donis gamosaTvlelad swored kardiuli ciklis mocemuli periodi gamoiyeneboda, iseve rogorc Reneman et al. [112] kvlevaSi.

endoTeluri funqcia, Sefasebuli rogorc nakad-ganpirobebuli vazodilatacia, ganisazRvreba rogorc sisxlZarRvis diametris procentuli zrda sabaziso momentidan hiperemiis Sedegad miRebul maqsimalur vazodilataciamde. saerTaSoriso rekomendaciebze dayrdnobiT, nakad-damokidebuli vazodilatacia gamovTvaleT rogorc absolutur cifrebSi, ise procentebis saxiT, formuliT:

$$\mathbf{FMD = D_1\text{-}D_0/D_0 \bullet 100\%,}$$

sadac FMD - nakad-damokidebuli vazodilataciaa, D_0 – sisxlZarRvis sawyisi diametri, D_1 – sisxlZarRvis diametri reaqtiuli hiperemiis Semdeg.

moqmedi gaidlainis Sesabamisad, endoTelium-damokidebuli vazodilataciis paralelurad vatarebdiT endoTelium-damoukidebeli vazodilataciis kvlevas nitroglicerinis sublingvaluri miRebis Semdgom. gazomvebi tardeboda nitratis miRebidan 3-4 wuTis Semdeg, rac Seesabameba nitratebis miRebiT gamnpirobebul vazodilataciis piks. amasTan, endoTelium-damokidebul da endoTelium-damoukidebeli vazodilataciis gazomvebs Soris iyo 15 wuTi, rac aseve Seesabameba kvlevis saerTaSoriso standartebs.

2.3.2. arteriuli wnevis gazomvis klinikuri da ambulatoriuli meTodebi

2.3.2.1. sisxlis wnevisKklinikuri gazomvebi

TviToeul individSi aw-is klinikuri gazomva xorcieldeboda ESH/ESC 2007 wlis gaidlainis arteriuli wnevis gazomvis Sesaxeb rekomendaciebis sruli dacviT m. winamZRvriSvilis sax. kardiologiis

institutSi [347] (*ix. damateba 3*). aw klinikuri gazomva warmoebda standartuli vercxliswylis sfigmomanometris gamoyenebiT [200,351]. aw-is mniSvnelobad gamoiyeneboda sami gazomviT miRebuli cifrebis saSualo ariTmetikuli.

2.3.2.2. arteriuli wnevis 24 saaTiani ambulatoriuli monitorireba

2.3.2.2.1. arteriuli wnevis 24-saaTiani minitorirebis Catarebis meTodika (protokoli)

aw-is 24-saaTiani minitorireba tardeboda kviris dReebis ganmavlobaSi. pacients wnevis monitoris manJeti uyendeboda aradominantur xelze da monitoringis proceduris dawyebamde yvela individSi orjeradad mowmdeboda awam-is aparatis mier daregistrirebuli wneviTi cifrebi vercxlis wylis manometriT gazomil wnevis cifrebTan. sxvaoba ori meTodiT gazomil wnevas Soris ar aRemateboda 5 mm.vwy.sv.

awam-is dawyebamde, pacientTa instruqtaJisaTvis Cven viyenebdiT University of Iowa Family Care Center-Si gamoyenebul formas, romelic warmoadgenda gamoqveynebul rekomendaciaTa adaptirebul versias (ix. *damateba 4*).

The Guideline of the Working Party on Blood Pressure Monitoring of the European Society of Hypertension rekomendaciiT, awam-is dros wnevaTa gazomva unda moxdes araumetes 30 wuTiani intervalebisa. Sesabamisad, Cvens mier gamokvleva tardeboda winaswar kodirebuli periodulobiT: 15 wuTSi erTjer – dRisiT da 30 wuTSi erTjer – Ramis ganmavlobaSi. kvlevis protokoli srul Sesabamisobasi iyo aRniSnul gaidlainTan.

2.3.2.2.2. arteriuli wnevis 24-saaTiani minitorirebiT miRebuli parametrebi

Ramis wneva ganisazRvra, rogorc saSualo wneva adamianis loginSi dasaZineblad Cawolidan gaRviZebamde [353]. Sesabamisad, 24 saaTis darCenili periodi Sefasda rogorc dRis arteriuli wneva.

dilis wneva Sefasda, rogorc saSualo aw gaRviZebidan pirveli 2 saaTis ganmavlobaSi, rac Seesabameboda 8 arteriuli wnevis gazomvis monacemTa saSualo maCvenebels.

yvelaze dabal (umdables) wnevad Ramis saaTebSi ganisazRvra aw-is yvelaze dabali Canaweris, uSualod mis win da mis ukan mdebare (e.i. sul 3 Canaweris) monacemTa saSualo maCvenebeli.

arteriuli wnevis dilis presoruli talRis gamosaTvlelad Cven viyenebdiT Kario et al. [138] SemoTavazebul formulas: dilis sistolur wnevas minus umdablesi sistoluri wneva Ramis ganmavlobaSi.

aw-is Ramis daqveiTebis xarisxis gamosaTvlelad viyenebdiT eqspertTa mier [157] mowodebul formulas: wnevis Ramis daqveiTebis xarisxi = (1 - saSualo Ramis wneva/saSualo dRiuri wneva) x 100.

yvela aRniSnuli wnevis maCveneblis kalkulaciisaTvis gamoiyeneboda sistoluri sisxlis wneva, rekomendaciaTa sruli dacviT. awam-is dros, saziano maxasaiTeblebad CaiTvala parametrebi, romelnic aRweril iqna Madin da Iqbal mier [249] (ix. *damateba 5*).

2.3.2.3. arteriuli wnevis sazomi manJeti

amerikis gulis asociaciis (*American Heart Association*) rekomendaciiT, aw-is zusti gazomvisaTvis pnevmaturi buStis sigrZe unda iyos aranakleb mxris sigrZis 80% da sigane mxris garSemowerilobis aranakleb 40%-is toli an aRematebodes kiduris diameters 1.2-jer [126].

rogorc klinikuri, aseve 24-saaTiani awam-is dros, manJetis zomis SerCevis mizniT Cven veyrdnobodiT Perloff et al. [351] mier SemoTavazebul meTodur rekomendaciebs (ix. *damateba 6*).

aw-is gazomvis dawyebamde, Sesabamisi manJetis SerCevis mizniT jer vzomavdiT pacientis mxris garSemowerilobas kiduris Sua wertilze (mxrisaTvis es wertili warmoadgens idayvisa da mxris saxsars Soris Sua wertils). manJets vadebdiT SiSvel kidurze ise, rom kidursa da manJets Soris Tavisuflad eteoda 2 TiTi. manJetis qveda kide idayvis saxsridan daSorebuli iyo 2 TiTiT.

im SemTxvevaSi, Tu pacientis kiduris garSemowerloba ori sxvadasxva zomis manJetis mosazRvre iyo, maSin rekomendaciis Tanaxmad viyenebdiT didi zomis manjets, rameTu am SemTxvevaSi mcirdeba mosalodneli Secdomis albaToba.

2.3.3. hemoreologiur parametrTa kvlevis meTodebi

hemoreologiuri gamokvleva Catarda akad. erisTavis sax. erovnuli qirurgiis centris hemoreologiisa da koagulologiis ganyofilebaSi.

sisxlis aReba xdeboda diliT, 8.30-9.30 saaTis periodSi. gamokvlevamde 24 saaTiT adre yvela pacients mieca rekomendacia, rom sisxlis aRebamde 8 saaTis ganmavlobaSi ar mieRoT sakvebi, kofeinis Semcveli produqtebi, alkoholi da medikamentebi (aspirini, arasteroiduli anTebis sawinaaRmdego medikamentebi, tricikluri antidepresantebi, antihistaminuri preparatebi, zogierTi antibiotiki, alkoholi, beta-blokerebi, heparini, varfarini).

hemoreologiuri gamokvleva moicavda Semdegi parametrebis kvlevas:

- hematokriti
- eriTrocitebis deformadoba
- eriTrocitebis agregaciuli aqtivoba
- plazmisa da sisxlis siblante
- fibrinogenis koncentracia
- Trombocitebis agregaciuli aqtivoba
- Trombocitebis adheziuri aqtivoba

2.3.3.1. hematokriti

hematokritis gansazRvrisaTvis Cven viyenebdiT “Wintrobe”-is meTods, anu sisxlis centrifugirebaze damyarebul makromeTods. aRniSnuli meTodis klinikuri Rirebuleba da validuroba damtkicebulia [354]. winaswar antikoagulantebiT damuSavebul erlenmaieris kolbaSi vaTavsebdiT 5-8 ml. venur sisxls. sisxli gadagvqonda salis hemometris sinjaraSi 100 danayofamde da vacentrifugebdiT 3000 bruni/wuTSi siCqariT 45 wuTis ganmavlobaSi. hematokritis maCvenebeli pirdapir miiReboda daleqili eriTrocitebis “boZis” simaRliT.

3.3.2. eriTrocitebis deformadoba

eriTrocitebis deformadoba Sefasda eriTrocitebis suspenziis celulozur membranaze filtraciis meTodiT [274].

venopunqturiT aRebul sisxls antikoagulaciis mizniT vasxamdiT citratul (deqstrozas fosfatis citratis xsnari (10:1.4)) xsnarSi. 3000 bruni/wuTSi 20 wuTiani centrifugaciis Semdeg, zedapiridan vaSorebdiT plazmas. aRniSnuli suspenziebis kvleva mimdinareobda xsnarebis damzadebidan 30 wuTis ganmavlobaSi 25^0C temperaturis pirobebSi.

mkveTrad vertikalur mdebareobaSi myofi pipetiT vaxdendiT 0.2 ml 0.85%-iani natriumis qloridisa da 0.7%-iani adamianis albuminiT damzadebuli xsnaris filtrze gadatanas da vrTavdiT wammzoms. xdeboda drois gansazRvra – T_1, romelic saWiroa mocemuli xsnaris sruli filtraciisaTvis, anu filtrSi (Filtrak 388, Germany) srulad gavlisaTvis. xsnaris filtrSi sruli gavlidan 60 wamSi, filtris nestiani laqis centrSi daitaneboda 0.02 ml eriTrocitaruli masa, romelic winaswar fiziologiuri xsnariT iyo ganzavebuli, ise rom misi hematokriti 60%-s utoldeboda. wammzomiT izomeboda eriTrocitaruli suspenziis filtrSi gavlis dro (T_2). arsebuli monacemebiT xdeboda eriTrocitebis deformadobis indeqsis gamoTvla, romelic tolia: $DF = T_1 / T_2$. rac ufro maRalia deformadobis indeqsi, miT ufro Zlieri deformadobis unari aqvT eriTrocitebs.

2.3.3.3. eriTrocitebis agregaciuli aqtivoba

eriTrocitebis agregadobis kvlevisaTvis jer xdeboda venidan aRebuli 4-5 ml sisxlis centrifugireba 1000 bruni/wuTSi siCqariT 7 wuTis ganmavlobaSi. centrifugirebis damTavrebis Semdeg, plazmas frTxilad vaSorebdiT eriTrocitarul masas da gadgvqonda sxva sinjaraSi. aseve vaSorebdiT leikocitur firfitasac. plazmasa da eriTrocitul masas vinaxavdiT oTaxis temperaturaze. eriTrocituli masis garecxva xdeboda 0.85%-iani natriumis qloridis xsnariT 9:1 fardobiT, 3-jeradi, 10-10 wuTiani igive siCqaris centrifugirebiT. aRniSnuli meTodis safuZvels warmoadgens Ashkenazi (1977w.) SemoTavazebuli meTodika. meTodis arsi mdgomareobs imaSi, rom eriTrocitebi ar agregirdebian natriumis qloridis xsnarSi, isini agregacias ganicdian mxolod sakuTar plazmaSi,

sadac fibrinogenis gavleniT isini warmoqmnian mcire da didi zomis agregatebs.

yvela minis sagani gamoyenebamde muSavdeboda limonmJava natriumiT. plazma da natriumis qloridis xsnari gamoiyeneboda eriTrocituli masis 200-jer gansazaveblad.

Sesabamisad, 2 standartul SemrevSi (melanJerSi) viRebdiT centrifugirebul eriTrocitul masas 0.5 danayofamde da vavsebdiT (101 danayofamde) erT SemTxvevaSi natriumis qloridis xsnariT, xolo meore SemTxvevaSi – sakuTari plazmiT. SemdgomSi specialurad damzadebuli mowyobilobis saSualebiT Tanabrad vaxdendiT SenjRrevas 3 wuTis ganmavlobaSi da vasxavdiT goriaevis kameraSi. aRniSnuls 15-20 wuTis ganmavlobaSi vaCerebdiT nestian sakanSi da amis Semdeg vikvlevdiT mikroskopis qveS 5 did kvadratSi. eriTrocitebs viTvlidiT did kvadratebSi diagonalurad (okulari da obieqtivi 20). aseve viTvlidiT plazmaSi gaxsnili eriTrocituli masisgan damzadebul xsnarSi, goriaevis kameris 5 did ujraSi diagonalze Tavisuflad mdebare eriTrocitebsa da maT agregatebs (didsa da pataras). daTvlisas yuradRebas vaqcevdiT eriTrocitebis agregadebis zomebsa da TviToeul agregatSi eriTricitTa raodenobasac.

eriTrocitebis agregadobis (X) Sesafaseblad, natriumis qloridis xsnarSi Tavisuflad mdebare eriTrocitebis raodenobas (A) akldeba Tavisuflad mdebare eriTrocitebis raodenoba plazmaSi (B), iyofa natriumis qloridis xsnarSi Tavisuflad mdebare eriTrocitebis raodenobaze (A) da mravldeba 100 procentze.

$$X = \frac{A - B}{A} \times 100$$

2.3.3.4. plazmisa da sisxlis siblantis gansazRvra

plazmis siblantis gansazRvrisaTvis Cven viyenebdiT Coulter-Harkness-is kapilarul viskozimetrs, romelic moqmedebs distilirebuli wylis webovanebasTan plazmis webovanebis Sedarebis principiT.

erTidaigive pirobebSi (37^{0}C) graduirebul pipetebSi gaivlis plazma da distilirebuli wyali da xdeba maTi moZraobis siCqareTa Sedareba. meTodis saSualo cdomileba SesaZloa iyos Skalis ± 2 mcire danayofis toli. EDTA-sisxlis centrifugireba xdeboda 3000 bruni/wuTSi siCqariT 15 wuTis ganmavlobSi.

saerTo sisxlis siblantis gamosaTvlelad Cven gamoviyeneT Weaver et al. mier SemuSavebuli formula [105].

$$\log WBV = \log \eta_0 + (0.030 - 0.0076 \log \dot{\gamma}) \cdot Hct$$

sadac, WBV – sisxlis saerTo webovanebaa, η_0 - minis kapilaruli viskozimetrebiT gazomili plazmis webovaneba (η_0; mPa · s), Hct - hematokriti (Hct, %) da γ - sisxlZarRvTa kedlis daZabulobis saSualo maCvenebeli (s^{-1}).

2.3.3.5. fibrinogenis gansazRvra

umetes klinikur laboratoriebSi fibrinogenis Seswavlis mizniT gamoiyeneba “Von Clauss”-is teqnika (Trombinis droze damyarebuli meTodi). aRniSnuli meTodis gamoyeneba rekomendirebulia britaneTis hematologiis sazogadoebis 2005 wlis gaidlainiT [355,356]. “Von Clauss”-is teqnika emyareba princips, rom rodesac Trombinis maRali koncentracia emateba buferSi ganzavebul plazmas (1:5 an 1:10), koagulaciis inhibitorTa moqmedeba mcirdeba; Sesabamisad, koagulaciis dro koagulirebuli fibrinogenis donis pirdapirproporciulia [357]. maRali koncentraciis Trombini (100 U/ml) emateba ganzavebul gamosakvlev plazmas da izomeba koagulaciis dro (Clauss, 1957). testis Sedegis Sedareba xdeba kalibraciul mrudTan, romelic warmoadgens standarts da Sedegi warmodgenilia g/l ganzomilebiT.

mocemuli meTodika gamoirCeva maRali sizustiT, rodesac fibrinogenis koncentracia 50-800mg/dl-is farglebSia.

2.3.3.6. Trombocitebis agregacia

Trombocitebis agregaciis testi aris TrombociTebis funqciis Sesafasebeli ZiriTadi testi. Trombocitebis agregaciis kvleva xdeboda O’Brien-isa [358] da Born-is [359] meTodis Renaud et al. [360] modifikaciiT.

meTodologiuri detalebi aRwerilia sxvagan [361,362]. kerZod, adenozin difosfati emateba TrombocitebiT mdidari plazmis mosamzadeblad da xdeba Suqis gatarebis cvlilebaTa aRricxva. pasuxi iyofa or nawilad: pirveladi talRa – Trombocitebis Seqcevad agregacias asaxavs, meore talRa ki – Seuqcevad agregacias. pirveli talRa izomeba, rogorc sinaTlis gatarebis maqsimaluri cvlilebis procentuli mniSvneloba TrombocitebiT mdidar plazmasa da TrombocitebiT Rarib plazmas Soris. meore talRaSi ganirCeva “maRali” da “dabali” meoradi agregaciis ubnebi, rac miuTiTebs Seuqcevadi agregaciis ganviTarebis mcire da did xarisxze [361,362].

2.3.3.7. Trombocitebis adheziuri aqtivobis gansazRvra

Trombocitebis adheziuri aqtivobis gansazRvris mizniT, Cven viyenebdiT Krizhanovsky V.L. –is mier SemuSavebul mikromeTods, romlis mixedviTac 10.05 ml. citratul-furacilinis xsnars vaTavsebdiT silikonizirebul sinjaraSi. citratul-furacilinis xsnariT winaswar damuSavebuli mikropipetiT vaxdendiT 0.05 ml sisxlis swraf aRebas da sinjaraSi arsebul citratul-furacilinis xsnarTan Serevas. 6 ml Sereuli xsnaris amoReba xdeboda pipetiT. amoRebuli xsnari wveTovnad ifiltreboda kvarcis qviSaze da isxmeboda sufTa silikonizirebul sinjaraSi. filtraciamde da filtraciis proceduris Semdgom arsebul xsnarebSi vaxdendiT Trombocitebis raodenobis daTvlas goriaevis kameris gamoyenebiT. kerZod, 10 did kvadratSi daTvlil Trombocitebis raodenobas emateboda 4 nuli da SemdgomSi iyofoda 2-ze.

adheziuri aqtivobis gamoTvla xdeba Semdegi formulis gamoyenebiT:

$$AA = \frac{(n_1 - n_2) \times 100}{n_1}$$

sadac, n_1 – Trombocitebis raodenobaa filtraciamde, n_2 – ki Trombocitebis raodenoba filtraciis Semdeg. miRebuli ricxvi asaxavs kvarcis qviSaze adhezirebul TrombocitTa procentul mniSvnelobas.

2.3.4. pozitiuri prognozuli mniSvneloba, mgrZnobeloba, specifikuroba

mgrZnobeloba – aris pozitiuri Sedegis mqone individTa wili daavadebis mqone saerTo populaciaSi.

specifikuroba – aris pozitiuri Sedegis mqone (anu cru-dadebiTi) individTa wili janmrTel (daavadebis ar mqone) pirTa populaciaSi.

pozitiuri prognozuli mniSvnelobis (PPV-Positive Prognostic Value) gamosaTvlelad, Cven viyenebdiT Bayes' wess [376].

$$PPV = \frac{P(\text{დაავადების}) \times P(\text{პოზიტ/დაავადება})}{P(\text{დაავად}) \times P(\text{პოზიტ/დაავად}) + [1-P(\text{დაავ})] \times P(\text{პოზიტ/ჯანმრთ})}$$

2.3.5. statistikuri analizi

statistikuri damuSaveba da analizi ganxorcielda SPSS 15.0 paketiT (SPSS 15.0 for windows Evaluation Version). monacemebi warmodgenilia, rogorc saSualo±standartuli gadaxra. kolmogorov-smirnovis algoriTmuli meTodi gamoyenebul iqna calkeuli maxasiaTeblis normaluri ganawilebis Seswavlis mizniT. bivariaciuli korelaciebi dadginda pirsonis korelaciuri koeficientis gamoyenebiT. $P<0.05$ mniSvneloba miCneul iqna, rogorc statistikurad sarwmuno. jgufTaSorisi sxvaoba dadgenil iqna Mann-Whitney testiT. garda Mann-Whitney meTodisa, hemoreologiur maxasiaTebelTa saSualo mniSvnelobebis Sedarebis mizniT gamoyenebul iqna "Fisher's F Test" da "Student's t Test". kontrolisa da hipertenziis jgufebSi sqesobrivi ganawilebis Sedarebis mizniT gamoyenebul iqna damoukideblobis T testi. sisxlis wnevis cirkauli profilsa da normotenzia/hipertenzias Soris damokidebulebis gamosavlenad gamoyenebul iqna χ^2 damoukideblobis testi. "zusti testis", e.w. "Exact Test method" meTodi gamoyenebul iqna arteriuli wnevis cirkauli profilis – diperi/non-diperi gavrcelebis sixSiris Sesaswavlad hipertenziisa da normotenziis dros.

Tavi 3. kvlevis Sedegebi da maTi ganxilva

cxrili #1-Si warmodgenilia 57 arasdros namkurnalebi hipertenziuli pacientisa da 17 janmrTeli kontrolis demografiuli da klinikuri maxasiaTeblebi. rogorc cxrilidan Cans, ZiriTad da sakontrolo jgufebs Soris asakobrivi da sqesobrivi sxvaoba ar gamovlinda, rac miuTiTebs am ori sakvlevi jgufis homogenurobaze. amasTan, rogorc mosalodneli iyo, ZiriTadi jgufis anu hipertenziul pacientebs sakontrolo jgufTan, anu janmrTel kontigentTan SedarebiT gaaCndaT arteriuli wnevis mniSvnelovnad maRali maCveneblebi. statistikurad sarwmuno gansxvaveba gamovlinda arteriuli wnevis cirkaduli profilis (diperi/non-diperi) arsebobas Soris janmrTel da hipertenziul individebSi (P=0.014). "χ^2 test for independence" statistikuri meTodis gamoyenebiT gamovlinda, rom cirkaduli sisxlis wnevis profili (diperi/non-diperi) damokidebulia sisxlis wnevis doneze, anu normo- da hipertenziaze (P=0.0298). "Exact Test" statistikuri meTodis gamoyenebiT dadginda, rom arteriuli wnevis diperi cirkaduli profili ufro xSirad gvxvdeba normotenziul individebSi hipertenziul pacientebTan SedarebiT (P = 0.0139).

ZiriTadi (hipertenziuli) da sakontrolo jgufis Sedareba

normotenziuli, praqtikulad janmrTeli pirebisa da ah-is mqone pacientebis awam-iT miRebuli maCveneblebi mocemulia cxrili #2-Si. maCvenebelTaSorisi gansxvaveba sarwmuno iyo yvela parametrisaTvis, garda gulis cemis sixSirisa dRis, Ramis da 24-saaTis ganmavlobaSi.

sisxlis reologiuri maxasiaTeblebis mxriv, mniSvnelovani gansxvaveba dafiqsirda Trombocitebis agregaciisa da adheziis, fibrinogenis koncentraciis, hematokritis, eriTrocitebis agregaciisa da deformaciis da plazmis siblantis mxriv ($P \leq 0.01$) (ix. cxrili #3). amasTan, Trombocitebis raodenobam da sisxlis siblantis donem statistikurad sarwmuno maCvenebels ver miaRwia am or jgufs Soris.

mxris arteriis dupleqs-skanirebis Sedegebi janmrTel da sakontrolo jgufis individebSi mocemulia cxrili #4-Si. janmrTel individebs, hipertenziul pacientebTan SedarebiT aReniSnebodaT nakad-damokidebuli vazodilataciis (FMD%), reaqtiuli hiperemiis testiT ganpirobebuli sisxlZarRvovani diametris cvlilebis (ΔD), nitrat-damokidebuli, anu endoTelium-damoukidebeli vazodilataciis (Ng-MD%), reaqtiuli hiperemiis testiT ganpirobebuli sisxlis nakadis siCqaris, gadanacvlebis daZabulobisa da gadanacvlebis siCqaris cvlilebis (ΔV, ΔT da $\Delta\gamma$, Sesabamisad) sarwmunod maRali maCveneblebi ($P \leq 0.01$) (grafiki #1). aRsaniSnavia, rom ara marto nakad-damokidebuli vazodilataciis saSualo maCveneblebi, aramed medianebic gansxvavebuli aRmoCnda mocemul jgufebs Soris (grafiki #2).

korelacia sisxlis hemoreologiur maxasiaTeblebsa da mxris arteriis dupleqs-skanirebiT miRebul parametrebs Soris ZiriTadi jgufis individebSi mocemulia cxrili #5-Si. FMD%, ΔD, Ng-MD%, ΔV, ΔT da $\Delta\gamma$ avlendnen Zlier korelacias yvela hemoreologiur parametrTan, garda eriTrocitebis deformaciisa.

sakontrolo jgufis individebSi FMD% korelirebda mxolod Trombocitebis agregaciasTan ($P=0.01$), xolo reaqtiuli hiperemiis testiT ganpirobebuli sisxlZarRvovani diametris cvlilebam (ΔD) aCvena korelacia Trombocitebis agregacias, adheziurobas, fibrinogenis koncentracias, eriTrocitebis agregacias, plazmisa da sisxlis siblantesTan ($P<0.05$). Ng-MD% korelirebda mxolod sisxlis siblantesTan ($P=0.004$) (ix. cxrili #6).

cxrili #7-Si mocemulia korelaciuri analizi hemoreologiur maxasiaTeblebsa da arteriuli wnevis 24-saaTiani monitorirebis monacemebs Soris sakontrolo jgufis individebSi. Trombocitebis agregaciam da adheziurobam gamoavlina mniSvnelovani korelacia dRis saSualo sistolur, diastolur da pulsur wnevebTan da Ramis saSualo pulsur wnevasTan ($P\leq0.02$). eriTrocitebis agregacia, plazmis siblante da sisxlis siblante korelirebda Ramis minimalur saw, Ramis minimalur daw, Ramis saSualo saw, da Ramis saSualo pulsur wnevasTan. eriTrocitebis

deformaciam gamoavlina korelacia Ramis saSualo sistolur da pulsur wnevasTan.

ZiriTadi jgufis individebSi Trombocitebis agregaciam gamoavlina Zlieri korelacia dRis maqsimalur daw, Ramis minimalur da maqsimalur sistolur, Ramis maqsimalur diastolur, Ramis saSualo sistolur da diastolur, adreuli dilis sistolur da diastolur wnevebTan. eriTrocitebis agregaciuli aqtivoba, plazmisa da sisxlis siblante metad ufro Zlier korelirebda Ramis wnevis maCvenebl ebTan (cxrili #8).

hipertenziul individebSi rogorc nakad-damokidebulma vazodilataciam (FMD%), ise reaqtiuli hiperemiis sapasuxod ganviTarebulma sisxlZarRvis diametris cvlilebam (ΔD) aCvena sarwmuno korelacia Ramis minimalur da maqsimalur saw-Tan, Ramis maqsimalur daw-Tan, Ramis saSualo sistolur, diastolur da pulsur arteriul wnevasTan (ix. cxrili #9). sakontrolo jgufis individebSi, msgavsad ZiriTadi jgufisa nakad-damokidebulma vazodilataciam da ΔD-m aCvenes Zlieri korelacia Ramis saSualo sistolur da pulsur wnevasTan (ix. cxrili #10). rogorc hipertenziuli, ise normotenziuli individebis gadanacvlebis daZabulobisa da gadanacvlebis siCqaris cvlileba (ΔT da Δγ) korelirebda Ramis wnevis maCvenebl ebTan.

hemoreologiur parametrTaSorisi korelaciebi ZiriTadi jgufis individebSi mocemulia cxrili #11-Si. Trombocitebis raodenoba maRali sarwmunoobiT korelirebda Trombocitebis adheziurobasTan, fibrinogenis koncentraciasTan, plazmisa da sisxlis siblantesTan. Trombocitebis agregacia, hematokriti da eriTrocitebis agregadoba korelirebda yvela hemoreologiur maxasiaTebel Tan, garda Trombocitebis raodenobisa da eriTrocitebis deformaciisa. Trombocitebis adheziuroba, plazmisa da sisxlis siblante avlenda korelacias yvela parametrTan, garda eriTrocitebis deformaciisa. eriTrocitebis deformacia korelirebda mxolod fibrinogenis koncentraciasTan (r=-0.327; P=0.013). hemoreologiur parametrTaSorisi korelaciebi sxvagvar saxes atarebs sakontrolo jgufSi. janmrTel individebSi ar aRiniSna aranairi korelacia Trombocitebis raodenobasa da sxva hemoreologiur parametrebs Soris.

Trombocitebis agregadoba korelirebda Trombocitebis adheziurobasTan, eriTrocitebis agregadobasa da deformadobasTan, plazmis siblantesTan da hematokritTan. fibrinogeni korelirebda Trombocitebis adheziurobasTan, hematokritTan, eriTrocitebis deformadobasa da agregadobasTan da plazmis siblantesTan. plazmis siblantem, iseve rogorc eriTrocitebis deformadobam gamoavlina korelacia yvela parametrTan, garda Trombocitebis raodenobisa da adheziurobisa. eriTrocitebis agregadoba korelirebda yvela hemoreologiur maCvenebelTan. amasTan, sisxlis siblante korelirebda mxolod eriTrocitebis agregadoba/deformadobasTan da plazmis siblantesTan (ix. cxrili #12).

cxrili #13-Si mocemulia mxris arteriis dupleqs-skanirebiT miRebul monacemTa Sida korelacia ZiriTadi jgufis individebSi. nakad-damokidebuli vazodilatacia (FMD%) avlenda korelacias yvela sisxlZarRvovan parametrTan, garda inicialuri gadanacvlebis daZabulobisa (T_0). msgavsad nakad-damokidebuli vazodilatacisa, mxris arteriis absoluturi cvlileba (ΔD) korelirebda yvela sisxlZarRvovan maxasiaTeblebTan, garda inicialuri gadanacvlebis daZabulobisa da gadanacvlebis siCqarisa (T_0 da γ_0, Sesabamisad). uaryofiTi korelacia aRiniSna FMD%-sa da sisxlZarRvis sawyis diametrs (D_0) Soris, iseve rogorc ΔD-sa da D_0-s Soris. korelacia inicialur diametrsa da endoTelium-damoukidebel vazodilatacias Soris ar gamovlinda. amas garda, gamovlinda Zlieri dadebiTi korelacia endoTelium-damokidebul da endoTelium-damoukidebel vazodilatacias Soris esenciuri hipertenziis mqone individebSi ($P=0.000$).

mxris arteriis dupleqs-skanirebiT miRebul monacemTa Sida korelacia sakontrolo jgufis individebSi mocemulia cxrili #14-Si. FMD% maRali sarwmunoebiT korelirebda reatriuli hiperemiiT ganpirobebul sisxlZarRvis dimetris, gadanacvlebis daZabulobisa da gadanacvlebis siCqaris cvlilebasTan (ΔD, ΔT da $\Delta\gamma$, Sesabamisad). inicialuri diametri (D_0) ukuproporciul damokidebulebaSi iyo sisxlis nakadis sawyis siCqaresTan (V_0), gadanacvlebis daZabulobasa (T_0) da

gadanacvlebis siCqaresTan (γ_0). amasTan, gamovlinda maRali sarwmunoebis (P=0.000) dadebiTi korelacia sisxlZarRvis inicialur diametrsa (D_0) da sisxlis nakadis siCqaris, gadanacvlebis daZabulobisa da gadanacvlebis siCqaris reaqtiuli hiperemiiT ganpirobebul cvlilebas (ΔV, ΔT da $\Delta\gamma$, Sesabamisad) Soris. nitroglicerin-dmokidebuli vazodilatacia dadebiTad korelirebda sisxlZarRvTa sawyis diametrTan da uaryofiTad korelirebda inicialur gadanacvlebis daZabulobasa da gadanacvlebis siCqaresTan.

hemoreologiur parametrTa albaTobiTi ganawilebis Seswavlam ori damoukidebeli populaciis homogenurobis Sesafasebeli kolmogorov-smirnovis testiT aCvena, rom Trombocitebis raodenoba xasiaTdeba msgavsi albaTobiTi ganawilebiT. aRniSnulis sawinaaRmdegod, Trombocitebis agregadoba (P=0.0013), Trombocitebis adheziuroba (P=0.0010), fibrinogenis koncentracia (P=0.0043), hematokriti (P=0.0057) da plazmis viskozuroba (P=0.0061) avlenda gansxvavebul albaTobiT ganawilebas (grafiki #3).

diperi da nondiperi hipertenziuli pacientebis Sedareba

arteriuli wnevis sxvadasxva cirkaduli profilis mqone 57 hipertenziuli pacientis klinikuri maxasiaTeblebi mocemulia cxrili #15-Si. diperi da nondiperi hipertenziuli pacientebis asaki ar gansxvavdeboda erTmaneTisagan (P=0.142). arteriuli wnevis xangrZlivoba statistikurad sarwmunod maRali iyo nondiper jgufSi (P=0.024). wminda raodenobrivi TvalsazrisiT, diper da nondiper hipertenziul jgufebSi I xarisxis hipertenziis gansxvaveba ar gamovlinda; orive jgufSi 12-12 pacienti iyo I xarisxis hipertenziis mqone. rac Seexeba procentul ganawilebas, diperi pacientebis 60%-s aReniSneboda I xarisxis hipertenzia da 40%-s meore xarisxis. rac Seexeba nondiper pacientebs, gamokvleulTa daaxloebiT 2/3-s aReniSneboda II xarisxis hipertenzia. Sesabamisad, me-2 xarisxis hipertenziis mqone pacientTa umetesoba xasiaTdeboda nondiperi cirkaduli profiliT (P<0.05). Ramis minimaluri da maqsimaluri saw, dRis da Ramis maqsimaluri daw, 24-sT. saSualo daw, dRis da Ramis saSualo daw, Ramis

saSualo saw da pulsuri wneva, da adreuli dilis daw statistikurad sarwmunod maRali iyo nondiper hipertenziul individebSi.

diper da nondiper hipertenziul pacientTa hemoreologiuri gamokvlevis Sedegebi mocemulia cxrili #16-Si. garda eriTrocitebis deformadobisa, yvela hemoreologiuri maCvenebeli statistikurad sarwmunod maRali iyo non-diper pacientebSi. amasTan, diper pacientebSi plazmis siblante konstantas warmoadgenda da Seadgenda 1.51 erTeuls (ix. grafiki #4).

Trombocitebis raodenobis albaTobiTi ganawileba msgavsi iyo diper da nondiper hipertenziul pacientebSi (P=0.088). amasTan, Trombocitebis agregacia (P=0.000008), Trombocitebis adheziuroba (P=0.000008), fibrinogenis koncentracia (P=0.0128), hematokriti (P=0.000008) da plazmis viskozuroba (P=0.000008) avlenda gansxvavebul albaTobiT ganawilebas. χ^2 testma gamoavlina, rom rogorc diperi, ise nondiperi hipertenziuli pacientebis Trombocitebis raodenobas, iseve rogorc Trombocitebis agregacia/adheziurobas da plazmis siblantes aqvs log-normaluri ganawileba (ix. cxrili #17). am mxriv gamonakliss Seadgens nondiperi pacientebis fibrinogenis koncentracia, romelic xasiaTdeba log-normaluri da degeneraciuli ganawilebis SenareviT (ix. grafiki 5).

garda Mann-Whitney meTodisa, diperi da nondiperi hipertenziuli individebis hemoreologiuri maxasiaTebelTa saSualo mniSvnelobebis Sedarebis mizniT Cven gamoviyeneT "Fisher's F Test" da "Student's t Test". kvlevis Sedegad gamovlinda, rom nondiper pacientebs diperebTan SedarebiT aReniSnebaT hemoreologiuri maxasiaTeblebis saSualo maCvenebleblebis sarwmunod maRali done (cxrili #18).

mxris arteriis dupleqs-skanirebis maCvenebleblebi diper da nondiper hipertenziul pacientebSi warmodgenilia me-19 cxrilSi. nondiper pacientebSi diperebTan SedarebiT maRali sarwmunoebiT dabali iyo nakad-damokidebuli vazodilataciis maCvenebeli (FMD%) (11.94±0.95 da 3.54±1.76, Sesabamisad; P=0.000). garda aRniSnulisa, statistikurad sarwmunod gansxvavdeboda erTmaneTisagan diperi da nondiperi pacientebis nakad-damokidebuli vazodilataciis maCvenbelTa medianac (4.16 da 12.31

Sesabamisad; P=0.000). msgavsad endoTelium-damokidebuli vazodilataciisa, diper pacientebs nondiperebTan SedarebiT nitrat-damokidebuli vazodilataciis rogorc saSualo maCvenebeli, ise mediana ufro maRali hqondaT (13.01±1.08 da 8.11±1.19, Sesabamisad; P=0.000. saSualo maCvenebl isaTvis da 13.14 da 8.3, Sesabamisad; P=0.000 medianisaTvis) (ix. grafiki #6).

diperebTan SedarebiT nondiper hipertenziul pacientebs aReniSnaT ufro didi sisxlZarRvTa inicialuri diametri (3.76±0.2 da 4.31±0.16, Sesabamisad; P=0.000). amasTan, reaqtiuli hiperemiis sapasuxod ganviTarebuli diametris cvlileba ufro masStaburi diper pacientebSi iyo. rogorc sisxlis nakadis inicialuri, ise reaqtiuli hiperemiis sapasuxod ganviTarebuli siCqare sarwmunod maRali iyo diper pacientebSi nondiper individebTan SedarebiT. msgavsad sisxlis nakadis siCqarisa, gadanacvlebis rogorc inicialuri, ise hiperemiis Semdgomi siCqare sarwmunod maRali diper pacientebs aReniSnaT. sawyisi gadanacvlebis daZabuloba praqtikulad ar gansxvavdeboda am or jgufs Soris (6.3±0.43 da 6.16±0.41, Sesabamisad; P=0.394). amasTan, gadanacvlebis daZabulobis sxvaoba ganviTarebuli reaqtiuli hiperemiis sapasuxod, sarwmunod maRali diper pacientebs hqondaT (-0.67±0.08 da -0.17±0.1, Sesabamisad; P=0.000) (ix. grafiki #7).

diperi da nondiperi cirkaduli profilis Sedareba saerTo sakvlev populaciaSi (janmrTeli - kontroli da ZiriTadi - hipertenziuli jgufebi)

aw-is sxvadasxva cirkaduli profilis mqone 74 individis (hipertenziuli da normotenziuli) klinikuri maxasiaTeblebi mocemulia cxrili #20-Si. diperi da nondiperi gamokvleuli pirebis saSualo asaki ar gansxvavdeboda erTmaneTisagan (P=0.086). rogorc arteriuli wnevis xangrZlivoba, ise arteriuli wnevis xarisxi sarwmunod maRali hqondaT nondiper individebs. rogorc mosalodneli iyo, Ramis rgorc maqsimaluri, ise minimaluri da saSualo sistoluri, diastoluri da pulsuri wnevis maCveneblebi diperebTan SedarebiT, nondiper pacientebs ufro maRali aReniSnaT. amas garda, dRis saSualo sistoluri da diastoluri

arteriuli wnevac, iseve rogorc adreuli dilis saSualo sistoluri da diastoluri arteriuli wneva sarwmunod maRali nondiper pacientebs hqondaT. dRe-Ramis sxvadasxva periodSi guliscemis sixSire praqtikulad ar gansxvavdeboda am or jgufs Soris.

arteriuli wnevis sxvadasxva cirkaduli profilis mqone 74 gamokvleuli piris (normotenziuli da hipertenziuli) hemoreologiuri maxasiaTeblebi mocemulia cxrili #21-Si.

nondiperi cirkaduli ritmis mqone individebs diperebTan SedarebiT aReniSnaT yvela hemoreologiuri parametris statistikurad sarwmunod maRali maCvenebeli (P=0.000), garda eriTrocitebis deformaciisa da Trombocitebis raodenobisa (ix. grafiki #8). diperebs nondiperebTan SedarebiT ufro gamoxatuli eriTrocitebis deformadobis unari hqondaT, xolo Trombocitebis raodenoba praqtikulad ar gansxvavdeboda am or sakvlev jgufSi.

mxris arteriis dupleqs-skanirebis maCveneblebi saerTo gamokvleuli populaciis (hipertenziuli, normotenziuli) diper da nondiper individebSi mocemulia cxrili #22-Si. diper pacientebs nondiper individebTan SedarebiT aReniSnaT mxris arteriis endoTelium-damokidebuli da endoTelium-damoukidebeli vazodilataciis statistikurad sarwmunod maRali done (P=0.000) (grafiki #9). inicialuri sisxlZarRvovani diametri nondiperebs diperebTan SedarebiT ufro maRali hqondaT (4.29±0.22 da 3.79±0.19, Sesabamisad; P=0.000). ΔD, ΔV, ΔT da $\Delta\gamma$ –s maCveneblebi mniSvnelovnad maRali iyo diperebis jgufSi. amasTan, inicialuri gadanacvlebis daZabuloba am or jgufSi praqtikulad ar gansxvavdeboda erTmaneTisgan (P=0.243).

hemoreologiur parametrTa albaTobiTi ganawilebis Seswavlam gamoavlina, rom Trombocitebis raodenobis albaTobiTi ganawileba msgavsia orive jgufSi (P=0.230). amasTan, Trombocitebis agregacia (P=0.000008), Trombocitebis adheziuroba (P=0.000008), fibrinogenis koncentracia (P=0.0018), hematokriti (P=0.000008) da plazmis viskozuroba (P=0.000008) gansxvavebul albaTobiT iyo ganawilebuli.

arteriuli wnevis nondiperi cirkaduli profilis mgrZnobeloba, specifikuroba da pozitiuri prognozuli mniSvneloba janmrTel da hipertenziul individebSi mocemulia cxrili #23-Si.

nondiperi cirkaduli profilis mgrZnobeloba Trombocitebis agregaciuli aqtivobis donis mimarT, ah-is mqone individebSi iyo 0.939, xolo normotenziul populaciaSi 0.5. amasTan, nondiperi cirkaduli profilis pozitiuri prognozuli mniSvneloba am or jgufs Soris praqtikulad ar gansxvavdeboda da Seadgenda 0.833-s janmrTelebisaTvis da 0.837-s ah-is mqone individebisaTvis. nondiper cirkadul profils mxolod hipertenziul pacientebSi gaaCnda maRali sensitiuroba da pozitiuri prognozuli mniSvneloba Trombocitebis adheziuri aqtivobis, eriTrocitebis agregaciis, fibrinigenis koncentraciis, plazmisa da sisxlis siblantisaTvis (ix. grafiki #10). amasTan, nondiperi profilis mgrZnobeloba hipertenziul pacientTa nakad-damokidebuli vazodilataciis mimarT iyo 1 da orive jgufSi gamoirCeoda maRali prediqtoruli mniSvnelobiT.

arteriuli hipertenziis sxvadasxva xangrZlivobis anamnezis mqone pacientTa Sedareba

57 hipertenziuli pacientidan, 28-s ah-is 7 welze naklebi xangrZlivobis anamnezi hqonda, xolo 29-s 7 an meti wlis xangrZlivobis. pacientebs ah-is 7 welze naklebi anamneziT, aReniSnaT Trombocitebis agregadobis, fibrinogenis koncentraciis, eriTrocitebis agregaciuli aqtivobisa da plazmis siblantis sarwmunod dabali maCveneblebi ($P<0.05$) (cxrili #24).

mxris arteriis dupleqs-skanirebis monacemebi hipertenziis sxvadasxva xangrZlivobis anamnezis mqone pacientebSi mocemulia cxrili #25-Si. statistikurad sarwmuno gansxvaveba mxolod endoTelium-damoukidebeli vazodilataciis maCvenebelma gamoavlina (11.92 ± 1.26 da 7.81 ± 1.33, Sesabamisad; $P=0.000$).

hipertenziul pacientTa Sedareba xarisxis mixedviT

gamokvleuli 57 hipertenziuli pacientidan 24-s aReniSneboda I xarisxis ah, xolo 33-s II-e xarisxis. hemoreologiuri gamokvleviT gamovlinda, rom II-e xarisxis hipertenziul pacientebs I xarisxis mqone individebTan SedarebiT gaaCndaT eriTrocitebis agregaciuli aqtivobis, plazmisa da sisxlis siblantis sarwmunod maRali done (cxrili # 26). reaqtiuli hiperemiiT ganpirobebuli gadanacvlebis daZabulobisa da gadanacvlebis siCqaris cvlileba sarwmunod maRali I xarisxis hipertenziis mqone individebSi aRiniSna ($P<0.05$). I xarisxis hipertenziul pacientebs II xarisxis pacientebTan SedarebiT nitroglicerin-damokidebuli, anu endoTelium-damokidebuli vazodilataciis sarwmunod maRali maCvenebeli gamouvlindaT (11.88±1.27 da 4.57±0.23, Sesabamisad; $P=0.000$). endoTelium-damokidebuli vazodilataciis jgufTaSorisma gansxvavebam statistikurad sarwmuno maCvenebels ver miaRwia (8.2±2.45 da 5.24±2.08, Sesabamisad; $P=0.054$) (cxrili # 27).

sxvadasxva nakad-damokidebuli vazodilataciis mqone hipertenziul pacientTa Sedareba

cxrili #28-Si mocemulia sxvadasxva nkad-damokidebuli vazodilataciis mqone hipertenziul pacientTa hemoreologiuri maxasiaTeblebi. hipertenziul pacientebs 7.5%-ze dabali endoTelium-damokidebuli vazodilataciis maCvenebliT aReniSnaT yvela hemoreologiuri parametris sarwmunod maRali done ($P=0.000$). am mxriv gamonakliss warmoadgenda mxolod eriTrocitebis deformacia, romelic praqtikulad ar gansxvavdeboda am ori jgufis individebs Soris (grafiki #11).

cxrili #29-Si mocemulia mxris arteriis dupleqs-skanirebis monacemebi endoTelium-damokidebuli vazodilataciis procentuli mniSvnelobis mixedviT. hipertenziul pacientebs, romelTa nakad-damokidebuli vazodilataciis maCvenebeli aRemateboda 7.5%-s, aReniSnaT sarwmunod maRali nitrat-damokidebuli vazodilatacia (12.13±1.13 da 7.6±1.34, Sesabamisad; $P=0.000$), iseve rogorc gadanacvlebis daZabulobisa da

gadanacvlebis siCqaris cvlilebis indeqsebi (P=0.000). sisxlZarRvTa sawyisi diametri mniSvnelovnad maRali iyo 7.5%-ze dabali FMD-s mqone pacientebSi (4.36±0.18 da 3.86±0.18, Sesabamisad; P=0.000).

Tavi 4. Sedegebis Sejameba

Cvens mier Catarebulma kvlevam gamoavlina, rom aw-is nondiperi cirkaduli profilis arsebobis sixSire ufro maRalia hipertenziis mqone individebSi normotenziul kontrolTan SedarebiT. garda aRniSnulisa, Cven gamovavlineT, rom arteriuli wnevis cirkaduli profilis konkretuli variantis (diperi/nondiperi) arseboba damokidebulia hipertenziis arsebobaze. Sesabamisad, Cveni azriT esenciuri hipertenziis arseboba gavlenas axdens arteriuli wnevis cirkadul ritmze da iwvevs mis darRvevas, anu wnevis nondiperi cirkaduli profilis Camoyalibebas.

61 prospeqtuli kvlevis metaanalizma, romelSic CarTuli iyo 1 milionze meti zrdasruli individi aCvena, rom sistoluri wnevis 10 mm.vwy.sv-iT an diastoluri wnevis 5 mm.vwy.sv-iT mateba asocirebulia insultiT ganpirobebuli sikvdilobis 40%-ian da kardiovaskuluri sikvdilobis 30%-ian zrdasTan [238]. mocemuli kvlevis Sedegebs mravali oponenti hyavs, rac ganapiroba wnevis klinikuri gazomvis teqnikis da ara arteriuli wnevis ambulatoriuli monitorirebis gamoyenebam. TeTri xalaTis hipertenziis gavrcelebis maRali maCveneblisa (zogierT populaciaSi daaxloebiT 30%-s utoldeba) da mkvlevarTaSorisi da individSida variabelobis gamoricxvis mizniT Cven kvlevaSi arteriuli wnevis 24-saaTiani ambulatoriuli monitorirebis meTodi gamoviyeneT. garda aRniSnulisa, ambulatoriuli monitorirebis gareSe praqtikulad SeuZlebeli iqneboda arteriuli wnevis cirkaduli profilis gansazRvra.

ZiriTad da sakontrolo jgufis individebs Soris hemoreologiur parametrTa Sedarebam gamoavlina, rom arteriuli hipertenzia asocirebulia hemoreologiur darRvevebTan. kerZod, hipertenziul individebSi aRiniSna Trombocitebis agregaciuli da adheziuri aqtivobis, fibrinogenis koncentraciis, hematokritis, eriTrocitebis agregaciisa da plazmis siblantis gazrdili done, rac proTrombozul mdgomareobaze mianiSnebs. warmodgenil kvlevaSi gamovlinda dadebiTi sarwmuno korelacia eriTrocitebis agregadobasa da sisxlis, iseve rogorc plazmis siblantes Soris. igive Sedegi iqna nanaxi Meiselman et al. [343] kvlevaSi. sarwmunod maRali korelacia gamovlinda aseve eriTrocitebis

agregadobasa da plazmis fibrinogenis koncentracias Soris. amasTan, SesaZloa fibrinogenis gazrdili plazmuri done gansazRvravdes eriTrocitebis agregaciis maRal maCvenebels hipertenziul jgufSi. Meiselman et al. [343] monacemebiT, eriTrocitebis gazrdil agregadobaSi wamyvan rols garda fibrinogenis donisa TamaSobs eriTrocitis garsis maxasiaTeblebic. maRali sarwmunoebis kavSiri gamovlinda eriTrocitebis agregadobasa da sisxlis wnevis maCvenebl ebs Soris, kerZod Ramis sistolur, diastolur da pulsur wnevebTan. gansxvavebiT hipertenziuli jgufisagan, normotenziul individebs aReniSnebodaT eriTrocitebis deformadobis sarwmunod maRali maCvenebeli. cnobilia, rom kardiovaskulur daavadebaTa did procents, gansakuTrebiT gulis iSemiur daavadebasa da periferiul sisxlZarRvTa daavadebebs Tan axlavs hemoreologiuri darRvevebi, gamoxatuli plazmis siblantisa da eriTrocitebis agregadobis matebiT [255, 259].

hipertenziul individebSi normotenziul kontrolTan SedarebiT gamovlinda Trombocitebis agregadobisa da adheziurobis sarwmunod maRali done. amasTan, orive sakvlev jgufSi aRiniSneboda TrombocitTa agregadobasa da adheziurobas Soris dadebiTi korelacia. maRali sarwmunoebis dadebiTi korelacia gamovlinda Trombocitebis adheziuroba/agregadobasa da fibriniogenis koncentracias, iseve rogorc sisxlisa da plazmis siblantes Soris, rac miuTiTebs sisxlis reologiis, rogorc mTliani sistemis erTian funqcionirebaze. amasTan, Trombwarmoqmna asocirebulia TrombocitTa hiperaqtivacias, plazmisa da sisxlis siblantis, da fibrinogenis koncentraciis zrdasTan.

kardiovaskulur daavadebaTa dros gamovlenili hemoreologiuri darRvevebi mkvlevarTa mier ganixileba, rogorc arasakmarisi cirkulatoruli funqciis Sedegi an indikatori. amasTan, am konteqstSi arteriuli hipertenzia praqtikulad Seuswavlelia. msgavsad zogadad kardiovaskuluri daavadebebisa, arteriuli hipertenziis dros ganviTarebuli hemoreologiuri darRvevebi SesaZloa ganxilul iqnas, rogorc mosalodneli cerebro- da kardiovaskuluri garTulebebis markerebi anu indikatorebi da darRveuli cirkulaciis Sedegi. ramdenadac,

hipertenzia warmoadgens paTofiziologiuri procesebis rTul kaskads da xasiaTdeba sisxlZarRvovan dazianebaTa ganviTarebiT, hemoreologiismxrivi darRvevebi SesaZloa ganxilul iqnas rogorc sisxlZarRvTa dazianebis an/da maRali arteriuli wnevis sisxlis reologiaze uSualo zemoqmedebis Sedegi. Bor-Kucukkatay et al. [271], eriTrocitebis agregaciis darRvevas hipertenziis dros ganixilaven rogorc erT-erT umniSvnelovanes faqtors hipertenziis ganviTarebisaTvis.

Cveni kvlevis msgavsad, Letcher et al. [264] kvlevaSi, janmrTel sakontrolo jgufTan SedarebiT hematokritis mniSvneloba ufro maRali hipertenziul individebSi gamovlinda. amas garda, Danesh et al. [289] gamoavlines, rom gazrdili hematokritis done zrdis kardiovaskulur risks. garda hematokritisa, 7 longitudinalur kogortul kvlevaSi gamovlinda fibrinogenis damoukidebeli prediqtoruli mniSvneloba insultisa da miokardiumis infarqtis ganviTarebisaTvis [301]. amasTan, praqtikulad SeuZlebelia hemoreologiur darRvevaTa pirveladi bunebis gansazRvra rogorc zogadad kardiovaskulur daavadebaTa, ise hipertenziis dros, anu “qaTami Tu kvercxis” pirveladobis problema aqac aqtualuri rCeba. kvlevam, msgavsad Natali et al. [394] kvlevis Sedegebisa, gamoavlina uaryofiTi korelacia endoTelium-damokidebul vazodilataciasa da hematokrits Soris.

Cveni kvlevis Sedegebze dayrdnobiT, esenciuri hipertenzia unda ganixilebodes rogorc gazrdili proTrombozuli riskis mqone mdgomareoba. msgavs daskvnamde mividnen Lip G. [296] da Minuz et al. [298]. Koenig et al. [257] da Lowe et al. [258] kvlevebma gamoavlina plazmis siblantisa da kardiovaskuluri gamosavlis kavSiri. eqsperimentuli da statistikuri kvlevebis umetesobam tradiciuli risk-faqtorebis (fibrinogenis donis mateba, simsuqne, mwevelobа, hiperlipoproteinemia da a.S.) gverdiT gamoavlina kardiovaskulur daavadebaTa axali mniSvnelovani risk-faqtorebi, rogoricaa hematokritis, sisxlisa da plazmis siblantis, eriTrocitebis agregadobis donis matebisa da eriTrocitebis deformadobis donis daqveiTebis maCveneblebi.

Cvens mier miRebuli Sedegebi SesaZloa ganxilul iqnas, rogorc erTgvari axsna kvlevaTa Sedegebisa, sadac avtorebi adastureben, rom gazrdili aw kavSirSia kardio- da cerebrovaskuluri avadobisa da sikvdilobis maRal riskTan [75, 77, 320, 372, 373, 374]. metic, Cveni kvleva daexmareba klinicistebs im hipertenziuli pacientebis identificirebaSi, romelTac gaaCniaT gazrdili kardiovaskuluri da cerebrovaskuluri riski.

mxris arteriis dupleqs-skanirebam gamoavlina, rom esenciuri hipertenziis mqone individebs janmrTel kontrolTan SedarebiT gaaCndaT gauaresebuli nakad-damokidebuli vazodilataciis unari, rac endoTeliumis disfunqciaze miuTiTebs. reaqtiul hiperemias janmrTel individTa mxris arteria ufro Zlieri dilataciiT pasuxobda. dReisaTvis, mecnierTa Soris ar arsebobs erTiani azri endoTelium-damokidebuli vazodilataciis maCveneblis normaluri mniSvnelobis Sesaxeb. Fathi et al. [382] monacemebiT, normad unda CaiTvalos 7.3%-ze ufro maRali nakad-damokidebuli vazodilataciis maCvenebeli. Neunteufel et al. [41] monacemebiT SenarCunebul, normalur nakad-damokidebuli vazodilataciis mniSvnelobad 10% da meti vazodilatacia miiCneva. zogadad, mecnierTa umetesobis azriT janmrTel populaciisaTvis normad 7-10%-iani vazodilatacia iTvleba [35, 69, 315, 383]. ... Cvens kvlevaSi esenciuri hipertenziis mqone individebis nakad-damokidebuli vazodilataciis saSualo procentuli maCvenebeli 6.49±1.58 iyo, rac udavod endoTeluri disfunqciis arsebobaze miuTiTebs. Lauer et al. [87] kvlevaSi, hipertenziul pacientTa nakad-damokidebuli vazodilataciis saSualo mniSvneloba 3.6±0.3% iyo. Cveni kvlevis Sedegsa da maT monacemebs Soris aseTi gansxvaveba SesaZloa ganpirobebuli iyos Cvens mier kvlevaSi CarTvis kriteriumebis simkacriTa da kvlevis dizainiT, zogadad.

saSualo mxris arteriis diametris cvlileba reaqtiuli hiperemiis dros, TiTqmis 2-jer aRemateboda mis analogs hipertenziul jgufSi. aRniSnuli sisxlZarRvTa endoTeliumis funqciis mkveTr darRvevaze miuTiTebs arteriuli hipertenziis dros. endoTelium-damoukidebeli vazodilatacia orive jgufSi aRemateboda 9%-s, amasTan hipertenziul

individebs normotenziasTan SedarebiT sarwmunod dabali maCvenebeli aReniSnaT. Sesabamisi Sedegi miuTiTebs sisxlZarRvTa kunTovani Sris dazianebaze da mis disfunqciaze arteriuli hipertenziis dros.

kvlevaTa erTi nawili Cveni Sedegebis msgavsad miuTiTebs endoTeluri disfunqciis arsebobaze arteriuli hipertenziis dros [44, 85, 87, 92]. metic, Plavnik et al. [88] normotenziuli da maRali normuli wnevis mqone individebis gamokvleviT aCvenes, rom endoTeliumis dazianeba aRiniSneba sistoluri wnevis matebasTan erTad da SesaZloa gamovlindes TviT kardiovaskuluri risk-faqtorebis ar mqone maRali normuli wnevis individebSic ki. Perticone et al. [44] kvlevis monacemebze dayrdnobiT, endoTelur disfunqcias ganixilaven rogorc kardiovaskuluri movlenebis ganviTarebis markers hipertenziis mqone pacientebSi. Bonetti et al. [73] ki endoTeliums ganixilaven rogorc kardiovaskuluri sikvdilobisa da avadobis Sesamcireblad mimarTul mkurnalobis pirvelad samiznes. amasTan, arsebobs kvlevaTa sawinaaRmdego Sedegebic, sadac arteriuli hipertenziisa da endoTeluri disfunqciis kavSiri ver dadasturda [84, 384, 385, 386]. miuxedavad kvlevaTa simravlisa, dReisaTvis sakiTxi endoTeluri disfunqciis ganviTarebis Sesaxeb arteriuli hipertenziis dros da misi pirveladi xasiaTis Sesaxeb jer kidev gadauWreli rCeba [92].

fiziologiuri laminaruli gadanacvlebis daZabuloba umniSvnelovanes rols TamaSobs sisxlZarRvTa struqturisa da funqciis normis farglebSi SesanarCuneblad. sisxlis siblante gansazRvravs gadanacvlebis daZabulobis dones da Sesabamisad, sisxlZarRvismxrivi cvlilebebis ganviTarebasac. mniSvnelovania, rom Cvens kvlevaSi ar gamovlinda gadanacvlebis daZabulobis statistikurad sarwmunod gansxvavebuli mniSvnelobebi hipertenziul da sakontrolo jgufebs Soris. amasTan hipertenziis jgufis pacientebSi gadanacvlebis daZabulobis cvlilebisa da gadanacvlebis siCqaris cvlilebis indeqsebis dabali maCveneblebis arseboba miuTiTebs sisxlZarRvTa intimaluri Sris funqciur ukmarisobaze.

gansxvavebiT plazmis siblantisagan, Cvens kvlevaSi sisxlis siblantis mniSvneloba praqtikulad ar gansxvavdeboda hipertenziul da

normotenziul individebs Soris. Cveni kvlevis Sedegebis msgavsad, De Simone et al. [283] amerikel indielebSi Catarebulma kvlevam aseve ver aCvena sisxlis siblantis donis sarwmuno gansxvaveba normo- da hipertenziul individebs Soris. amasTan, sisxlis siblantis gamosaTvlelad avtorebi gansxvavebul formulas iyenebdnen, romelSic gamoiyeneboda plazmis proteinebis koncentracia (g/l); gamoTvla tardeboda mudmivi gadanacvlebis daZabulobis – 208wm^{-1} arsebobis daSvebis pirobebSi. Cveni da De Simone et al. [283] kvlevis Sedegebisagan gansxvavebiT, Razavian et al. [252], Sandhagen et al. [284], Devereux [285] kvlevebma gamoavlines hipertenziasa da sisxlis siblantes Soris kavSiris arseboba; amasTan, avtorebma ver axsnes sisxlis siblantis cvlileba hipertenziis mizezia Tu Sedegi [287,393]. dReisaTvis yvelaze metad gavrcelebuli hipoTezis mixedviT, hipertenzia da sisxlis siblante ar arian urTierTdakavSirebuli parametrebi, maTze zegavlenas axdenen garemosa da genetikuri faqtorebi, iseTi rogoricaa simsuqne, adinamia, mwevelobada a.S. [288]. aRniSnuli absolutur SesabamisobaSi modis Cvens mier miRebul SedegebTan.

miuxedavad imisa, rom Cvenma kvlevam ar gamoavlina sisxlis siblantis sarwmuno gansxvaveba ZiriTadi da sakontrolo jgufis individebs Soris, gamovlinda mniSvnelovani korelacia sisxlis siblantesa da Ramis sistolur, diastolur da pulsur wnevebs Soris rogorc hipertenziul, ise normotenziul populaciaSi. amasTan, hipertenziul populaciaSi aseve gamovlinda dadebiTi korelacia sisxlis siblantesa da saSualo sistolur da diastolur, da adreuli dilis diastolur wnevebs Soris. msgavsad Cvens mier miRebuli Sedegisa, De Simone et al. [251] mier janmrTel, hipertenziis armqone individebSi Catarebulma kvlevam gamoavlina sisxlis siblantis damoukidebeli kavSiri diastolur wnevasTan, xolo sistolur wnevasTan korelacia ar gamovlinda.

hipertenziul individebSi gamovlinda ra hemoreologiuri da sisxlZarRvovani darRvevebis maRali done, Cven SeviswavleT aRniSnul faqtorTa urTierTdamokidebuleba. ZiriTadi jgufis individebSi nakad-damokidebuli vazodilataciis, iseve rogorc sisxlZarRvis absoluturi cvlilebis maCvenebeli uaryofiTad da sarwmunod korelirebda yvela

gamokvleul hemoreologiur parametrTan, garda eriTrocitebis deformadobisa. hipertenziul pacientebSi gamovlinda Trombocitebis agregaciuli da adheziuri aqtivobis sarwmunod maRali uaryofiTi korelacia endoTelium-damokidebul vazodilataciis maCveneblebTan, kerZod nakad-damokidebuli vazodilataciis procentul maCvenebelsa da reaqtiuli hiperemiis sapasuxod ganviTarebul sisxlZarRvis absolutur cvlilebasTan. aRniSnuli garkveulwilad xsnis endoTeluri disfunqciisas Trombwarmoqmnis procesis aqtivacias. hipertenziul pacientebSi janmrTeli kontrolisagan gansxvavebiT gamovlinda maRali sarwmunoebis uaryofiTi korelacia (r=-0.690; P=0.000) sisxlZarRvis diametris absolutur cvlilebasa da plazmis siblantes Soris. xolo sisxlis siblante rogorc janmrTel, ise hipertenziul pacientebSi korelirebda sisxlZarRvis diametris cvlilebasTan. damokidebuleba sisxlis siblantesa da sisxlZarRvis diametris cvlilebas Soris intaqtur arteriebSi nanaxi iqna Fischer et al. [323] mier, rac absolutur SesabamisobaSi modis Cveni kvlevis SedegebTan. amasTan, Cvens SemTxvevaSi korelacia metad ufro maRali sarwmunoobiT hipertenziul jgufSi gamoirCeoda (r=-0.535, P=0.000; hipertenziul pacientebSi da r=-0.552, P=0.022). Nagy et al. [389] Catarebulma kvlevam aCvena, rom nakad-damokidebuli vazodilatatoruli pasuxi sisxlis siblantisagan damoukidebelia. Cvens kvlevaSic sakontrolo jgufis individebSi, anu janmrTelebSi ar gamovlinda damokidebuleba nakad-damokidebul vazodilataciasa da sisxlis siblantes Soris. amasTan, damokidebuleba nakad-damokidebul vazodilataciasa da sisxlis siblantes Soris uaryofiTi korelaciis (r=-0.600; P=0.000) saxiT gamovlinda mxolod hipertenziul individebSi. Sesabamisad, keTdeba daskvna, rom rac ufro metadaa dazianebuli sisxlZarRvTa endoTeliumi, miT ufro maRalia hemoreologiur darRvevaTa gamovlenis masStabi; da meorec, miT ufro maRalia hemoreologiur da sisxlZarRvovan maxasiaTeblebs Soris korelaciuri kavSiri. garda endoTelium-damokidebuli vazodilataciisa, hipertenziul pacientebSi uaryofiTi korelacia yvela hemoreologiur maxasiaTebelTan gamoavlina endoTelium-damoukidebelma, anu nitrat-damokidebulma vazodilataciam.

rac aseve miuTiTebs mZime Trombozuli garTulebebis ganviTarebis maRal albaTobaze ah-is dros. janmrTel, sakontrolo jgufSi korelaciis mxriv nakad-damokidebul vazodilataciis procentul maCvenebelTan SedarebiT metad ufro efeqturi sisxlZarRvis absoluturi cvlileba gamovlinda. es ukanasknelი korelirebda Trombocitebis agregadoba/adheziurobasTan, fibrinogenis koncentracias, eriTrocitebis agregaciasa da sisxlis siblantesTan, maSin roca FMD% korelirebda mxolod Trombocitebis agregaciul aqtivobasTan. dReisaTvis ar arsebobs konsensusi mecnierTa Soris, Tu ra ufro metad mgrZnobiare parametria FMD% Tu ΔD. moqmed gaidlainSi upiratesoba FMD%-s eniWeba [37]. Cveni kvlevis Sedegebze dayrdnobiT, sisxlZarRvis absoluturi cvlileba metad ufro Rirebulia endoTeliumis funqciis Sefasebis mizniT procentul sididesTan SedarebiT, ramdenadac hemoreologiur parametrebTan korelacias avlens rogorc normotenziis, ise hipertenziis dros, gansxvavebiT FMD%-gan, romelic Sedegiania korelaciebis dasadgenad mxolod hipertenziul pacientebSi.

rogorc normotenziul kontrol, ise hipertenziul ZiriTad jgufebSi gamovlinda maRali sarwmunoebis uaryofiTi korelacia sisxlZarRvis inicialur diametrsa da inicialur gadanacvlebis daZabulobsas Soris. gansxvavebiT Cveni Sedegebisagan, Verbeke et al. [109] Seiswavlidnen ra bolo stadiis Tirkmlis daavadebis mqone da janmrTel sakontrolo jgufis individebs, pozitiuri korelacia gamoavlines sakontrolo jgufis individebSi da uaryofiTi korelacia - daavadebulTa Soris. amasTan, wminda maTematikuri TvalsazrisiT, gadanacvlebis siCqarisa da gadanacvlebis daZabulobis gamosaTvleli formulebidan gamomdinare, Cvens mier miRebuli Sedegi metad logikuria.

Cvenma kvlevam, msgavsad Girerd et al. [387] kvlevis Sedegebisa, gamoavlina, rom hipertenziul pacientebs normotenziul individebTan SedarebiT gaaCniaT mxris arteriis diametris, iseve rogorc gadanacvlebis daZabulobis ufro maRali mniSvneloba. miRebuli Sedegi adasturebs mosazrebas, rom gadanacvlebis daZabulobis cvlilebis xanmokle

zemoqmedebisagan gansxvavebiT, sxivis/mxris arteriis diametri izrdeba qronikulad gazrdili gadanacvlebis daZabulobis sapasuxod.

sisxli aris araniutonuri siTxe, romelic gavlenas axdens gadanacvlebis daZabulobaze da damokidebulia gadanacvlebis siCqareze. Cvenma kvlevam gamoavlina uaryofiTi korelacia gadanacvlebis siCqaresa da sisxlis siblantes Soris rogorc janmrTel, ise hipertenziul individebSi. aRniSnuli faqti miuTiTebs, rom sisxlis siblante iklebs gadanacvlebis siCqaris zrdis paralelurad. msgavs daskvnamde mividnen Brookshier et al. [377] da Dutta et al. [378], romelTac aCvenes rom gadanacvlebis siCqaris cvlileba upiratesad sisxlis viskozuri maxasiaTeblebiT ganisazRvreba.

hemoreologiur parametrTa Sida korelaciebis Seswavlisas ZiriTad jgufSi gamovlinda sarwmunod maRali pozitiuri korelacia (P=0.000) hematokritis donesa da plazmisa da sisxlis siblantes Soris. amasTan, sakontrolo jgufSi pozitiuri korelacia hematokritma mxolod plazmis siblantesTan aCvena (P=0.007). aRniSnuli fenomenis axsna SesaZloa Fedde et al. [379] kvlevis SedegebiT. kerZod, hematokritis maRali done asocirebulia hemoglobinis maRal donesTan, rac pozitiurad korelirebs plazmisa da sisxlis siblantis donesTan. garda hemoglobinisa, plazmis cilebidan mniSvnelovania fibrinogenic, romelmac Cvens kvlevaSi gamoavlina pozitiuri korelacia sisxlisa da plazmis siblantesaTan. ramdenadac, sisxlis siblante gansazRvravs gadanacvlebis daZabulobas, romelic sisxlZarRvTa struqturasa da funqciaze momqmedi ZiriTadi faqtoria, Sesabamisad momatebuli siblantis done sisxlZarRvovani garTulebebis ganviTarebis mniSvnelovani maCvenebelia. rogorc ZiriTadi, ise sakontrolo jgufis individebSi gamovlinda pozitiuri korelacia eriTrocitebis agregadobasa da Trombocitebis agregaciul da adheziur aqtivobas Soris. aRniSnuli SesaZloa aixsnas Holme et al. [392] kvlevis SedegebiT, sadac gamovlinda eriTrocitebis zegavlena Trombocitebis aqtivaciaze, maT mier Trombocitaruli agonistis - adf-is gamoyofis safuZvelze. unda aRiniSnos, rom kvlevis avtorebi Seiswavlidnen momatebuli gadanacvlebis daZabulobis zegavlenas Trombocitebis

aqtivaciaze mkveTrad stenozirebul arteriebSi. rogorc eriTrocitebi, ise Trombocitebi Seicavs adf-is ujredSida marags, romelTa gamonTavisufleba aRiniSneba maRali gadanacvlebis daZabulobis pirobebSi [294]. hipertenziul pacientebs Cvens kvlevaSi aReniSnaT sarwmunod maRali hematokritis mniSvneloba normotenziul kontrolTan SedarebiT, rac nawilobriv xsnis Trombwarmoqmnis maRal albaTobas hipertenziul jgufSi, rac viTardeba gadanacvlebis daZabulobis maRali maCveneblis da/an cvlilebis ganviTarebis sapasuxod didi raodenobiT adf-is sisxlSi gadmosroliT.

Pries et al. [380], Rachev et al. [381] kvlevis Sedegebis mixedviT, sisxlis wnevis done zegavlenas axdens gadanacvlebis daZabulobis maCvenebelze, kerZod rac ufro maRalia arteriuli wneva, miT ufro didia gadanacvlebis daZabulobis mniSvneloba. Cvens kvlevaSi aRniSnuli mosazreba ar dadasturda. ar gamovlinda sarwmuno korelacia arteriuli wnevis simaRlesa da gadanacvlebis daZabulobas Soris.

Cvens mier Catarebulma kvlevam aCvena, rom esenciuri hipertenziis dros aRiniSneba rogorc Trombocitebis, ise endoTeliumis aqtivacia, rasac gadamwyveti mniSvneloba aqvs Trobozuli tendencis ganviTarebaSi. marTlac, miuxedavad sisxlZarRvebze maRali wnevis zemoqmedebisa, hipertenziis ZiriTadi garTulebani (rogoricaa miokardiumis infarqti da insulti) Tavisi bunebiT paradoqsalurad Trombozulia da ara hemoragiuli. aRniSnuli fenomeni cnobilia “hipertenziis Trombozuli paradoqsis” anu “birmingemis paradoqsis” saxelwodebiT [375]. klinikur-laboratoriuli monacemebi mowmobs, rom hipertenzia per se ganxilul unda iqnas rogorc proTrombozuli mdgomareoba, romelic moicavs hiperkoagulacias, Trombocitebisa da endoTeliumis aqtivacias – anu virxovis Trombogenezul triadas [296].

nakad-damokidebuli vazodilatacia ganisazRvreba gadanacvlebis daZabulobiT. es ukanaskneli ki Tavis mxriv gamoiTvleba sisxlis siblantisa da gadanacvlebis siCqaris namravliT. dReisaTvis gamoyenebad sisxlis siblantis gamosaTvlel formulaSi monawileobs plazmis siblante, hematokriti da gadanacvlebis siCqare. ramdenadac, formula ar

iTvaliswinebs srul hemoreologiur profils, Cven SeviswavleT damokidebuleba sisxlis siblantesa da sxva hemoreologiur maxasiaTeblebs Soris. sakontrolo jgufis individebSi dadebiTi korelacia gamovlinda sisxlis siblantesa da plazmis siblantes, iseve rogorc eriTrocitebis agregadobas Soris da uaryofiTi korelacia eriTrocitebis deformadobas Soris. aRniSnuli Sedegi mosalodneli iyo, radgan hematokritis maCvenebeli ganisazRvreba eriTrocitebis raodenobiT. mdgomareoba kritikulad gansxvavebuli aRmoCnda hipertenziul pacientebSi, sadac sisxlis siblante maRali sarwmunoobiT korelirebda yvela hemoreologiur maxasiaTebelTan. aRniSnuli kidev erTxel adasturebs hemoreologiuri darRvevebisa da Trombozuli riskis arsebobas esenciuri hipertenziis dros. sxva hemoreologiur faqtorTa Soris gamovlinda Zlieri korelacia rogorc janmrTel, ise hipertenziul individebSi.

literaturaSi arsebobs mcire raodenobis informacia nakad-damokidebuli vazodilataciis maCvenebelsa da sisxlZarRvis inicialur diametrs Soris damokidebulebis Sesaxeb. Silber et al. [33] avtorebis mtkicebiT, rac ufro mcirea sisxlZarRvis diametri, miT ufro maRalia endoTelium-damokidebuli vazodilataciis procentuli maCvenebelic. avtorebma aseve aCvenes, rom gadanacvlebis daZabulobis maCvenebelic ufro maRali mcire kalibris sisxlZarRvebs hqondaT. amasTan, aRniSnuli fenomenis mizezebi praqtikulad gaurkvevelia. Cvens mier Catarebul kvlevaSi, mxolod hipertenziul pacientebSi gamovlinda statistikurad sarwmuno, uaryofiTi korelacia sisxlZarRvis diametrsa da nakad-damokidebul vazodilatacias Soris (r=-0.427, P=0.001). janmrTel individebSic aRiniSna uaryofiTi korelacia, magram mniSvnelobam sarwmuno zRvars ver miaRwia (r=-0.457, P=0.065). sarwmunod maRali uaryofiTi korelacia gamovlinda gadanacvlebis daZabulobis donesa da sisxlZarRvis inicialur diametrs Soris rogorc janmrTel, ise hipertenziul individebSi; rac miuTiTebs, rom gadanacvlebis daZabulobis donis ganmsazRvreli sisxlZarRvis diametria.

Cven SeviswavleT damokidebuleba, rogorc inicialur sisxlZarRvovan diametrsa da FMD%-s, ise sisxlZarRvis absolutur cvlilebas Soris janmrTel, anu sakontrolo da hipertenziuli jgufis individebSi. korelacia gamovlinda mxolod hipertenziul jgufSi. amasTan, inicialur sisxlZarRvovan diametrsa da FMD%-s Soris aRmoCnda ufro Zlieri korelacia sisxlZarRvis absolutur cvlilebasTan SedarebiT (P=0.001 da P=0.024, Sesabamisad). CvenTvis aseve mniSvnelovani iyo garkveva, Tu romeli faqtori (inicialuri gadanacvlebis daZabuloba Tu reaqtiuli hiperemiis sapasuxod ganviTarebuli gadanacvlebis daZabulobis cvlileba) gansazRvravs FMD%-is mniSvnelobas. kvlevam aCvena Zlieri uaryofiTi korelacia reaqtiuli hiperemiis sapasuxod ganviTarebul gadanacvlebis daZabulobis cvlilebasa da FMD%-s Soris rogorc sakontrolo, ise hipertenziul individebSi (r=-0.907, P=0.000 da r=-0.977, P=0.000; Sesabamisad). korelacia inicialuri gadanacvlebis daZabulobasa da FMD%-s Soris arasarwmuno aRmoCnda. msgavs Sedegebamde mividnen Niebauer et al. [388]. Sesabamisad, Cven SegviZlia davaskvnaT, rom endoTelium-damokidebuli vazodilatacia damokidebulia gadanacvlebis daZabulobis absolutur cvlilebaze.

bolo wlebSi arteriuli wnevis cirkaduli profilis Seswavla klinikuri da prevenciuli hipertenziis erT-erT prioritetul mimarTulebad Camoyalibda. Dolan et al. [200] saSualod 8.4 wliani sikvdilis gamosavlis prospeqtuli kvleviT, romelSic CarTuli iyo 5292 aranamkurnalebi arteriuli hipertenziis mqone pacienti, daaskvnes rom kardiovaskuluri sikvdilobis prediqciis TvalsazrisiT arteriuli wnevis klinikur gazomvebTan SedarebiT upiratesoba arteriuli wnevis 24-saaTian ambulatoriul monitorirebas eniWeba, da meorec, Ramis wnevis done gamosavlis ZiriTadi prediqtoria. kvlevis Sedegad avtorebma gamoTqves azri, Ramis wnevis donis – rogorc, damoukidebeli risk-faqtoris arsebobis Sesaxeb. Metoki et al. [138], ohasamas 10.4 wliani prospeqtuli kvlevis farglebSi gamoavlines Ramis wnevis daqveiTebis arasrulfasovnebis zegavlena insultis ganviTarebis sixSireze. miuxedavad prospeqtuli kvlevebis simravlisa, praqtikulad Seuswavlelia arteriuli wnevis

cirkaduli profilis zegavlena mikro (hemoreologia) da makrocirkulaciaze (msxvili sisxlZarRvebis endoTeluri funqcia).

Sesabamisad, mocemuli kvlevis farglebSi, Cven SeviswavleT pacientTa hemoreologiuri kvleviTa da mxris arteriis dupleqs-skanirebiT miRebuli monacemebi aw-is sxvadasxva cirkaduli profilis mqone hipertenziul pacientebSi. unda aRiniSnos, rom arteriuli wnevisa da sisxlis reologiis Seswavla rogorc hipertenziul, ise saerTo populaciaSi ukiduresad iSviaTia. am mxriv Cveni kvlevis sagani garkveul novacias warmoadgens, gansakuTrebiT arteriuli wnevis cirkaduli profilis hemoreologiaze zegavlenis Seswavlis kuTxiT.

nondiper pacientebs diperebTan SedarebiT aReniSnaT ah-is ufro xangrZlivi anamnezi. rogorc 24-saaTiani sistoluri, ise 24-saaTiani diastoluri arteriuli wneva ufro maRali non-diper pacientebSi gamovlinda. msgavsi Sedegebi miiRes Higashi et al. [223] 20 diperi da 20 nondiperi hipertenziuli pacientis Seswavlisas. Sedegad Cven vaskvniT, rom nondiperi cirkaduli profilis CamoyalibebaSi garkveul rols TamaSobs ara mxolod ah-is arseboba, aramed ah-is xangrZlivoba anamnezSi da wnevis xarisxi.

diperi da nondiperi hipertenziuli pacientebis hemoreologiur parametrTa Sedarebam rogorc Mann-Whitney-s (ganawilebis Sedareba), ise Student's t Test-iT (saSualoTa Sedareba) aCvena, rom nondiper esenciuri hipertenziis mqone pirebs diper hipertenziul individebTan SedarebiT gaaCniaT hemoreologiur parametrTa statistikurad sarwmunod maRali maCveneblebi (P=0.000), rac udavod mianiSnebs rom esenciuri hipertenziis arteriuli wnevis nondiper cirkadul profilTan Serwymisas, proTrombozuli riski kidev ufro izrdeba da Sesabamisad sisxlZarRvovani garTulebebis ganviTarebis albaTobac.

Cvenma kvlevam gamoavlina, rom diperebs nondiperebTan SedarebiT gaaCniaT fibrinogenis koncentraciis sarwmunod dabali done (kerZod 3.36±0.23 diperebSi da 3.89±0.18 nondiperebSi, Sesabamisad). amasTan, Leigh General Practice Study-m [296] aCvena, rom hipertenziul pacientebs plazmuri fibrinogenis doniT >3,5 g/l gaaCndaT 12-jer ufro maRali

kardiovaskuluri riski hipertenziul individebTan SedarebiT, romelTa fibrinogenis plazmuri koncentracia naklebia 2,9g/l-ze. Sesabamisad, nondiper pacientebs diper hipertenziul individebTan SedarebiT gaaCniaT kardiovaskuluri garTulebebis ganviTarebis albaTobis sarwmunod maRali done.

hemoreologiur parametrTa albaTobiTi ganawilebis Seswavlam diper da nondiper hipertenziul pacientebSi gamoavlina, rom yvela hemoreologiuri parametri xasiaTdeba log-normaluri ganawilebiT, garda fibrinogenis koncentraciisa nondiper pacientebSi da plazmis siblantisa diperebSi, sadac es ukanaskneli konstantaa (1.51 erTeuli). nondiperebSi fibrinogenma aCvena lognormaluri da degeneraciuli ganawilebis Senarevi. aRniSnuli Cven avxseniT laborantis mier gazomvaTa Sedegebis xelovnuri diskretizaciiT.

mxris arteriis dupleqs-skanirebam gamoavlina endoTeliumis funqciuri mdgomareobis mkveTri diferenciacia arteriuli wnevis cirkaduli profilis mixedviT. msgavsi Sedegi iqna naCvenebi O'Brien et al. [132] mier. nondiper pacientebs aReniSnebodaT gamoxatulad dabali nakad-damokidebuli vazodilataciis procentuli maCvenebeli, iseve rogorc reaqtiuli hiperemiiT ganpirobebuli sisxlZarRvTa diametris absoluturi cvlileba. diperi hipertenziuli pacientebis saSualo FMD% maCvenebeli normis zRvarSi iyo ganTavsebuli (11.94±0.95), rac miuTiTebs nondiperi hipertenziuli pacientebis endoTeliumis funqciis seleqtiur dazianebaze. msgavs Sedegebamde mividnen Higashi et al. [223], romelTac aseve Seiswavles sisxlis wnevis cirkaduli profilis endoTeliumis funqciaze gavlena invaziuri pletizmografiis meTodis gamoyenebiT. am mxriv mniSvnelovania Scholze et al. [221] kvleva, sadac fotopletizmigrafiis gamoyenebiT gamovlinda sisxlZarRvTa tonusis cirkaduli variabeloba, kerZod, hipertenziul individebs kontrolis jgufisagan gansxvavebiT aReniSnebodaT sistemuri arteriuli tonusis mniSvnelovani zrda Ramis pirvel naxevarSi. amasTan, arteriuli wnevis cirkaduli profilTan mimarTebaSi Sedegebi ar ganxilula.

Cvens SemTxvevaSi, nondiper pacientTa sisxlZarRvis inicialuri diametri sarwmunod aRemateboda diperi pacientebis vaskularul diameters. rac kidev erTxel adasturebs mosazrebas imis Taobaze, rom rac ufro mcirea sisxlZarRvis diametri, miT ufro maRalia misi dilataciis unarianoba reaqtiuli hiperemiis sapasuxod da Sesabamisad, miT ufro SenarCunebula endoTeliumis funqcia.

diper hipertenziul pacientebSi ganviTarebuli hemoreologiuri da sisxlZarRvovani darRvevebi minimaluria da Seesabameba normotenziur individTa maCveneblebs. Cveni kvlevis monacemebze dayrdnobiT, hipertenziul pacientebSi garTulebaTa ganviTarebisaTvis wamyvani mniSvneloba arteriuli wnevis cirkaduli profilis darRvevas, kerZod nondiperi cirkaduli profilis arsebobas eniWeba. amasTan, ramdenadac hipertenziis dros adgili aqvs normaluri cirkaduli profilis paTologiuriT Canacvlebas, aRniSnuli SesaZloa warmoadgendes erTgvar axsnas hipertenziul individebSi gamovleni li cvlilebebisa.

diperi da nondiperi hipertenziuli pacientebis gadanacvlebis daZabulobis maCvenebeli praqtikulad ar gansxvavdeboda erTmaneTisagan (P=0.394). amasTan, gamovlinda maRali sarwmunoebis mqone gansxvaveba reaqtiuli hiperemiis sapasuxod ganviTarebul gadanacvlebis daZabulobis cvlilebas Soris sxvadasxva cirkaduli profilis mqone hipertenziul pacientebSi. aRniSnuli, kidev erTxel miuTiTebs gadanacvlebis daZabulobis cvlilebis mniSvnelobis upiratesobaze inicialur maCvenebelTan SedarebiT prognozuli TvalsazrisiT. aqve unda aRiniSnos, rom Cvens mier Catarebuli kvleva originaluria da msgavsi meTodologiiTa da mimarTulebiT kvleva garkveul novacias warmoadgens.

hemoreologiuri da sisxlZarRvTa endoTeliumismxrivi dazianebebis arseboba esenciuri hipertenziis mqone pacientebSi, miuTiTebs proTrombozul mdgomareobasa da sisxlZarRvovani garTulebebis ganviTarebis maRal riskze. hipertenziul pacientTa Seswavlam arteriuli wnevis cirkaduli profilis mixedviT dagvanaxa, rom arteriuli hipertenzia gansakuTrebulad “saSiSi” Trombozuli bunebis garTulebaTa ganviTarebis TvalsazrisiT mxolod misi nondiper cirkadul profilTan

Serwymisas xdeba. amasTan, arteriuli hipertenziis dros ganviTarebuli wnevis normaluri cirkaduli profilis paTologiuriT Canacvleba xsnis hipertenziis jgufSi gamovlenil hemoreologiur da sisxlZarRvovani darRvevebis ganviTarebis mizezs.

nondiperi profilis gavlenis Sesaswavlad hemoreologiasa da sisxlZarRvTa endoTeliumze, 74 gamokvleuli piri davyaviT 2 jgufad – diperebad da nondiperebad cirkaduli profilis mixedviT hipertenziis arsebobisagan damoukideblad. kvlevam gamoavlina, rom nondiper individebs diperebTan SedarebiT gaaCniaT ufro metad darRveuli hemoreologia. kerZod, nondiperebs aReniSnaT yvela hemoreologiuri maxasiaTeblis sarwmunod maRali done (P=0.000), garda eriTrocitebis deformadobisa, romelic sarwmunod maRali diper pacientebSi iyo. gansakuTrebiT aRsaniSnavia plazmis siblante, romelic diper individebSi konstanta iyo da Seadgenda 1.51 erTeuls, rac normad aris miCneuli. amasTan, unda aRiniSnos rom TviT normotenziul individebSic ki, wnevis cirkaduli profilisagan damoukideblad, plazmis siblantis saSualo maCvenebeli 1.54±0.04 erTeuls Seadgenda. plazmis siblante gansazRvravs sisxlis siblantes, romelic Tavis mxriv gadanacvlebis daZabulobis ganmsazRvrelia. am ukanasknelis mniSvnelobaze ki aris endoTelium-damokidebuli vazodilataciis maCveneblis sidide damokidebuli. mocemuli faqti kidev erTxel usvams xazs cirkaduli profilis gansakuTrebul mniSvnelobas proTrombozuli mdgomareobis Camoyalibebasi. nondiper individebs hemoreologiis msgavsad, statistikurad sarwmunod aReniSnaT endoTeliumis funqciuri darRveva. nakad-damokidebuli vazodilataciis saSualo maCvenebeli nondiper jgufSi Seadgenda 5.05±2.58 procents, gansxvavebiT diperebisagan, sadac FMD% 12.45±1.07 iyo. nondiperi pacientebis saSualo FMD% maCvenebeli (5.05±2.58), ufro dabali iyo ZiriTadi jgufis pacientebis FMD%-Tan (6.49±1.58) SedarebiT. mgavsad ZiriTadi jgufis individebisa, am SemTxvevaSic sisxlZarRvTa inicialuri diametri sarwmunod dabali diper pacientebs aReniSnaT. aseve, gansxvaveba nanaxi iqna gadanacvlebis daZabulobis cvlilebis indeqsSi, gadanacvlebis inicialur siCqaresa da mis cvlilebaSi. xolo, inicialuri gadanacvlebis daZabuloba

am or sakvlev populacias Soris ar gansxvavdeboda. aRniSnuli kidev erTjer adasturebs gadanacvlebis daZabulobis mniSvnelobis upiratesobas inicialur mniSvnelobasTan SedarebiT.

diperi da nondiperi pirebis hemoreologiurma kvlevam da sisxlZarRvTa dupleqs-skanirebam gamoavlina, rom nondiperi cirkaduli profili arteriuli wnevisagan damoukideblad zrdis proTrombozul risks da kardio-vaskuluri da cerebrovaskuluri garTulebebis ganviTarebis albaTobas. Sesabamisad, hipertenziuli da zogadad populaciis (hipertenziuli da normotenziuli) Seswavlam gamoavlina axali risk-faqtori – arteriuli wnevis darRveuli cirkaduli, anu nondiperi profili, romelic TavisTavad asocirdeba endoTeliumis mZime dazianebasTan da hemoreologiur darRvevebTan, rac Trombozis winapirobas warmoadgens.

arteriuli wnevis cirkaduli profilis prognozuli mniSvnelobis Seswavlis mizniT, Cven SeviswavleT nondiperi cirkaduli profilis mgrZnobeloba (sensitiuroba), specifikuroba da pozitiuri prognozuli maCvenebeli (PPV – positive prognostic value) hemoreologiur da sisxlZarRvovan darRvevebTan mimarTebaSi. ramdenadac hemoreologiuri darRvevebi qmnis proTrombozul mdgomareobas da SesaZloa ganxilul iqnas rogorc mosalodneli garTulebebis prediqtori, CvenTvis mniSvnelovani iyo cirkaduli profilis prognozuli mniSvnelobisa da mgrZnobeloba-specifikurobis gansazRvra am parametrebis mimarT.

arteriuli wnevis 24-sT monitorirebiT dadgenili cirkaduli profilis nondiperi varianti CaiTvala, rogorc testis pozitiuri Sedegi, Sesabamisad diperi – rogorc negatiuri. hemoreologiur parametrTa diqotomiuri dayofisas (pirobiTad, norma da paTologia), gamoiyeneboda mocemuli parametrisaTvis medianis maCvenebeli hipertenziuli da normotenziuli individebisaTvis. nondiperi cirkaduli profilis maRali pozitiuri prognozuli mniSvneloba rogorc janmrTel, ise hipertenziul individebSi dafiqsirda Trombocitebis agregaciuli aqtivobisa da FMD%-is mimarT. nondiper cirkadul profils upiratesad esenciuri hipertenziis mqone pacientebSi gaaCnda maRali sensitiuroba da pozitiuri prognozuli

mniSvneloba Trombocitebis adheziuri aqtivobis, eriTrocitebis agregaciis, fibrinigenis koncentraciis, plazmisa da sisxlis siblantisaTvis. Sesabamisad, hipertenziul individebSi nondiperi cirkaduli profilis gamovlenisas, arsebobs maRali albaToba hemoreologiuri da endoTeliumis funqciuri darRvevebis arsebobisa. sagulisxmoa is faqtic, rom nondiperi profili xasiaTdeboda maRali pozitiuri prediqtoruli mniSvnelobiT FMD%-sa da Trombocitebis agregaciis mimarT rogorc hipertenziul, ise normotenziul jgufSi.

arteriuli hipertenziis xangrZlivobis zegavlenis Sesaswavlad sisxlZarRvovani garTulebebis ganviTarebis procesze, hipertenziuli pacientebi davyaviT or jgufad. gamyof wertilad gamoviyeneT aw-is xangrZlivobis mediana, romelic 7 weli iyo. gamokvlevis Sedegebma aCvena, rom arteriuli wnevis xangrZlivoba dakavSirebulia hemoreologiur darRvevebTan, magram xasiaTdeba naklebi masStaburobiT. pacientebs 7 welze meti xangrZlivobis hipertenziis anamneziT, aReniSnaT Trombocitebisa da eriTrocitebis agregaciis, fibrinogenis koncentraciisa da plazmis siblantis sarwmunod maRali done ($P<0.05$). amasTan, sisxlZarRvTa dupleqs-skanirebam gansxvaveba endoTeliumis funqciur mdgomareobasTan mimarTebaSi ver gamoavlina. sawinaaRmdego Sedegi iqna miRebuli Hamasaki et al. [390] kvlevaSi, sadac avtorebma gamoavlines koronaruli arteriebis endoTeluri disfunqciis xarisxis damokidebuleba arteriuli wnevis xangrZlivobaze. aRniSnuli gansxvaveba SesaZloa aixsnas imiT, rom aRniSnuli avtorebi ikvlevdnen pacientebs parkuWTa hipertrofiiT, rac Cveni kvlevis sagans ar warmoadgenda. sarwmuno gansxvaveba gamoavlina mxolod endoTelium-damoukidebeli, anu nitratdamokidebuli vazodilataciis maCvenebelma. Sesabamisad, Cven SegviZlia davaskvnaT, rom arteriuli hipertenziis xangrZlivoba upiratesad zemoqmedebs sisxlZarRvTa medialur Sreze da iwvevs mis disfunqcias, rac Cvens SemTxvevaSi endoTelium-damoukidebeli vazodilataciis gauaresebiT, anu kunTovani Sris disfunqciiT ($7.81\pm1.33\%$) gamoixata.

kvlevis farglebSi Cven aseve SeviswavleT arteriuli wnevis xarisxis zegavlena sisxlis reologiasa da sisxlZarRvovan parametrebze. gamovlinda, rom aw-is xarisxi aranair zegavlenas ar axdens Trombocitul funqciaze. misi zegavlena hemoreologiaze eriTrocitebis agregaciuli aqtivobisa da sisxlis/plazmis siblantis zrdiT Semoifargla. am SemTxvevaSic, arteriuli wnevis xangrZlivobis msgavsad, zegavlena endoTeliumis funqciaze ar gamovlinda – FMD% da sisxlZarRvis diametris absoluturi cvlileba ganviTarebuli reaqtiuli hiperemiis sapasuxod ar aRmoCnda mniSvnelovnad gansxvavebuli am or jgufs Soris. gansxvavebiT Cveni Sedegebisagan, Houghton et al. [391] gamoavlines endoTeluri disfunqciisa da arteriuli wnevis simZimis kavSiri. aRniSnuli sxvaoba SesaZloa aixsnas kvlevaSi CarTvis kriteriumTa sxvaobiT, kerZod avtorebi ikvlevdnen gulis areSi tkivilis mqone (anamnezSi stenokardia an misi eqvivalenti) pacientebs. amas garda, pacientTa dajgufebisas wamyvani miokardiumis hipertrofiis arseboba/arарseboba iyo. amasTan, Cveni kolegebis msgavsad [391], Cvens SemTxvevaSic endoTelium-damoukidebeli vazodilataciis maCvenebeli sarwmunod dabali me-2 xarisxis hipertenziis mqone individebSi gamovlinda; rac mowmobs, rom wnevis xarisxic, xangrZlivobis msgavsad upiratesad sisxlZarRvTa kunTovan Sres azianebs da iwvevs mis disfunqcias.

hemoreologiaze endoTeliumis funqciuri zegavlenis Sesaswavlad, Cven hipertenziuli pacientebi davyaviT 2 jgufad, FMD%-is medianas mixedviT, romelic 7.5%-s Seadgenda. pacientebs endoTeliumis darRveuli funqciiT aReniSnaT sarwmunod maRali done hemoreologiuri maCveneblebisa, rac gazrdil proTrombozul statusze mianiSnebs. Cven aseve SeviswavleT mxris arteriis dupleqs-skanirebiT miRebuli sisxlZarRvovani maxasiaTeblebi hipertenziul pacientebSi 7.5%-ze meti da naklebi procentuli maCvenebliT. pacientebs dabali nakad-damokidebuli vazodilataciis maCvenebliT aReniSnaT mxris arteriis inicialuri diametris ufro maRali mniSvneloba. pacientebs, endoTeliumis SenarCunebuli funqciiT gaaCndaT endoTelium-damoukidebeli vazodilataciis sarwmunod maRali done, rac miuTiTebs kunTovani da

endoTeluri Sris paraleluri dazianebis arsebobaze ah-is dros. am SemTxvevaSic, jgufTaSorisi gansxvaveba inicialur gadanacvlebis daZabulobas Soris ar gamovlinda, gansxvavebiT reaqtiuli hiperemiis sapasuxod ganviTarebuli gadanacvlebis daZabulobis cvlilebisagan, romelic sarwmunod maRali endoTeliumis SenarCunebuli funqciis mqone pacientebSi gamovlinda. aRniSnuli xazs usvavs gadanacvlebis daZabulobis cvlilebis wamyvan mniSvnelobas endoTeliumis disfunqciis ganviTarebaSi.

ramdenadac, endoTeliumis funqciuri dazianeba da hemoreologiuri cvlilebebi - Trombocitebisa da eriTrocitebis agregadobis, plazmisa da sisxlis siblantis, iseve rogorc fibrinogenis koncentraciis, hematokritisa da Trombocitebis adheziurobis mateba – qmnis proTrombozul mdgomareobas da zrdis Trombozuli genezis sisxlZarRvovani garTulebebis ganviTarebis albaTobas, gansakuTrebuli yuradReba unda mieqces nondiperi cirkaduli profilis mqone hipertenziuli pacientebis da normotenziuli individebis gamovlenas, meTvalyureobas da Sesabamisi prevenciuli RonisZiebebis gatarebas.

daskvnebi

1. esenciuri hipertenziis pacientebSi non-diperi cirkaduli profilis sixSire sarwmunod maRalia, maSin rodesac janmrTel individebSi diperi cirkaduli profili prevalirebs.
2. esenciuri hipertenziis pacientebSi normotenziuli individebisagan gansxvavebiT dadginda eriTrocitebis agregaciis, Trombocitebis agregaciuli da adheziuri aqtivobis, fibrinogenis plazmuri koncentraciis, hematokritis donisa da plazmis siblantis sarwmunod maRali done, rac Tavis mxriv Trombogenezis maRal albaTobaze mianiSnebs.
3. garda mikrocirkulatoruli donisa, esenciuri hipertenziis mqone pacientebSi gamovlinda darRvevebi makrocirkulatorul – kunTovani tipis arteriebis donezec; kerZod, endoTelium-damokidebuli vazodilataciis saSualo maCvenebeli sarwmunod Seesabameboda endoTeliumis disfunqciur mdgomareobas.
4. dadginda sarwmunod maRali uaryofiTi korelacia erTis mxriv hemoreologiur parametrebsa da meores mxriv endoTelium-damokidebul da endoTelium-damoukidebel vazodilatacias Soris.
5. dadginda, rom esenciuri hipertenziis mqone pacientebSi xdeba diperi cirkaduli profilis non-diperi cirkaduli profiliT Canacvleba, romelTac diperisagan gansxvavebiT gaaCniaT ufro mkveTrad gamoxatuli hemoreologiuri darRvevebi da endoteliumis disfunqcia.
6. esenciuri hipertenziis mqone non-diperi pacientebi Rrma hemoreologiuri darRvevebisa da endoTeluri disfunqciis gamo unda ganixilebodes, rogorc sisxlZarRvovani garTulebebis ganviTarebis maRali riskis jgufi e.w. Ramis da dilis kritikuli saaTebis periodSi.
7. dadginda, rom arteriuli hipertenziis xangrZlivoba ar korelirebs endoTeliumis disfunqciis xarisxTan. amave dros gamovlinda daavadebis xangrZlivobisa da xarisxis korelacia sisxlZarRvTa kunTovani Sris disfunqciasTan..

8. hemoreologiur maxasiaTeblebze arteriuli wnevis xangrZlivobisa da xarisxis gavlenis SeswavliT Cven davadgineT, rom pacientebs II xarisxis esenciuri hipertenziiTa da 7 welze xangrZlivi anamneziT aReniSnebaT Trombocitebisa da eriTrocitebis agregaciuli aqtivobis, fibrinogenis raodenobisa da plazmis siblantis sarwmunod maRali done.
9. Cvens kvlevaSi ar gamovlinda sisxlZarRvTa endoTeliumis funqciuri darRvevis xarisxobrivi gansxvaveba arteriuli hipertenziis xangrZlivobisa da xarisxis mixedviT. amasTan, kunTovani disfunqcia ufro metad gamoxatuli arteriuli hipertenziis 7 welze meti xangrZlivobis anamnezisa da II xarisxis hipertenziis mqone pirebSi iyo.
10. kvlevam daadgina, rom non-diper pacientebs diperebTan SedarebiT aReniSnebaT arteriuli hipertenziis ufro marali xarisxi da xangrZlivi anamnezi. am jgufis pacientebSi reaqtiuli hiperemiis sapasuxo vazodilataciis absoluturi mniSvneloba 3-jer ufro naklebi iyo diper hipertenziul individebSi ganviTarebul vazodilataciasTan SedarebiT. amdenad, reaqtiuli hiperemiiT gamowveuli vazodilataciis gamokvleva miCneul unda iqnas sisxlZarRvTa reaqtiulobis stres-testad am jgufis kontingentSi.

Conclusions

1. Non-dipper circadian blood pressure profile is significantly frequent in patients with essential hypertension, while dipper circadian blood pressure profile is prevalent in normotensive individuals.
2. Different from the normotensive individuals, in patients with essential hypertension was established significantly higher levels of erythrocyte aggregability, platelet aggregative and adhesive activity, fibrinogen concentration, hematocrit level and plasma viscosity, which indicates on the high possibility of thrombogenesis.
3. Besides microcirculatory level, in patients with essential hypertension were appeared disturbances on the macrocirculatory – conduit artery – level; namely, mean value of endothelium-dependent vasodilatation was significantly correlated with the state of endothelial function.
4. There was established significantly high negative correlation between haemorheological parameters on the one hand and endothelium-dependent and endothelium-independent vaspodilatation on the other hand.
5. There was established, that in patients with essential hypertension dipper circadian blood pressure profile is replaced by non-dipper circadian profile, which in comparison with dippers has more sharply expressed haemorheological disorders and endothelial dysfunction.
6. Because of the deep haemorheological disturbances and endothelial dysfunction, patients with non-dipper essential hypertension have to be considered as the high risk group for development of vascular complications while critical hours period of night and morning.
7. It was established, that duration of arterial hypertension does not correlate with the stage of endothelial dysfunction. At the same time, there were appeared correlations between duration and stage of arterial hypertension and dysfunction of vascular musculature.
8. Via studying an action of the duration and stage of arterial hypertension on haemorheological indices we established, that patients with 2^{nd} stage of essential hypertension and duration more than 7 years have significantly higher platelet and erythrocyte aggregative activity, fibrinogen concentration and plasma viscosity level.
9. In our study there was not appeared difference in the endothelial dysfunction's degree according to the duration and stage of essential hypertension. Therefore, muscular dysfunction was more clearly appeared in hypertensive patients with 2^{nd} stage and duration more that 7 years.

10. Our study confirmed that non-dipper patients compared with dippers have higher stage of arterial hypertension and longer duration of it. In this group of patients absolute level of vasodilatatory response on reactive hyperemia test was 3-folds lower than it was in dipper hypertensive patients. Consequently, reactive hyperemia mediated vasodilatation have to be considered as an assessment stress-test of vascular reactivity in the contingent of this group.

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cxrili #1. 57 arasdros namkurnalebi hiperteziuli pacientisa da 17 janmrTeli kontrolis demografiuli da klinikuri maxasiaTeblebi.

maCvenebeli/jgufi	ah (n=57)	sakontrolo (n=17)	P
asaki (ww)	51.26±1.94	51±5.41	0.575
sqesi m/q	30m/27q	9m/8q	0.964
guliscemis sixSire (dartyma/wT)	75.7±2.09	74.71±2	0.601
24-sT awam			
24-sT saw mm Hg	131.61±3	98.47±1.85	***0.000***
24-sT daw mm Hg	80.31±2.32	59.18±2.62	***0.000***
24-sT pw mm Hg	48.95±1.75	41.15±3.99	***0.000***
dRis saw mm Hg	133.95±2.99	101.12±1.01	***0.000***
dRis daw mm Hg	84.58±4.36	61.35±2.27	***0.000***
dRis pw mm Hg	49.79±1.9	39.5±1.63	***0.000***
Ramis saw mm Hg	123.1±3.16	91.35±4.53	***0.000***
Ramis daw mm Hg	73.64±2.42	52.24±2.98	***0.000***
Ramis pw mm Hg	47.05±1.63	39.25±1.99	***0.000***
adreuli dilis saS. saw	138.63±3.09	98.12±1.83	***0.000***
adreuli dilis saS. daw	85.83±2.04	58.41±2.77	***0.000***
diperi/non-diperi profili	37dip/20ndip	11dip/6ndip	***0.014***

yvela monacemi mocemulia, rogorc saSualo±SD. A
ah = arteriuli hipertenzia; saw = sistoluri arteriuli wneva;
awam = arteriuli wnevis ambulatoriuli monitoringi;
daw = diastoluri arteriuli wneva; pw = pulsuri wneva.

cxrili #2. arteriuli wnevis ambulatoriuli monitorirebiT miRebuli Sedegebi janmrTel da hipertenziul individebSi.

maCvenebeli/jgufi	ZiriTadi (ah) (n=57)	sakontrolo (n=17)	P
24-sT awam			
dRis minimaluri saw.	109.53±2.93	82.82±2.04	***0.000***
dRis maqsimaluri saw.	166.49±3.8	131.65±2.77	***0.000***
dRis minimaluri daw.	61.65±2.57	41.71±1.87	***0.000***
dRis maqsimaluri daw.	101.12±2.92	77.82±1.86	***0.000***
Ramis minimaluri saw.	104.26±3.35	76.18±5.23	***0.000***
Ramis maqsimaluri saw.	148.47±4.7	105.88±4.71	***0.000***
Ramis minimaluri daw.	62.65±2.75	42.35±2.89	***0.000***
Ramis maqsimaluri daw.	87.32±3.12	60.59±3.19	***0.000***
24-sT. saSualo saw.	131.61±3	98.47±1.85	***0.000***
24-sT. saSualo daw.	80.31±2.32	59.18±2.62	***0.000***
24-sT. saSualo gcs (dartyma/wT)	75.7±2.09	74.71±2	0.601
24-sT. pw.	48.95±1.75	41.15±3.99	***0.000***
dRis saSualo saw.	133.95±2.99	101.12±1.01	***0.000***
dRis saSualo daw.	84.58±4.36	61.35±2.27	***0.000***
dRis saSualo pw.	49.79±1.9	39.5±1.63	***0.000***
dRis saSualo gcs (dartyma/wT)	79.74±2.46	74.88±2.31	0.056
Ramis saSualo saw.	123.1±3.16	91.35±4.53	***0.000***
Ramis saSualo daw.	73.64±2.42	52.24±2.98	***0.000***
Ramis saSualo gcs (dartyma/wT)	65.86±1.72	64.76±2.39	0.446
Ramis saSualo pw.	47.05±1.63	39.25±1.99	***0.000***
adreuli dilis saS. saw.	138.63±3.09	98.12±1.83	***0.000***
adreuli dilis saS. daw.	85.83±2.04	58.41±2.77	***0.000***
adreuli dilis saS. gcs (dartyma/wT)	79.26±2.46	71.94±2.37	***0.000***

yvela monacemi mocemulia, rogorc saSualo±SD. A
awam = arteriuli wnevis ambulatoriuli monitoringi;
ah = arteriuli hipertenzia. saw = sistoluri arteriuli wneva;
daw = diastoluri arteriuli wneva; pw = pulsuri wneva;
gcs = gulis cemis sixSire.

cxrili #3. sisxlis reologiuri maCveneblebi janmrTel da hipertenziul individebSi.

maCvenebeli/jgufi	ZiriTadi (ah) (n=57)	sakontrolo (n=17)	P
Tr. raodenoba (?10^3/mm^3)	191.64±7.02	191.06±13.06	0.892
Tr. agregaciuli aqtivoba (%)	97.68±2.42	87.18±4.67	***0.000***
Tr. adheziuri aqtivoba (%)	40.8±3.31	28.35±3.89	***0.000***
fibrinogenis koncentracia (g/l)	3.71±0.15	2.97±0.29	***0.000***
hematokriti (%)	40.28±0.6	38.24±0.94	***0.001***
er. agregaciuli aqtivoba (%)	27.2±3.71	14.59±3.78	***0.000***
er. deformacia	2.66±0.21	3.14±0.12	***0.010***
plazmis siblante (erTeulebSi)	1.75±0.07	1.54±0.04	***0.002***
sisxlis siblante	0.76±0.03	0.7±0.03	0.086

Tr. = Trombocitebi; er. = eriTrocitebi.

cxrili #4. mxris arteriis dupleqs-skanirebis maCveneblebi janmrTel da hipertenziul individebSi.

maCvenebeli/jgufi	ZiriTadi (ah) (n=57)	sakontrolo (n=17)	P
nakad-damokidebuli dilatacia, FMD %	6.49±1.58	13.73±1.21	***0.000***
sisxlZarRvis diametri, sm			
sawyisi, D_0	4.12±0.14	3.96±0.28	0.217
RHtest-is Semdeg, D_1	4.37±0.14	4.5±0.31	0.571
RHtest-iT ganpirobebuli cvlileba, ΔD	0.25±0.06	0.54±0.04	***0.000***
nitroglicerinis s/l miRebis Semdgom, NG-D	4.52±0.16	4.51±0.36	0.877
nitrat-damokidebuli dilatacia, NG-MD %	9.83±1.04	13.66±1.39	***0.000***
sisxlis nakadis siCqare sm/wm			
sawyisi, V_0	86.17±2.75	86.69±3.45	0.753
RHtest-is Semdgom, V_1	81.19±2.98	77.03±1.99	0.059
RHtest-iT ganpirobebuli cvlileba, ΔV	-4.98±1.63	-9.67±2.28	***0.002***
gadanacvlebis daZabuloba, T			
sawyisi, T_0	6.21±0.3	5.86±0.39	0.429
RHtest-is Semdgom, T_1	5.86±0.32	5.15±0.32	***0.042***
RHtest-iT ganpirobebuli cvlileba, ΔT	-0.35±0.09	-0.71±0.09	***0.000***
gadanacvlebis siCqare, γ			
sawyisi, γ_0	834.04±50.47	846.07±78.27	0.550
RHtest-is Semdgom, γ_1	782.45±44.61	742.97±64.93	0.625
Rhtest-iT ganpirobebuli cvlileba, $\Delta\gamma$	-51.58±14.13	-103.1±15.82	***0.001***

cxrili #5. korelacia sisxlis hemoreologiur maxasiaTeblebsa da mxris arteriis dupleqs-skanirebiT miRebul parametrebs Soris ZiriTadi jgufis individebSi.

korelacia/p		Tr. raodenoba	Tr. agregac %	Tr. adhezia %	fibrinogeni	hematokriti %	er. aggregac. %	er. deformacia	plazmis siblante	sisxlis siblante
r	FMD %	-0.390	-0.557	-0.667	-0.348	-0.599	-0.598	0.223	-0.713	-0.600
P		***0.003***	***0.000***	***0.000***	***0.008***	***0.000***	***0.000***	0.096	***0.000***	***0.000***
r	D0	-0.036	0.369	0.282	0.234	0.377	0.291	-0.284	0.270	0.518
P		0.790	***0.005***	***0.034***	0.079	***0.004***	***0.028***	***0.032***	***0.042***	***0.000***
r	D1	-0.219	0.148	0.003	0.101	0.131	0.037	-0.206	-0.032	0.295
P		0.102	0.273	0.981	0.455	0.333	0.784	0.124	0.814	***0.026***
r	ΔD	-0.401	-0.520	-0.639	-0.314	-0.575	-0.585	0.195	-0.690	-0.535
P		***0.002***	***0.000***	***0.000***	***0.017***	***0.000***	***0.000***	0.146	***0.000***	***0.000***
r	NG-D	-0.142	0.240	0.146	0.130	0.295	0.155	-0.261	0.144	0.415
P		0.293	0.072	0.280	0.337	***0.026***	0.249	0.050	0.287	***0.001***
r	NG-MD %	-0.389	-0.483	-0.504	-0.400	-0.313	-0.522	0.085	-0.484	-0.384
P		***0.003***	***0.000***	***0.000***	***0.002***	***0.018***	***0.000***	0.530	***0.000***	***0.003***
r	V0	-0.065	-0.272	-0.311	-0.314	-0.441	-0.310	0.259	-0.388	-0.637
P		0.628	***0.040***	***0.019***	***0.017***	***0.001***	***0.019***	0.052	***0.003***	***0.000***
r	V1	0.081	-0.013	-0.087	-0.171	-0.208	0.057	0.151	-0.125	-0.440
P		0.549	0.926	0.521	0.204	0.120	0.675	0.263	0.354	***0.001***
r	ΔV	0.258	0.437	0.366	0.218	0.364	0.627	-0.161	0.426	0.271
P		0.052	***0.001***	***0.005***	0.103	***0.005***	***0.000***	0.231	***0.001***	***0.041***
r	T0	0.289	0.084	0.145	0.007	-0.086	0.124	0.154	0.400	0.083
P		***0.029***	0.535	0.283	0.957	0.525	0.358	0.253	***0.002***	0.541
r	T1	0.376	0.232	0.323	0.095	0.100	0.288	0.084	0.582	0.259
P		***0.004***	0.083	***0.014***	0.482	0.460	***0.030***	0.532	***0.000***	0.052
r	ΔT	0.356	0.513	0.627	0.294	0.601	0.577	-0.198	0.697	0.607
P		***0.007***	***0.000***	***0.000***	***0.026***	***0.000***	***0.000***	0.141	***0.000***	***0.000***
r	γ0	-0.010	-0.291	-0.270	-0.299	-0.400	-0.250	0.286	-0.304	-0.601
P		0.939	***0.028***	***0.042***	***0.024***	***0.002***	0.061	***0.031***	***0.022***	***0.000***
r	γ1	0.099	-0.154	-0.102	-0.228	-0.259	-0.094	0.252	-0.116	-0.467
P		0.465	0.254	0.450	0.088	0.051	0.485	0.058	0.391	***0.000***
r	Δγ	0.349	0.555	0.642	0.349	0.612	0.594	-0.226	0.719	0.673
P		***0.008***	***0.000***	***0.000***	***0.008***	***0.000***	***0.000***	0.090	***0.000***	***0.000***

pirsonis korelacia (Pearson Correlation) = r
sarwmunoebis maCvenebeli = P

cxrili #6. korelacia hemoreologiur maxasiaTeblebsa da mxris arteriis dupleqs-skanirebiT miRebul parametrebs Soris sakontrolo jgufis individebSi.

korelacia/P		Tr. Raodenoba	Tr. agregac %	Tr. adhezia %	fibrinogeni	hematokriti %	er. aggregac. %	er. deformacia	plazmis siblante	sisxlis siblante
r	FMD %	0.172	0.603	0.412	0.198	-0.164	0.049	-0.108	-0.059	-0.256
P		0.509	***0.010***	0.100	0.447	0.528	0.852	0.679	0.821	0.321
r	D0	-0.175	-0.109	0.135	0.425	0.459	0.628	-0.381	0.524	0.864
P		0.500	0.677	0.606	0.089	0.064	***0.007***	0.132	***0.031***	***0.000***
r	D1	-0.160	-0.031	0.202	0.476	0.454	0.673	-0.416	0.548	0.881
P		0.539	0.906	0.436	0.053	0.067	***0.003***	0.097	***0.023***	***0.000***
r	ΔD	0.017	0.488	0.537	0.566	0.199	0.627	-0.435	0.430	0.552
P		0.949	***0.047***	***0.026***	***0.018***	0.444	***0.007***	0.081	0.085	***0.022***
r	NG-D	-0.199	-0.082	0.143	0.394	0.439	0.640	-0.361	0.534	0.879
P		0.443	0.755	0.584	0.117	0.078	***0.006***	0.154	***0.027***	***0.000***
r	NG-MD %	-0.247	0.012	0.058	0.058	0.158	0.425	-0.061	0.371	0.660
P		0.339	0.963	0.825	0.826	0.544	0.089	0.816	0.142	***0.004***
r	V0	0.258	-0.103	-0.144	-0.472	-0.526	-0.610	0.580	-0.558	-0.824
P		0.317	0.694	0.581	0.055	***0.030***	***0.009***	***0.015***	***0.020***	***0.000***
r	V1	0.239	0.077	-0.024	-0.348	-0.392	-0.258	0.390	-0.069	-0.385
P		0.356	0.769	0.928	0.172	0.120	0.318	0.121	0.793	0.127
r	ΔV	-0.182	0.223	0.197	0.411	0.454	0.697	-0.537	0.783	0.910
P		0.484	0.391	0.448	0.101	0.067	***0.002***	***0.026***	***0.000***	***0.000***
r	T0	0.207	0.172	-0.041	-0.402	-0.508	-0.495	0.348	-0.335	-0.695
P		0.424	0.509	0.876	0.110	***0.037***	***0.043***	0.172	0.189	***0.002***
r	T1	0.189	0.074	-0.120	-0.474	-0.525	-0.541	0.397	-0.347	-0.699
P		0.467	0.778	0.646	0.054	***0.030***	***0.025***	0.115	0.172	***0.002***
r	ΔT	-0.225	-0.475	-0.242	0.064	0.339	0.230	-0.102	0.220	0.531
P		0.386	0.054	0.349	0.809	0.183	0.375	0.698	0.396	***0.028***
r	γ0	0.196	0.173	-0.057	-0.410	-0.433	-0.539	0.384	-0.464	-0.840
P		0.451	0.507	0.828	0.102	0.083	***0.026***	0.128	0.060	***0.000***
r	γ1	0.184	0.100	-0.115	-0.464	-0.442	-0.576	0.425	-0.481	-0.852
P		0.480	0.702	0.659	0.061	0.075	***0.016***	0.089	0.051	***0.000***
r	Δγ	-0.216	-0.443	-0.193	0.124	0.325	0.305	-0.159	0.322	0.659
P		0.406	0.075	0.459	0.635	0.203	0.233	0.542	0.207	***0.004***

pirsonis korelacia (Pearson Correlation) = r
sarwmunoebis maCvenebeli = P

cxrili #7a. korelacia sisxlis hemoreologiur maxasiaTeblebsa da arteriuli wnevis 24-sT-iani monitorirebis monacemebs Soris sakontrolo jgufis individebSi.

korelacia/P		min. saw - dRe	maqs. saw - dRe	min. daw - dRe	maqs. daw - dRe	min. saw - Rame	maqs. saw - Rame	min. daw - Rame	maqs. daw - Rame	24-sT. saS. saw	24-sT. saS. daw	24-sT. saS. gcs	24-sT pw
r	Tr. raodenoba	-0.185	-0.022	-0.221	0.102	-0.374	-0.303	-0.029	0.061	-0.014	0.192	0.315	-0.458
P		0.478	0.933	0.393	0.698	0.139	0.237	0.913	0.817	0.958	0.460	0.219	0.064
r	Tr. agregac %	0.167	-0.410	-0.195	-0.444	0.328	0.313	0.122	-0.035	-0.047	-0.351	-0.197	0.048
P		0.522	0.102	0.453	0.074	0.198	0.221	0.640	0.893	0.859	0.167	0.449	0.856
r	Tr. adhezia %	-0.062	-0.342	0.161	-0.501	0.441	0.246	0.320	-0.125	-0.258	-0.443	-0.507	-0.010
P		0.812	0.180	0.537	***0.040***	0.077	0.341	0.210	0.634	0.318	0.075	***0.038***	0.969
r	fibrinogeni	-0.016	-0.257	0.221	-0.093	0.350	0.291	0.266	0.032	0.038	-0.052	-0.496	-0.133
P		0.951	0.320	0.394	0.722	0.168	0.256	0.303	0.904	0.886	0.844	0.043	0.612
r	hematokriti %	0.404	-0.220	0.115	0.120	0.379	0.511	0.242	0.291	0.336	0.197	-0.184	-0.268
P		0.108	0.396	0.660	0.646	0.134	***0.036***	0.350	0.257	0.188	0.448	0.480	0.299
r	er. aggregac. %	0.203	-0.589	0.297	-0.148	0.839	0.601	0.722	0.348	0.207	-0.003	-0.482	-0.049
P		0.435	***0.013***	0.247	0.570	***0.000***	***0.011***	***0.001***	0.171	0.426	0.991	0.050	0.851
r	er. deformacia	-0.424	0.533	0.000	-0.006	-0.459	-0.509	-0.409	-0.427	-0.321	-0.194	0.190	-0.095
P		0.090	***0.028***	0.999	0.983	0.064	***0.037***	0.103	0.088	0.209	0.457	0.466	0.716
r	plazmis siblante	0.119	-0.508	0.161	-0.084	0.565	0.375	0.506	0.284	0.215	0.061	-0.358	-0.036
P		0.649	***0.037***	0.536	0.749	***0.018***	0.138	***0.038***	0.269	0.408	0.815	0.158	0.892
r	sisxlis siblante	0.201	-0.425	0.489	0.235	0.770	0.523	0.762	0.510	0.405	0.352	-0.460	0.231
P		0.439	0.089	0.046	0.365	***0.000***	***0.031***	***0.000***	***0.037***	0.107	0.166	0.063	0.373

cxrili #7b. korelacia sisxlis hemoreologiur maxasiaTeblebsa da arteriuli wnevis 24-saaTiani monitorirebis monacemebs Soris sakontrolo jgufis individebSi.

korelacia/P		saS. saw - dRe	saS. daw - dRe	saS. pw - dRe	saS. gcs - dRe	saS. saw - Rame	saS. daw - Rame	saS. gcs - Rame	saS. pw - Rame	adreuli dilis saw.	adreuli dilis daw.	adreuli dilis gcs.
r	Tr. raodenoba	0.134	0.293	-0.496	-0.362	-0.288	-0.048	-0.011	-0.454	-0.561	-0.044	-0.446
P		0.607	0.254	***0.043***	0.154	0.263	0.854	0.967	0.067	***0.019***	0.865	0.073
r	Tr. agregac %	-0.558	-0.561	0.557	-0.010	0.272	0.010	0.293	0.583	0.189	-0.330	0.556
P		***0.020***	***0.019***	***0.020***	0.969	0.291	0.970	0.254	***0.014***	0.467	0.196	***0.021***
r	Tr. adhezia %	-0.639	-0.600	0.542	0.084	0.259	-0.013	0.195	0.616	0.189	-0.240	0.384
P		***0.006***	***0.011***	***0.025***	0.748	0.316	0.959	0.454	***0.008***	0.467	0.353	0.128
r	fibrinogeni	-0.386	-0.194	-0.034	-0.087	0.324	0.172	-0.073	0.453	0.186	0.207	-0.060
P		0.126	0.457	0.896	0.741	0.204	0.509	0.780	0.068	0.474	0.425	0.819
r	hematokriti %	-0.026	0.098	-0.033	-0.042	0.485	0.391	0.007	0.458	0.285	0.295	-0.095
P		0.922	0.709	0.898	0.872	***0.048***	0.120	0.979	0.065	0.267	0.250	0.717
r	er. aggregac. %	-0.312	-0.224	0.294	-0.167	0.735	0.512	0.424	0.847	0.229	0.131	0.220
P		0.222	0.386	0.253	0.523	***0.001***	***0.036***	0.090	***0.000***	0.376	0.617	0.395
r	er. deformacia	0.100	0.003	0.073	0.437	-0.564	-0.474	-0.278	-0.532	-0.121	-0.207	0.002
P		0.704	0.990	0.781	0.080	***0.018***	0.055	0.280	***0.028***	0.642	0.426	0.993
r	plazmis siblante	-0.278	-0.099	0.009	-0.317	0.552	0.394	0.244	0.621	0.012	0.109	-0.021
P		0.281	0.706	0.974	0.214	***0.022***	0.117	0.345	***0.008***	0.964	0.678	0.935
r	sisxlis siblante	-0.026	0.182	-0.194	-0.324	0.756	0.670	0.295	0.654	0.090	0.468	-0.213
P		0.921	0.485	0.455	0.205	***0.000***	***0.003***	0.250	***0.004***	0.730	0.058	0.411

cxrili #8ª. korelacia sisxlis hemoreologiur maxasiaTeblebsa da arteriuli wnevis 24-sT-iani monitorirebis monacemebs Soris ZiriTadi jgufis individebSi.

korelacia/P		min. saw - dRe	maqs. saw - dRe	min. daw - dRe	maqs. daw - dRe	min. saw - Rame	maqs. saw - Rame	min. daw - Rame	maqs. daw - Rame	24-sT. saS. saw	24-sT. saS. daw	24-sT. saS. gcs	24-sT pw
r	Tr. raodenoba	0.001	0.223	-0.027	0.126	0.123	0.099	-0.003	0.080	0.041	0.091	0.108	0.145
P		0.994	0.095	0.841	0.351	0.362	0.464	0.981	0.553	0.762	0.503	0.424	0.281
r	Tr. agregac %	-0.056	0.233	0.003	0.362	0.498	0.431	0.187	0.479	0.195	0.301	-0.340	0.130
P		0.680	0.081	0.985	***0.006***	***0.000***	***0.001***	0.165	***0.000***	0.145	***0.023***	***0.010***	0.335
r	Tr. adhezia %	-0.172	0.177	-0.157	0.168	0.351	0.336	0.073	0.393	0.027	0.144	-0.236	0.195
P		0.201	0.188	0.244	0.213	***0.007***	***0.011***	0.588	***0.003***	0.843	0.285	0.077	0.145
r	fibrinogeni g/l	0.121	0.070	0.155	0.020	0.334	0.373	0.003	0.101	0.091	0.100	-0.124	0.173
P		0.369	0.607	0.249	0.881	***0.011***	0.004	0.982	0.456	0.500	0.459	0.356	0.198
r	hematokriti %	0.119	0.119	0.190	0.179	0.235	0.120	-0.021	0.362	0.095	0.153	-0.114	0.052
P		0.378	0.379	0.157	0.182	0.078	0.372	0.877	***0.006***	0.482	0.256	0.399	0.703
r	er. aggregac. %	0.195	0.232	0.255	0.207	0.372	0.413	0.006	0.362	0.231	0.222	-0.186	0.231
P		0.145	0.083	0.056	0.121	***0.004***	***0.001***	0.964	***0.006***	0.083	0.097	0.167	0.084
r	er. deformacia	-0.107	-0.038	-0.106	-0.231	-0.159	-0.249	-0.150	-0.203	-0.057	-0.240	-0.317	0.114
P		0.429	0.779	0.431	0.084	0.237	0.062	0.265	0.129	0.674	0.072	***0.016***	0.399
r	plazmis siblante	0.185	0.263	0.223	0.264	0.447	0.429	0.141	0.486	0.279	0.344	-0.245	0.165
P		0.169	***0.048***	0.096	***0.047***	***0.000***	***0.001***	0.295	***0.000***	***0.035***	0.009	0.066	0.220
r	sisxlis siblante	0.222	0.256	0.312	0.326	0.538	0.521	0.249	0.586	0.401	0.488	-0.323	0.110
P		0.097	0.055	***0.018***	***0.013***	***0.000***	***0.000***	0.062	***0.000***	***0.002***	***0.000***	***0.014***	0.416

cxrili #8[b]. korelacia sisxlis hemoreologiur maxasiaTeblebsa da arteriuli wnevis 24-saaTiani monitorirebis monacemebs Soris ZiriTadi jgufis individebSi.

korelacia/P		saS. saw - dRe	saS. daw - dRe	saS. pw - dRe	saS. gcs - dRe	saS. saw - Rame	saS. daw - Rame	saS. gcs - Rame	saS. pw - Rame	adreuli dilis saw.	adreuli dilis daw.	adreuli dilis gcs.
r	Tr. raodenoba	-0.039	0.257	0.118	0.167	0.130	0.141	0.131	0.253	-0.105	0.003	-0.079
P		0.773	0.053	0.382	0.214	0.334	0.296	0.331	0.058	0.438	0.983	0.559
r	Tr. agregac %	0.186	0.080	0.015	-0.212	0.368	0.359	-0.204	0.243	0.287	0.490	-0.096
P		0.166	0.555	0.911	0.114	***0.005***	***0.006***	0.128	0.069	***0.031***	***0.000***	0.476
r	Tr. adhezia %	0.054	0.065	0.106	-0.107	0.179	0.188	-0.132	0.200	0.116	0.230	-0.013
P		0.688	0.632	0.431	0.428	0.183	0.161	0.327	0.136	0.389	0.086	0.925
r	fibrinogeni g/l	0.080	0.025	0.076	-0.116	0.300	0.168	-0.048	0.275	0.011	-0.018	-0.072
P		0.553	0.855	0.573	0.390	***0.023***	0.212	0.723	***0.039***	0.937	0.894	0.596
r	hematokriti %	0.203	-0.095	-0.057	-0.079	0.138	0.190	-0.113	0.064	0.157	0.317	0.114
P		0.129	0.483	0.674	0.557	0.307	0.156	0.401	0.639	0.243	***0.016***	0.397
r	er. aggregac. %	0.324	0.052	0.096	-0.136	0.399	0.298	-0.044	0.214	0.314	0.292	-0.061
P		***0.014***	0.702	0.479	0.313	***0.002***	***0.024***	0.746	0.110	***0.018***	***0.027***	0.652
r	er. deformacia	-0.023	-0.168	0.180	-0.278	-0.183	-0.258	-0.405	-0.070	0.215	-0.023	-0.118
P		0.867	0.212	0.181	***0.036***	0.174	0.052	***0.002***	0.607	0.108	0.864	0.383
r	plazmis siblante	0.317	0.082	0.079	-0.159	0.349	0.358	-0.174	0.274	0.219	0.318	-0.151
P		***0.016***	0.544	0.559	0.238	***0.008***	***0.006***	0.194	***0.039***	0.102	***0.016***	0.261
r	sisxlis siblante	0.419	0.143	0.022	-0.236	0.462	0.467	-0.189	0.276	0.284	0.433	-0.225
P		***0.001***	0.288	0.869	0.078	***0.000***	***0.000***	0.159	***0.038***	***0.032***	***0.001***	0.092

cxrili #9[a]. korelacia mxris arteriis ultrasonografiul maxasiaTeblebsa da arteriuli wnevis ambulatoriuli monitoringiT miRebul parametrebs Soris ZiriTadi jgufis pacientebSi.

korelacia/P		min. saw - dRe	maqs. saw - dRe	min. daw - dRe	maqs. daw - dRe	min. saw - Rame	maqs. saw - Rame	min. daw - Rame	maqs. daw - Rame	24-sT. saS. saw	24-sT. saS. daw	24-sT. saS. gcs	24-sT pw
r	FMD %	-0.086	-0.171	-0.138	-0.201	-0.391	-0.320	-0.036	-0.402	-0.132	-0.247	0.224	-0.152
P		0.522	0.203	0.304	0.133	***0.003***	***0.015***	0.791	***0.002***	0.329	0.064	0.094	0.258
r	D0	0.144	0.228	0.301	0.363	0.511	0.345	0.158	0.501	0.383	0.431	-0.306	0.109
P		0.285	0.089	***0.023***	***0.006***	***0.000***	***0.009***	0.240	***0.000***	***0.003***	***0.001***	***0.021***	0.420
r	ΔD	-0.103	-0.123	-0.147	-0.162	-0.341	-0.293	-0.050	-0.366	-0.088	-0.209	0.184	-0.135
P		0.446	0.361	0.277	0.228	***0.009***	***0.027***	0.710	***0.005***	0.514	0.118	0.170	0.316
r	NG-MD %	0.016	-0.338	0.070	-0.276	-0.240	-0.421	0.050	-0.213	-0.155	-0.157	0.071	-0.246
P		0.908	***0.010***	0.603	***0.038***	0.073	***0.001***	0.713	0.112	0.250	0.242	0.598	0.065
r	V0	-0.236	-0.065	-0.377	-0.191	-0.348	-0.316	-0.209	-0.475	-0.302	-0.429	0.206	0.165
P		0.077	0.631	***0.004***	0.155	***0.008***	***0.017***	0.119	***0.000***	***0.023***	***0.001***	0.124	0.221
r	ΔV	0.146	0.254	0.133	0.193	0.333	0.253	-0.069	0.215	0.149	0.139	-0.036	0.251
P		0.279	0.057	0.324	0.150	***0.011***	0.058	0.610	0.109	0.268	0.301	0.788	0.059
r	T0	-0.046	0.098	-0.159	-0.048	-0.046	0.043	-0.044	-0.110	-0.102	-0.135	0.056	0.170
P		0.734	0.467	0.239	0.724	0.736	0.753	0.747	0.416	0.451	0.315	0.680	0.207
r	ΔT	0.111	0.220	0.160	0.199	0.403	0.310	0.010	0.401	0.175	0.263	-0.218	0.147
P		0.412	0.100	0.236	0.138	***0.002***	***0.019***	0.939	***0.002***	0.192	***0.048***	0.104	0.277
r	γ0	-0.183	-0.112	-0.320	-0.249	-0.402	-0.326	-0.158	-0.464	-0.341	-0.426	0.267	0.061
P		0.172	0.407	***0.015***	0.062	***0.002***	***0.013***	0.242	***0.000***	***0.009***	***0.001***	***0.045***	0.651
r	Δγ	0.116	0.222	0.173	0.230	0.440	0.357	0.036	0.443	0.211	0.311	-0.252	0.130
P		0.390	0.097	0.199	0.086	***0.001***	***0.006***	0.790	***0.001***	0.114	***0.018***	0.059	0.333

r = Pirson-is korelaciis maCvenebeli; P = statistikuri sarwmunoebis maCvenebeli.

cxrili #9[b]. korelacia sisxlis hemoreologiur maxasiaTeblebsa da arteriuli wnevis 24-sT-iani monitorirebis monacemebs Soris ZiriTadi jgufis individebSi.

korelacia/p		saS. saw - dRe	saS. daw - dRe	saS. pw - dRe	saS. gcs - dRe	saS. saw - Rame	saS. daw - Rame	saS. gcs - Rame	saS. pw - Rame	adreuli dilis saw.	adreuli dilis daw.	adreuli dilis gcs.
r	FMD %	-0.206	-0.044	-0.047	0.173	-0.341	-0.339	0.004	-0.317	-0.201	-0.289	0.060
P		0.124	0.743	0.727	0.198	***0.009***	***0.010***	0.976	***0.016***	0.134	***0.029***	0.656
r	D0	0.441	0.062	0.003	-0.286	0.469	0.419	-0.128	0.288	0.343	0.518	-0.074
P		***0.001***	0.649	0.982	***0.031***	***0.000***	***0.001***	0.342	***0.030***	***0.009***	***0.000***	0.584
r	ΔD	-0.147	-0.065	-0.037	0.142	-0.307	-0.307	-0.023	-0.302	-0.174	-0.241	0.034
P		0.275	0.629	0.785	0.292	***0.020***	***0.020***	0.865	***0.023***	0.195	0.071	0.803
r	NG-MD %	-0.219	-0.037	-0.154	0.043	-0.181	-0.128	-0.024	-0.318	-0.110	-0.079	0.058
P		0.102	0.785	0.254	0.749	0.179	0.344	0.861	***0.016***	0.413	0.560	0.671
r	V0	-0.355	-0.046	0.246	0.178	-0.341	-0.435	-0.008	0.060	-0.177	-0.436	0.080
P		***0.007***	0.733	0.065	0.186	***0.010***	***0.001***	0.952	0.660	0.187	***0.001***	0.556
r	ΔV	0.237	-0.013	0.162	-0.091	0.327	0.242	0.158	0.359	0.134	0.255	0.025
P		0.075	0.922	0.230	0.503	***0.013***	0.070	0.242	***0.006***	0.320	0.056	0.851
r	T0	-0.157	0.073	0.212	0.098	-0.085	-0.117	-0.035	0.123	-0.092	-0.249	-0.104
P		0.242	0.590	0.113	0.470	0.529	0.384	0.796	0.360	0.494	0.062	0.443
r	ΔT	0.273	-0.001	0.041	-0.176	0.342	0.357	0.012	0.284	0.179	0.291	-0.060
P		***0.040***	0.994	0.764	0.190	***0.009***	***0.006***	0.927	***0.032***	0.182	***0.028***	0.657
r	γ0	-0.410	-0.012	0.161	0.234	-0.380	-0.419	0.088	-0.081	-0.250	-0.468	0.071
P		***0.002***	0.929	0.233	0.080	***0.004***	***0.001***	0.514	0.549	0.061	***0.000***	0.601
r	Δγ	0.307	0.010	0.018	-0.197	0.377	0.395	-0.021	0.279	0.212	0.343	-0.080
P		***0.020***	0.939	0.892	0.142	***0.004***	***0.002***	0.876	***0.036***	0.113	***0.009***	0.556

r = Pirson-is korelaciis maCvenebeli; P = statistikuri sarwmunoebis maCvenebeli.

cxrili #10[a]. korelacia mxris arteriis ultrasonografiul maxasiaTeblebsa da arteriuli wnevis ambulatoriuli monitoringiT miRebul parametrebs Soris ZiriTadi jgufis individebSi.

korelacia/P		min. saw - dRe	maqs. saw - dRe	min. daw - dRe	maqs. daw - dRe	min. saw - Rame	maqs. saw - Rame	min. daw - Rame	maqs. daw - Ram	24-sT. saS. saw	24-sT. saS. daw	24-sT. saS. gcs	24-sT pw
r	FMD %	-0.157	-0.160	-0.193	-0.464	-0.013	-0.074	-0.069	-0.289	-0.331	-0.471	-0.121	-0.020
P		0.547	0.539	0.458	0.061	0.960	0.778	0.793	0.260	0.194	0.056	0.645	0.939
r	D0	0.326	-0.270	0.587	0.446	0.768	0.644	0.736	0.578	0.530	0.515	-0.428	0.089
P		0.201	0.294	***0.013***	0.073	***0.000***	***0.005***	***0.001***	***0.015***	***0.029***	***0.035***	0.086	0.735
r	ΔD	0.094	-0.442	0.339	-0.087	0.701	0.483	0.638	0.237	0.131	-0.024	-0.518	0.053
P		0.718	0.076	0.183	0.738	***0.002***	***0.049***	***0.006***	0.360	0.617	0.929	***0.033***	0.839
r	NG-MD %	0.168	-0.259	0.462	0.085	0.674	0.364	0.601	0.389	0.246	0.173	-0.326	0.332
P		0.519	0.315	0.062	0.746	***0.003***	0.151	***0.011***	0.123	0.342	0.506	0.201	0.193
r	V0	-0.560	0.344	-0.478	-0.376	-0.774	-0.734	-0.706	-0.674	-0.581	-0.511	0.343	-0.256
P		***0.019***	0.177	0.053	0.137	***0.000***	***0.001***	***0.002***	***0.003***	***0.014***	***0.036***	0.178	0.322
r	ΔV	0.244	-0.577	0.395	0.080	0.808	0.526	0.804	0.549	0.365	0.277	-0.412	0.091
P		0.345	***0.015***	0.117	0.761	***0.000***	***0.030***	***0.000***	***0.022***	0.150	0.283	0.101	0.729
r	T0	-0.487	0.121	-0.561	-0.555	-0.658	-0.680	-0.598	-0.606	-0.596	-0.597	0.319	-0.125
P		***0.047***	0.645	***0.019***	***0.021***	***0.004***	***0.003***	***0.011***	***0.010***	***0.012***	***0.011***	0.213	0.634
r	ΔT	0.330	0.015	0.403	0.562	0.359	0.385	0.370	0.498	0.509	0.594	-0.086	0.078
P		0.196	0.955	0.109	***0.019***	0.157	0.127	0.144	***0.042***	***0.037***	***0.012***	0.743	0.767
r	γ0	-0.407	0.196	-0.588	-0.512	-0.709	-0.645	-0.675	-0.608	-0.567	-0.571	0.378	-0.165
P		0.105	0.452	***0.013***	0.036	***0.001***	***0.005***	***0.003***	***0.010***	***0.018***	***0.017***	0.135	0.526
r	Δγ	0.305	-0.055	0.455	0.545	0.446	0.415	0.466	0.526	0.512	0.590	-0.164	0.103
P		0.233	0.835	0.066	***0.024***	0.073	0.098	0.059	***0.030***	***0.035***	***0.013***	0.530	0.693

r = Pirson-is korelaciis maCvenebeli; P = statistikuri sarwmunoebis maCvenebeli.

cxrili #10[b]. korelacia sisxlis hemoreologiur maxasiaTeblebsa da aw-is 24-saaTiani monitorirebis monacemebs Soris sakontrolo jgufis individebSi.

korelacia/P		saS. saw - dRe	saS. daw - dRe	saS. pw - dRe	saS. gcs - dRe	saS. saw - Rame	saS. daw - Rame	saS. gcs - Rame	saS. pw - Rame	adreuli dilis saw.	adreuli dilis daw	adreuli dilis gcs
r	FMD %	-0.557	-0.573	0.456	0.087	-0.121	-0.274	0.157	0.185	0.016	-0.434	0.528
P		***0.020***	***0.016***	0.066	0.739	0.643	0.287	0.548	0.476	0.952	0.082	***0.029***
r	D0	0.162	0.383	-0.299	-0.172	0.799	0.764	0.179	0.588	0.228	0.687	-0.355
P		0.534	0.129	0.244	0.510	***0.000***	***0.000***	0.493	***0.013***	0.379	***0.002***	0.162
r	ΔD	-0.418	-0.244	0.200	-0.109	0.601	0.415	0.354	0.724	0.190	0.153	0.227
P		0.095	0.345	0.442	0.676	***0.011***	0.098	0.164	***0.001***	0.466	0.557	0.381
r	NG-MD %	0.088	0.069	0.098	-0.019	0.592	0.512	0.338	0.510	0.237	0.258	0.063
P		0.738	0.793	0.709	0.942	***0.012***	***0.036***	0.185	***0.037***	0.361	0.318	0.810
r	V0	-0.229	-0.332	0.185	0.255	-0.869	-0.818	-0.276	-0.676	-0.366	-0.630	0.173
P		0.377	0.193	0.477	0.323	***0.000***	***0.000***	0.284	***0.003***	0.149	***0.007***	0.507
r	ΔV	0.007	0.104	-0.078	-0.391	0.782	0.690	0.439	0.711	0.137	0.320	-0.044
P		0.977	0.690	0.765	0.121	***0.000***	***0.002***	0.078	***0.001***	0.601	0.211	0.868
r	T0	-0.333	-0.495	0.330	0.089	-0.758	-0.764	-0.078	-0.486	-0.360	-0.771	0.373
P		0.192	***0.043***	0.196	0.735	***0.000***	***0.000***	0.766	***0.048***	0.156	***0.000***	0.140
r	ΔT	0.519	0.605	-0.444	-0.122	0.468	0.565	-0.033	0.137	0.156	0.646	-0.507
P		***0.033***	***0.010***	0.074	0.640	0.058	***0.018***	0.901	0.599	0.549	***0.005***	***0.038***
r	γ0	-0.261	-0.456	0.345	0.169	-0.782	-0.773	-0.127	-0.532	-0.281	-0.739	0.379
P		0.312	0.066	0.175	0.518	***0.000***	***0.000***	0.628	***0.028***	0.274	***0.001***	0.133
r	Δγ	0.456	0.577	-0.447	-0.172	0.537	0.614	0.015	0.223	0.140	0.658	-0.501
P		0.066	***0.015***	0.072	0.510	***0.026***	***0.009***	0.954	0.390	0.591	***0.004***	***0.040***

r = Pirson-is korelaciis maCvenebeli; P = statistikuri sarwmunoebis maCvenebeli.

cxrili @11. hemoreologiur parametrTaSorisi korelaciebi ZiriTadi jgufis individebSi.

korelacia/P	hemoreologia	Tr. raodenoba	Tr. agregacia %	Tr. adheziuroba %	fibrinogeni	hematokriti %	er. agregadoba %	er. deformacia	plazmis siblante	sisxlis siblante
r	Trombocitebis		0.215	0.411	0.354	0.092	0.122	-0.214	0.384	0.325
P	raodenoba		0.108	***0.001***	***0.007***	0.497	0.367	0.110	***0.003***	***0.014***
r	Trombocitebis	0.215		0.688	0.391	0.581	0.626	-0.070	0.568	0.492
P	agregacia %	0.108		***0.000***	***0.003***	***0.000***	***0.000***	0.607	***0.000***	***0.000***
r	Trombocitebis	0.411	0.688		0.454	0.581	0.577	-0.133	0.644	0.563
P	adheziuroba %	***0.001***	***0.000***		***0.000***	***0.000***	***0.000***	0.324	***0.000***	***0.000***
r	fibrinogeni	0.354	0.391	0.454		0.278	0.534	-0.327	0.400	0.431
P	g/l	***0.007***	***0.003***	***0.000***		***0.037***	***0.000***	***0.013***	***0.002***	***0.001***
r	hematokriti	0.092	0.581	0.581	0.278		0.544	-0.059	0.625	0.469
P	%	0.497	***0.000***	***0.000***	***0.037***		***0.000***	0.661	***0.000***	***0.000***
r	eriTrocitebis	0.122	0.626	0.577	0.534	0.544		-0.136	0.538	0.426
P	agregadoba %	0.367	***0.000***	***0.000***	***0.000***	***0.000***		0.313	***0.000***	***0.001***
r	eriTrocitebis	-0.214	-0.070	-0.133	-0.327	-0.059	-0.136		-0.137	-0.240
P	deformacia	0.110	0.607	0.324	***0.013***	0.661	0.313		0.308	0.072
r	plazmis	0.384	0.568	0.644	0.400	0.625	0.538	-0.137		0.900
P	siblante	***0.003***	***0.000***	***0.000***	***0.002***	***0.000***	***0.000***	0.308		***0.000***
r	sisxlis	0.325	0.492	0.563	0.431	0.469	0.426	-0.240	0.900	
P	siblante	***0.014***	***0.000***	***0.000***	***0.001***	***0.000***	***0.001***	0.072	***0.000***	

r = Pirson-is korelaciis maCvenebeli; P = statistikuri sarwmunoebis maCvenebeli.

cxrili 12. hemoreologiur parametrTaSorisi korelaciebi sakontrolo jgufis individebSi.

	hemoreologia	Tr. raodenoba	Tr. agregacia %	Tr. adheziuroba %	fibrinogeni	hematokriti %	er. agregadoba %	er. deformacia	plazmis siblante	sisxlis siblante
r	Trombocitebis		-0.222	-0.216	-0.136	-0.192	-0.401	0.193	-0.202	-0.182
P	raodenoba		0.391	0.405	0.602	0.460	0.111	0.458	0.437	0.485
r	Trombocitebis	-0.222		0.621	0.416	0.518	0.524	-0.528	0.526	0.049
P	agregacia %	0.391		***0.008***	0.097	***0.033***	***0.031***	***0.029***	***0.030***	0.853
r	Trombocitebis	-0.216	0.621		0.501	0.402	0.736	-0.427	0.429	0.187
P	adheziuroba %	0.405	***0.008***		***0.040***	0.109	***0.001***	0.087	0.086	0.472
r	fibrinogeni	-0.136	0.416	0.501		0.547	0.532	-0.610	0.488	0.404
P	g/l	0.602	0.097	***0.040***		***0.023***	***0.028***	***0.009***	***0.047***	0.108
r	hematokriti	-0.192	0.518	0.402	0.547		0.638	-0.519	0.629	0.287
P	%	0.460	***0.033***	0.109	***0.023***		***0.006***	***0.033***	***0.007***	0.264
r	eriTrocitebis	-0.401	0.524	0.736	0.532	0.638		-0.561	0.746	0.642
P	agregadoba %	0.111	***0.031***	***0.001***	***0.028***	***0.006***		***0.019***	***0.001***	***0.005***
r	eriTrocitebis	0.193	-0.528	-0.427	-0.610	-0.519	-0.561		-0.622	-0.495
P	deformacia	0.458	***0.029***	0.087	***0.009***	***0.033***	***0.019***		***0.008***	***0.043***
r	plazmis	-0.202	0.526	0.429	0.488	0.629	0.746	-0.622		0.742
P	siblante	0.437	***0.030***	0.086	***0.047***	***0.007***	***0.001***	***0.008***		***0.001***
r	sisxlis	-0.182	0.049	0.187	0.404	0.287	0.642	-0.495	0.742	
P	siblante	0.485	0.853	0.472	0.108	0.264	***0.005***	***0.043***	***0.001***	

r = Pirson-is korelaciis maCvenebeli; P = statistikuri sarwmunoebis maCvenebeli.

cxrili #13. mxris arteriis dupleqs-skanirebiT miRebul monacemTa Sida korelacia ZiriTadi jgufis individebSi.

		FMD %	D0	ΔD	NG-D	NG-MD %	V0	ΔV	T0	ΔT	γ0	Δγ
r	FMD %		-0.427	0.982	-0.273	0.581	0.367	-0.736	-0.152	-0.977	0.342	-0.960
P			***0.001***	***0.000***	***0.040***	***0.000***	***0.005***	***0.000***	0.259	***0.000***	***0.009***	***0.000***
r	D0	-0.427		-0.300	0.965	-0.120	-0.631	0.276	-0.640	0.488	-0.872	0.560
P		***0.001***		***0.024***	***0.000***	0.373	***0.000***	***0.037***	***0.000***	***0.000***	***0.000***	***0.000***
r	ΔD	0.982	***-0.300***		-0.152	0.554	0.282	-0.734	-0.248	-0.934	0.211	-0.899
P		***0.000***	***0.024***		0.260	***0.000***	***0.034***	***0.000***	0.062	***0.000***	0.116	***0.000***
r	NG-D	-0.273	0.965	-0.152		0.144	-0.575	0.137	-0.696	0.336	-0.831	0.406
P		***0.040***	***0.000***	0.260		0.285	***0.000***	0.310	***0.000***	***0.011***	***0.000***	***0.002***
r	NG-MD %	0.581	-0.120	0.554	0.144		0.215	-0.537	-0.219	-0.582	0.154	-0.590
P		***0.000***	0.373	***0.000***	0.285		0.109	***0.000***	0.102	***0.000***	0.254	***0.000***
r	V0	0.367	-0.631	0.282	-0.575	0.215		-0.152	0.582	-0.436	0.898	-0.522
P		***0.005***	***0.000***	***0.034***	***0.000***	0.109		0.260	***0.000***	***0.001***	***0.000***	***0.000***
r	ΔV	-0.736	0.276	-0.734	0.137	-0.537	-0.152		0.203	0.749	-0.110	0.702
P		***0.000***	***0.037***	***0.000***	0.310	***0.000***	0.260		0.131	***0.000***	0.417	***0.000***
r	T0	-0.152	-0.640	-0.248	-0.696	-0.219	0.582	0.203		0.072	0.727	0.000
P		0.259	***0.000***	0.062	***0.000***	0.102	***0.000***	0.131		0.595	***0.000***	0.998
r	ΔT	-0.977	0.488	-0.934	0.336	-0.582	-0.436	0.749	0.072		-0.428	0.988
P		***0.000***	***0.000***	***0.000***	***0.011***	***0.000***	***0.001***	***0.000***	0.595		***0.001***	***0.000***
r	γ0	0.342	-0.872	0.211	-0.831	0.154	0.898	-0.110	0.727	-0.428		-0.531
P		***0.009***	***0.000***	0.116	***0.000***	0.254	***0.000***	0.417	***0.000***	***0.001***		***0.000***
r	Δγ	-0.960	0.560	-0.899	0.406	-0.590	-0.522	0.702	0.000	0.988	-0.531	
P		***0.000***	***0.000***	***0.000***	***0.002***	***0.000***	***0.000***	***0.000***	0.998	***0.000***	***0.000***	

pirsonis korelacia (Pearson Correlation) = r

sarwmunoebis maCvenebeli = P

cxrili #14. mxris arteriis dupleqs-skanirebiT miRebul monacemTa Sida korelacia sakontrolo jgufis individebSi.

		FMD %	D0	ΔD	NG-D	NG-MD %	V0	ΔV	T0	ΔT	γ0	Δγ
r	FMD %		-0.457	0.588	-0.431	-0.204	0.297	-0.249	0.522	-0.907	0.502	-0.857
P			0.065	***0.013***	0.084	0.433	0.247	0.336	***0.032***	***0.000***	***0.040***	***0.000***
r	D0	-0.457		0.444	0.993	0.627	-0.881	0.818	-0.938	0.767	-0.977	0.837
P		0.065		0.074	***0.000***	0.007	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
r	ΔD	0.588	0.444		0.466	0.376	-0.484	0.513	-0.303	-0.220	-0.375	-0.097
P		***0.013***	0.074		0.060	0.137	***0.049***	***0.035***	0.238	0.397	0.138	0.712
r	NG-D	-0.431	0.993	0.466		0.714	-0.897	0.844	-0.928	0.748	-0.973	0.822
P		0.084	***0.000***	0.060		***0.001***	***0.000***	***0.000***	***0.000***	***0.001***	***0.000***	***0.000***
r	NG-MD %	-0.204	0.627	0.376	0.714		-0.692	0.691	-0.588	0.439	-0.650	0.509
P		0.433	***0.007***	0.137	***0.001***		***0.002***	***0.002***	***0.013***	0.078	***0.005***	***0.037***
r	V0	0.297	-0.881	-0.484	-0.897	-0.692		-0.836	0.898	-0.638	0.922	-0.706
P		0.247	***0.000***	***0.049***	***0.000***	***0.002***		***0.000***	***0.000***	***0.006***	***0.000***	***0.002***
r	ΔV	-0.249	0.818	0.513	0.844	0.691	-0.836		-0.673	0.517	-0.779	0.620
P		0.336	***0.000***	***0.035***	***0.000***	***0.002***	***0.000***		***0.003***	***0.034***	***0.000***	***0.008***
r	T0	0.522	-0.938	-0.303	-0.928	-0.588	0.898	-0.673		-0.828	0.970	-0.856
P		***0.032***	***0.000***	0.238	***0.000***	***0.013***	***0.000***	***0.003***		***0.000***	***0.000***	***0.000***
r	ΔT	-0.907	0.767	-0.220	0.748	0.439	-0.638	0.517	-0.828		-0.809	0.986
P		***0.000***	***0.000***	0.397	***0.001***	0.078	***0.006***	***0.034***	***0.000***		***0.000***	***0.000***
r	γ0	0.502	-0.977	-0.375	-0.973	-0.650	0.922	-0.779	0.970	-0.809		-0.872
P		***0.040***	***0.000***	0.138	***0.000***	***0.005***	***0.000***	***0.000***	***0.000***	***0.000***		***0.000***
r	Δγ	-0.857	0.837	-0.097	0.822	0.509	-0.706	0.620	-0.856	0.986	-0.872	
P		***0.000***	***0.000***	0.712	***0.000***	***0.037***	***0.002***	***0.008***	***0.000***	***0.000***	***0.000***	

pirsonis korelacia (Pearson Correlation) = r

sarwmunoebis maCvenebeli = P

cxrili #15. arteriuli wnevis sxvadasxva cirkaduli profilis mqone 57 hipertoziuli pacientis klinikuri maxasiaTeblebi

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	diperi (n=20)	nondiperi (n=37)	P
asaki (ww)	49.4±3.57	52.27±2.34	0.142
aw xangrZlivoba	6.55±2.29	10.16±1.77	***0.024***
aw xarisxi	12-Ix/8-IIx	12-Ix/25-IIx	***0.046***
24-sT awam dRis minimaluri saw. mm.Hg.	109.45±6.78	109.57±2.97	0.706
dRis maqsimaluri saw. mm.Hg.	162.6±7.5	168.59±4.35	0.072
dRis minimaluri daw. mm.Hg.	61.2±3.41	61.89±3.62	0.920
dRis maqsimaluri daw. mm.Hg.	95.8±4.79	104±3.47	***0.005***
Ramis minimaluri saw. mm.Hg.	95.6±4.09	108.95±4	***0.000***
Ramis maqsimaluri saw. mm.Hg.	135.95±5.35	155.24±5.62	***0.000***
Ramis minimaluri daw. mm.Hg.	60.6±4.27	63.76±3.64	0.357
Ramis maqsimaluri daw. mm.Hg.	78.5±3.35	92.08±3.67	***0.000***
24-sT. saSualo saw. mm.Hg.	127.93±5.57	133.61±3.53	0.136
24-sT. saSualo daw. mm.Hg.	75.98±3.75	82.65±2.76	***0.005***
24-sT. saSualo gcs (dartyma/wT)	78.6±3.68	74.14±2.51	0.050
24-sT. pw.	47.78±2.5	49.58±2.39	0.509
dRis saSualo saw. mm.Hg.	129.35±5.55	136.43±3.42	0.053
dRis saSualo daw. mm.Hg.	83.3±12.05	85.27±2.77	***0.012***
dRis saSualo pw. mm.Hg.	49.89±2.92	49.74±2.57	0.531
dRis saSualo gcs (dartyma/wT)	81.8±4.8	78.62±2.88	0.461
Ramis saSualo saw. mm.Hg.	116.65±4.1	126.58±4.01	***0.003***
Ramis saSualo daw. mm.Hg.	68.75±3.02	76.28±3.11	***0.002***
Ramis saSualo gcs (dartyma/wT)	66.9±2.45	65.3±2.37	0.435
Ramis saSualo pw. mm.Hg.	44.9±2.73	48.21±2.03	***0.040***
adreuli dilis saS. saw. mm.Hg.	134.8±2.89	140.7±4.46	0.110
adreuli dilis saS. daw. mm.Hg.	81.07±2.68	88.4±2.47	***0.001***
adreuli dilis saS. gcs (dartyma/wT)	80.3±2.15	78.7±3.69	0.700

cxrili #16. aw-is sxvadasxva cirkauli profilis mqone 57 hiperteziuli pacientis hemoreologiuri maxasiaTeblebi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	diperi (n=20)	nondiperi (n=37)	P
Tr. raodenoba (*10^3/mm^3)	183.35±9.08	196.13±9.62	***0.045***
Tr. agregaciuli aqtivoba (%)	87.35±2.73	103.27±1.5	***0.000***
Tr. adheziuri aqtivoba (%)	27.85±3.82	47.79±2.67	***0.000***
fibrinogenis koncentracia (g/l)	3.36±0.23	3.89±0.18	***0.001***
hematokriti (%)	38.25±0.5	41.38±0.64	***0.000***
er. agregaciuli aqtivoba (%)	14.1±1.54	34.28±4.11	***0.000***
er. deformacia	2.83±0.35	2.58±0.27	0.127
plazmis siblante (erTeulebSi)	1.51±0	1.88±0.09	***0.000***
sisxlis siblante	0.66±0.02	0.81±0.04	***0.000***

cxrili #17. hemoreologiur parametrTa albaTobiTi ganawileba diper da nondiper ah pacientebSi.

hemoreologiuri maxasiaTeblebi	parametrTa ganawilebis tipi			
	hipertenziuli diperebi (n = 20)	χ^2 (2) testi P	hipertenziuli nondiperebi (n = 37)	χ^2 (3) testi P
Tr. agregacia %	log-normaluri ganawileba (4.468; 0.076)	0.149	log-normaluri ganawileba (4.639; 0.042)	0.309
Tr. adhezia %	log-normaluri ganawileba (3.860; 0.180)	0.657	log-normaluri ganawileba (3.276; 0.389)	0.244
fibrinogeni mg/dl	log-normaluri ganawileba (1.186; 0.171)	0.644	log-normaluri da degeneraciuli ganawilebis Senarevi (1.229; 0.168)	0.515
hematocriti %	log-normaluri ganawileba (3.645; 0.028)	0.121	log-normaluri ganawileba (3.718; 0.055)	0.079
plazmis siblante (erTeuli)	konstanta 1.51	—	log-normaluri ganawileba (0.600; 0.164)	0.341

cxrili #18. aw-is sxvadasxva cirkaduli profilis mqone 57 hipertenziuli pacientis hemoreologiuri maxasiaTeblebi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi			
	diperi (n=20)	nondiperi (n=37)	Fisher's F Test P	Student's t Test P
Tr. raodenoba (*10^3/mm^3)	183.35±9.08	196.13±9.62	0.039	***0.028***
Tr. agregaciuli aqtivoba (%)	87.35±2.73	103.27±1.5	0.018	***0.000***
Tr. adheziuri aqtivoba (%)	27.85±3.82	47.79±2.67	0.000	***0.000***
fibrinogenis koncentracia (g/l)	3.36±0.23	3.89±0.18	0.395	***0.000***
hematokriti (%)	38.25±0.5	41.38±0.64	0.01	***0.000***
er. agregaciuli aqtivoba (%)	14.1±1.54	34.28±4.11	0.000	***0.000***
er. deformacia	2.83±0.35	2.58±0.27	0.000	***0.000***
plazmis siblante (erTeulebSi)	1.51±0	1.88±0.09	"One sample Z Test"	***P=0.000***
mTliani sisxlis siblante	0.66±0.02	0.81±0.04	0.000	***0.000***

cxrili #19. mxris arteriis dupleqs-skanirebis maCveneblebi diper da nondiper hipertenziul individebSi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	diperi (n=20)	nondiperi (n=37)	P
nakad-damokidebuli dilatacia, FMD %	11.94±0.95	3.54±1.76	***0.000***
sisxlZarRvis diametri, sm sawyisi, D_0	3.76±0.2	4.31±0.16	***0.000***
RHtest-iT ganpirobebuli cvlileba, ΔD	0.45±0.03	0.15±0.07	***0.000***
nitrat-damokidebuli dilatacia, NG-MD %	13.01±1.08	8.11±1.19	***0.000***
sisxlis nakadis siCqare sm/wm sawyisi, V_0	93.45±4.32	82.24±2.93	***0.000***
RHtest-iT ganpirobebuli cvlileba, ΔV	-9.19±1.63	-2.7±2.03	***0.000***
gadanacvlebis daZabuloba, T sawyisi, T_0	6.3±0.43	6.16±0.41	0.394
RHtest-iT ganpirobebuli cvlileba, ΔT	-0.67±0.08	-0.17±0.1	***0.000***
gadanacvlebis siCqare, γ sawyisi, γ_0	963.17±90.5	764.24±49.75	***0.000***
Rhtest-iT ganpirobebuli cvlileba, $\Delta\gamma$	-103.41±13.85	-23.57±13.54	***0.000***

cxrili #20.A aw-is sxvadasxva cirkaduli profilis mqone 74 (hipertenziuli da normotenziuli) individis klinikuri maxasiaTeblebi.

maCvenebeli/jgufi	saerTo populacia (n=74)		
	diperi (n=31)	nondiperi (n=43)	P
asaki (ww)	49.13±4.5	52.7±2.86	0.086
aw xangrZlivoba	4.23±2.49	8.74±2.5	***0.009***
aw xarisxi	12-Ix/8-IIx	12-Ix/25-IIx	***0.001***
24-sT awam dRis minimaluri saw. mm.Hg.	99.55±8.88	106.16±4.9	***0.037***
dRis maqsimaluri saw. mm.Hg	152.06±9.6	163.12±7.59	***0.009***
dRis minimaluri daw. mm.Hg	54.16±5.67	59.16±5.03	0.108
dRis maqsimaluri daw. mm.Hg	89.55±5.9	100.26±5.58	***0.001***
Ramis minimaluri saw. mm.Hg	87.26±6.69	105.42±6.18	***0.000***
Ramis maqsimaluri saw. mm.Hg	123.81±9.6	149.42±8.86	***0.000***
Ramis minimaluri daw. mm.Hg	53.58±5.98	61.16±5.11	***0.026***
Ramis maqsimaluri daw. mm.Hg	71.74±5.62	87.98±6.04	***0.000***
24-sT. saSualo saw. mm.Hg	117.31±8.63	128.83±6.41	***0.008***
24-sT. saSualo daw. mm.Hg	70.05±5.26	79.35±4.74	***0.001***
24-sT. saSualo gcs (dartyma/wT)	77.48±3.42	74.02±2.9	0.060
24-sT. pw. mm.Hg	45.42±3.79	48.41±3.02	0.103
dRis saSualo saw. mm.Hg	119.45±8.18	131.42±6.5	***0.006***
dRis saSualo daw. mm.Hg	75.77±11.37	81.74±4.9	***0.002***
dRis saSualo pw. mm.Hg	45.89±3.71	48.54±3.25	0.173
dRis saSualo gcs (dartyma/wT)	79.29±4.61	78.14±3.37	0.943
Ramis saSualo saw. mm.Hg	106.42±7.87	122.57±6.37	***0.000***
Ramis saSualo daw. mm.Hg	62.35±5.15	73.31±4.82	***0.000***
Ramis saSualo gcs (dartyma/wT)	65.81±2.47	65.47±2.82	0.974
Ramis saSualo pw. mm.Hg	42.2±2.99	47.46±2.51	***0.000***
adreuli dilis saS. saw. mm.Hg	121.42±9.44	135.02±7.78	***0.005***
adreuli dilis saS. daw. mm.Hg	72.88±6.08	84.32±5.2	***0.000***
adreuli dilis saS. gcs (dartyma/wT)	76.97±3.03	78.02±4.37	0.564

cxrili #21. arteriuli wnevis sxvadasxva cirkaduli profilis mqone 74 individis hemoreologiuri maxasiaTeblebi.

maCvenebeli/jgufi	saerTo populacia (n=74)		
	diperi (n=31)	nondiperi (n=43)	P
Tr. raodenoba (*10^3/mm^3)	188.21±11.71	193.89±11.38	0.227
Tr. agregaciuli aqtivoba (%)	85.87±3.01	102.05±2.54	***0.000***
Tr. adheziuri aqtivoba (%)	26.61±3.61	46.1±3.61	***0.000***
fibrinogenis koncentracia (g/l)	3.15±0.29	3.81±0.23	***0.000***
hematokriti (%)	37.9±0.53	41.19±0.81	***0.000***
er. agregaciuli aqtivoba (%)	12.84±1.7	32.57±5.14	***0.000***
er. deformacia	2.96±0.31	2.64±0.32	***0.010***
plazmis siblante (erTeulebSi)	1.51±0	1.84±0.11	***0.000***
sisxlis siblante	0.67±0.02	0.8±0.05	***0.000***

cxrili #22. mxris arteriis dupleqs-skanirebis maCveneblebi diper da nondiper individebSi.

maCvenebeli/jgufi	saerTo populacia (n=74)		
	diperi (n=31)	nondiperi (n=43)	P
nakad-damokidebuli dilatacia, FMD %	12.45±1.07	5.05±2.58	***0.000***
sisxlZarRvis diametri, sm sawyisi, D_0	3.79±0.19	4.29±0.22	***0.000***
RHtest-iT ganpirobebuli cvlileba, ΔD	0.47±0.04	0.21±0.11	***0.000***
nitrat-damokidebuli dilatacia, NG-MD %	13.1±1.12	8.98±1.7	***0.000***
sisxlis nakadis siCqare sm/wm sawyisi, V_0	91.86±4.01	82.28±3.55	***0.000***
RHtest-iT ganpirobebuli cvlileba, ΔV	-9.71±1.51	-3.43±2.64	***0.000***
gadanacvlebis daZabuloba, T sawyisi, T_0	6.21±0.38	6.06±0.5	0.243
RHtest-iT ganpirobebuli cvlileba, ΔT	-0.69±0.08	-0.25±0.14	***0.000***
gadanacvlebis siCqare, γ sawyisi, γ_0	933.41±82.79	767.16±65.29	***0.000***
Rhtest-iT ganpirobebuli cvlileba, $\Delta\gamma$	-103.62±13.38	-34.44±20.12	***0.000***

cxrili #23. nondiperi cirkaduli profilis mgrZnobeloba, specifikuroba da pozitiuri prognozuli mniSvneloba.

maxasiaTebeli	janmrTeli	ah-is mqone
Tr. agregacia%		
mgrZnobeloba	0.5	0.939
specifikuroba	0.142	0.25
ppm	0.833	0.837
Tr. Adheziuroba %		
mgrZnobeloba	0	1
specifikuroba	0.5	0.285
ppm	0	0.783
fibrinogeni g/l		
mgrZnobeloba	0.166	0.8
specifikuroba	0.454	0.481
ppm	0.166	0.648
hematokriti %		
mgrZnobeloba	0.45	0.89
specifikuroba	1	0.2
ppm	0.45	0.891
eriT. Agregacia %		
mgrZnobeloba	0.4	1
specifikuroba	1	0.25
ppm	0.363	0.81
eriT. Deformacia		
mgrZnobeloba	0.687	0.64
specifikuroba	0	0.66
ppm	1	0.675
plazmis siblante		
mgrZnobeloba	0.5	1
specifikuroba	0.307	0.259
ppm	0.333	0.810
sisxlis siblante		
mgrZnobeloba	0.5	0.965
specifikuroba	0.272	0.32
ppm	0.5	0.756
FMD %		
mgrZnobeloba	0.5	1
specifikuroba	0.142	0.31
ppm	0.833	0.756

cxrili #24. hemoreologiuri maxasiaTeblebi ah-is sxvadasxva xangrZlivobis mqone pacientebSi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	< 7w. (n=28)	≥ 7w. (n=29)	P
Tr. raodenoba (*10^3/mm^3)	184.59±7.77	198.46±11.51	0.145
Tr. agregaciuli aqtivoba (%)	94.57±3.4	100.69±3.26	***0.008***
Tr. adheziuri aqtivoba (%)	38.04±4.86	43.46±4.59	0.069
fibrinogenis koncentracia (g/l)	3.52±0.23	3.89±0.2	***0.021***
hematokriti (%)	40.21±0.99	40.34±0.74	0.585
er. agregaciuli aqtivoba (%)	22.91±5.02	31.34±5.29	***0.015***
er. deformacia	2.85±0.2	2.48±0.37	0.100
plazmis siblante (erTeulebSi)	1.68±0.1	1.81±0.1	***0.031***
mTliani sisxlis siblante	0.74±0.05	0.78±0.04	0.100

cxrili #25. mxris arteriis dupleqs-skanirebis maCveneblebi hipertenziis sxvadasxva xangrZlivobis anamnezis mqone individebSi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	< 7w. (n=28)	≥ 7w. (n=29)	P
nakad-damokidebuli dilatacia, FMD %	7.89±2.07	5.13±2.41	0.112
sisxlZarRvis diametri, sm			
sawyisi, D_0	4.12±0.21	4.11±0.19	0.682
RHtest-is Semdeg, D_1	4.43±0.2	4.31±0.19	0.255
RHtest-iT ganpirobebuli cvlileba, ΔD	0.31±0.08	0.2±0.09	0.079
nitroglicerinis s/l miRebis Semdgom, NG-D	4.61±0.23	4.43±0.23	0.123
nitrat-damokidebuli dilatacia, NG-MD %	11.92±1.26	7.81±1.33	***0.000***
gadanacvlebis daZabuloba, T			
sawyisi, T_0	5.93±0.39	6.47±0.44	0.071
RHtest-is Semdgom, T_1	5.51±0.38	6.19±0.49	***0.029***
RHtest-iT ganpirobebuli cvlileba, ΔT	-0.42±0.12	-0.28±0.15	0.177
gadanacvlebis siCqare, γ			
sawyisi, γ_0	825.42±81.52	842.36±65.43	0.492
RHtest-is Semdgom, γ_1	762.52±68.98	801.7±60.42	0.213
Rhtest-iT ganpirobebuli cvlileba, $\Delta\gamma$	-62.9±19.54	-40.66±20.73	0.140

cxrili #26. hemoreologiuri maxasiaTeblebi ah-is sxvadasxva xarisxis mqone pacientebSi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	I x. (n=24)	II x. (n=33)	P
Tr. raodenoba (*10^3/mm^3)	186.50±9.21	195.39±10.34	0.299
Tr. agregaciuli aqtivoba (%)	94.96±3.77	99.67±3.15	0.057
Tr. adheziuri aqtivoba (%)	38.54±5.01	42.44±4.56	0.152
fibrinogenis koncentracia (g/l)	3.57±0.21	3.8±0.22	0.118
hematokriti (%)	39.83±1.12	40.61±0.67	0.086
er. agregaciuli aqtivoba (%)	21.5±3.86	31.35±5.5	***0.017***
er. deformacia	2.84±0.22	2.54±0.33	0.254
plazmis siblante (erTeulebSi)	1.67±0.11	1.8±0.1	***0.034***
sisxlis siblante	0.73±0.05	0.79±0.04	***0.032***

cxrili #27. mxris arteriis dupleqs-skanirebis maCveneblebi hipertenziis sxvadasxva xarisxis mqone individebSi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	I x. (n=24)	II x. (n=33)	P
nakad-damokidebuli dilatacia, FMD %	8.2±2.45	5.24±2.08	0.054
sisxlZarRvis diametri, sm			
sawyisi, D_0	3.98±0.21	4.22±0.19	0.156
RHtest-is Semdeg, D_1	4.29±0.18	4.43±0.2	0.427
RHtest-iT ganpirobebuli cvlileba, ΔD	0.31±0.09	0.21±0.08	0.090
nitroglicerinis s/l miRebis Semdgom, NG-D	4.45±0.22	4.57±0.23	0.739
nitrat-damokidebuli dilatacia, NG-MD %	11.88±1.27	8.33±1.38	***0.001***
gadanacvlebis daZabuloba, T			
sawyisi, T_0	6.19±0.43	6.22±0.42	0.910
RHtest-is Semdgom, T_1	5.74±0.42	5.95±0.47	0.651
RHtest-iT ganpirobebuli cvlileba, ΔT	-0.46±0.14	-0.27±0.12	***0.043***
gadanacvlebis siCqare, γ			
sawyisi, γ_0	874.48±87.06	804.63±62.06	0.190
RHtest-is Semdgom, γ_1	805.57±73.06	765.65±58.54	0.457
Rhtest-iT ganpirobebuli cvlileba, $\Delta\gamma$	-68.91±22.69	-38.98±17.72	***0.040***

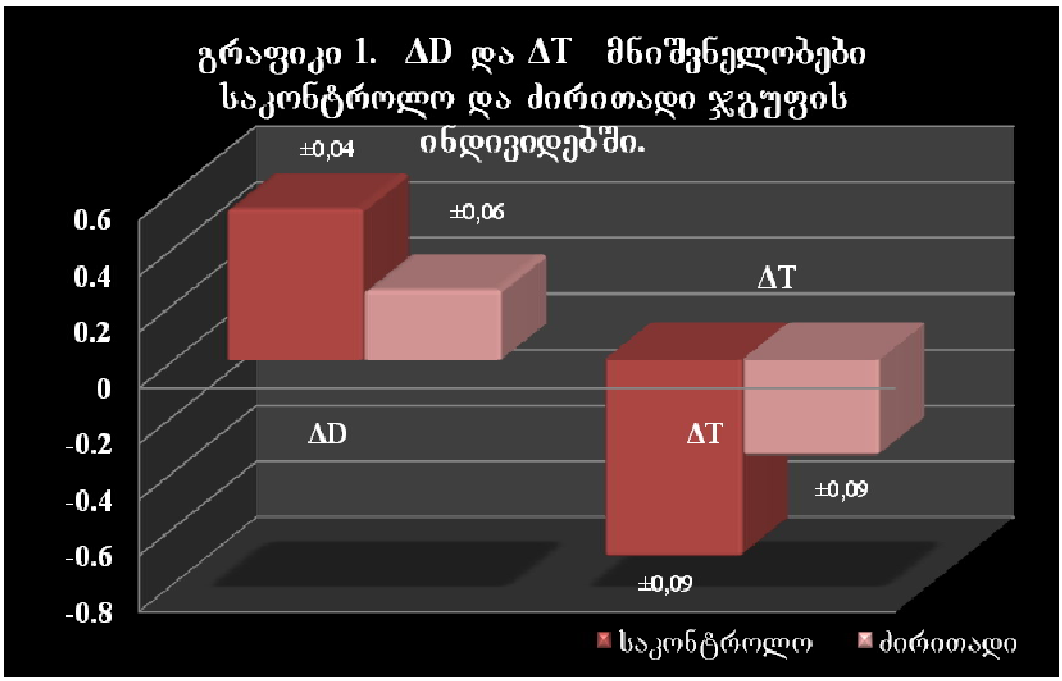
cxrili #28. hemoreologia sxvadasxva nakad-damokidebuli vazodilataciis mqone hipertenziul pacientebSi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	< 7.5%. (n=29)	≥ 7.5% (n=28)	P
Tr. raodenoba (*10^3/mm^3)	201.86±10.89	181.07±7.51	***0.000***
Tr. agregaciuli aqtivoba (%)	102.76±2.04	92.43±3.61	***0.000***
Tr. adheziuri aqtivoba (%)	48.66±2.99	32.65±4.32	***0.000***
fibrinogenis koncentracia (g/l)	3.88±0.2	3.53±0.23	***0.025***
hematokriti (%)	41.59±0.76	38.93±0.62	***0.000***
er. agregaciuli aqtivoba (%)	33.7±4.8	20.47±4.73	***0.000***
er. deformacia	2.53±0.34	2.8±0.26	0.202
plazmis siblante (erTeulebSi)	1.93±0.1	1.56±0.04	***0.000***
sisxlis siblante	0.84±0.04	0.68±0.02	***0.000***

cxrili #29. mxris arteriis dupleqs-skanirebis maCveneblebi sxvadasxva nakad-damokidebuli vazodilataciis mqone hipertenziul pacientebSi.

maCvenebeli/jgufi	arteriuli hipertenziis jgufi		
	< 7.5%. (n=29)	≥ 7.5% (n=28)	P
sisxlZarRvis diametri, sm sawyisi, D_0	4.36±0.18	3.86±0.18	***0.000***
RHtest-is Semdeg, D_1	4.43±0.2	4.3±0.19	0.491
RHtest-iT ganpirobebuli cvlileba, ΔD	0.07±0.07	0.44±0.03	***0.000***
nitroglicerinis s/l miRebis Semdgom, NG-D	4.7±0.23	4.33±0.2	***0.030***
nitrat-damokidebuli dilatacia, NG-MD %	7.6±1.34	12.13±1.13	***0.000***
gadanacvlebis daZabuloba, T sawyisi, T_0	6.25±0.49	6.17±0.35	0.786
RHtest-is Semdgom, T_1	6.18±0.54	5.52±0.3	0.125
RHtest-iT ganpirobebuli cvlileba, ΔT	-0.07±0.09	-0.64±0.06	***0.000***
gadanacvlebis siCqare, γ sawyisi, γ_0	753.54±57.24	917.41±74.96	***0.002***
RHtest-is Semdgom, γ_1	745.17±61.95	821.08±64.97	0.088
Rhtest-iT ganpirobebuli cvlileba, $\Delta\gamma$	-8.37±11.13	-96.34±11.7	***0.000***

grafikebi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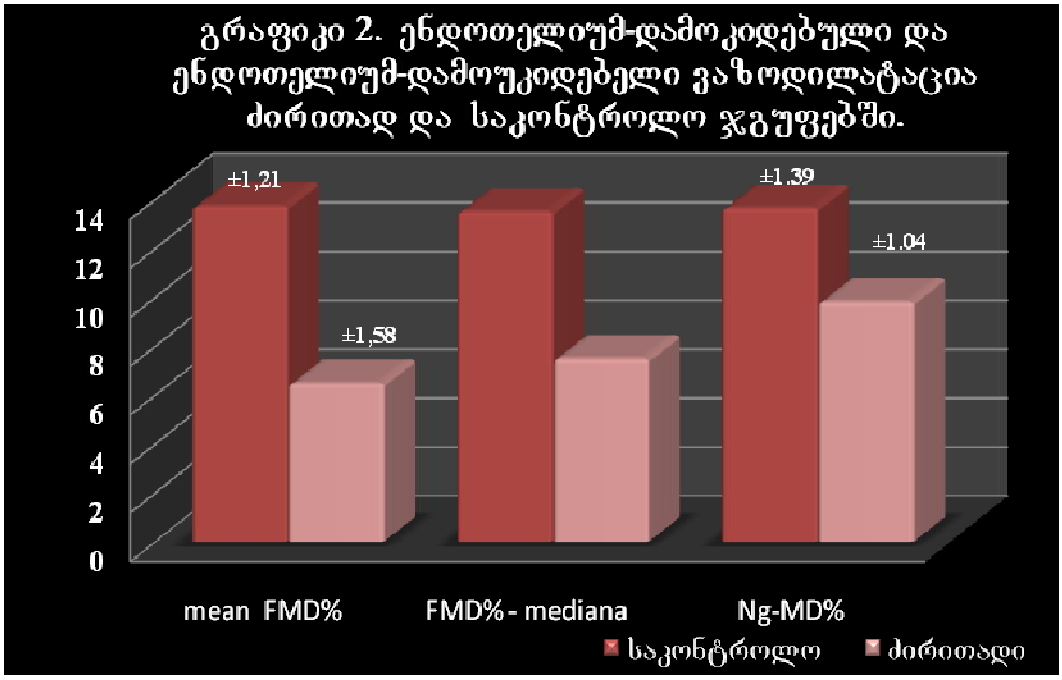
±0,04
±0,06
ΔT
ΔD
ΔT
±0,09
±0,09
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
საკონტროლო
ძირითადი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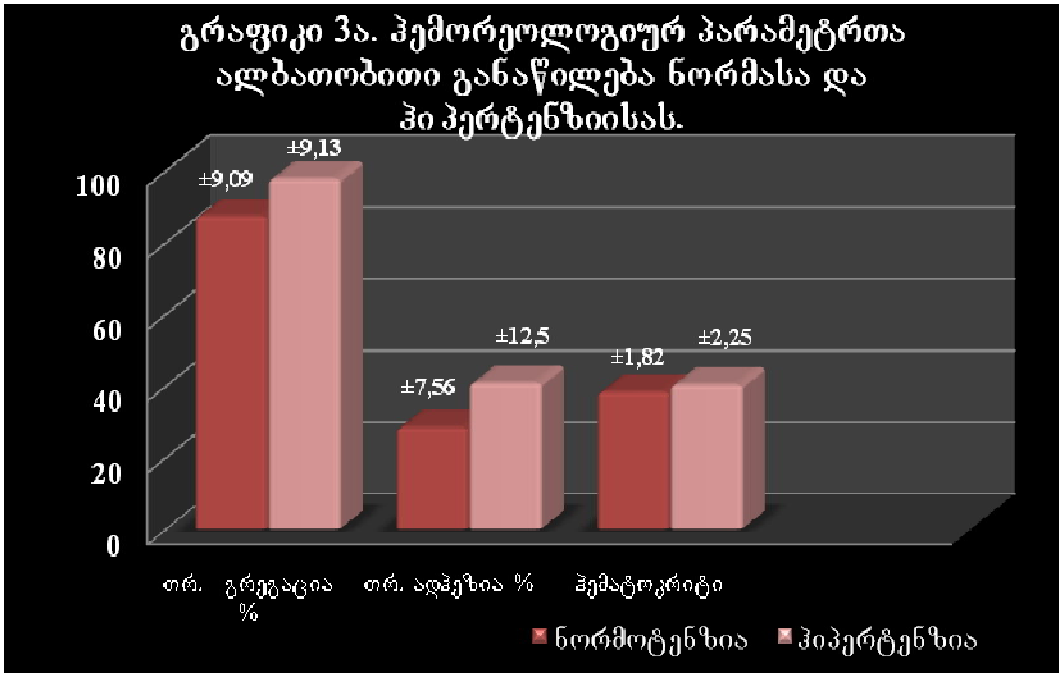
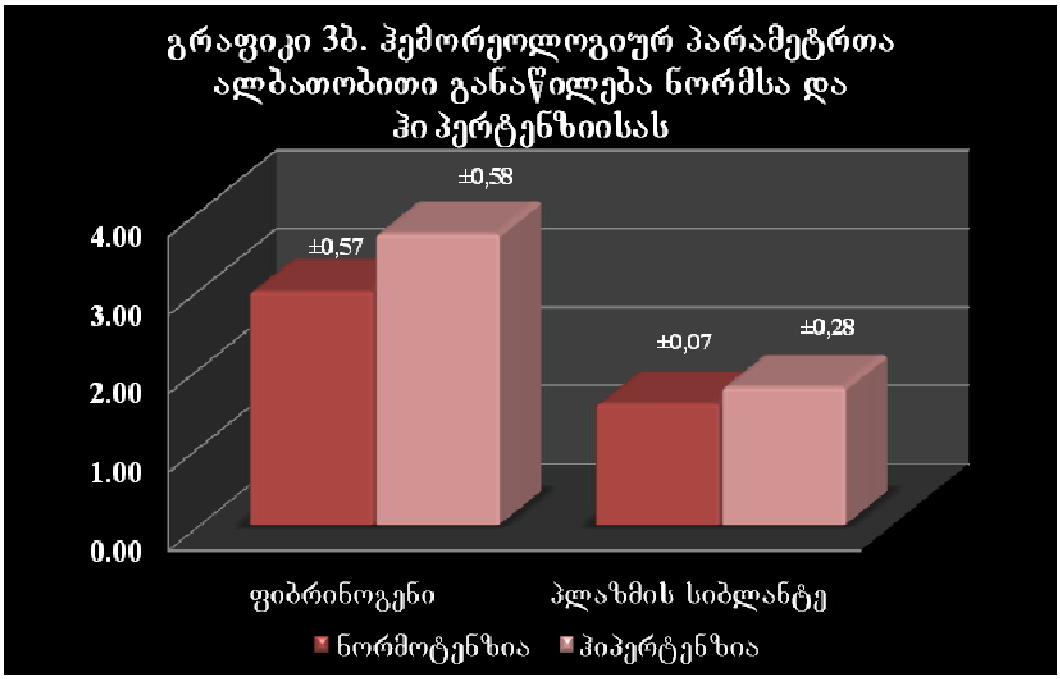
±1,21
±1,58
±1,39
±1,04
14
12
10
8
6
4
2
0
mean FMD%
FMD%- mediana
Ng-MD%
საკონტროლო
ძირითადი


გრაფიკი 3ა. ჰემორეოლოგიურ პარამეტრთა ალბათობითი განაწილება ნორმასა და ჰიპერტენზიისას.
100
80
60
40
20
0
±9,09
±9,13
±7,56
±12,5
±1,82
±2,25
თრ. გრეგაცია %
თრ. ადჰეზია %
ჰემატოკრიტი
ნორმოტენზია
ჰიპერტენზია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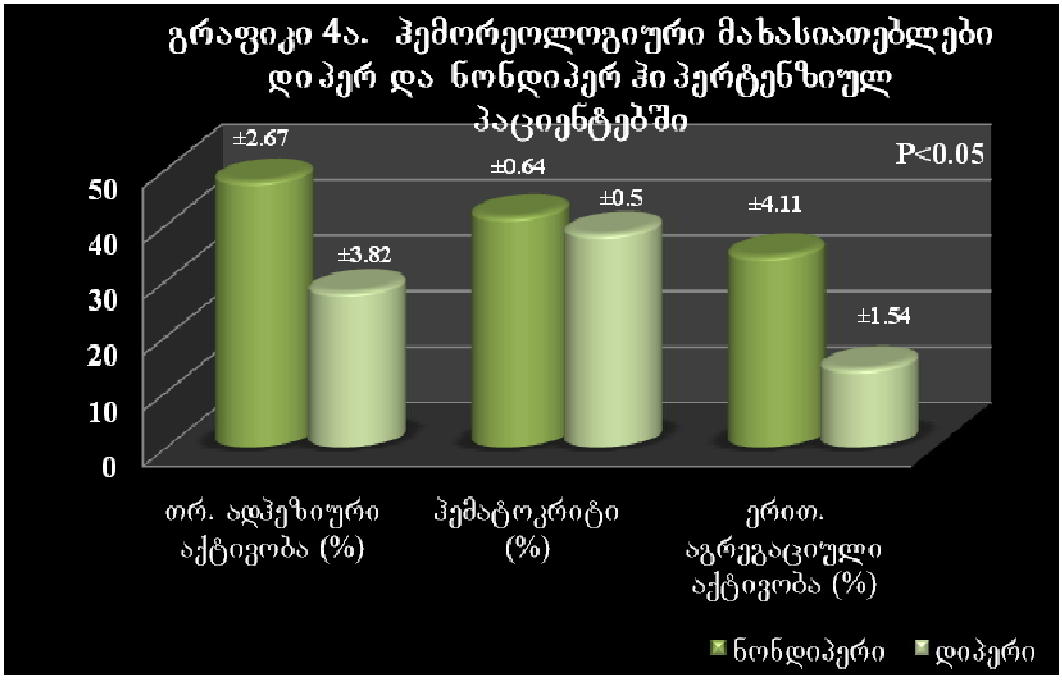
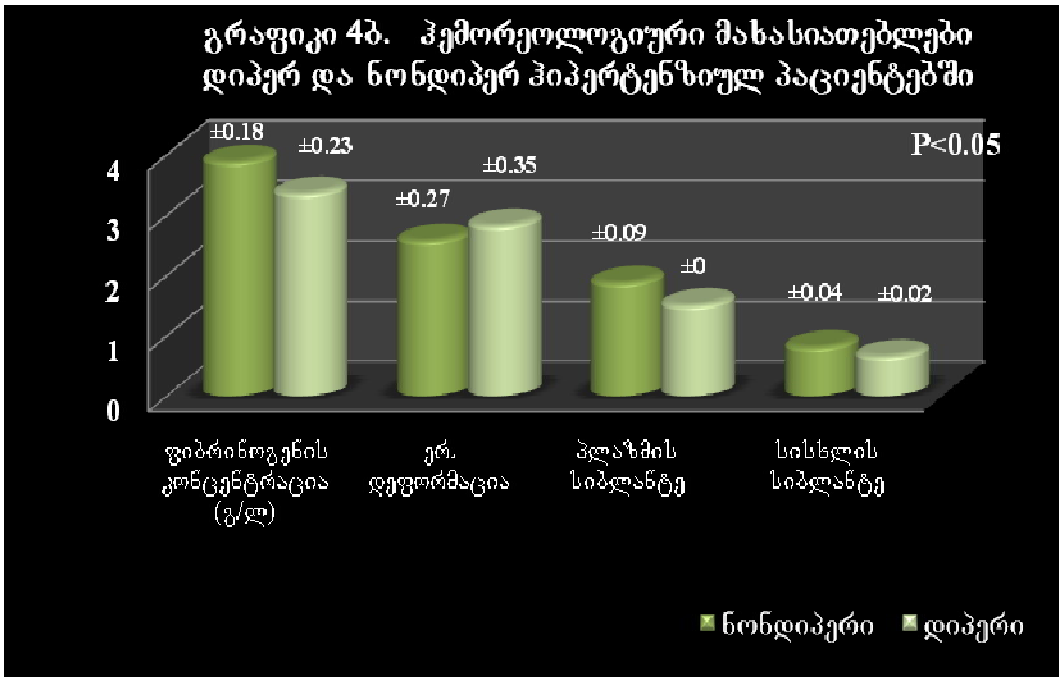
4.00
3.00
2.00
1.00
0.00
±0,57
±0,58
±0,07
±0,28
ფიბრინოგენი
პლაზმის სიბლანტე
ნორმოტენზია
ჰიპერტენზია


გრაფიკი 4ა. ჰემორეოლოგიური მახასიათებლები დიპერ და ნონდიპერ ჰიპერტენზიულ პაციენტებში
P<0.05
±2.67
±3.82
±0.64
±0.5
±4.11
±1.54
50
40
30
20
10
0
თრ. ადჰეზიური აქტივობა (%)
ჰემატოკრიტი (%)
ერითრ. აგრეგაციული აქტივობა (%)
ნონდიპერი
დიპერი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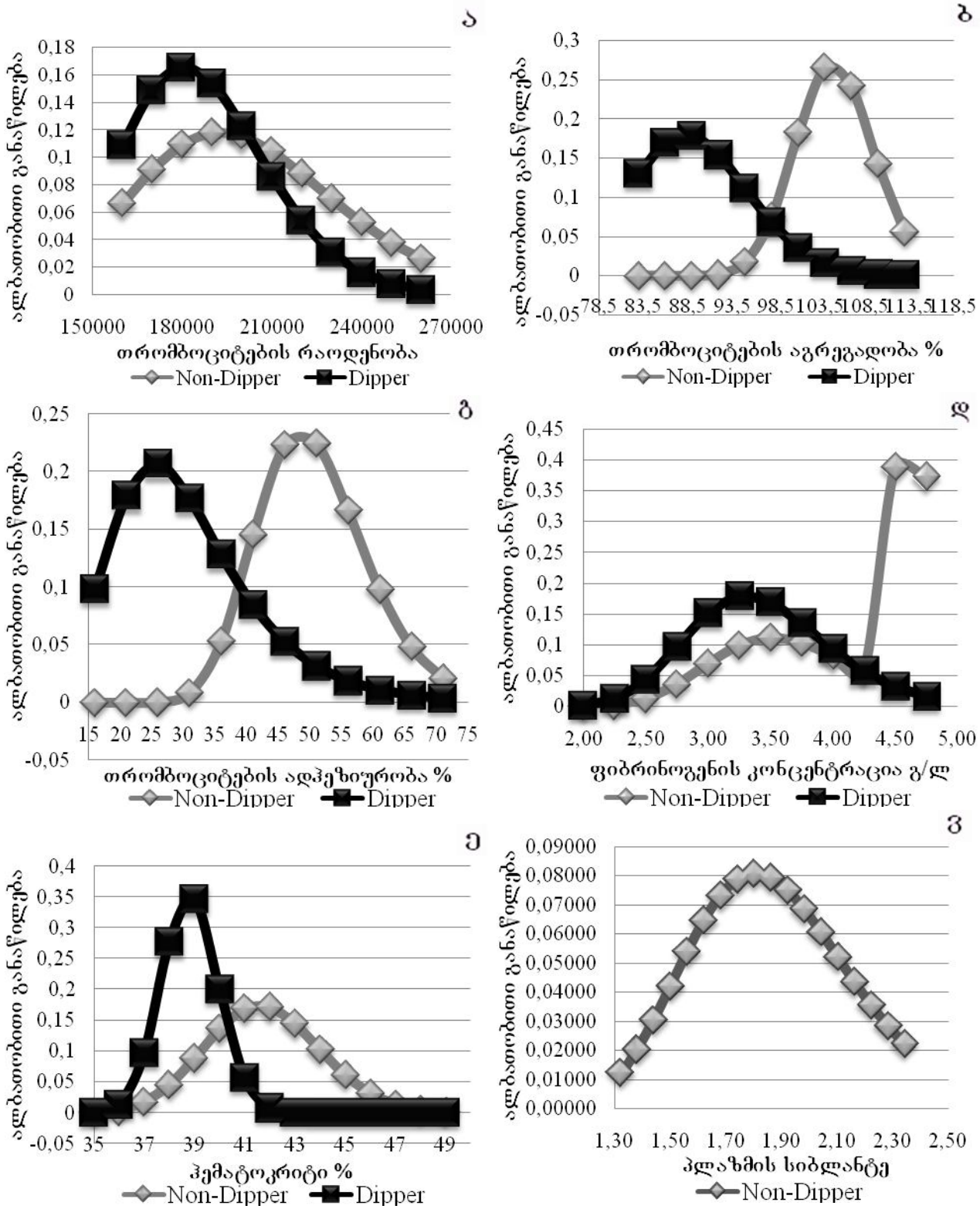
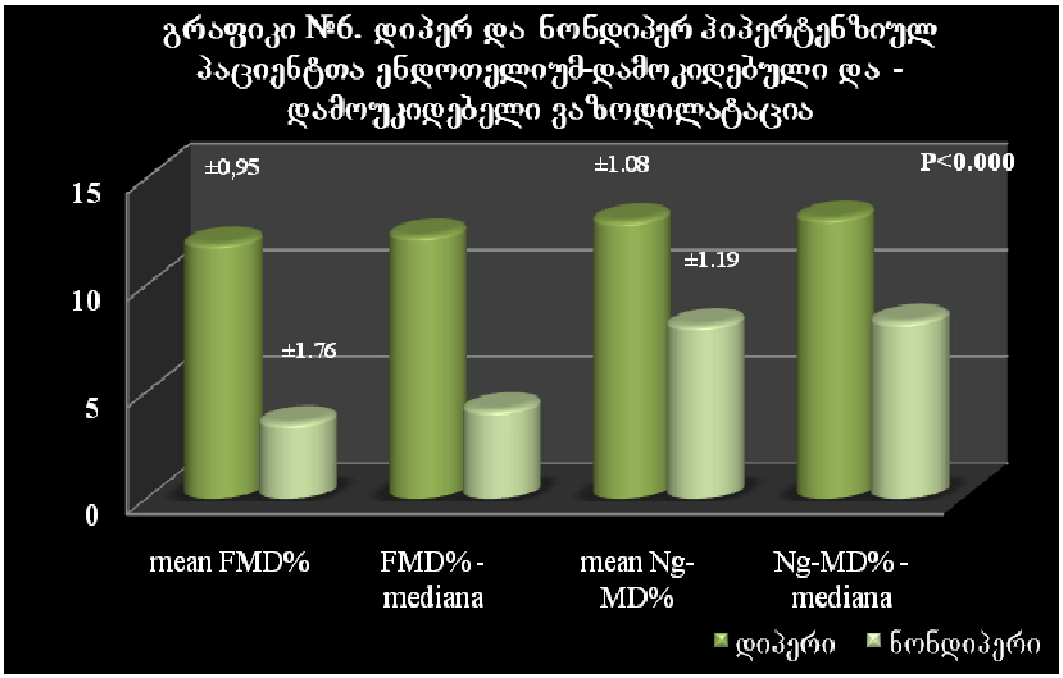
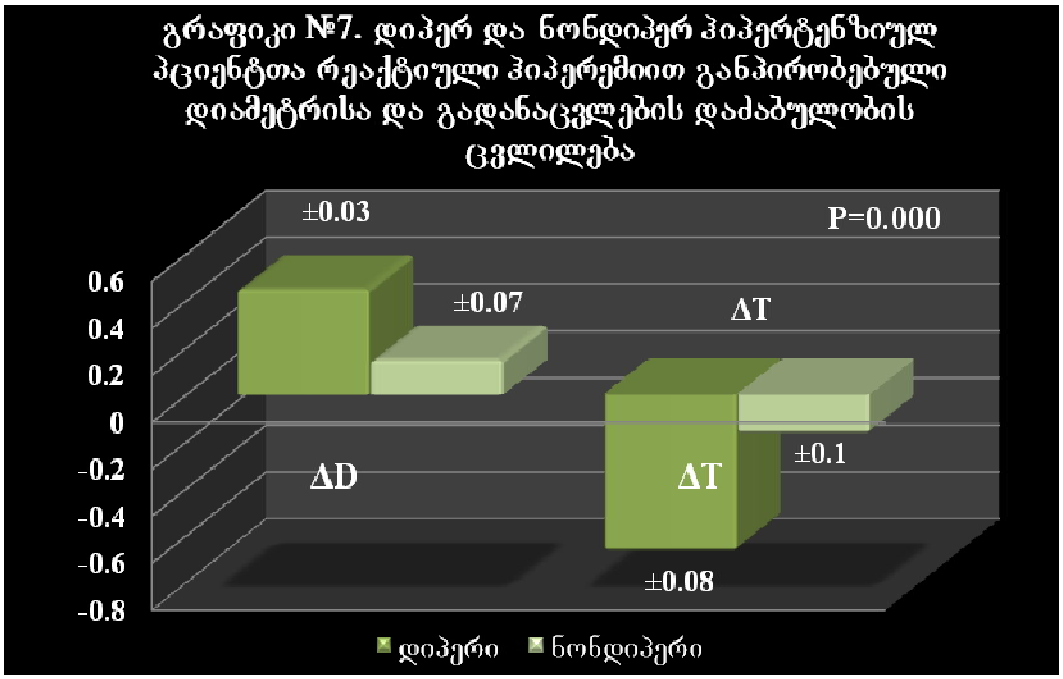
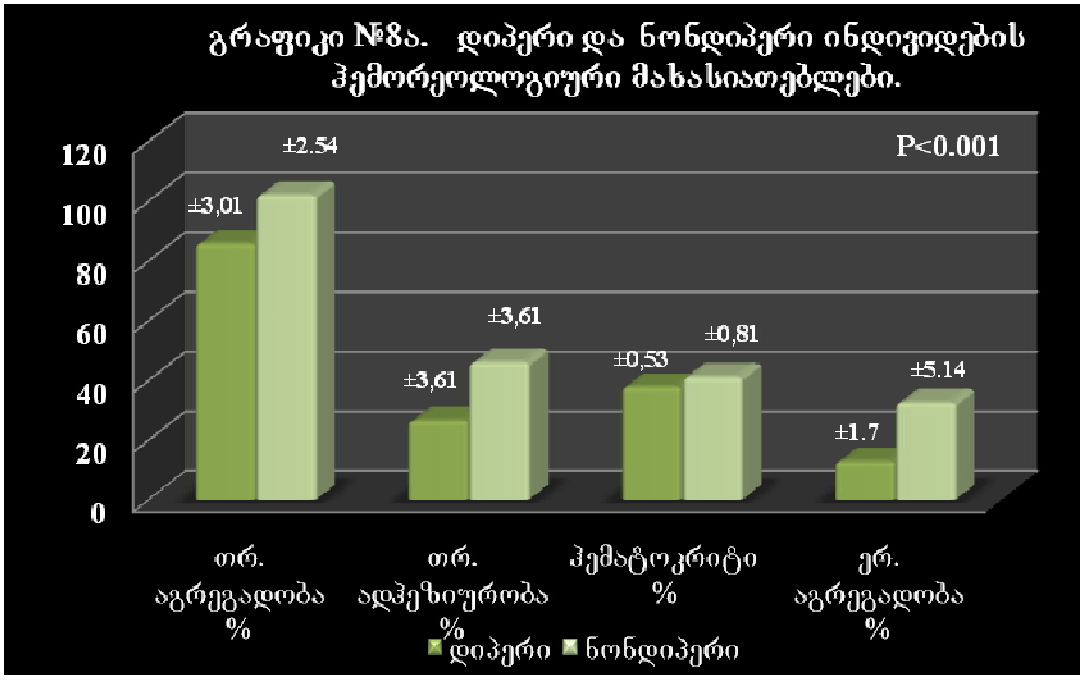
P<0.05
±0.18
±0.23
±0.27
±0.35
±0.09
±0
±0.04
±0.02
4
3
2
1
0
ფიბრინოგენის კონცენტრაცია (გ/ლ)
ერ. დეფორმაცია
პლაზმის სიბლანტე
სისხლის სიბლანტე
ნონდიპერი
დიპერი

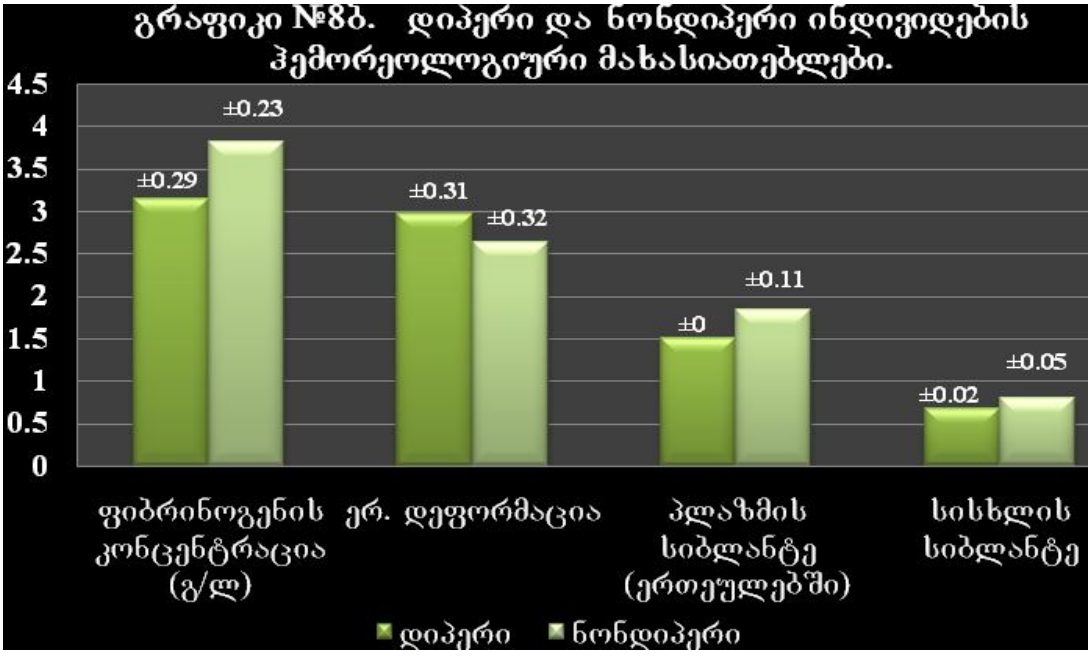
grafiki 5. hemoreologiur parametrTa albaTobiTi ganawileba diper da nondiper pacientebSi.

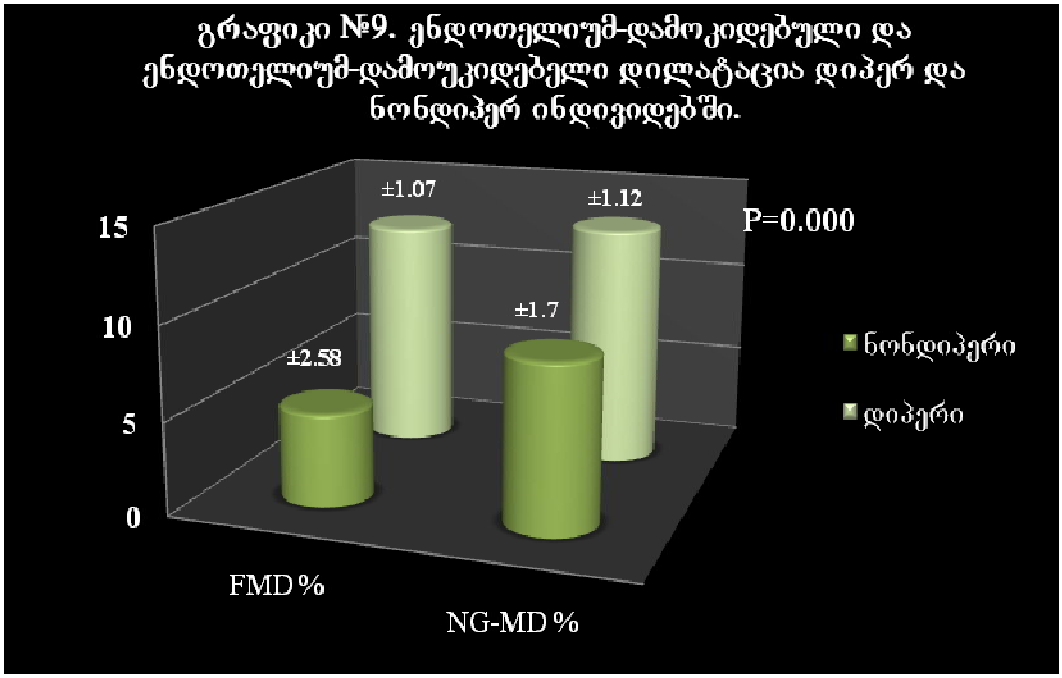


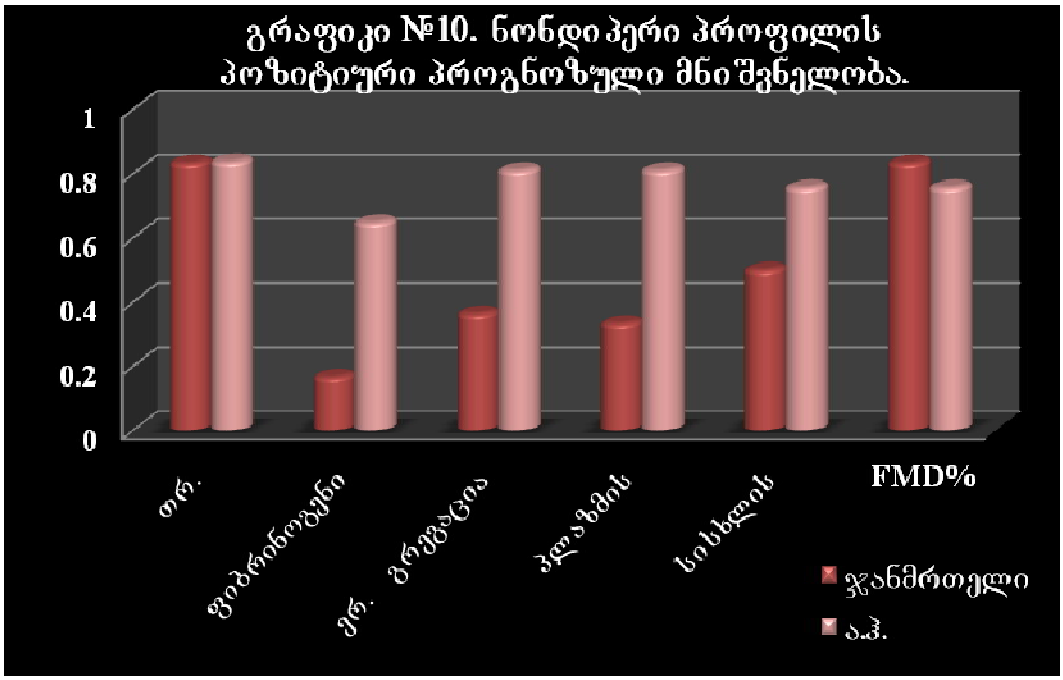

გრაფიკი №6. დიპერ და ნონდიპერ ჰიპერტენზიულ პაციენტთა ენდოთელიუმ-დამოკიდებული და - დამოუკიდებელი ვაზოდილატაცია
±0,95
±1.08
P<0.000
±1.76
±1.19
15
10
5
0
mean FMD%
FMD% - mediana
mean Ng-MD%
Ng-MD% - mediana
დიპერი
ნონდიპერი

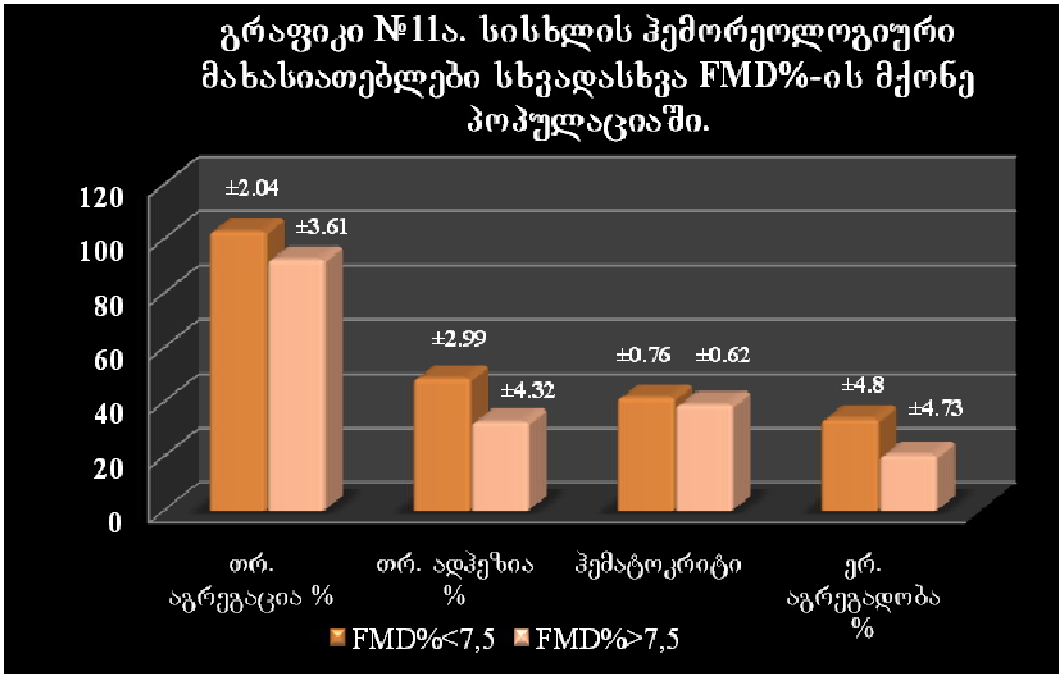

გრაფიკი №7. დიპერ და ნონდიპერ ჰიპერტენზიულ პაციენტთა რეაქტიული ჰიპერემიით განპირობებული დიამეტრისა და გადანაცვლების დაძაბულობის ცვლილება
±0.03
P=0.000
±0.07
ΔT
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
ΔD
ΔT
±0.1
±0.08
დიპერი
ნონდიპერი

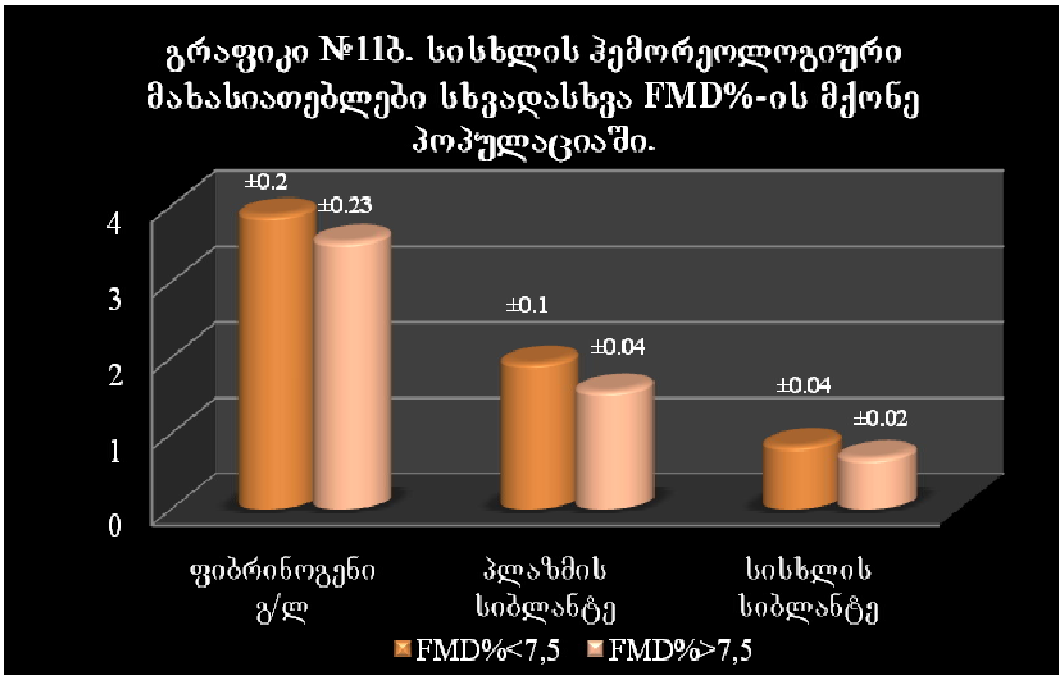

გრაფიკი №8ა. დიპერი და ნონდიპერი ინდივიდების ჰემორეოლოგიური მახასიათებლები.
120
100
80
60
40
20
0
±2.54
P<0.001
±3,01
±3,61
±3,61
±0,81
±0,53
±5.14
±1.7
თრ. აგრეგადობა %
თრ. დეფორმაბელობა %
ჰემატოკრიტი %
ერ. აგრეგადობა %
დიპერი
ნონდიპერი


გრაფიკი №8ბ. დიპერი და ნონდიპერი ინდივიდების ჰემორეოლოგიური მახასიათებლები.
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
±0.23
±0.29
±0.31
±0.32
±0.11
±0
±0.05
±0.02
ფიბრინოგენის კონცენტრაცია (გ/ლ)
ერ. დეფორმაცია
პლაზმის სიბლანტე (ერთეულებში)
სისხლის სიბლანტე
დიპერი
ნონდიპერი


გრაფიკი №9. ენდოთელიუმ-დამოკიდებული და ენდოთელიუმ-დამოუკიდებელი დილატაცია დიპერ და ნონდიპერ ინდივიდებში.
15
10
5
0
±1.07
±1.12
P=0.000
±1.7
±2.58
ნონდიპერი
დიპერი
FMD %
NG-MD %


გრაფიკი №10. ნონდიპერი პროფილის პოზიტიური პროგნოზული მნიშვნელობა.
1
0.8
0.6
0.4
0.2
0
თრ.
ფიბრინოგენი
ენ. გრეხვა
ასაკის
სისხლის
FMD%
ჯანმრთელი
ა.ჰ.


გრაფიკი №11ა. სისხლის ჰემორეოლოგიური მახასიათებლები სხვადასხვა FMD%-ის მქონე პოპულაციაში.
120
100
80
60
40
20
0
±2.04
±3.61
±2.99
±4.32
±0.76
±0.62
±4.8
±4.73
თრ. აგრეგაცია %
თრ. ადჰეზია %
ჰემატოკრიტი
ერ. აგრეგადობა %
FMD%<7,5
FMD%>7,5


გრაფიკი №11ბ. სისხლის ჰემორეოლოგიური მახასიათებლები სხვადასხვა FMD%-ის მქონე პოპულაციაში.
4
3
2
1
0
±0.2
±0.23
±0.1
±0.04
±0.04
±0.02
ფიბრინოგენი გ/ლ
პლაზმის სიბლანტე
სისხლის სიბლანტე
FMD%<7,5
FMD%>7,5

damateba 1.

klinikuri mdgomareobani, romelTa dros rekomendirebulia sisxlis wnevis ambulatoriuli monitoringis Catareba - JNC 7-is mixedviT
• TeTri xalaTis" hipertenziis gamosaricxad pacientebSi, axlad diagnostirebuli hipertenziiTa da samizne organoebis dazianebis ar arsebobiT; • medikamentebis mimarT rezistentobis dros (e.w. ofisis rezistentoba); • antihipertenziuli mkurnalobisas hipotenziis simptomebis gamovlenisas; • epizoduri hipertenzia; • autonomiuri disfunqcia.

ambulatoriuli sisxlis wnevis monitoringis Catarebis Cvenebebi ESH/ESC 2007-is mixedviT
• erTidaigive an sxvadasxva vizitis dros ofisis wnevis mniSvnelovani variabeloba; • maRali ofisis wneva pcientebSi, romelTac ar gaaCniaT dabali saerTo kardiovaskuluri riski; • didi Seusabamobis arsebobisas ofisisa da saxlis wnevis gazomvaTa monacemebs Soris; • aRiniSneba/mosalodnelia medikamentebis mimarT rezistentoba, gansakuTrebiT moxuc da diabetian pacientebSi; • momatebuli ofisis wnevis mqone orsul qalebSi, mosalodneli pre-eklamfsiis ganviTarebis albaTobis gamo; • namkurnaleb da aranamkurnaleb pacientebSi kardiovaskuluri riskis prediqciis gasaumjobeseblad.

damateba 2. eqspertTa rekomendaciebi arteriuli wnevis ambulatoriuli monitoringis Catarebis Sesaxeb

(ESH/ESC 2007 wlis gaidlainis mixedviT)

- awam-is mizniT gamoyenebul unda iqnas mxolod is aparatebi, romlebic srulad Seesabameba saerTaSoriso standartizaciis protokols;
- gazomvisas gamoyenebul unda iqnas Sesabamisi zomis manJeti. amasTan monitoringis procesis dawyebamde unda moxdes aw-is monitoriT gazomili cifrebis gadamowmeba vercxliswylis manometriT gazomil monacemebTan. sxvaoba ori meTodiT gazomil wnevas Soris ar unda aRematebodes 5 mm.vwy.sv.-s.
- avtomaturi gzomvebis sixSiris programirebisas, gazomvaTaSorisi intervalebis xangrZlivoba ar unda aRematebodes 30 wuTs;
- manJetidan haeris avtomaturi gamotumbvis siCqare ar unda aRematebodes 2 mm.vwy.sv-s wamSi;
- pacients unda mieces instruqcia, rom monitorirebis periodSi icxovros Cveuli reJimiT da uSualod gazomvis procesSi xeli gaaCeros gaSlil umoZrao mdgomareobaSi. pacients unda mieTiTos, rom gamokvlevis periodSi aucilebelia dRiuris warmoeba, sadac CainiSnavs dRiur aqtivobas, Zilis xangrZlivobasa da xarisxs, uCveulo simptomtikas da a.S.
- im SemTxvevaSi, Tu gazomvaTa da Sesabamisad CanawerTa raodenoba naklebia 70%-ze, pacienti saWiroebs ganmeorebiTi gamokvlevis Catarebas; amasTan, yuradReba unda mieqces artefaqtebis raodenobas dRisa da Ramis ganmavlobaSi, validurobisaTvis isini Tanabrad unda iyos gadanawilebuli dRisa da Ramis periodze;
- ambulatoriuli sisxlis wneva Cveulebriv ramdenime milimetriT vwy.sv. ufro dabalia ofisis anu klinikuri gazomviT miRebul SedegTan SedarebiT;
- klinikuri Sefaseba metwilad damokidebulia 24-saaTian saSualo wnevasa da wnevis dRe-Ramur variabelobaze.

damateba 3.

rekomendaciebi arteriuli wnevis gazomvis Sesaxeb ESH/ESC 2007 wlis gaidlainis mixedviT.

- wnevis gazomvamde pacienti unda ijdes wynar oTaxSi ramdenime wuTis ganmavlobaSi;
- wneva unda gaizomos sul mcire orjer 1-2 wuTiani SualedebiT. im SemTxvevaSi Tu monacemTa Soris didi sxvaobaa, aucilebelia mesame gazomvis ganxorcielebac;
- gazomvebi unda ganxorcieldes standartuli manJetiT (12-13 sm. sigrZisa da 35 sm. siganis); saWiroebis SemTxvevaSi didi an mcire zomis manJetebiT;
- manJeti unda Seesabamebodes gulis dones Tavisi lokalizaciiT, miuxedavad pacientis poziciisa;
- sistoluri da diastoluri wnevis gansazRvrisaTvis gamoyenebul unda iqnas korotkovis pirveli da mexuTe toni, Sesabamisad;
- pirveli vizitis dros wneva gazomil unda iqnas orive xelze, SesaZlo periferiuli vaskuluri daavadebis gamosaricxad. gansxvavebis SemTxvevaSi mniSvneloba eniWeba im xels, romelzec ufro maRali cifrebi dafiqsirda;
- wnevis gazomva moxucebSi, diabetian pacientebSi, da posturuli hipotenziis mqone pirebSi unda gaizomos arteriuli wneva fexze dgomidan 1 da 5 wuTis Semdeg;
- guliscemis sixSire pulsis palpaciiT daTvlili unda iqnas minimum 30 wamis ganmavlobaSi arteriuli wnevis meore gazomvis Semdeg.

damateba 4.

awam-is rekomendaciaTa kerbuli, SemuSavebuli University of Iowa Family Care Center-is mier [129]:

- awam-is dayeneba wynar oTaxSi 15 wuTiani relaqsaciis Semdeg;
- mowyobilobis gadaprogrameba saWiro gazomvaTa sixSiris misaRebad;
- tradiciuli vercxliswylis sfigmo-manometriT pacientis orive xelze arteriuli wnevis gazomva. Tu wnevaTa Soris sxvaoba ar aRemateba 10 mm.vwy.sv., ambulatoriuli arteriuli wnevis monitoris manJeti Tavsdeba aradominantur xelze; xolo im SemTxvevaSi, roca xelTa Sorisi wnevis sxvaoba aRemateba 10 mm.vwy.sv., manJeti Tavsdeba im xelze, romelzec ufro maRalia sisxlis wneva;
- kvlevisas gamoyenebul unda iqnas Sesabamisi zomis manJeti;
- pacients sityvierad unda miewodos informacia da gadaeces werilobiTi instruqcia Tu rogor unda moiqces gazomvis periodSi (kerZod, gaaCeros xeli umoZraod gulis simaRleze), Zilis dros (datovos CarTuli aparati), aparatis moxsnisa da gamorTvis Sesaxeb;
- sacdeli gazomva Catardes pacientis TandaswrebiT, raTa Semowmdes aparatis muSaobis sizuste;
- pacientis momzadeba;
- pacients miewodos zepiri informacia imis Sesaxeb, Tu ramdenad xSirad moxdeba arteriuli wnevis gazomva, saWiroebis SemTxvevaSi rogor Caataros damatebiTi gazomva da a.S.;
- pacients unda gaaCndes sakontaqto piris koordinatebi, raTa saWiroebis SemTxvevaSi advilad SeZlos masTan kontaqti;
- pacients unda mieces rekomendacia, rom 24 saaTis, anu gamokvlevis periodSi awarmoos dRiuri, sadac maqsimaluri sizustiT Cawerili iqneba gaRviZebis, daZinebis, fizikuri aqtivobis, medikamentis miRebis, kvebis, raime saxis simptomis da a.S. gamovlenis dro;
- monacemTa analizi, daskvna da kardiologis konsultacia.

damateba 5.

awam-is dros dafiqsirebuli saziano maCveneblebi [249]:

- dRis sistoluri wneva >135 mm.vwy.sv.
- dRis diastoluri wneva >85 mm.vwy.sv.
- Ramis sistoluri wneva >120 mm.vwy.sv.
- Ramis diastoluri wneva >75 mm.vwy.sv.
- Ramis wnevis daqveiTebis ararseboba (sistoluri wnevis daqveiTeba <10%)
- dilis hipertenzia >140/90 mm.vwy.sv.
- maRali pulsuri wneva >50 mm.vwy.sv.

damateba 6.

manJetis zomebi mxris garSemowerilobis mixedviT*

manJeti	mxris garSemowerilobacentralur wertilze (santimetrebSi)
"zrdasruli"	27-34 sm
"zrdasrulis didi"	35-44 sm
"zrdasrulis barZayis"	45-52 sm

warmodgenili gaidlaini SemuSavebulia Dorothee Perloff et colleagues mier (Circulation 1993;88:2460-2467).

damateba 7.

kvlevis ZiriTadi rekomendaciebi

- *yvela hipertenziul pacients Cautardes sisxlis reologiuri gamokvleva, ramdenadac “birmingemis paradoqsis” pirveladi niSnebi reologiaSi Cndeba;*

- *dadges sakiTxi arteriuli wnevis 24-saaTiani ambulatoriuli monitoringis Catarebis CvenebaTa gafarTovebis Sesaxeb, rameTu droulad iqnas gamovlenili arteriuli wnevis non-diperi cirkaduli profili da Sefasdes prognozi;*

- *hipertenziul individebs non-diperi cirkaduli profiliT CautardeT sisxlZarRvTa endoTeliumis funqciuri gamokvleva, raTa ganisazRvros garTulebaTa ganviTarebis riski da gatardes swori, mizanmimarTuli prevenciuli strategia.*