GEORGIAN MEDICAL NEWS

ISSN 1512-0112

NO 4 (361) Апрель 2025

ТБИЛИСИ - NEW YORK

ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press. Published since 1994. Distributed in NIS, EU and USA.

GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

GEORGIAN MEDICAL NEWS
No 4 (361) 2025

Содержание:

GEORGIAN MEDICAL NEWS
No 4 (361) 2025

PILOT STUDY ON THE CARDIOVASCULAR MORBIDITY IN OLDER PEOPLE IN THE REGION OF BURGAS IN BULGARIA

Diyan Gospodinov[1], Stamen Pishev[1], Boryana Parashkevova[1], Nikolay Gerasimov[2], Guenka Petrova[3,4]*.

[1]*Trakia University, Faculty of Medicine, St. Zagora, Bulgaria.*

[2]*Trakia University, Medical College, Bulgaria.*

[3]*Medical University Sofia, Faculty of Pharmacy, Bulgaria.*

[4]*Institute of Innovative Medical Sciences, Medical University Sofia, Bulgaria.*

Abstract.

Cardiovascular morbidity is a leading cause of complaints in the older population. **Objectives:** The goal of this study is to present the results of a basic assessment of present cardiovascular diseases (CVD) in older people in the region of Burgas in Bulgaria.

Methods: A six-month cross-sectional study was conducted in the municipality of Burgas. People aged 65 and older were interviewed at pensioners' clubs by a team of 4 physicians including cardiologists, and a pulmonologist. Clinical parameters were also measured.

Results: A total 647 people participated in the study with a prevalent female cohort (84%). The average age was approximately 73 years. 426 (66%) of the people reported diagnosed diseases from 1 to 5 (1.7 on average per person). Blood pressure was elevated than the normal values of 140/90 mmHg with higher levels observed in the male group. All participants had glucose levels higher than the physiological norm of 5.6mmol/l. Total cholesterol in the male cohort was below the recommended values of 5.2mmol/l, while in the female cohort levels were higher (5.59mmol/l). HDL and LDL were found to be close to the values recommended for people without CVDs, and 85% reported hypertension. **Conclusions:** Hypertension is the most prevalent cardiovascular condition among the older population in Burgas. Almost all older individuals have comorbidities.

Key words. Cardiovascular morbidity, older, Bulgaria, cardiovascular diseases, hypertension.

Introduction.

Cardiovascular diseases (CVD) are the leading causes of mortality in older people, responsible for approximately 17.9 million deaths globally each year [1]. With the advancing of age the risk of CVD increases, particularly after the age of 60 [2,3]. Studies indicate a higher risk for males at younger ages; however, with age, the progression of CVD becomes almost equal between both genders [4].

Other factors contributing to the increasing prevalence of CVD include modern lifestyles, especially in the urbanised areas, which are often characterised by sedentary behaviour, high-calorie diet, rich in saturated fats, and sugars. These factors further promote the development of atherosclerosis and other metabolic diseases like metabolic syndrome, diabetes mellitus, and hypertension, which frequently accompany CVDs [5-7]. Arterial hypertension is one of the primary risk factors for the development of CV complications [8].

In Bulgaria CVDs are one of the major health and economic problems, responsible for more than 60% of all-cause mortality [9,10]. Studies show that that many preventable cardiovascular risk factors are insufficiently and ineffectively controlled, particularly in primary health care [11,12]. Addressing risks factors associated with the development of CVDs is crucial for implementing adequate preventive measures. This is especially true for urbanised cities, with a predominantly aging population.

The goal of this pilot study is to present the results from a basic assessment of available cardiovascular diseases among older people in the Burgas region of Bulgaria.

Burgas is the 4th largest region in Bulgaria. It is highly industrialised, with a harbour on the Black see, with developed tourism, and developed chemical and gas industries. These characteristics make Burgas an interesting area for studying CVDs risk of its inhabitants.

Materials and Methods.

Study design: This is a six-month cross-sectional study performed in the municipality of Burgas. People above 65 years of age were interviewed at the pensioners' clubs from April to October 2024. Blood samples were then taken for laboratory testing. The study was initiated by the municipality of Burgas and a team of physicians from the city. There were no specific selection criteria and procedure for participants. The only condition for voluntarily participation was the age of 65 years or older.

A team of 4 physicians including cardiologists, a pulmonologist, general practitioners, and endocrinologists visited the clubs accompanied by laboratory technicians. Demographic data for the people (age, gender, known diseases) were collected via interview with the physicians, and they measure blood pressure and glucose level at the site of the interview. Laboratory technician collected blood samples, assayed them in a certified laboratory and evaluated the lipid profile.

Only demographic data and clinical tests that were easy to perform on site, and that provided information about the main risk factors such as dyslipidaemia, high glucose level and pre-existing diseases were collected.

Statistical analysis:

A variety of descriptive statistical analyses were performed. All samples appear to be non-normally distributed. The significance of relations between participants' characteristics and clinical indicators was tested using the Kruskal-Wallis's test for dependent variables and with Mann-Whitney test in case of independent variables. Spearman correlation analyses were performed to test the mutual dependence between variables of interest.

Sample size:

The municipality of Burgas is the 4th largest region in the country with 384 446 inhabitants. Raosoft sample size method was used. A sample size of 384 participants was calculated to achieve a confidence level of 95% with the real value expected to fall within ±5% margin of error.

Ethical approval:

Participants signed informed consent forms to be interviewed and to provide blood samples. The study was approved by the ethical committee of Trakia University, Stara Zagora, Protocol N29/01.02. 2024.

Results.

Demographic and clinical data:

On total 647 people participated in the study with a prevalent female cohort (84%). The average age was approximately 73 years with male cohort being slightly older than female cohort, however difference was not statistically significant (Table 1).

The majority of participants (61%) were from the urban area. Of the participants, 426 (66%) reported being diagnosed with 1 to 6 diseases (1.7 on average). Among them, 355 were women, indicating that nearly all the interviewed and tested adults had an average of two diagnosed diseases.

No statistically significant differences were found between men and women regarding their average age, number of diagnosed diseases, systolic blood pressure (SBP), diastolic blood pressure (DBP), or glucose levels (GL). SBP values for all participants were higher than the normal range of 120/80 mm Hg and were slightly higher in the male group.

All participants had glucose levels (GL) higher than the physiological norm of 5.6 mmol/L, although not all reported being diagnosed with diabetes (Table 1).

Total cholesterol (CHOL) in the male cohort were below the recommended values of 5.2mmol/l, while in the female cohort values were higher (5.59mmol/l). High density cholesterol (HDL) and low-density lipoprotein (LDL) were found to be close to the values recommended for individuals without cardiovascular disease (CVD) risk. However, considering that 85% of participants reported hypertension, there is a risk of further CVD development, and all cholesterol levels should ideally be reduced. This suggestion is further supported by the fact that all participants had elevated triglyceride levels, averaging 2.2 mmol/L, which is above the recommended level of 1.7 mmol/L. Measurements of total cholesterol, HDL, LDL, and triglycerides were statistically significantly lower in the male cohort compared to the female cohort (Table 1).

Among the reported diseases, hypertension was the most prevalent affecting 363 out of 426 people (Figure 1), followed by ischemic heart disease (n=48), coronary angioplasty and stenting (n=24), and heart failure (n=8). The most frequently reported concomitant disease was type 2 diabetes in 97 participants which often is related to hypertension.

Statistical analysis:

We analysed two factors for cardiovascular diseases: the reported number of comorbidities and place of residence. We also followed the changes in clinical parameters in different places of residence (Tables 2 and 3). Table 2 presents the results of the statistical analysis of changes in clinical parameters according to the present number of comorbidities.

Systolic blood pressure (SBP), diastolic blood pressure (DBP), and glucose levels (GL) increase when the number of diseases is also increasing. Conversely, there is a tendency for total cholesterol (CHOL) levels to decrease as the number of diseases increases. Similar trends are observed for LDL and HDL, but not for triglycerides (TRG).

Further analysis reveals no statistically significant differences in the average SBP and DBP values among subgroups with varying numbers of diseases. However, post-hoc analysis shows statistically significant differences in GL between patient groups with:

- 2 and 3 diseases,
- 2 and 5 diseases,
- 3 and 4 diseases, and
- 3 and 5 diseases.

Although the groups with 5 and 6 diseases are small, the observed increase in GL suggests that these differences would likely be significant in the general population. Similar observations apply to cholesterol variables, including HDL. LDL and triglycerides show no significant changes across the groups and are excluded from detailed analysis.

For CHOL, post-hoc analysis reveals statistically significant differences between levels in the following patient groups:

- 2 and 4 diseases,
- 3 and 5 diseases,

Table 1. *Characteristics of the included people.*

Type	All	male	Female	P
Number	647	104 (16%)	543 (84%)	
Average age (years)	73.53 (SD 5.65)	75.07 (SD 6.54)	73.3 (SD 5.45)	0.06
Leaving in town (n and %)	396 (61%)	59 (57%)	206 (38%)	0.0001
Leaving in villages (n and %)	251 (39%)	45 (43%)	337 (62%)	0.0001
Average number of diseases (n)	1.7 (SD 0.8)	1.79 (SD 0.8)	1.67 (SD 0.8)	0.1158
Systolic blood pressure (mmHg)	144.48 (SD 15.7)	146.68 (SD 7.2)	144.06 (SD 3.4)	0,131
Diastolic blood pressure (mmHg)	85.13 (SD 8.08)	84.47 (SD 1.7)	85.25 (SD 4.1)	0.774
Blood glucose level (mmol/l)	6.69 (SD 1.4)	6.7 (SD 0.37)	6.7 (SD 0.8)	0.9751
Cholesterol (mmol/l)	5.44 (SD 1.00)	4.76 (SD 0.5)	5.59 (SD 0.3)	0.0001
High density cholesterol (mmol/l)	1.50 (SD 0.32)	1.32 (SD 0.16)	1.54 (SD 0.08)	0.0001
Low density cholesterol (mmol/l)	3.00 (SD 0.88)	2.56 (SD 0.42)	3.09 (SD 0.34)	0.0002
Triglycerides (mmol/l)	2.22 (SD 0.96)	2.14 (SD 0.64)	2.23 (SD 0.3)	0.0001

Table 2. *Statistically significant differences between clinical measures and number of diseases (Kruskal-Wallis).*

Variable (Mean; SD)	**Number of diseases**						**Significance for the whole variable**
	1	2	3	4	5	6	(p)
SBP	141.96 (17.93)	145.53 (20.89)	145.71 (20.47)	145.18 (18.87)	150.00 (22.14)	151.86 (17.05)	0.229
DBP	84.71 (9.06)	85.73 (11.07)	84,43 (9.81)	85,44 (9.22)	85,63 (6.29)	86,43 (11.80)	0.796
Glucose level	6.56 (1.98)	6.42 (1.88)	7.08 (2.55)	7.43 (3.34)	7.09 (2.03)	6.97 (1.86)	0.019
CHOL	575 (1.66)	5.48 (1.13)	5.25 (1.08)	4,74 (1,29)	5.20 (1,41)	4,62 (1,46)	0.0003
LDL	3,32 (1.56)	3,05 (1.01)	2,83 (1.11)	2,44 1,1050	2,58 1,4095	2,09 1,1002	0.0002
HDL							0.113
Triglycerides							0.067

Table 3. *Statistically significant differences between patient's characteristics and place of living (Mann-Whitney test).*

Compared variables	**Village Median (95% CI)**	**Town Median (95% CI)**	**Significance level (p)**
Glucose level	6.45 (6.10 to 6.79)	5.9 (5.8 to 6.1)	0.0001
HDL	1.55 (1.47 to 1.63)	1.39 (1.35 to 1.47)	0.0011
Triglycerides	1.7 (1.54 to 1.86)	1.03 (1.88 to 2.21)	0.0007
Number of diseases	1.00 (1.00 to 1.00)	2.03 (1.88 to 2.21)	<0.0001

Table 4. *Results from the correlation analysis.*

		CHOL	**HDL**	**LDL**	**TRG**	**DP**	**SP**
CHOL	Correlation coefficient Significance Level P n	1	0,184 0,0001 428	0,920 <0,0001 428	0,269 <0,0001 428	0,113 0,0199 428	0,020 0,6828 428
HDL	Correlation coefficient Significance Level P n	0,184 0,0001 428	1	0,053 0,2785 428	-0,473 <0,0001 428	0,020 0,6851 428	-0,002 0,9678 428
LDL	Correlation coefficient Significance Level P n	0,920 <0,0001 428	0,053 0,2785 428	1	0,105 0,0292 428	0,113 0,0198 428	0,013 0,7856 428
TRG	Correlation coefficient Significance Level P n	0,269 <0,0001 428	-0,473 <0,0001 428	0,105 0,0292 428	1	0,056 0,2516 428	0,026 0,5971 428
DP	Correlation coefficient Significance Level P n	0,113 0,0199 428	0,020 0,6851 428	0,113 0,0198 428	0,056 0,2516 428	1	0,597 <0,0001 647
SP	Correlation coefficient Significance Level P n	0,020 0,6828 428	-0,002 0,9678 428	0,013 0,7856 428	0,026 0,5971 428	0,597 <0,0001 647	1

Spearman rank correlation coefficient.

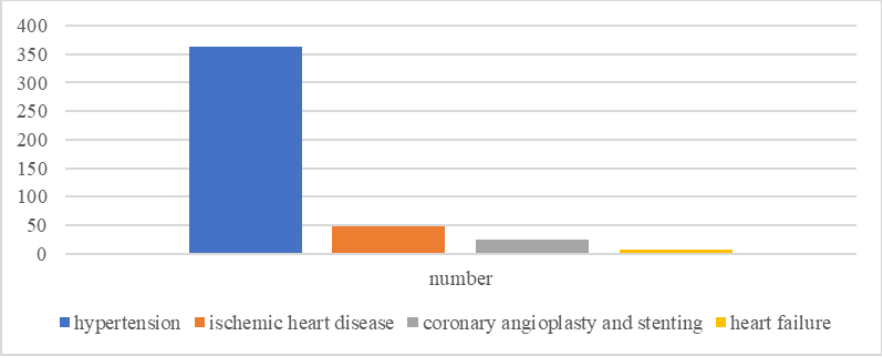

Figure 1. *Reported diseases.*

• 4 and 2 diseases,
• 5 and 6 diseases,
• 5 and 2 diseases,
• 7 and 2 diseases.

These analyses confirm the overall trend that the number of concomitant diseases is an important factor affecting clinical indicators.

The results of the statistical analysis of the relationship between clinical indicators and place of residence are presented in Table 3.

The average blood glucose level, HDL level, triglycerides level is statistically significantly lower in people living in towns than those living in villages. However, the average number of diseases is significantly higher for people living in towns than those living in villages.

To understand whether there is a mutual relationship between all variables of interest we perform Spearman correlation analysis (Table 4).

Logically we found moderate to strong linear correlation between HDL, SP and DP. It was surprising that we did not find a correlation between the cholesterol level, glucose level and number of diseases, as well as between blood pressure measurements, cholesterol and glucose level.

Linear regression analysis was performed to explore the dependencies between collected data. The regression analysis reveals a strong positive and statistically significant correlation between total cholesterol and HDL, LDL levels ($R2=0,8754$; $p<0001$). The regression formula is $y = 2,3324 + 1,0369$ x. This means that variations in the LDL and HDL explain 85% of the variations in total CHOL level, and the rest 15% are attributed to other factors.

Moderate, negative, statistically significant regression exists between TRG and HDL ($R2=0,20$; $p<0001$). Triglycerides level explains 20% of the variability in HDL level and the rest 80% are determined by other factors.

Discussion.

In this study, we aimed to evaluate the prevalence of cardiovascular diseases (CVDs) and several associated factors, such as place of residence, glucose levels, and hyperlipidemia, in a highly industrialized region of Bulgaria. These factors have been identified in previous studies as significant predictors of CVD development and mortality, particularly in the older population [13,14]. To the best of our knowledge, this is the first regional study assessing the prevalence of CVDs in Burgas.

Our primary intention was to make a type of screening evaluation of the CVDs presence. Almost all the observed patients already have cardiovascular diseases therefore we do not attempt to calculate the risk of their development. Our primary intention was just to try to increase the awareness of elderly people about their CV diseases.

We focused on the older population due to the high prevalence of CVDs, particularly hypertension, in this group and the elevated risk of further health deterioration [15]. Consistent with findings from other national studies, we observed that almost all participants had comorbidities, with an average of at least two per person [16]. Comorbidities are associated with polypharmacy, which may further increase cardiovascular morbidity due to potentially inappropriate prescriptions and medication use [17,18].

Arterial hypertension was the most reported CVD, affecting 85% of participants. This prevalence aligns with findings from the Global Burden of Cardiovascular Diseases study [19].

Although no statistically significant difference in diastolic blood pressure (DBP) was observed between genders, the mean DBP value was close to the upper limit of normal at approximately 85 mmHg (mean: 85.13 mmHg) [20]. The optimal DBP limit for older adults is generally considered to be below 80 mmHg to reduce cardiac workload and minimize the risk of cardiovascular events. A DBP of 85 mmHg, in combination with existing hypertension increases the risk of future complications. Lowering DBP values may be advisable, particularly for individuals with additional comorbidities such as diabetes and hyperlipidemia [21].

People reporting heart failure are also a limited number. This could be due to 2 major reasons. The first is that there are no people with HF at the moment of interviews in the pensionary clubs. The second could be a lack of information for HF diagnosis by the patients.

Surprisingly, fewer people reported having diabetes, but all had glucose levels above the recommended physiological norm of 5.6 mmol/l, suggesting inadequate glucose control and a potential risk of diabetes, particularly among undiagnosed individuals. It has been shown that even slightly elevated glucose levels correlate with an increased risk of developing cardiovascular disease in older people [22]. These results should be communicated to general practitioners so they can refer individuals for diabetes testing. Changes in lifestyle and diet should also be recommended. There is evidence that educational campaigns and preventive measures play a crucial role in the management and prevention of CVD development, helping to achieve “ideal cardiovascular health” [23,24].

Although triglyceride levels, on average, appear within the acceptable range (mean value of 2.22 mmol/l), this can be misleading in people with comorbidities, especially those with arterial hypertension (AH) and metabolic syndrome. Literature supports that values above 1.7 mmol/l are considered an increased risk factor in people with AH and other metabolic disorders [25]. Research shows that even moderately elevated triglycerides, combined with high LDL cholesterol levels, increase the likelihood of coronary heart disease and other cardiovascular events, with this risk being more pronounced in men. We found that total cholesterol values were lower in men (4.76 mmol/l), which is below the recommended limit of 5.2 mmol/l, but the combination of high LDL (3.09 mmol/l) and triglycerides indicated that the risk of atherosclerosis and cardiovascular complications remains significant. In women, the lipid profile is also a concern because the total cholesterol and LDL cholesterol levels are above normal. In this case, HDL values are not high enough to offset the risk, especially in people with diagnosed hypertension [26,27]. Studies show that men with comorbidities such as AH and high cholesterol are at higher cardiovascular risk than women. This is related to hormonal and physiological differences, as well as the fact that triglycerides are a greater risk factor in men, especially when combined with high LDL and low HDL [20].

Maintaining diastolic pressure values below 80 mmHg and triglycerides below 1.7 mmol/l may be a goal for optimal cardiovascular risk management in older people with comorbidities. Regular monitoring of lipid and glucose profiles, as well as additional lifestyle and nutritional interventions, are recommended for these individuals. Prophylactic measures and dietary recommendations should be considered to reduce cardiovascular risk in high-risk individuals, especially men.

The limitations of our study include the fact that we did not evaluate other factors, such as smoking habits, family history, etc. Our study was a broad screening of older individuals who agreed to participate that did not allow us to collect all relevant information on-site. Smoking is also a well-recognized risk factor that was not explored due to our attempt to keep the study brief and to limit the time spent with participants. We also acknowledge that pensioners' clubs are places for socializing, and people may not be willing to share many details about their unhealthy habits. Another limitation of this study is the female predominance in the study population. This could be because women are generally more conscientious about their health, which may explain their higher representation. This could skew the results, making them less representative of the general population. We also have to add that female prevail in the cohort of people above 65 years of age (male=186 442; female=202 477). During the study we did not influence participants' selection. Only those people who visited the clubs during the time of the team visit and who agreed to participate were included in the analysis. This limitation leads to heterogeneity in our sample that is limiting the generalizability of the results. This is the reason to name the study as a pilot study. We do not observe in details concomitants diseases because they were out of scope of the screening and professional knowledge of participating physicians.

This study should be further developed following the identification of high-risk individuals and the organization of detailed clinical examinations, as well as educational campaigns for the older population. There were four similar programs in the region during 2019-2023 which cover near 15000 citizens. Summary of their results shows that 74.3% of participants had high blood pressure above 140/90 mmHg. Controlled patients on antihypertensive therapy were 46% (34.8% of the screened individuals). Unfortunately, there is no possibility to compare observed cohorts in respect of age or other demographic characteristics [28].

Conclusion.

Hypertension is the most prevalent cardiovascular disease in older populations in Burgas. Almost all older populations possess comorbidities.

Author Contributions.

Conceptualization, B.P. and G.P.; methodology, D.G.; software, S.P. and N.G.; validation, B.P., N.G. and G.P.; formal analysis, D.G., G.P.; investigation, D.G., S. P.; resources, D.G., S. P., N.M; data curation, D.G., S.P..; writing—original draft preparation, G.P., N.G.; writing—review and editing, B.P, G.P., N.G., D.G, S.P..; visualization, N.G.; supervision, B.P., G.P.; project administration, B.P.; funding acquisition, B.P, D.G.. All authors have read and agreed to the published version of the manuscript.

Funding.

This work was not funded

Institutional Review Board Statement.

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of TRAKIA UNIVERSITY (Protocol N29/01.02. 2024).

Acknowledgement.

The authors are thankful to the Municipality of Bulgar that support this study, as well as to Trakia University, Stara Zagora for scientific support and mentoring.

Conflicts of Interest.

The authors declare no conflicts of interest.

REFERENCES

1. WHO. Cardiovascular diseases. 2024. https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1
2. Fox C.S, Pencina M.J, Wilson P.W, et al. Lifetime risk of cardiovascular disease among individuals with and without diabetes stratified by obesity status in the Framingham heart study. Diabetes Care. 2008;31:1582-4.
3. Lloyd-Jones D.M, Larson M.G, Beiser A, et al. Lifetime risk of developing coronary heart disease. Lancet. 1999;353:89-92.
4. Benjamin E.J, Virani S.S, Callaway C.W, et al. American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics-2018 Update: A Report from the American Heart Association. Circulation. 2018;137:e67-e492.
5. Curry S.J, Krist A.H, Owens D.K, et al. US Preventive Services Task Force. Risk Assessment for Cardiovascular Disease with Nontraditional Risk Factors: US Preventive Services Task Force Recommendation Statement. JAMA. 2018;320:272-280.
6. Fox C.S, Coady S, Sorlie P.D, et al. Trends in cardiovascular complications of diabetes. JAMA. 2004;292:2495-9.
7. Vasan R.S, Sullivan L.M, Wilson P.W, et al. Relative importance of borderline and elevated levels of coronary heart disease risk factors. Ann Intern Med. 2005;142:393-402.
8. Yusuf S, Hawken S, Ounpuu S, et al. INTERHEART Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364:937-52.
9. National Statistical Institute. Sofia. Deaths by causes in 2006. 2024. http://www.nsi.bg/SocialActivities_e/Health.htm
10. Yotov Y.T, Torbova S.V, Naydenov S, et al. Risk factors for cardiovascular diseases in urban population with arterial hypertension-have they changed in five years in Bulgaria? European Heart Journal. 2013;34:P3237.
11. Dyakova M, Shipkovenska E, Dyakov P, et al. Cardiovascular risk assessment of Bulgarian urban population: cross-sectional study. Croat Med J. 2008;49:783-91.
12. Movsisyan N.K, Vinciguerra M, Medina-Inojosa J.R, et al. Cardiovascular Diseases in Central and Eastern Europe: A Call for More Surveillance and Evidence-Based Health Promotion. Ann Glob Health. 2020;86:21.

13. Fox C.S, Pencina M.J, Wilson P.W, et al. Lifetime risk of cardiovascular disease among individuals with and without diabetes stratified by obesity status in the Framingham heart study. Diabetes Care. 2008;31:1582-4.
14. Savji N, Rockman C.B, Skolnick A.H, et al. Association between advanced age and vascular disease in different arterial territories: a population database of over 3.6 million subjects. J Am Coll Cardiol. 2013;61:1736-43.
15. Chunrun Q, Sheng L, Jingdan Z, et al. Burden of cardiovascular disease among older: based on the Global Burden of Disease Study 2019, European Heart Journal - Quality of Care and Clinical Outcomes. 2024;10:143-153.
16. Krustev T, Milushewa P, Tachkov K. Impact of Polypharmacy, Drug-Related Problems, and Potentially Inappropriate Medications in Geriatric People and Its Implications for Bulgaria—Narrative Review and Meta-Analysis. Front. Public Health. 2022;10:743138.
17. Krustev T, Milushewa P, Tachkov K, et al. Evaluation of potentially inappropriate medication in older people with cardiovascular diseases-STOPP/START-based study. Front Public Health. 2022;10:1023171.
18. Milushewa P, Blagova S, Stefanova P, et al. Evaluating potentially inappropriate medications in older people in a pharmacy setting in Bulgaria: A pilot study utilizing the EU (7)-PIM List. Pharmacia. 2023;70:1249-1255.
19. Roth G.A, Mensah G.A, Johnson C.O, et al. GBD-NHLBI-JACC Global Burden of Cardiovascular Diseases Writing Group. Global Burden of Cardiovascular Diseases and Risk Factors, 1990-2019: Update from the GBD 2019 Study. J Am Coll Cardiol. 2020;76:2982-3021. Erratum in: J Am Coll Cardiol. 2021;77:1958-1959.
20. Regitz-Zagrosek V, Kararigas G. Mechanistic pathways of sex differences in cardiovascular disease. Physiological Reviews. 2017;97:1-37.
21. Franklin S.S, Wong N.D. Hypertension and cardiovascular disease: contributions of the Framingham Heart Study. Global Heart. 2013;8:49-57.
22. Emerging Risk Factors Collaboration, Sarwar N, Gao P, Seshasai S.R, et al. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. Lancet. 2010,375:2215-22.
23. Lloyd-Jones D.M, Hong Y, Labarthe D, et al. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. Circulation. 2010;121:586-613.
24. Goff D.C, Lloyd-Jones D.M, Bennett G, et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Circulation. 2014;25:S49-73.
25. Miller M, Stone N.J, Ballantyne C, et al. Triglycerides and cardiovascular disease: a scientific statement from the American Heart Association. Circulation. 2011;123:2292-2333.
26. Grundy S.M, Stone N.J, Bailey A.L, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/ PCNA guideline on the management of blood cholesterol. Journal of the American College of Cardiology. 2018;73:e285-e350.
27. Greenland P, Alpert J.S, Beller G.A, et al. 2010 ACCF/AHA guideline for assessment of cardiovascular risk in asymptomatic adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2010;56:e50-103.
28. https://www.burgas.bg/bg/novini/ako-stradate-ot-sardechno-sadovi-problemi-vklyuchete-se-v-initsiativata-may-mesets-za-merene/.