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მედიცინისა და მენეჯმენტის თანამედროვე პრობლემები

საერთაშორისო, რეცენზირებადი, რეფერირებადი
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თამაზ ხვიჩიას მარადიული ხსოვნისათვის

საუნივერსიტეტო ცხოვრებას საქართველოში, საბედნიეროდ, საკმაოდ ბევრი ღირსეული აღმაშენებელი მოღვაწე ახსოვს და უნივერსიტეტ გეომედის რექტორის მოადგილე - ბატონი თამაზ ხვიჩია ერთ-ერთი საუკეთესოა მათ შორის. უნივერსიტეტის ყველა თანამშრომელმა ღრმა მწუხარებით განიცადა მზრუნველი მეგობრის დაკარგვა. ბატონი თამაზის გარდაცვალება ნამდვილად დიდი დანაკლისია თითოეული ჩვენთაგანისთვის. არ დავივიწყებთ მის ამაგს და მუდამ გავიხსენებთ, როგორც საქმისადმი ზედმიწევნით თავდადებულ და სიკეთით სავსე ერთგულ ადამიანს.

To Eternal Memory of Tamaz Khvichia

Fortunately, university life in Georgia is remembered by quite a few worthy builders, and the Deputy Rector of the University Geomedi - Mr. Tamaz Khvichia is one of the best among them. All employees of the university deeply grieved the loss of a caring friend. The death of Mr. Tamaz is truly a great loss for each of us. We will not forget His legacy and will always remember Him as a person who was extremely dedicated to His work and full of kindness.

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მთავარი რედაქტორისაგან
From the Editor-in-Chief

ძვირფასო კოლეგებო!

შემოთავაზებული სამეცნიერო ნაშრომთა ჟურნალი განკუთვნილია მედიცინის, ეკონომიკის, მენეჯმენტის, ფიზიკური მედიცინისა და რეაბილიტაციის დარგის სპეციალისტებისათვის.

ჩვენ ვიმედოვნებთ, რომ ავტორთა მიერ წარმოდგენილი ნაშრომები ხელს შეუწყობს სამეცნიერო პოტენციალის გაძლიერებას.

მარინა ფირცხალავა
ბიოლოგიურ მეცნიერებათა დოქტორი,
პროფესორი, აკადემიკოსი,
უნივერსიტეტ გეომედის რექტორი

Dear colleagues!

The proposed scientific journal is intended for specialists in medicine, management, physical medicine and rehabilitation, economics.

We hope that the works presented by the authors will help to strengthen the scientific potential.

Marina Pirtskhalava
Doctor of Biological Sciences,
Professor, Academician,
Rector of University Geomedi

შინაარსი Contents

Review Article

Ethnobotanical Study and Phytochemical Profiling of Traditionally Used Medicinal Plants of Georgia and Armenia: *Symphytum caucasicum* M. Bieb. (Boraginaceae) and *Cyclamen coum* Mill. (Primulaceae)

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Abstract

A variety of climate zones and unique relief make the Caucasus a hotspot, characterized by the highest biological diversity of any area with temperate forests worldwide. The Caucasus hotspot shelters 6350 species of vascular plants, at least 25% of which are unique to the region. For centuries, many Caucasian plants have been used in traditional medicine. Interestingly, in different countries, the same plant could have different applications in traditional medicine. In this study, we considered botanical characteristics, distribution, biochemical composition and use in traditional medicine of *Symphytum caucasicum* M. Bieb. and *Cyclamen coum* Mill., medicinal plants used in the traditional medicine of Georgia and Armenia. The review demonstrates that Caucasian medicinal plants *Symphytum caucasicum* M. Bieb. and *Cyclamen coum* Mill. are an important source of alkaloids, saponins and phenolic compounds. The review demonstrates the benefits of using *Symphytum caucasicum* M. Bieb. and *Cyclamen coum* Mill. for the treatment of different disorders, indicates different applications of these plants in traditional Georgian and Armenian medicine and offers information to produce safe plant-based medications.

Keywords: *Symphytum caucasicum* M. Bieb., *Cyclamen coum* Mill., Georgia, Armenia, medicinal plants, alkaloids, saponins and phenolic compounds.

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Introduction

Although synthetic pharmaceuticals are increasingly produced, there is a rising global interest in and demand for herbal medicines. The Great Caucasus is renowned for its spectacular flora. This biodiversity hotspot has evolved due to a variety of factors, such as a rich topography and geology, sharp climate gradients, and the location between the flora regions of Asia, Europe, and the Mediterranean. The Caucasus is home to 6350 vascular plant species, including more than 2900 endemic species. [1]. Two neighbouring countries of the South Caucasus, Georgia and Armenia, are characterised by a rich and diverse flora [2], [3]. There are about 3800 plant species described in the Armenian flora, out of which about 800 species could be used as medicinal plants [4], [5]. The flora of Georgia includes more than 4,100 vascular species; the latest register published in 2018 lists 4275 species [6], and one-fifth of them are endemic. Around 700 species are used in Georgian traditional medicine, and 200 taxa have been listed in the country's official pharmacopoeia [7]. Throughout human history, various parts of medicinal plants, including leaves, stems, bark, roots, seeds, and fruits, have been utilized for the treatment and prevention of the primary types of diseases. Biologically active compounds isolated from plant material exhibit antioxidant, anti-inflammatory, antibacterial and anti-cancer activities and serve as the major sources of new drug molecules today [8], [9]. Even though many plant species occur in the territories of both Armenia and Georgia, and the folk medicine of both countries has a long history, the comparison of the traditional medicinal use of the same plant species in these countries has not been performed. In this review, the systematization of knowledge on biology, phytochemical profile and use in folk medicine of two medicinal plant species, grown on the territory of both Georgia and Armenia, *Symphytum caucasicum* M. Bieb. and *Cyclamen coum* Mill. was performed. The literature search was carried out in PubMed, Scopus, Google Scholar and eLibrary databases between 10th of July - 10th and August 2025. The name of each medicinal plant was used as a search criterion. The search was performed in Georgian, Armenian, English and Russian languages.

Botanical characteristics of *Symphytum caucasicum* and *Cyclamen coum* Mill.

Symphytum caucasicum M. Bieb.

S. caucasicum is an herbaceous perennial species, covered in fine greyish hairs, with a reduced rhizome, short, fusiform, with long, thick roots (Fig. 1A). The stem is 40–60 cm high, thick, soft-villous, and has a few short lateral branches. The cauline leaves are quite numerous and oval or oblong, while the lower leaves have a reasonably long petiole and are obtuse, truncate, or rounded at the base. The leaves are 5–10 cm long and 2–4 cm wide. The radical leaves wither at flowering. Inflorescence in cymes apical on the stem and upper lateral branches. Inflorescences are few-flowered, leafless and twisted to one side: pedicels drooping, 3–5 mm long, greyish downy and sometimes with prickly short bristles [10]. Calyx incised at 1/3, 3 times shorter than the corolla, with unequal lobes.

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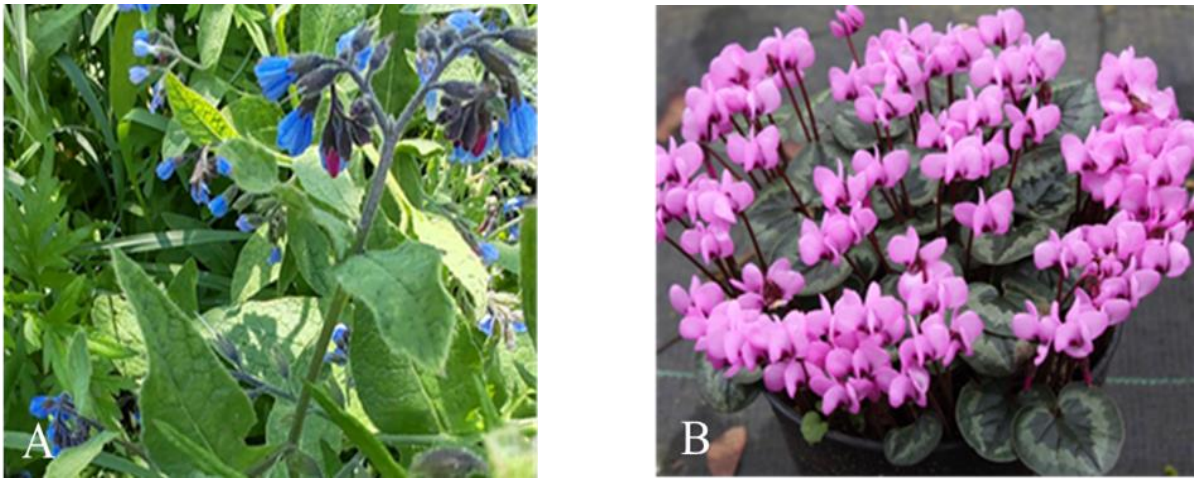

Fig. 1. ***Symphytum caucasicum*** **M. Bieb. (A) and** ***Cyclamen coum*** **Mill. (B) in the flowering pha**

Flowers are small. Corolla red in bud, light blue when open. The fruit is oblong, brownish, sharply netted-wrinkled, finely tuberculate within this net, 3–3.5 mm long. The flowering phase is from April to June, and fruiting occurs in June-July [10].

Cyclamen coum Mill

The name of the plant refers to the Greek Kos Island in the Aegean Sea. Perennial tuberous plant. The tuber is shaped like a compressed sphere and frequently flattens on top as it ages. It is medium in size when fully grown, reaching a diameter of 5 cm, brown, smooth, and has fine, velvety hairs. It can occasionally have small floral trunks, thin branching roots with a diameter of 1 mm, originating from the center of the underside. The leaves are rounded, kidney-shaped leaves in the fall or winter, which are either plain green or marked with silver on top and purple underneath. It lacks an above-ground stem. The corolla is dark pink, with a dark purple spot at the base. The fruit is a spherical box, with hemispherical, small seeds [11]. The corolla consists of 5 petals that are up to 15 mm long. The flowering phase begins in February-March and ends in April.

Geographical distribution of plants

S. caucasicum is distributed in Central European Russia, the North Caucasus, North European Russia, South European Russia, and the Transcaucasus [12], growing in shrubberies, glades, damp forest fringes, near ravines and at watersides. It is a winter-hardy plant, but not very tolerant of moisture.

In Armenia, plants grow in humid habitats, near water streams, and in ruderal places. It was revealed up to the upper mountain belt, on an elevation of 400–2000 m. It was described in Upper Akhuryan, Lori, Idjevan, Sevan, Darelegis, Zangezur, Meghri floristic regions [13].

In Georgia, plant grows in meadows and wetlands in the middle and lower montane regions. Distributed in Abkhazia, Racha-Lechkhumi, Adjara, Kartli, Tsakhia-Pshav-Khevsureti, Kakheti, Trialeti, Meskheti [10] .

The native range of *C. coum* is from Bulgaria to Caucasus and Israel. It is a tuberous geophyte and grows primarily in the temperate biome [14]. *C. coum* occupies contrasting habitats from the forest belt to the alpine belt, in deciduous forests, mainly in oak forests and in shrubbery. *C. coum* has a

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wider distribution from the Black Sea region to the southern part of Turkey. *C. coum* accessions are distributed in Ukraine, Armenia, Georgia, Bulgaria, Lebanon, Syria, Israel and the south Caspian coast of Iran, but nowhere else in the world [15]. In Georgia, it is widespread in Abkhazia [10]. It was observed on the Gagra ridge, in the Gegi and Bzipi Gorges [16].

The use of *Symphytum caucasicum* M. Bieb. and *Cyclamen coum* Mill. in traditional Armenian and Georgian medicine

The medicinal importance of the genus *Symphytum* have already been acclaimed by Dioscorides in the ancient Greek pharmacopoeia, De Materia Medica. The genus's name is derived from the Greek word *symphuo* ("to grow together"), and it is indicative of the wound-healing properties [17]. Throughout the Middle Ages, burns, bruises and fractures were treated with different preparations of plants of the genus *Symphytum*; in some countries, medical uses include pulmonary and gastroduodenal conditions, tonsillitis, metrorrhagia, and phlebitis [18]. The plants of the genus are still widely used in European and Western Asian countries for wound-healing, skin-regeneration, treatment of ulcers, wounds, bone fractures, and rheumatic complaints [19]. Fresh or dried parts of plants can be administered after homogenisation, or plant extracts are included in topical preparations (such as collars, compresses, pastes, ointments, and poultices) and formulations that indicated an internal use were also retrieved [17].

In Georgia, concentrated *S. caucasicum* root extracts are used to cure fractures [20]. The tea prepared from the roots is used to treat diseases of the gastrointestinal system [21], and the leaves and roots of this plant are used in ointments and to treat fractures [3]. In Armenia, *S. caucasicum* is used as a good remedy to treat inflammation of the sciatic nerve and fractures [3].

The name of the genus Cyclamen originates from Medieval Latin *cyclamen*, and Greek *kyklaminos*, meaning circle, referring to the round shape of the tubers and this part of the plant is used in traditional medicine [22]. Various *Cyclamen* species were used in the traditional medicine of many countries. Thus, the tubers of *C. repandum* were used in Sardinian folk medicine as a laxative and abortive; other species of this genus are used in Turkey against infertility [23]. In Georgian traditional medicine, alcohol tincture is prepared from tubers of *Cyclamen*, and it is used as a remedy that completely and permanently cures chronic sinusitis, nasal polyps and adenoids, and also treats arthritis and headaches [11]. The raw tubers of the *C. coum* are used against frontitis, sinusitis and pansinusitis and other such diseases [20]. Also, dried tubers of *C. coum* are used in traditional Georgian medicine for the stimulation of intestinal peristalsis, as remedies for haemorrhoids, rheumatism, some uterine diseases and snakebites [24].

Phytochemical composition of *Symphytum caucasicum* M. Bieb. and *Cyclamen coum* Mill. and the biological activity of compounds

Phenolic acids, saponins, flavonoids and pyrrolizidine alkaloids are the most

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representative compounds in all *Symphytum* species and *Cyclamen* [25], [26].

Alkaloids

Alkaloids are a type of secondary metabolites which contain at least one nitrogen in their chemical structure, generally forming a ring. Alkaloids are present as salts of organic acids in different parts of plants and are involved in seed dispersal and pollinator attraction, also protecting plants from pathogens and herbivore grazing [27].

The production of alkaloids in plants is closely linked to environmental conditions. Because these compounds are mainly synthesized in young, actively developing tissues, any factor that affects tissue growth - such as light intensity, nutrient availability, soil moisture, temperature, and elevation - can significantly impact alkaloid levels [28].

Pyrrolizidine alkaloids were revealed in *S. caucasicum* [29] and were generally more abundant in the roots than in the aerial parts [25]. Among these, the following alkaloids were detected using paper chromatography and thin-layer chromatography: the N-oxide of echimidine, asperumine, echinatine, intermedine, intermedine-N-oxide, 3'-acetylsymphytine-N-oxide, 7-acetylintermedine, heliosupine-N-oxide, and lasiocarpine [29], [25], [30], [31]. The aerial part of *S. caucasicum* contained intermedine, intermedine-N-oxide, 7-acetylintermedine, heliosupine-N-oxide, symphytine-N-oxide, 3'-acetylsymphytine-N-oxide [25]. Some of the alkaloids, isolated from *S. caucasicum,* had significant biological activity (Table 1). Thus, echmidine and N-oxide of echimidine exhibited significant acetylcholinesterase inhibitory activity with IC50 0.276-0.769 [32]. Intermedine was shown to induce cell apoptosis via excessive ROS generation, changing the mitochondrial membrane potential and releasing cytochrome *c* [33]. Heliosupine-N-oxide caused significant inhibition of muscarinergic (mACh) and serotonin$_2$ (5-HT$_2$) receptors [34]. Lasiocarpine caused inhibition of RNA synthesis and induction of tryptophan pyrrolase activity in rats [35].

A piperidine-type alkaloid was isolated from the whole *C. coum* plants, and the structure was established as 2-β-D-4glycopyranosyl-2-undecil-3,5-dihydroxy-6-carboxypiperidine [36].

Phenolic compounds

Monomeric and polymeric phenolics are secondary aromatic metabolites synthesised via the shikimate/phenylpropanoid pathway or polyketide acetate/malonate pathway [37]. Phenolic compounds are typically classified into two categories: flavonoids and non-flavonoids, and are involved in preventing stress and regulating physiological activities [37].

Various phenolic compounds were identified in *S. caucasicum*. Hydroxybenzoic acid-O-hexoside, hydroxybenzoic acid, caffeic acid, rabdosiin, rosmarinic acid, and dihydrogloboidnan A were found in the aerial part and roots of *S. caucasicum* [25]. Caffeic acid exhibits antioxidant and anti-inflammatory properties, cardioprotective effects against dyslipidemia, and hypercoagulability [38]. Hydroxybenzoic acid and its derivatives exhibit antioxidant and anti-inflammatory properties, modulate

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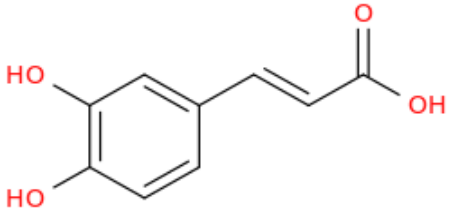
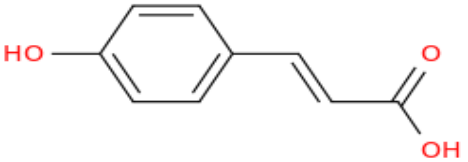
the immune response in inflammatory bowel diseases, regulate glucose levels, exhibit antimicrobial and neuroprotective effects, and inhibit the aggregation and propagation of α-synuclein [39]. Dehydrorabdosiin, globoidnan A, and danshensu were detected only in the aerial part of *Symphytum caucasicum* [25]. The aerial part of *S. caucasicum* also contained quercetin-O-hexoside and quercetin-O-malonylhexoside, while these flavonoids were not revealed in the roots [25]. Quercetin-O-hexoside exhibits cytotoxic, phytotoxic, antimicrobial and antioxidant effects [40].

New, biologically active phenolic polymers poly[3-(3,4-dihydroxyphenyl) glyceric acid] and poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl)ethylene] were revealed in *S. caucasicum* [41], [42]. It was demonstrated that poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl) ethylene] is the main component in four water-soluble high-molecular preparations obtained from roots and stems of *Symphytum asperum* and *S. caucasicum* [43]. This polymer is a representative of a new class of natural polyethers with a residue of 3-(3,4-dihydroxyphenyl)glyceric acid as the repeating unit [44]. Poly[3-(3,4-Poly[3-(3,4-dihydroxyphenyl)glyceric acid] was also isolated from roots of *S. asperum* and *S. caucasicum,* and the antibacterial activity of this compound was demonstrated [43], [45].

The total phenolic content in leaves and roots of *C. coum* was compared, and the highest phenolic content was revealed in the leaves [46]. Gallic acid, 3,4-dihydroxybenzoic acid, 4-dihydroxybenzoic acid, chlorogenic acid, vanillic acid, caffeic acid, *p*-coumaric acid, ferulic and cinnamic acids were revealed in the leaves and roots of *C. coum* [46]. Antioxidant, anti-inflammatory, anti-cancer, anti-diabetic, and anti-melanogenic properties of *p*-coumaric acid were demonstrated[47]. Such phenolic compounds as phloretin, *C*-dihexoside, quercetin 3-galactoside, and catechin were identified from *C. coum* tuber extracts [48]. Phloretin exhibits antidiabetic, antioxidant, anti-inflammatory, and antitumor activities, inducing apoptosis in tumour cells and possessing an inhibitory effect on S180 sarcoma [49]. Quercetin-3-β-galactoside is effective for treating allergies and preventing heart disease and cancer, and it was identified as a new class of inhibitors of the 3-chymotrypsin-like protease of SARS-CoV [50].



caffeic acid (A)



p-coumaric acid

Fig. 2. Two structurally-related phenolic compounds isolated from *Symphytum caucasicum* M. Bieb. (A) and *Cyclamen coum* Mill. (B).

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Saponins

Saponins are a category of plant specialised metabolites, which are produced in plants in response to various biotic stresses. These compounds have a hydrophobic aglycone backbone attached to a hydrophilic saccharide, like glycosides [51]. Different studies have shown the activity of saponins against major herbivorous insects and strong antibacterial activity [52].

The presence of saponins was demonstrated for plants of the genus *Symphytum* [31]. Thus, the presence of symphytoxide-A and leontoside-A and B was shown for the most studied species of the genus, *Symphytum officinale* L. [53]. However, data on the saponin composition of *S. caucasicum* are not available in the literature.

The composition of saponins from *C. coum* was investigated in several studies. Thus, cydaminorin, cyclacoumin, mirabilin lactone, and deglucocyclamin, were isolated from the *C. coum* tubers and their molecular structures were elucidated [48], [54]. A new triterpenoid saponins, coumoside A and coumoside B, have been isolated from the whole *C. coum* plant and structures of these compounds were deduced by NMR methods [55], [56]. The coumoside A has the structure 3 beta-O-[beta-D-glucopyranosyl-(1-6)-[alpha-L-arabinopyranosyl- (1-2)]-beta-D-glucopyranosyl-(1-4)-[beta-D-gluco-pyranosyl-(1-2)]-alpha-L-arabinopy-ranosyl]-16 alpha-hydroxy-30,28 beta-lactone-olean-12-ene and the structure of coumoside B was 16α-hydroxy-3β-[β-xylopyranosyl-(1→2)]-[β-glucopyranosyl-(1→4)]-[β-glucopyranosyl-(1→2)]-α-arabino-pyranosyl]-oxy]olean-12-eno-30,28-lactone [56]. From the tubers of *C. coum*, deglucocyclamin and three new saponins, cyclaminorin, cyclacoumin, and mirabilin lactone, were isolated [54]. According to NMR methods, the new compounds had the following structures: cyclaminorin: 13 beta,28-epoxy-3-beta-(([beta-D-gluco-pyranosyl-(1-->2)]- [beta-D-glucopyranosyl-(1-->4)]-alpha-L-arabinopyranosyl) oxy) 16 alpha-hydroxy-olean-30-al, cyclacoumin had the structure 13 beta, 28-epoxy-3 beta-((([beta-D-xylopyranosyl-(1-->2) -beta-D-glucopyranosyl-(1-->4)]-[beta-D-gluco-pyranosyl-(1-->2)]-alpha-L-arabinopyra-nosyl)oxy)-16 alpha,23-dihydroxy-olean-30-al and the structure of mirabilin lactone was 16 alpha-hydroxy-3 beta-((([beta-D-xylopyranosyl-(1-->2)]- [beta-D-gluco-pyranosyl-1-->6)]-beta D-glucopyranosyl-(1-->4))-[beta-D-glucopyranosyl-(1-->2)]-alpha-L-arabinopyranosyl)-oxy) olean-12-eno-30,28-lactone [54]. Sapogenins cyclamiretin A, C, D, cyclamigenin A and primulagenin were isolated from tubers of *C. coum* [57]. Hemolytic activity of cyclamiretin A was demonstrated [58]. The potential of primulagenin for modulating immune responses in inflammatory and autoimmune diseases was shown [59].

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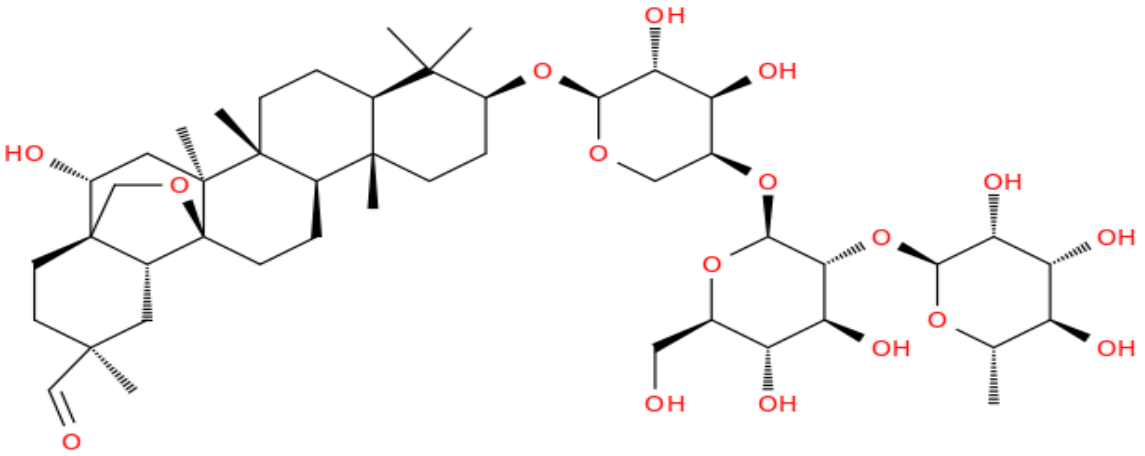

Cyclamiretin

Fig. 3. An example of a saponin endowed with a complex strucuture isolated from *Cyclamen coum* Mill. (Table 1).

Table 1. Biological activity of compounds isolated from *Symphytum caucasicum* M. Bieb. and *Cyclamen coum* Mill.

Class of compounds	Compound	Plant	Organ	Biological activity
Alkaloids	N-oxide of echimidine [29]	*Symphytum caucasicum* Bieb.	The whole plant	Acetylcholinesterase inhibitory activity [32].
	Intermedine, intermedine-N-oxide [25]	*Symphytum caucasicum* Bieb.	The whole plant	Hepatotoxicity through mitochondria-mediated apoptosis [33].
	Heliosupine-N-oxide [25]	*Symphytum caucasicum* Bieb.	The whole plant	Inhibitor of muscarinergic (mACh) and serotonin$_2$(5-HT$_2$) receptors [34].
	Lasiocarpine [31]	*Symphytum caucasicum* Bieb.	The whole plant	Inhibition of RNA synthesis and induction of tryptophan pyrrolase activity [35].
Phenolic compounds	Hydroxybenzoic acid-O-hexoside, hydroxybenzoic acid [25].	*Symphytum caucasicum* Bieb.	The whole plant	Antioxidant, anti-inflammatory properties, modulate the immune response, regulate glucose level, antimicrobial effect, and neuroprotective effect, [39].
	3,4-dihydroxybenzoic acid, 4-dihydroxy benzoic acid [46]	*Cyclamen coum* Mill.	Leaves and roots	
	Caffeic acid [25], [46]	*Symphytum caucasicum* Bieb.	Leaves and roots	Antioxidant and anti-inflammatory properties, cardioprotective effect [38].
		Cyclamen coum Mill.	Leaves and roots	

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	Quercetin-O-hexoside [25]	*Symphytum caucasicum* Bieb.	Aerial part	Cytotoxic, phytotoxic, antimicrobial and antioxidant effects [40].
	Poly[3-(3,4-dihydroxyphenyl)glyceric acid] [43].	*Symphytum caucasicum* Bieb.	Roots	Antibacterial activity [45]
	p-coumaric acid [46]	*Cyclamen coum* Mill.	Leaves and tubers	Antioxidant, anti-inflammatory, anti-cancer, anti-diabetic, and anti-melanogenic properties [47].
	Phloretin [48]	*Cyclamen coum* Mill	Tubers	Antidiabetic, antioxidant, anti-inflammatory, and antitumor activities [49].
	Quercetin-3-β-galactoside [48]	*Cyclamen coum* Mill	Tubers	Treatment of allergies, prevention of heart disease and cancer, inhibitor of 3-chymotrypsin-like protease of SARS-CoV [50].
Saponins	Cyclamiretin A [57]	*Cyclamen coum* Mill	Tubers	Haemolytic activity [58].
	Primulagenin [57]	*Cyclamen coum* Mill	Tubers	Modulation of immune responses [59].

Conclusions

An understanding of the ethnopharmacology and phytochemical composition of Armenian and Georgian medicinal plants, *Symphytum caucasicum* M. Bieb. and *Cyclamen coum* Mill. was the aim of the review. According to the current review, these species, for centuries used in medicine in both countries, are valuable sources of a variety of biologically active compounds, such as alkaloids, phenolic compounds and saponins. Nevertheless, more research is required to clarify the composition and structures of biologically active substances, mechanisms of action, and side effects in the treatment of a particular disease. The compounds found in Caucasian medicinal plants discussed in this review have a lot of potential for creating new therapeutic agents and are useful resources for drug discovery.

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საქართველოსა და სომხეთის ტრადიციული სამკურნალო მცენარეების: *Symphytum caucasicum* M. Bieb. (Boraginaceae) და *Cyclamen coum* Mill. (Primulaceae) ეთნობოტანიკური კვლევა და მათი ფიტოქიმიური პროფილი

ვალენტინა მიტტოვა[1,], ჯოვანი ნ. როვიელო[2], ზურაბ რ. ცეცხლაძე[1], ალექსანდრე ლოლაძე[3], ხათუნა მაკალათია[1], ეკატერინე გორგოშიძე[3], ეკატერინე მოწონელიძე[3], თათევიკ სარგსიანი[4,5], აიარპი სიმონიანი[5], ავეტის ცატურიანი[4], როზა ბიძინაშვილი[6], ანა გოგოლაძე[6], მარინე სირაძე[6],*

[1]ექსპერიმენტული და კლინიკური მედიცინის სამეცნიერო-კვლევითი ინსტიტუტი, უნივერსიტეტი გეომედი, მეფე სოლომონ II-ის ქ. 4, 0114 თბილისი, საქართველო.
[2]ბიოსტრუქტურებისა და ბიოვიზუალიზაციის ინსტიტუტი, იტალიის ეროვნული კვლევის საბჭო (IBB-CNR), არეა დი რიჩერკას საიტი და შტაბბინა, ვია პიეტრო კასტელინო 111, 80131, იტალია, ნეაპოლი.
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აბსტრაქტი

კლიმატური ზონების მრავალფეროვნება და უნიკალური რელიეფი კავკასიას მსოფლიოს ერთ-ერთ ცხელ წერტილად აქცევს, რომელიც ზომიერი ტყეების მქონე ნებისმიერ სხვა რეგიონებს შორის ყველაზე მაღალი ბიოლოგიური მრავალფეროვნებით ხასიათდება. კავკასია უმაღლესი მცენარეების დაახლოებით 6350 სახეობის თავშესაფარია, რომელთაგან სულ მცირე 25% მხოლოდ ამ რეგიონში გვხვდება. საუკუნეების განმავლობაში, კავკასიური მცენარეების უმეტესობა ტრადიციულ მედიცინაში გამოიყენებოდა. აღსანიშნავია, რომ სხვადასხვა ქვეყანაში ერთი და იგივე მცენარე სხვადასხვა სამკურნალო მიზნით გამოიყენებოდა. მოცემულ კვლევაში განხილულია ***Symphytum caucasicum M. Bieb.***-ისა და ***Cyclamen coum Mill.***-ის ბოტანიკური მახასიათებლები, გავრცელება, ბიოქიმიური შემადგენლობა და მათი გამოყენება ტრადიციულ მედიცინაში - კერძოდ საქართველოსა და სომხეთში. ლიტერატურულმა მიმოხილვამ აჩვენა, რომ ეს მცენარეები ალკალოიდების, საპონინებისა და ფენოლური ნაერთების მნიშვნელოვანი წყაროა. მათი გამოყენება ტრადიციულ ქართულ და სომხურ მედიცინაში მიუთითებს მათ სამკურნალო პოტენციალზე სხვადასხვა დაავადებების მიმართ და საფუძველს ქმნის მომავალში უსაფრთხო მცენარეული პრეპარატების წარმოებისთვის.

საკვანძო სიტყვები: *Symphytum caucasicum M. Bieb.*, *Cyclamen coum Mill.*, საქართველო, სომხეთი, სამკურნალო მცენარეები, ალკალოიდები, საპონინები და ფენოლური ნაერთები.

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References

1. Abdaladze O, Batsatsashvili K, Körner C, Nakhutsrishvili G, Spehn E, eds. Plant Diversity in the Central Great Caucasus: A quantitative assessment. 1st ed. Springer International Publishing: Imprint: Springer; 2017: 170. doi:10.1007/978-3-319-55777-9

2. Pirtskhalava M, Mittova V, Tsetskhladze ZR, Palumbo R, Pastore R, Roviello GN. Georgian medicinal plants as rich natural sources of antioxidant derivatives: a review on the current knowledge and future perspectives. CMC. 2024; 31. doi: 10.2174/0109298673262575231127034952

3. Ayvazyan A, Zidorn C. Traditionally used medicinal plants of Armenia. Plants. 2024;13(23):3411. doi:10.3390/plants13233411

4. Fayvush G, Aleksanyan A, Bussmann RW. Ethnobotany of the Caucasus – Armenia. In: Bussmann RW, ed. Ethnobotany of the Caucasus. European Ethnobotany. Springer International Publishing; 2017:21-36. doi:10.1007/978-3-319-49412-8_18

5. Manukyan A, Lumlerdkij N, Heinrich M. Caucasian endemic medicinal and nutraceutical plants: in-vitro antioxidant and cytotoxic activities and bioactive compounds. Journal of Pharmacy and Pharmacology. 2019;71(7):1152-1161. doi:10.1111/jphp.13093

6. Davlianidze M, Gviniashvili T, Mukbaniani M, Jinjolia-Imnadze L, Jugheli T. Nomenclatural checklist of flora of Georgia. Universali; 2018.

7. Miller JS, McCue K, Consiglio T, Stone J, Eristavi M, Sikharulidze S, Mikatadze-Pantsulaia T, Khutsishvili M. Endemic medicinal plants of Georgia (Caucasus). Missouri Botanical Garden Press; 2005:452.

8. Roviello GN, Mittova V, Tsetskhladze ZR, Bidzinashvili R, Berdzenishvili M, Vakhania M, Mindiashvili T, Kobiashvili M. Antioxidant properties of some Caucasian medicinal plants. MIMM. 2024;27(1):1-13. doi:10.56580/GEOMEDI44

9. Fik-Jaskółka M, Mittova V, Motsonelidze C, Vakhania M, Vicidomini C, Roviello GN. Antimicrobial metabolites of Caucasian medicinal plants as alternatives to antibiotics. Antibiotics. 2024; 13 (6): 487. doi: 10.3390/antibiotics13060487

10. Flora of Georgia. Vol X. Second edition. Metsniereba; 1985: 388 p.

11. Bokov DO, Krasikova MK, Sergunova ES, Bobkova NV, Kovaleva TYu, Bondar AA, Marakhova AI, Morokhina SL and Moiseev DV. Pharmacognostic, Phytochemical and ethnopharmacological potential of *Cyclamen coum* Mill. PJ. 2020;12(1):204-212. doi:10.5530/pj.2020.12.31

12. https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:120758-1.

13. Bussmann RW, ed. Ethnobotany of the Caucasus. Springer International Publishing; 2017: 6564 p. doi:10.1007/978-3-319-49412-8

14.https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:700707-1.

15. Curuk P, Sogut Z, Bozdogan E, Izgu I, Sevindik B, Tagipur EM, Teixeira da Silva JA, Serce S, Solmaz I, Kacar YA, Mendi NYY. Morphological characterization of *Cyclamen* sp. grown naturally in Turkey: Part I. South African Journal of Botany. 2015; 100:7-15. doi:10.1016/j.sajb.2015.03.199

16. Kolakovsky AA. Flora of Abkhazia. Vol 3. Metsniereba:292 p.

17. Trifan A, Wolfram E, Skalicka-Woźniak K, Luca SV. *Symphytum* genus—from traditional medicine to modern uses: an update on phytochemistry, pharmacological activity, and safety. Phytochem Rev. 2025;24(3):2329-2386. doi:10.1007/s11101-024-09977-1

18. Grube B, Grünwald J, Krug L, Staiger C. Efficacy of a comfrey root (*Symphyti offic. radix*) extract ointment in the treatment of patients with painful osteoarthritis of the knee: results of a double-blind, randomised, bicenter, placebo-controlled trial. Phytomedicine. 2007; 14 (1): 2-10. doi: 10.1016/j.phymed.2006.11.006

19. Veitch NC, Smith M. Herbal Medicines. 4th ed. Pharmaceutical press; 2013: 912 p.

20. Shengelia Z. The culture of medicinal plants in Georgia. Sabchota Sakartvelo; 1983: 308 p.

21. Rainer WB, Narel Y PZ, Shalva S, Zaal K, David K. Medicinal and food plants of Svaneti and Lechkhumi, Sakartvelo (Republic of Georgia), Caucasus. Med Aromat Plants. 2016;5(5). doi:10.4172/2167-0412.1000266

22. Mohammed GJ, Hameed IH, Kamal SA. Anti-inflammatory effects and other uses of Cyclamen species: a review. Ind Jour of Publ Health Rese & Develop. 2018;9(3):206. doi:10.5958/0976-5506.2018.00210.3

23. Speroni E, Cervellati R, Costa S, Dall'Acqua S, Guerra MC, Panizzolo C, Utan A, Innocenti G. Analgesic and antiinflammatory activity of *Cyclamen repandum* S. et S. Phytotherapy Research. 2007;21(7):684-689. doi:10.1002/ptr.2145

24. R. Bidzinashvili, N. Tskhadadze, Kh. Khaikashvil. Medicinal plants of the Tbilisi region. Basiani; 2010: 228 p.

25. Luca SV, Zengin G, Kulinowski Ł, Sinan KI, Skalicka-Woźniak K, Trifan A. Phytochemical profiling and bioactivity assessment of underutilized *Symphytum* species in comparison with *Symphytum officinale*. J Sci Food Agric. 2024;104(7):3971-3981. doi:10.1002/jsfa.13279

26. Sharara A, Badran A, Hijazi A, Albahri G, Bechelany M, Mesmar JE, Baydoun E. Comprehensive review of *Cyclamen*: development, bioactive properties, and therapeutic applications. Pharmaceuticals. 2024;17(7):848. doi:10.3390/ph17070848

27. Pereira AG, Cassani L, Garcia-Oliveira P, et al. Plant alkaloids: production, extraction, and potential therapeutic properties. In: Carocho M, Heleno SA, Barros L, eds. Natural Secondary Metabolites. Springer International Publishing; 2023: 157-200. doi:10.1007/978-3-031-18587-8_6

28. Mirifar A, Hemati A, Asgari Lajayer B, Pandey J, Astatkie T. Impact of various environmental factors on the biosynthesis of alkaloids in medicinal plants. In: Aftab T, ed. Environmental challenges and medicinal plants. environmental challenges and solutions. Springer International Publishing; 2022:229-248. doi:10.1007/978-3-030-92050-0_9

29. Roeder E. Medicinal plants in Europe containing pyrrolizidine alkaloids. Pharmazie. 1995; 50(2): 83-98.

30. Manko I, Melkumova ZV, Malysheva VF. Accumulation of alkaloids in various organs

DOI: 10.56580/GEOMEDI71

of *Symphytum caucasicum*. Plant resources. 1972; 4:538-541.

31. Salehi B, Sharopov F, Boyunegmez Tumer T, Ozleyen A, Rodríguez-Pérez C, Ezzat SM, Azzini E, Hosseinabadi T, Butnariu M, Sarac I, Bostan C, Acharya K, Sen S, Nur Kasapoglu K, Daşkaya-Dikmen C, Özçelik B, Baghalpour N, Sharifi-Rad J, Valere Tsouh Fokou P, Cho WC, Martins N. *Symphytum* species: a comprehensive review on chemical composition, food applications and phytopharmacology. Molecules. 2019; 24 (12): 2272. doi: 10.3390/molecules24122272

32. Benamar H, Tomassini L, Venditti A, Marouf A, Bennaceur M, Serafini M, Nicoletti M. Acetylcholinesterase inhibitory activity of pyrrolizidine alkaloids from *Echium confusum* Coincy. Natural Product Research. 2017; 31 (11): 1277-1285. doi: 10.1080/14786419.2016.1242000

33. Wang Z, Han H, Wang C, Zheng Q, Chen H, Zhang X, Hou R. Hepatotoxicity of pyrrolizidine alkaloid compound intermedine: comparison with other pyrrolizidine alkaloids and its toxicological mechanism. Toxins. 2021; 13(12): 849. doi: 10.3390/toxins13120849

34. Schmeller T, El-Shazly A, Wink M. Allelochemical activities of pyrrolizidine alkaloids: interactions with neuroreceptors and acetylcholine-related enzymes. J Chem Ecol. 1997; 23(2): 399-416. doi: 10.1023/B:JOEC.0000006367.51215.88

35. Reddy J, Harris C, Svoboda D. Inhibition by lasiocarpine of RNA synthesis, RNA polymerase and induction of tryptophan pyrrolase activity. Nature. 1968; 217 (5129): 659-661. doi: 10.1038/217659a0

36. Yayli N, Baltaci C. A novel glycosidicly linked piperidine alkaloid from *Cyclamen coum.* Turkish Journal of Chemistry. 1997; 21 (2): 139-143.

37. Kumar K, Debnath P, Singh S, Kumar N. An overview of plant phenolics and their involvement in abiotic stress tolerance. Stresses. 2023; 3(3): 570-585. doi: 10.3390/stresses3030040

38.Birková A. Caffeic acid: a brief overview of its presence, metabolism, and bioactivity. Bioactive Compounds in Health and Disease. 2020;3(4):74. doi:10.31989/bchd.v3i4.692

39. López-Herrador S, Corral-Sarasa J, González-García P, Morillas-Morota Y, Olivieri E, Jiménez-Sánchez L, Díaz-Casado ME. Natural hydroxybenzoic and hydroxycinnamic acids derivatives: mechanisms of action and therapeutic applications. Antioxidants. 2025;14(6):711. doi:10.3390/antiox14060711

40. Razavi SM, Zahri S, Zarrini G, Nazemiyeh H, Mohammadi S. Biological activity of quercetin-3-O-glucoside, a known plant flavonoid. Russ J Bioorg Chem. 2009;35(3):376-378. doi:10.1134/S1068162009030133

41. Barbakadze V, Gogilashvili L, Amiranashvili L, Merlani M, Mulkijanyan K. Novel biologically active phenolic polymers from different species of genera *Symphytum* and *Anchusa* (Boraginaceae). J Chem Eng Chem Res. 2014;1:47-53.

42. Barbakadze V, Kemertelidze E, Targamadze I, Mulkijanyan K, Shashkov A, Usov A. Poly[3-(3,4-dihydroxyphenyl)glyceric acid], a new biologically active polymer from *Symphytum asperum* Lepech. and *S. caucasicum* Bieb.

DOI: 10.56580/GEOMEDI71

(Boraginaceae). Molecules. 2005;10(9):1135-1144. doi:10.3390/10091135

43. Barbakadze VV, Kemertelidze EP, Mulkijanyan KG, van der Berg AJJ, Beukelman CJ, van den Worm E, Quarles van Ufford HC, Usov AI. Antioxidant and anticomplement activity of poly[3-(3,4-dihydroxyphenyl)glyceric acid] from *Symphytum asperum* and *Symphytum caucasicum* plants. Pharm Chem J. 2007;41(1):14-16. doi:10.1007/s11094-007-0004-7

44. Merlani M, Barbakadze V, Amiranashvili L, Gogilashvili L, Yannakopoulou E, Papadopoulos K, Chankvetadze B. Enantioselective synthesis and antioxidant activity of 3-(3,4-dihydroxyphenyl)-glyceric acid—basic monomeric moiety of a biologically active polyether from *Symphytum asperum* and *S. caucasicum*. Chirality. 2010;22(8):717-725. doi:10.1002/chir.20823

45. Barbakadze V, Merlani M, Gogilashvili L, Amiranashvili L, Petrou A, Geronikaki A, Ćirić A, Glamočlija J, Soković M. Antimicrobial activity of catechol-containing biopolymer poly[3-(3,4-dihydroxyphenyl)glyceric acid] from different medicinal plants of Boraginaceae family. Antibiotics. 2023;12(2):285. doi:10.3390/antibiotics12020285

46. Aydin C, Mammadov R, Davidov M. Biological activities, phenolic constituents and of various extracts of *Cyclamen coum* tubers and leaves from Turkey. JCPRM. 2023; (1): 255-263. doi: 10.14258/jcprm.20230111262

47. Roychoudhury S, Sinha B, Choudhury BP, Jha NK, Palit P, Kundu S, Mandal SC, Kolesarova A, Yousef MI, Ruokolainen J, Slama P, Kesari KK. Scavenging properties of plant-derived natural biomolecule para-coumaric acid in the prevention of oxidative stress-induced diseases. Antioxidants. 2021; 10(8): 1205. doi: 10.3390/antiox10081205

48. Mahomoodally MF, Picot-Allain MCN, Zengin G, Llorent-Martínez EJ, Stefanucci A, Ak G, Senkardes I, Tomczyk M, Mollica A. Chemical profiles and biological potential of tuber extracts from *Cyclamen coum* Mill. Biocatalysis and Agricultural Biotechnology. 2021; 33: 102008. doi: 10.1016/j.bcab.2021.102008

49. Zhao YY, Fan Y, Wang M, Cheng JX, Zou Jb, Zhang Xf, Shi Yaj, Guo Dy. Studies on pharmacokinetic properties and absorption mechanism of phloretin: in vivo and in vitro. Biomedicine & Pharmacotherapy. 2020; 132: 110809. doi: 10.1016/j.biopha.2020.110809

50. Chen L, Li J, Luo C, Liu H, Xu W, Chen G, Liew OW, Zhu W, Puah CM, Shen X, Jiang H. Binding interaction of quercetin-3-β-galactoside and its synthetic derivatives with SARS-CoV 3CLpro: Structure–activity relationship studies reveal salient pharmacophore features. Bioorganic & Medicinal Chemistry. 2006;14(24):8295-8306. doi:10.1016/j.bmc.2006.09.014

51. Shakeel A, Noor JJ, Jan U, Gul A, Handoo Z, Ashraf N. Saponins, the unexplored secondary metabolites in plant defense: opportunities in integrated pest management. Plants. 2025; 14(6): 861. doi: 10.3390/plants14060861

52. Iovinella I, Barbieri F, Biazzi E, Sciandra C, Tava A, Mazza G, Marianelli L, Cini A, Roversi PF, Torrini G. Antifeedant and insecticidal effects of alfalfa saponins in the

management of the Japanese beetle *Popillia japonica*. J Applied Entomology. 2023;147(8):651-660. doi:10.1111/jen.13153

53. Aftab K, Shaheen F, Mohammad FV, Noorwala M, Ahmad VU. Phyto-pharmacology of saponins from *Symphytum officinale* L. In: Waller GR, Yamasaki K, eds. Saponins used in traditional and modern medicine. Vol 404. Advances in Experimental Medicine and Biology. Springer US; 1996:429-442. doi:10.1007/978-1-4899-1367-8_34

54. Çaliş İ, Yürüker A, Tanker N, Wright A, Sticher O. Triterpenesaponins from *Cyclamen coum* var. *coum*. Planta Med. 1997;63(02):166-170. doi:10.1055/s-2006-957637

55. Yayli N, Baltaci C, Zengin A, Kuçukislamoglu M, Genc H. A triterpenoid saponin from *Cyclamen coum*. Phytochemistry. 1998;48(5):881-884. doi:10.1016/S0031-9422(97)00978-3

56. ayli N, Baltaci C, Zengin A, Küçükslamoglu M, Genç H, Küçük M. Pentacyclic triterpenoid saponin from *Cyclamen coum*. Planta Med. 1998;64(04):382-384. doi:10.1055/s-2006-957459

57. Reznicek G, Jurenitsch J, Robien W, Kubelka W. Saponins in *Cyclamen* species: configuration of cyclamiretin C and structure of isocyclamin. Phytochemistry. 1989; 28(3): 825-828. doi: 10.1016/0031-9422(89)80123-2

58. Voutquenne L, Lavaud C, Massiot G, Men-Olivier LL. Structure-activity relationships of haemolytic saponins. Pharmaceutical Biology. 2002; 40 (4): 253-262. doi: 10.1076/phbi.40.4.253.8470

59. Schwarz PF, Perhal AF, Preglej T, et al. Primulagenin A is a potent inverse agonist of the nuclear receptor RAR-related orphan receptor gamma (RORγ). Preprint posted online April 4, 2025. doi: 10.1101/2025.04.01.646598

Review Article

A Systematic Review and Meta-analysis on Factors Influencing Academic Achievement of Children and Adolescents

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Abstract

Background: Academic achievement is crucial for public health concerns because it significantly impacts future academic success. However, the factors influencing the academic achievement of children and adolescents remain unclear.

Objectives: To synthesize and critically evaluate the findings of systematic review on the factors influencing academic achievement in children and adolescents through meta-analysis.

Methods: A systematic literature search was conducted from different databases for meta-analysis. Articles were extracted from scholar.google.com, Pubmed.com, eric.ed.gov, Elicit.com, sematicscholar.com to identify related studies published between 2015 to 2025 using PRISMA flow diagram. Approximately 120 full text papers were initially identified. Among them, irrelevant papers were excluded. After screening 12 studies, met the inclusion criteria, which were included in meta-analysis of this review. Selected articles and results of them were examined and synthesized in sub headings through thematic analysis.

Results: This study showed that out of total, 83.33% articles used cross-sectional and 16.67% used longitudinal research design in this reviewed study. The majority (25%) of healthy home food environment and breakfast were found as the influencing factors of academic achievement followed by poverty and sedentary life styles, proceed food, energy dense diet, balance diet, fruits and vegetables, Mediterranean diet, inflammatory and anti-inflammatory diet were found 25%, 16.67%, 16.67%. 8.33% and 8.33% respectively as the influencing factors of academic achievement of children and adolescents. Conclusion: The study concluded that academic achievement of children and adolescents is influenced by various factors. Mainly the dietary intake home food environment and breakfast as well as poverty and life styles. Even though, the rigorous design, control of biases and confounding variables are necessary to conform this association.

Key words: Academic achievement, Influencing factor, Children and Adolescent.

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Introduction

Academic achievement is not only important to educators, parents, and children, but it is also vital for public health concern, since it has a big impact on future academic success [1]. A person's future is significantly influenced by their academic performance during their childhood and adolescence [2]. The academic success includes the attainment of educational objectives, the cultivation of vital skills and competencies, personal fulfillment, persistence and post-college performance [3]. Academic achievement serves as a foundation for their critical thinking skills, cognitive development and overall academic behaviors [4]. Diet and lifestyle are the behaviors that can be altered to influence brain development, cognition and ultimately academic achievement. The cognitive development is directly linked with eating breakfast [5]. Food behavior is the major contributor to health-related issues in the world. Specifically in long term health problems [6]. A previous study found that children and adolescents who eat fewer nutrient-dense foods like fruits, vegetables, fish and more unhealthy meals like fast food and highly processed foods performed worse academically. Similarly, nutritional diet may have direct, indirect, and synergistic effects on the brain and cognition in addition to physical activity, sedentary lifestyles, cardio metabolic health, and sleep [7]. In this scenario, no previous systematic review or meta-analysis has looked at the relationship between adherence to the factors that influence children's and adolescents' academic achievement. The existing research often focuses on specific eating patterns rather than broader dietary patterns [8]. In this context, understanding this connection is essential to the implications for individual well-being of children and adolescents. Therefore, the aim of the present study was to synthesize and critically evaluate the findings of systematic review on the factors influencing academic achievement in children and adolescents through meta-analysis.

Materials and Methods

Systematic literatures were searched from different databases for meta-analysis. Articles were extracted from scholar.google.com, Pubmed.com, eric.ed.gov, Elicit.com, sematicscholar.com to identify related studies published between 2015 to 2025. The search was performed from January 15 to February 16, 2025, using predefined key words. which were 'academic achievement, Influencing factor, children and adolescent.' From this process approximately 120 full text papers were initially identified. Among them, irrelevant papers were excluded. These studies were assessed on the basis of inclusion and exclusion criteria. Only the studies published in English and focusing on academic achievement as well as its related factors of children and adolescents were considered. After screening 12 studies, met the inclusion criteria, which were included in meta-analysis of this review. Selected articles and results of them were examined and synthesized in sub headings through thematic analysis. The findings of this systematic review were analyzed using Microsoft excel sheet.

Inclusion and exclusion criteria

The studies published in English, focusing on academic performance and its influencing factors and employing a clear methodology were included. Similarly, if they lacked a clear methodology and sampled participants did not examine dietary patterns in relation with academic achievement, focused on maternal diet related issues, published in other than English language were excluded in this study.

Selection process

A PRISMA flow diagram was used to illustrate the study selection process. First of all, a total 120 full-text articles were retrieved from electronic

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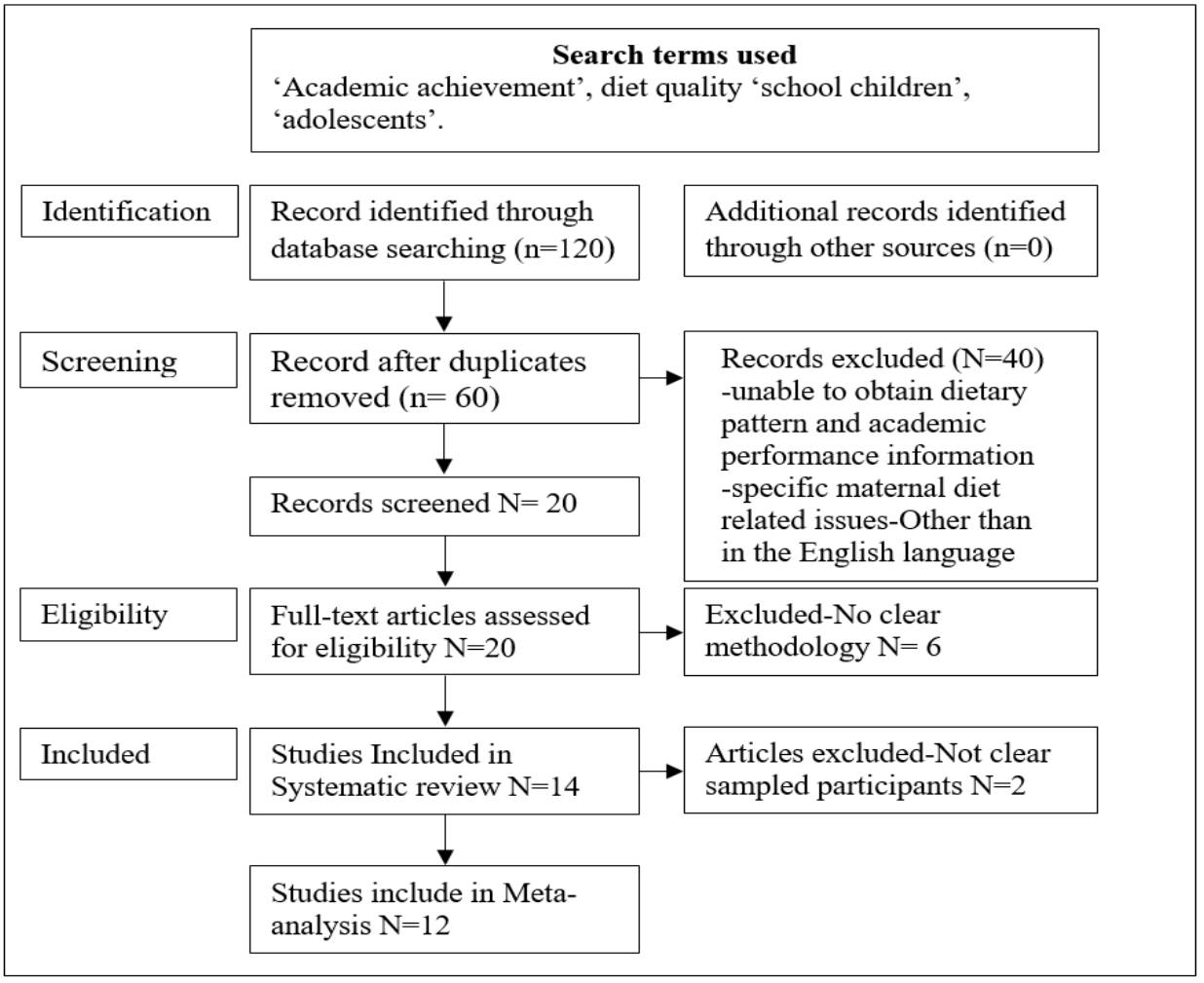
databases including scholar.google.com, Pubmed.com, eric.ed.gov, Elicit.com, sematicscholar.com. After removing duplicate records, 60 unique studies remained for screening. During the screening phase, 40 articles were removed based on title and abstract screening because they did not focus on academic performance. They were published in languages other than English, or contained content pertaining to maternal diet. During the eligibility phase, 20 full-text articles were assessed for methodological soundness and applicability. Six of these articles were rejected due to unclear methodology. Among the total, 14 studies that met the inclusion criteria were included in the systematic review. Two articles were excluded at the end because of not clear participants in samples. Finally, 12 articles met the inclusion criteria for meta-analysis. These studies were analyzed and categorized thematically based on the ways in which diet affects academic performance. The PRISMA flow diagram provides a visual representation of this methodical selection process, which are presented in Figure 1.

Figure: 1 *PRISMA Flow Diagram of the Study*



Results

The available studies were examined to summarize academic achievement and its associated factors, which were energy intake, fruit and vegetable intake dietary patterns and overall diet in children and adolescents. The majority of the reviewed studies were cross-sectional which are presented in

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figure 2.

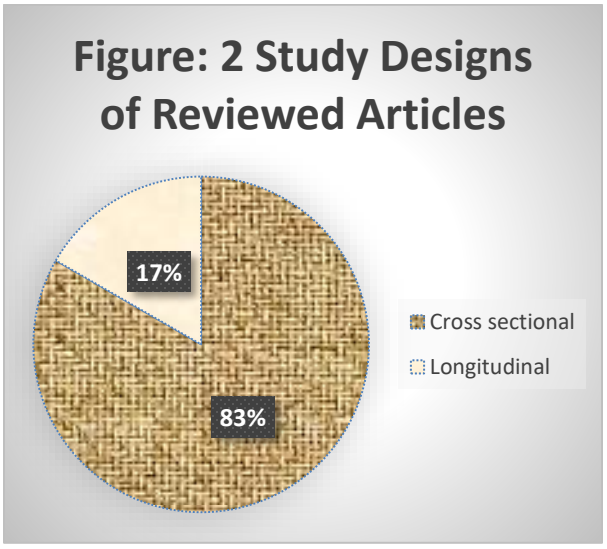


Figure 2 showed that out of total, 83.33% articles used cross-sectional design and 16.67% used longitudinal research design in this reviewed study.

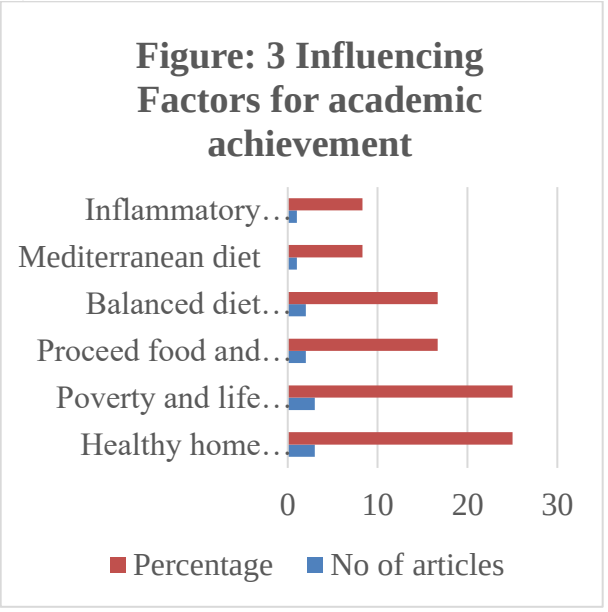
It indicated the need of longitudinal studies to conform the findings, which have not been conducted sufficiently.

Similarly, the average age group was ranged 4-22 years in this systematic review and meta-analysis. Overall findings suggested a positive association between the frequency of good dietary intake and academic outcome.

The reviewed study revealed the different influencing factors of academic performance in children and adolescents which are presented in figure 3.

Figure 3 showed that most of the reviewed articles (25%) reported healthy home food environment and breakfast as a influencing factor for academic performance of children and adolescents, followed (25%) poverty and life style, 16.67% proceed food and energy dense diet, 16.67% balance diet with fruits and vegetables, 8.33% Mediterranean diet

and 8.33% reported Inflammatory and anti-inflammatory diet.



Whereas, the healthy home food environment and taking breakfast appropriately, balanced diet with fruits and vegetables and anti-inflammatory diet were reported as the positive influencing factors and proceed food and energy dense diet, Inflammatory diet as well as poverty and sedentary life styles were reported as negative influencing factors for academic achievement of children and adolescents.

Out of total reviewed articles, most of the articles (25%) reported healthy home food environment and breakfast as a positive influencing factor for academic performance. Regarding the negative influence, approximately 25% articles reported poverty and life styles as a negative influencing factor for academic achievement of children and adolescents.

Discussion

This meta-analysis identified the factors that influence academic performance of children and adolescents which are described here.

Dietary factors

This review revealed the different types of

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diet in relation to academic performance, which includes the inflammatory and anti-inflammatory died, proceed foods and energy dense diet, Mediterranean diet and balance diet.

Out of them, the inflammatory diet (white breads, cereals, white pasta, and other products made with refined flours as well as white rice) may negatively impact academic achievement and adhere to a more anti-inflammatory diet (fresh fruits and vegetables, fish, whole grains and fats) to achieve academic benefits of children and adolescents [9]. Contradictorily, in reference to proceed foods and energy dense diet, academic performance was not linked to a nutritious diet, and it was negatively correlated with an energy-dense nutrient-poor diet [1].

In this way, another study claimed that a high-fiber diet can improve the brain electrophysiology and cognitive function. The health and cognitive development of the students are significantly impacted by plant-based diets. Eating a processed diet might make learning more difficult in children and adolescents [10]. Similarly, the Mediterranean diet includes (vegetables and tubers, Fruits, Grains, Nuts, seeds and legumes) performed better than the low fruit and vegetables. In nutshell, the Med Diet was associated with improved cognitive and academic performance of children and adolescents ($p < 0.05$) [11]. Therefore, we can say that diet have sometimes negative effects too if we could not identify which food if good for learning and development.

Regarding the balanced diet with fruits and vegetables, the increased consumption of dark green and red-orange vegetables, beans and peas, potatoes and eggs were associated with a higher reading proficiency [12]. But unhealthy diets were associated with overweight and obesity, which are linked to decreased cognitive abilities and academic achievement in children and adolescents [7]. Although, a study reported that the dietary diversity score (DDS) of children had no direct, indirect, or total effect on his/her academic achievement [13]. This depicted that balanced diets have a significant value in developing learning achievement in students.

Healthy Home Food Environment and Breakfast

This study found that high academic achievers were more likely to have a favorable healthy home environment (HFE) score [14]. In this regard, healthy breakfast have a crucial role to better cognitive and academic performance of children. Regularly eating a healthy breakfast has a positive impact on motivation and learning of children and adolescents in the home and classroom [15]. Even a study resulted that 24.8% of students perform well in school, whereas 88.2% of students eat three times meals a day, and 88.9% of students eat breakfast regularly including consumption of fruits and vegetables [16]. It indicates that regular eating breakfast and healthy home food environment can improve academic achievement of children and adolescents.

Poverty and Life styles

This study identified the poverty and life styles as a influencing factor of academic performance. To support this finding a study reported that children living in poverty tend

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to perform poorly academically, which results in reduced educational attainment and significantly lower scores on standardized tests. Over the course of a lifetime, these patterns continue into adulthood and result in a decline in professional accomplishment [17]. Eating or dietary behaviors strongly correlate health status of children [18]. Similarly in life style, the children who maintained at least three healthy lifestyles such as not being overweight, limiting screen time, and getting enough sleep were more likely to be in the high-performance in classroom [19]. Even though, the food insecure children reported lower academic performance with prior campus-based studies [20]. Therefore, poverty and life styles have also a critical role to improve academic performance of children and adolescents.

Conclusion

The study concluded that the factors such as healthy home food environment and various balanced diet, fruits and vegetables have positive influences and proceed food, energy dense diet, Inflammatory diet, poverty and sedentary life styles have negative influences in academic achievement of children and adolescents. However, the more longitudinal studies are needed to conform the results of this reviewed article. Thus, standardized evaluation and reporting of academic results, comprehensive measures of the entire validated diet and other factors should all be taken into account in future research. Where rigorous design and control of biases as well as confounding variables are needed to conform these associations.

Abbreviations

DDS Dietary Diversity Score
HFE Healthy Home Food Environment
MED DIET Mediterranean Diet

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Author Contributions

Bishnu Kumar Adhikari: Conceptualization, data curation, investigation, methodology, project administration, software, validation, visualization, writing – original draft, writing – review and editing

Prakash Sharma: Conceptualization, formal analysis, project administration, resources, supervision, validation, visualization, writing - review and editing

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ბავშვთა და მოზარდთა აკადემიურ მოსწრებაზე მოქმედი ფაქტორების სისტემატური მიმოხილვა და მეტაანალიზი

პრაკაშ შარმა (კორესპონდენტი ავტორი) [1], ბიშნუ კუმარ ადჰიკარი [2]*

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აბსტრაქტი

საზოგადოებრივი ჯანმრთელობის საკითხებისთვის აკადემიური მოსწრება უმნიშვნელოვანესი ქვაკუთხედია, რადგან ის სასიცოცხლოდ მოქმედებს მომავალ წარმატებაზე. თუმცა, ბავშვებისა და მოზარდების აკადემიურ მოსწრებაზე მოქმედი ფაქტორები ჯერ კიდევ სათანადოდ არ არის შესწავლილი.

მიზნები: მეტაანალიზის საშუალებით, ბავშვებსა და მოზარდებში აკადემიურ მოსწრებაზე მოქმედი ფაქტორების სისტემატური მიმოხილვის შედეგების სინთეზირება და კრიტიკული შეფასება.

მეთოდები: სხვადასხვა მონაცემთა ბაზიდან, მეტაანალიზისთვის ჩატარდა მრავალფაქტორული ლიტერატურული მიმოხილვა. კვლევები ამოღებული იქნა scholar.google.com, pubmed.com, eric.ed.gov, elicit.com, sematicscholar.com-დან, რათა გამოვლენილიყო 2015-დან 2025 წლამდე გამოქვეყნებული დაკავშირებული კვლევები დიაგრამის PRISMA გამოყენებით. თავდაპირველად, გამოვლინდა დაახლოებით 120 სრული ტექსტის მქონე კვლევა. მათ შორის, არარელევანტური კვლევები გამოირიცხა. სკრინინგის შემდეგ, 12 კვლევა, რომლებიც შედიოდა აღნიშნული მიმოხილვის მეტაანალიზში, აკმაყოფილებდა ჩართვის ყველა კრიტერიუმს. შერჩეული კვლევები და მათი შედეგები შემოწმდა და სინთეზირდა ქვესათაურებში, თემატური ანალიზის საშუალებით.

შედეგები: კვლევამ აჩვენა, რომ სტატიების 83.33%-ში გამოყენებული იყო ჯვარედინი კვლევის დიზაინი, ხოლო 16.67%-ში - გრძივი კვლევის დიზაინი. ჯანსაღი საშინაო გარემო და საუზმე, უმრავლესობაში (25%), აკადემიური მოსწრების გავლენის ფაქტორებად იქნა მიჩნეული, შემდეგ მოდის სიღარიბე და უმოძრაო ცხოვრების წესი, მაღალი ენერგეტიკული ღირებულება, დაბალანსებული დიეტა, ხილი და ბოსტნეული, ხმელთაშუა ზღვის დიეტა, ანთებითი და ანთების საწინააღმდეგო დიეტა (25%, 16.67%, 16.67%). შესაბამისად, 8.33% და 8.33% ბავშვებისა და მოზარდების აკადემიური მოსწრების გავლენის ფაქტორებად.

დასკვნა. კვლევამ დაასკვნა, რომ ბავშვებისა და მოზარდების აკადემიურ მოსწრებაზე გავლენას ახდენს სხვადასხვა ფაქტორი. ძირითადად, კვების რაციონი, საშინაო გარემო და საუზმე, ასევე, სიღარიბე და ცხოვრების წესი. მიუხედავად ამისა, ამ კავშირის დასადასტურებლად, აუცილებელია, მკაცრი დიზაინი, ცრურწმენების და შემაშრიალებელი ცვლადების კონტროლი.

საკვანძო სიტყვები: აკადემიური მოსწრება, გავლენის ფაქტორი, ბავშვები და მოზარდები.

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References

1. Pearce K, Golley R, Lewis L, Cassidy L, Olds T, Maher C. The apples of academic performance: associations between dietary patterns and academic performance in Australian children. Journal of School Health. 2018;88(6):444-52. https://doi.org/10.1111/josh.12631

2. Bücker S, Nuraydin S, Simonsmeier BA, Schneider M, Luhmann M. Subjective well-being and academic achievement: A meta-analysis. Journal of Research in Personality. 2018;74:83-94. https://doi.org/10.1016/j.jrp.2018.02.007

3. York TT, Gibson C, Rankin S. Defining and measuring academic success. Practical assessment, research & evaluation. 2015;20(5):n5. https://files.eric.ed.gov/fulltext/EJ1059739.pdf

4. Peng P, Kievit RA. The development of academic achievement and cognitive abilities: A bidirectional perspective. Child development perspectives. 2020; 14(1): 15-20. https://doi.org/10.1111/cdep.12352

5. Nyaradi A, Li J, Hickling S, Foster J, Oddy WH. The role of nutrition in children's neurocognitive development, from pregnancy through childhood. Frontiers in human neuroscience. 2013; 7: 97. https://doi.org/10.3389/fnhum.2013.00097

6. Adhikari BK, Sharma P, Giri S. The Paradox of Health Literacy: Unchanged Nutritional Behaviors of Literates. International Journal. 2025;14(2):117-24. https://doi.org/10.11648/j.ijnfs.20251402.14

7. Naveed S, Lakka T, Haapala EA. An overview on the associations between health behaviors and brain health in children and adolescents with special reference to diet quality. International Journal of Environmental Research and Public Health. 2020;17(3):953. https://doi.org/10.3390/ijerph17030953

8. Burrows T, Goldman S, Pursey K, Lim R. Is there an association between dietary intake and academic achievement: a systematic review. Journal of Human Nutrition and Dietetics. 2017; 30(2): 117-40. https://doi.org/10.1111/jhn.12407

9. Esteban-Cornejo I, Mota J, Abreu S, Pizarro AN, Santos MP. Dietary inflammatory index and academic performance in children. Public health nutrition. 2018;21(17):3253-7. https://doi.org/doi:10.1017/S1368980018001994

10. Mualem R, Jadon N, Shance S, Hussein Farraj R, Mansour R, Cohen S. The effect of dietary preferences on academic performance among kindergarten-aged children. J Neurosci Neurol Surg. 2023;13:277. https://doi.org/10.31579/2578-8868/277

11. Peña-Jorquera H, Martínez-Flores R, Espinoza-Puelles JP, López-Gil JF, Ferrari G, Zapata-Lamana R, et al. Adolescents with a favorable Mediterranean-style-based pattern show higher cognitive and academic achievement: a cluster analysis—the cogni-action project. Nutrients. 2024;16(5):608. https://doi.org/10.3390/nu16050608

12. Barg G, Frndak S, Queirolo EI, Peregalli F, Kordas K. Dietary patterns and cognitive achievement among school children in socio-cultural context, a case of Montevideo,

Uruguay. European journal of nutrition. 2023;62(6):2475-88. https://doi.org/10.1007/s00394-023-03167-z.

13. Beressa G, Biratu A, Lencha B, Sahiledengle B, Zenbaba D, Bekele D, et al. Association between dietary diversity, nutritional status, and academic performance of school-age children in Southeast Ethiopia using structural equation modelling. Journal of Health, Population and Nutrition. 2024;43(1):188. https://doi.org/10.1186/s41043-024-00687-0

14. Sohail R, Hasan H, Saqan R, Barakji A, Khan A, Sadiq F, et al. The Influence of the Home Food Environment on the Eating Behaviors, Family Meals, and Academic Achievement of Adolescents in Schools in the UAE. International Journal of Environmental Research and Public Health. 2024;21(9):1187. https://doi.org/10.3390/ijerph21091187

15. Martin AJ, Bostwick KC, Burns EC, Munro-Smith V, George T, Kennett R, et al. A healthy breakfast each and every day is important for students' motivation and achievement. Journal of School Psychology. 2024;104:101298.

16. Rajan Jr A, Peter RM, Logaraj M, Palanivel SM, Anantharaman V. Relation of Dietary Practices and Academic Achievement Among School-Going Children in Kattankulathur Block, Chengalpattu District, Tamil Nadu. Cureus. 2024; 16(11). https://doi.org/10.1016/j.jsp.2024.101298

17. Hair NL, Hanson JL, Wolfe BL, Pollak SD. Association of child poverty, brain development, and academic achievement. JAMA pediatrics. 2015; 169(9): 822-9. https://doi.org/10.1001/jamapediatrics.2015.1475.

18. Adhikari BK, Giri S, Sharma P. Evaluation of Childhood Dietary Patterns and Their Impact on Nutrition Status: A Literature Review. International Journal of Nutrition and Food Sciences. 2024;13(3):66-76. https://doi.org/10.11648/j.ijnfs.20241303.12

19. Adelantado-Renau M, Jiménez-Pavón D, Beltran-Valls MR, Moliner-Urdiales D. Independent and combined influence of healthy lifestyle factors on academic performance in adolescents: DADOS Study. Pediatric Research. 2019;85(4):456-62. https://doi.org/10.1038/s41390-019-0285-z

20. Payne-Sturges DC, Tjaden A, Caldeira KM, Vincent KB, Arria AM. Student hunger on campus: Food insecurity among college students and implications for academic institutions. American Journal of Health Promotion. 2018; 32(2): 349-54. https://doi.org/10.1177/0890117117719620.

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Reasoned opinion

Physical performance and biological maturity of primary school children

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Abstract

The results of one-factor variance analysis indicate the necessity of incorporating into the physical training of primary school children methods and tools aimed at improving the efficiency of aerobic energy production, as an integral part of the internal structure of children's preparedness for strenuous muscular activity. Factor analysis revealed that the aerobic abilities of primary school children have a heterogeneous structure and are largely determined by capacity, power, the feasibility of potential aerobic power, and aerobic efficiency.

Keywords: Analysis of variance, dynamic mode, muscular work, aerobic capacity.

Introduction. Physical performance is an integral state of those functions of the cardiovascular, respiratory systems and energy metabolism that directly or indirectly ensure the performance of cyclic muscular work in a dynamic mode of a certain intensity and duration [1-4].

The current state of the cardiorespiratory system's readiness to perform such muscular activity reflects the degree of its adaptation and covers a range of issues, some of which - testing and organization - are central to the problem, since aerobic bioenergetics is one of the most important in the vegetative and metabolic support of manifestations of general endurance.

Clearly, the foundation for developing adequate methods for assessing physical performance is determining its structure. The information used for these methods is directly dependent on our understanding of the most essential properties and factors of the systems underlying the internal structure of the body's physical performance. This requires a clear understanding of what exactly should be tested, the research methods, and the evaluation criteria used.

Research method. Until recently, the practice of assessing physical performance, not only in adults but also in children and adolescents, has focused primarily on assessing the degree of maximization of the cardiorespiratory system, reflecting its functional limits - in other words, determining its capacity.

The most illustrative example is the indirect determination of maximum oxygen consumption using the Astrand-Ryhming nomogram or its modification for preschool,

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primary, and secondary school-aged children.

Table 1. The results of one-factor variance analysis regarding maximum oxygen consumption.

#	Indicator	Factor Weight
1	VO2 Max Maintenance Time	938
2	Total Specific Energy Expenditure	913
3	Total Aerobic Specific Energy Expenditure	869
4	Total Absolute Energy Expenditure	867
5	Total Absolute Aerobic Energy Expenditure	854
6	Absolute Oxygen Consumption during the total time of constant-power muscular work	827
7	Product of the Load Power of the Last Stage and the Execution Time	827
8	Specific Oxygen consumption during the time of Constant-Power Muscular Work	816
9	Total aerobic energy expenditure absolute	707
10	Volume of performed Muscular Work	686
11	Percentage contribution of total anaerobic energy expenditure	240
12	Total Specific anaerobic energy expenditure	233
13	Percentage contribution of total aerobic energy expenditure	230

Therefore, it is not surprising that physical performance continues to be equated with maximum oxygen consumption. However, the appropriate selection of research methods and assessment criteria that most fully reflect the level of physical performance can only be determined through so-called factor analysis. When factoring 15- to 40-order correlation matrices using the principal component analysis with rotation of the reference axes using the Varimax criterion, we typically identified six to nine factors. The factor analysis model we used distinguishes factors in order of decreasing contribution to the overall sample variance. Therefore, the first factor was considered the general factor.

Research results. In the examined children of primary school age, the general factor was interpreted as metabolic capacity, as it characterises the volume of the substrate available for use and the permissible volume of changes in energy metabolism during intense muscular work of constant intensity. After one-factor analysis of variance, 13 indicators were separated, characterising the total energy expenditure and oxygen exchange during specially organized muscular activity under bicycle ergometry conditions with a load intensity at the level of individual VO2 max values (Table 1).

Conclusion. Thus, the data obtained indicate the necessity of incorporating into the physical training of primary school children methods and tools aimed at improving the efficiency of aerobic energy production, as an integral part of the internal structure of children's preparedness for strenuous muscular activity. Factor analysis revealed that the aerobic abilities of primary school children have a heterogeneous structure and are largely determined by capacity, power, the feasibility of potential aerobic power, and aerobic efficiency.

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დაწყებითი სკოლის ასაკის ბავშვების ფიზიკური მაჩვენებლები და ბიოლოგიური სიმწიფე

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აბსტრაქტი

ერთფაქტორიანი დისპერსიული ანალიზის შედეგები მიუთითებს დაწყებითი სკოლის ასაკის ბავშვების ფიზიკურ მომზადებაში აერობული ენერგიის წარმოების ეფექტურობის გაუმჯობესებისკენ მიმართული მეთოდებისა და ინსტრუმენტების ჩართვის აუცილებლობაზე, როგორც ბავშვების ინტენსიური კუნთოვანი აქტივობისთვის მზადყოფნის შიდა სტრუქტურის განუყოფელ ნაწილად. ფაქტორულმა ანალიზმა აჩვენა, რომ დაწყებითი სკოლის ასაკის ბავშვების აერობულ შესაძლებლობებს აქვთ ჰეტეროგენული სტრუქტურა და ისინი დიდწილად განისაზღვრება გამძლეობით, სიმძლავრით, პოტენციური აერობული ძალის გონივრული მოხმარებით და აერობული ეფექტურობით.

საკვანძო სიტყვები: დისპერსიული ანალიზი, დინამიური რეჟიმი, კუნთოვანი მუშაობა, აერობული შესაძლებლობები.

References:

1. Son'kin, V.D., Tambovtseva, R.V. (2018). The Development of Muscle Energy and Performance in Ontogenesis. Moscow, Russia: URSS.
2. Davydov, A.S., Sidorov, E.P. (2014). New Modification of the PWC170 Test. Therapist, No. 6, 68-71
3. Dushanin, S.F., Beregovoy, Yu.V., Miguleva, I.G. (1984). Accelerated Methods for Studying Muscle Energy Metabolism: Methodical Recommendations. Kiev, 29 pages.
4. Kolyagina, E.F. (1983). Motor Activity and Oxygen Regimes of the Schoolchild's Body. Rostov University Press, 112 pages.

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Reasoned Opinion

Long-Term Health Impacts of the Chernobyl Disaster: Updated Insights

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Abstract

The legacy of the Chernobyl disaster illustrates the far-reaching and multifaceted consequences of large-scale radiation exposure. While acute radiation sickness was rare, the long-term health impacts, including thyroid cancer, other malignancies, and chronic non-cancer morbidity, persist decades later. The purpose of our research was to determine the problem of radiation due to increased number of cancer cases in Belarus, Ukraine, Russia and Georgia. As a result of the research, it was determined that the problem is substantial and needs furthermore investigation and continuing surveillance.

Key words: Chernobyl, Radiation, Cancer.

Introduction

The Chernobyl nuclear accident of April 26, 1986, remains one of the most catastrophic environmental disasters in modern history. A flawed safety test at Reactor No. 4 triggered a thermal explosion, destroyed containment structures, ignited fires, and released vast quantities of radio nuclides into the environment. The fallout affected much of the European Soviet Union, contaminating air, soil, water, and the food chain [1].

During operation, various radionuclides in dense and gaseous states were produced in the uranium-graphite-channel boiling reactor, a thermal explosion occurred, the reactor's protective shell was broken, a fire broke out, radionuclides were released, and radioactive precipitation appeared. The precipitation was most abundant near the nuclear power plant, i.e. there was the highest level of radiation. Radioactive contamination covered almost the entire European part of the former Soviet Union. In areas far from the reactor, contamination of milk with iodine-131 was found, and subsequently with cesium radionuclides - cesium-137 (half-life 30 years) and cesium-134 (half-life 2 years) - which got into food products. In several regions - in the south of Belarus and in the western regions of the RSFSR, the level of cesium-137 content in the soil led to restrictions on the use of agricultural products (especially mushrooms and berries). Strict sanitary control was established over livestock products and vegetables. Therefore, clean products were imported from other regions [2].

Exposure and Early Response

As a result of the assessment of the situation by specialists, they conditionally divided the

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population into three groups. The first group included the evacuated population living directly around the nuclear power plant; The second group - those living relatively far away. For them, irradiation was not dangerous, although it required restrictions and detailed sanitary control of products; In the third group - territories where increased radioactivity was noted, although it was not necessary to take any measures (Georgia turned out to be among them).

"Academician Revaz Khazaradze" writes in his book "Human and Radiation" (1988) that "as a result of in-depth medical examinations, it was determined that none of the evacuated residents had either radiation sickness or any deviation from the health norm associated with irradiation." [2].

Long-Term Epidemiological Findings, Thyroid and Hematological Cancers

Subsequent epidemiological studies have documented a significant rise in thyroid cancer incidence, particularly among individuals exposed to radioactive iodine-131 during childhood or adolescence. More than 11,000 cases have been diagnosed in Belarus, Ukraine, and certain Russian oblasts, with the incidence continuing to increase as these cohorts age. The primary exposure route was ingestion of contaminated milk in the days following the accident [3].

The Survivors of acute radiation syndrome and cleanup workers also exhibit elevated risks for various cancers. In a long-term Ukrainian cohort of over 110,000 cleanup workers, researchers found statistically significant increases in thyroid cancer (SIR 4.18), multiple myeloma (SIR 1.61), leukemia, breast cancer, and all-site cancers (SIR 1.07) over a 30-year span. Cardiovascular disease and mental health disorders were found to be substantially elevated [4].

Non-cancer effects, such as increased prevalence of cataracts, have influenced regulatory decisions regarding occupational radiation limits [5]. Furthermore, Israeli research indicates that immigrants from the affected areas have higher hospitalization rates for circulatory, endocrine, neoplastic, and ocular diseases, even decades after exposure [6].

Ecological Research

Recent genomic sequencing studies have yielded important new insights:

1. Children born to exposed parents showed no statistically significant increase in de novo germline mutations, a finding that provides reassurance regarding transgenera-tional hereditary risk [7].

2. Thyroid tumors in exposed individuals exhibited higher rates of double-strand DNA breaks and gene fusions, particularly involving BRAF, RAS, and RET, suggesting distinct, dose- and age-dependent mechanisms of radiation-induced carcinogenesis, in contrast to the point mutations typically seen in unexposed cases [8].

Parallel ecological studies have employed wildlife species, such as birds, insects, and mammals, as biological sentinels. These organisms exhibited developmental abnormalities, elevated mutation burdens, and genomic instability in heavily contaminated zones. These findings support human risk models independent of confounding social variables [9].

Projected Overall Burden

Estimates from the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) indicate a collective exposure dose of approximately 500,000–600,000 person-Sieverts. This level of exposure is projected to result in 30,000 to

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70,000 excess cancer cases, including over 17,000 thyroid cancers, nearly half of which are expected to occur outside of Belarus, Ukraine, and Russia [10].

Discussion and Recommendations

- **Latency and Duration:** Thyroid cancer typically manifests after a latency period of 4–5 years, and incidence remains elevated even 30–40 years post-exposure [11].
- **Beyond Cancer:** Cardiovascular, endocrine, neuropsychiatric, and ocular outcomes remain areas of concern and require ongoing medical monitoring.
- **Mechanistic Insights:** Genomic research has helped identify molecular signatures of radiation exposure without confirming heritable genetic damage.
- **Emerging Research Needs:** Further studies are required to assess the long-term health of aging exposed populations, investigate non-thyroid cancer incidence, and evaluate transgenerational effects.

Conclusion

The legacy of the Chernobyl disaster illustrates the far-reaching and multifaceted consequences of large-scale radiation exposure. While acute radiation sickness was rare, the long-term health impacts, including thyroid cancer, other malignancies, and chronic non-cancer morbidity, persist decades later. Advances in genomic science have clarified tumor pathogenesis and reduced concern over heritable mutations. Nonetheless, continued surveillance and long-term research are essential, particularly among ageing and high-risk populations.

ჩერნობილის კატასტროფის გრძელვადიანი ზემოქმედება ჯანმრთელობაზე: განახლებული მონაცემები

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აბსტრაქტი

ჩერნობილის კატასტროფის შედეგები ასახავს ფართომასშტაბიანი რადიაციული ზემოქმედების გრძელვადიან და მრავალმხრივ შედეგებს. მიუხედავად იმისა, რომ მწვავე რადიაციული ავადმყოფობა იშვიათი იყო, ჯანმრთელობაზე გრძელვადიანი ზემოქმედება, მათ შორის ფარისებრი ჯირკვლის კიბო, სხვა ავთვისებიანი სიმსივნეები და ქრონიკული არასიმსივნური ავადობა, ათწლეულების შემდეგაც გრძელდება. ჩვენი კვლევის მიზანი იყო რადიაციის პრობლემის დადგენა, რაც გამოწვეულია კიბოს შემთხვევების ზრდით ბელარუსში, უკრაინაში, რუსეთსა და საქართველოში. კვლევის შედეგად დადგინდა, რომ პრობლემა მნიშვნელოვანია და საჭიროებს შემდგომ კვლევას და მუდმივ მეთვალყურეობას.

საკვანძო სიტყვები: ჩერნობილი, რადიაცია, კიბო.

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References

1. Yablokov, Alexey V., Vassily B. Nesterenko, and Alexey V. Nesterenko. *Atmospheric, Water, and Soil Contamination after Chernobyl*. Annals of the New York Academy of Sciences, 2009.
2. Khazaradze R., *Human and Radiation,* Editory "Soviet Georgia", Tbilisi, 1988: 33-34.
3. Brenner, Alexander V., et al. "I-131 Dose Response for Incident Thyroid Cancers in Ukraine Related to the Chernobyl Accident." *Environmental Health Perspectives* 119, no. 7 (2011): 933–939.
4. IARC. "Chernobyl, 30 Years On – Overview." *IARC News*, 2016.
5. IARC. "Cataract Risk and Radiation Exposure." *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, 2016.
6. Cwikel, Julie, Eyal Sheiner, David Slusky, et al. "Hospitalization Risks in Chernobyl Immigrants." *Journal of Immigrant and Minority Health* (2021).
7. Yeager, Meredith, Lisa M. Morton, et al. "Germline Mutation Rates in Children of Chernobyl-Exposed Parents." *Science*, 2021.
8. Morton, Lisa M., et al. "Genomic Profiling of Thyroid Tumors in Chernobyl-Exposed Individuals." *Science*, 2021.
9. "Environmental Epidemiologic Studies and Animal Sentinels Post-Chernobyl." *International Journal of Environmental Research and Public Health* 9, no. 8 (2012): 2894–2919.
10. United Nations Scientific Committee on the Effects of Atomic Radiation. *The TORCH Report*, 2006/2016.
11. Schiller, Jason. "Health Problems Persist Among Chernobyl Survivors." *Journal of Immigrant and Minority Health*, 2021.

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Original Research Article

Life satisfaction survey in Georgia

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Abstract

Life satisfaction and happiness is one of the most important issues throughout a person's life. It determines not only the well-being of an individual person, but also the well-being of the entire nation and country. We live in this world to have a good life, to be happy, one of the measures of which is our self-esteem of satisfaction with life. The mentioned issue is relevant in Georgia. According to the results of the survey the average total life satisfaction score equals to 17.04. Minimum score is equal to 5 and the maximum is 33 score. 57.9% of the respondents are dissatisfied with their life, 1.3% have a neutral attitude, and 40.8% are satisfied. Only 0.8% of respondents are extremely satisfied. The average life satisfaction for female is equal to 16.87 score and for male - 17.39 score. There is no significant statistical difference in life satisfaction by sex. The level of life satisfaction varies by age. The average life satisfaction score in 11-18 age group equals to 23.54, in 19-30 age group – 21.77 score, in 31-50 age group – 17.42, in 51-70 age group – 9.43 and in 71- 87 age group – 9.14 score. There is a significant statistical difference in life satisfaction by different age groups. The foundation of a strong, successful, and happy country is happy people, and increasing their life satisfaction is very important.

Keywords: Life satisfaction, statistical survey, well-being.

Introduction

A widely held and empirically supported assumption is that most individuals across the globe tend to favor greater levels of happiness over lesser, and generally prefer to lead lives marked by more frequent satisfaction than dissatisfaction. While there is ongoing debate regarding the philosophical merit of happiness and life satisfaction - as well as skepticism toward the prioritization of these constructs by both individuals and researchers - there remains little doubt that these experiences hold considerable significance for the majority of people worldwide. This pervasive relevance underscores the legitimacy of examining

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happiness and life satisfaction - commonly conceptualized together as subjective well-being - as core topics within the social sciences [5].

Subjective well-being (SWB) is commonly defined as the degree to which individuals perceive their lives as going well, both emotionally and cognitively. It is widely regarded as one of the most valid and accessible indicators for assessing general well-being. Over the past three decades, a core conceptual distinction within SWB research has been the separation between affective components - characterized by emotional responses - and cognitive components, which involve evaluative judgments of one's life against internally defined standards. More recently, scholars have advocated for expanding the model to include life harmony, reflecting behavioral assessments of one's functioning and integration within a broader social environment [4].

Many works have been devoted to the study of life satisfaction in the world. This issue has been studied by many scientists over the years. Life satisfaction survey conducted several times across countries [2]. Determining the level of life satisfaction is important in Georgia today. In our study, we will only examine the self-assessment of life satisfaction, which was developed by Diener. Such studies are very scarce in Georgia and are limited to a few master's and other studies [3]. Due to the absence of precise statistical data in this area, we initiated an extensive empirical investigation across Georgia. The study was designed to encompass all geographic regions and demographic age groups, thereby providing a comprehensive national overview. In our study, we used the 5-question self-assessment test of life satisfaction by Diener.

The life satisfaction survey will help us to understand the current level of satisfaction. Also identify and define the weaknesses that cause dissatisfaction and make future plans to eliminate it.

Materials and methods

The primary objective of the survey was to assess the overall level of life satisfaction among the population of Georgia. To achieve this, the study used Diener's Satisfaction with Life Scale (SWLS), a widely validated instrument comprising five items that evaluate individuals' global cognitive appraisals of their lives. Participants were asked to indicate their level of agreement with each statement: (1) "In most ways my life is close to my ideal," (2) "The conditions of my life are excellent," (3) "I am satisfied with my life," (4) "So far I have gotten the important things I want in life," and (5) "If I could live my life over, I would change almost nothing." Responses were recorded on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree) [1]. The total life satisfaction score was calculated by summing the individual responses across all five items. They are presented in raw scores, with a total score range of 5 to 35. Higher scores indicate greater life satisfaction. The below range corresponds with the following interpretive categories: scores between 31 and 35 indicated extreme satisfaction, 26 to 30 as satisfied, 21 to 25 as slightly satisfied, a score

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of 20 reflected a neutral stance, 15 to 19 indicated slight dissatisfaction, 10 to 14 as dissatisfied, and 5 to 9 as extremely dissatisfied.

The study used both descriptive and inferential statistical techniques. Descriptive analysis included statistical observation through a sample survey, data grouping, and the construction of frequency distributions (including both relative and cumulative frequencies), as well as crosstabulation and visual representation via statistical graphs. For hypothesis testing, parametric inferential methods were applied, specifically one-way analysis of variance (ANOVA) and the independent samples *t*-test.

The data collection for this study took place in May 2025, during which 950 individuals participated in structured interviews. The sampling strategy ensured representation across all age groups, genders, and regions within Georgia. Subsequent data processing and analysis were performed using IBM SPSS Statistics software, version 26.

Discussion of obtained results

The reliability of the survey instrument was evaluated using Cronbach's alpha coefficient, which yielded a value of 0.916. This result indicates excellent internal consistency, as values of 0.7 or higher are generally accepted as indicative of good reliability in psychometric assessments. This means, that the items are highly reliable and consistently measure the construct of life satisfaction.

The average total life satisfaction score is equal to 17.4, which expresses dissatisfaction with life. Minimum score of life satisfaction is equal to 5 and the maximum – 33 scores. The table below represents the descriptive statistics of life satisfaction.

Table1. Descriptive statistics of the scores of life satisfaction

N	Valid	950
	Missing	0
Mean		17.04
Median		16.00
Mode		10
Std. Deviation		7.544
Range		28
Minimum		5
Maximum		33

We combine the initial life satisfaction scores into 7 groups. The first group include scores from 5 to 9, labeled as extremely dissatisfied, the second group include the scores 10-14 labeled as dissatisfied, the third group include scores 15-19 labeled as slightly dissatisfied. The fourth group include only respondents with 20 scores, labeled as neutral satisfaction. The fifth group include scores from 21 to 25 labeled as slightly satisfied, the sixth group include scores from 26 to 30 labeled as satisfied and the seventh group include scores from 31 to 35 labeled as Extremely satisfied.

The survey findings indicated that 57.9% of participants reported dissatisfaction with their lives, while 1.3% expressed a neutral stance. Conversely, 40.8% of respondents indicated that they are satisfied with their life circumstances.

Only 0.8% of respondents are extremely satisfied.

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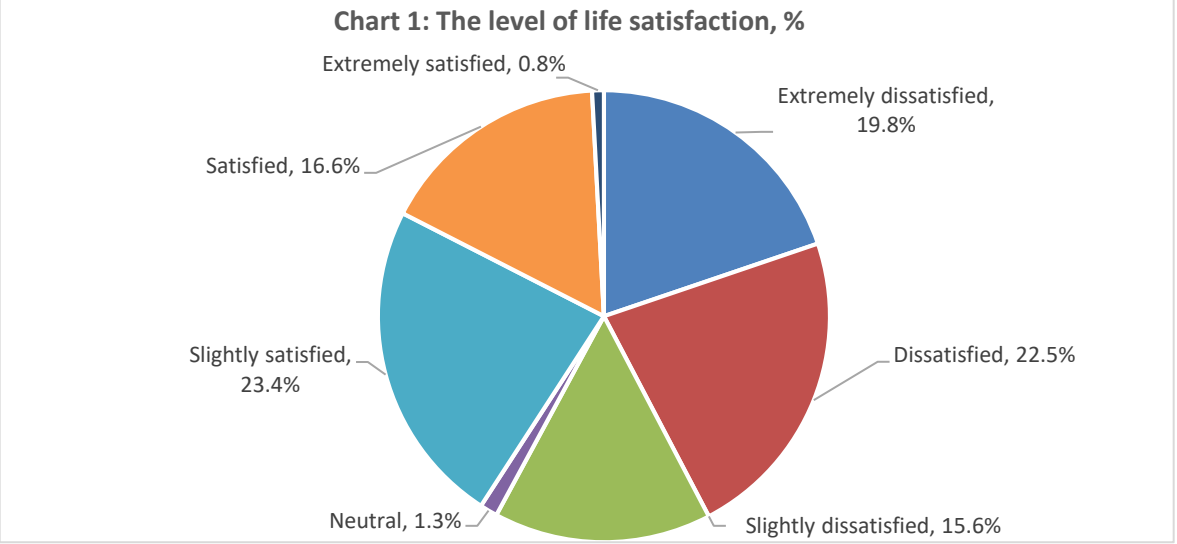
The related frequency distribution is presented in the table below

Table 2. The level of life satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely dissatisfied	188	19.8	19.8	19.8
	Dissatisfied	214	22.5	22.5	42.3
	Slightly dissatisfied	148	15.6	15.6	57.9
	Neutral	12	1.3	1.3	59.2
	Slightly satisfied	222	23.4	23.4	82.5
	Satisfied	158	16.6	16.6	99.2
	Extremely satisfied	8	0.8	0.8	100.0
	Total	950	100.0	100.0	

These findings are also illustrated in the first chart:



According to the survey, average life satisfaction is not differs too much by gender and is presented as follows:

Table 3: Life satisfaction by gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Life satisfaction	Female	640	16.87	7.794	.308
	Male	310	17.39	6.998	.397

Average life satisfaction for female is equal to 16.87 score and for male - 17.39.

To determine whether there is a statistically significant difference in life satisfaction by gender, we used an independent sample t-test.

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Table 4. Results of independent samples t test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
life satisfaction	Equal variances assumed	5.632	0.018	-0.967	948	0.334	-0.505	0.522	-1.530	0.520
	Equal variances not assumed			-1.003	669.646	0.316	-0.505	0.504	-1.494	0.484

The table shows a p-value of 0.316, which exceeds the predetermined significance threshold of 0.05. Therefore, it can be concluded that there is no statistically significant difference in life satisfaction between sexes.

To study the life satisfaction by different age groups, we divided the variable age into 5 groups. The first group included respondents aged 11 to 18, the second group included respondents aged 19-30, the third group included respondents aged 31-50, the fourth group included respondents aged 51-70, and the fifth group included respondents aged 71-87.

The highest level of life satisfaction was found in the 11-18 age group, where the average score was 23.54, and the lowest - in the 71-87 age group, where the average score was 9.14.

Descriptive statistics of life satisfaction scores by age groups are given in the following table.

Table 5: Descriptive statistics of life satisfaction scores by age groups

Age groups	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
11-18	113	23.54	3.887	0.366	22.82	24.26	15	30
19-30	349	21.77	5.146	0.275	21.23	22.31	7	33
31-50	171	17.42	7.571	0.579	16.28	18.56	6	32
51-70	193	9.43	1.632	0.117	9.20	9.66	7	19
71-87	124	9.14	3.272	0.294	8.56	9.72	5	15
Total	950	17.04	7.544	0.245	16.56	17.52	5	33

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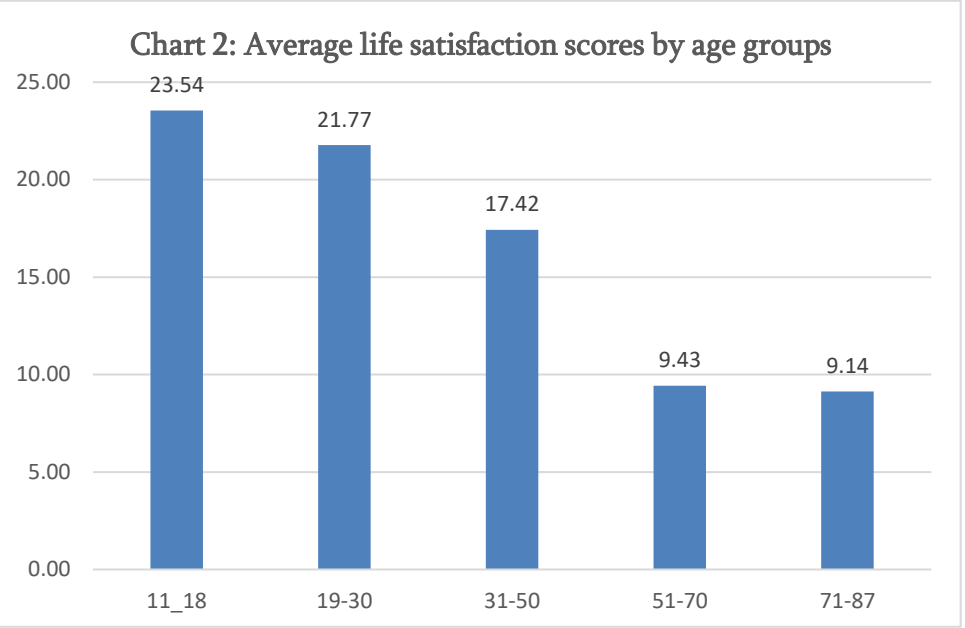
The Chart below more clearly shows the differences in average life satisfaction by age groups.



To defermine if life satisfaction varies significantly across different age groups, a one-way ANOVA test was used to assess the corresponding hupotheses.

Table 6: ANOVA results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	31521.468	4	7880.367	331.241	0.000
Within Groups	22481.931	945	23.790		
Total	54003.399	949			

As indicated in the table, the p-value is 0.000, which is well below the predetermined significance level of 0.05. This result provides statistical evidence of a significant difference in life satisfaction across different age groups.

Conclusions

The key findings derived from the research can be summarized as follows:

- The average total life satisfaction score equals to 17.04, which expresses dissatisfaction with life. Minimum score of life satisfaction is equal to 5 and the maximum is 33 score.
- 57.9% of the respondents are dissatisfied with their life, 1.3% have a neutral attitude, and 40.8% are satisfied. Only 0.8% of respondents are extremely satisfied.
- The average life satisfaction for female is equal to 16.87 score and for male - 17.39 score. There is no significant statistical difference in life satisfaction by sex.
- The average life satisfaction score in 11-18 age group equals to 23.54, in 19-30 age group – 21.77 score, in 31-50 age group – 17.42, in 51-70 age group – 9.43 and in 71-87 age group – 9.14 score. There is a significant statistical difference in life satisfaction by different age groups.

In conclusion, the following recommendation can be proposed:

- It is advisable to develop and implement

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targeted policy measures aimed at enhancing overall life satisfaction within the population.

The foundation of a strong, successful, and happy country is happy people, and increasing their life satisfaction is very important.

ცხოვრებით კმაყოფილების გამოკვლევა საქართველოში

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აბსტრაქტი

ცხოვრებით კმაყოფილება და ბედნიერება ადამიანის ცხოვრების ერთ-ერთი უმნიშვნელოვანესი საკითხია. ის განსაზღვრავს არა მხოლოდ ცალკეული ადამიანის, არამედ მთელი ერისა და ქვეყნის კეთილდღეობას. ამ სამყაროში ვცხოვრობთ იმისათვის, რომ გვქონდეს კარგი ცხოვრება, ვიყოთ ბედნიერები, რომლის ერთ-ერთი საზომი ჩვენი თვითშეფასებაა, ცხოვრებით კმაყოფილების შესახებ. აღნიშნული საკითხი აქტუალურია საქართველოში.

გამოკითხვის შედეგების თანახმად, ცხოვრებით კმაყოფილების საშუალო ქულა 17.04-ის ტოლია, ცხოვრებით კმაყოფილების მინიმალური ქულა კი - 5-ის, მაქსიმალური 33 ქულაა. გამოკითხულთა 57.9% უკმაყოფილოა თავისი ცხოვრებით, 1.3%-ს აქვს ნეიტრალური დამოკიდებულება, ხოლო 40.8% კმაყოფილია. გამოკითხულთა მხოლოდ 0.8% არის უკიდურესად კმაყოფილი.

ცხოვრებით კმაყოფილების საშუალო მაჩვენებელი ქალებისთვის 16.87 ქულას, ხოლო მამაკაცებისთვის 17.39 ქულას უდრის. სქესის მიხედვით, ცხოვრებით კმაყოფილებაში მნიშვნელოვანი სტატისტიკური განსხვავება არ არის.

ცხოვრებით კმაყოფილების დონე ასაკის მიხედვით განსხვავდება. 11-18 წლის ასაკობრივ ჯგუფში ცხოვრებით კმაყოფილების საშუალო ქულა 23.54-ს შეადგენს, 19-30 წლის ასაკობრივ ჯგუფში - 21.77 ქულას, 31-50 წლის ასაკობრივ ჯგუფში - 17.42 ქულას, 51-70 წლის ასაკობრივ ჯგუფში - 9.43 ქულას, ხოლო 71-87 წლის ასაკობრივ ჯგუფში - 9.14 ქულას. სხვადასხვა ასაკობრივი ჯგუფების მიხედვით ცხოვრებით კმაყოფილების მხრივ მნიშვნელოვანი სტატისტიკური განსხვავებაა.

ძლიერი, წარმატებული და ბედნიერი ქვეყნის საფუძველს ქმნის ბედნიერი ხალხი და მათი ცხოვრებით კმაყოფილების გაუმჯობესება უმნიშვნელოვანესი საკითხია.

საკვანძო სიტყვები: ცხოვრებით კმაყოფილება, სტატისტიკური გამოკვლევა, კეთილდღეობა.

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References

1. Diener, E., Emmons, R.A., Larsen, R.J., & Griffin, S. (1985). Development of the Satisfaction with Life Scale. Journal of Personality Assessment, 49(1), 71–75.
2. Jovanović, V., Rudnev, M., Arslan, G., Buzea, C., Dimitrova, R., Góngora, V., Guse, T., Ho, R. T. H., Iqbal, N., Jámbori, S., Jhang, F.-H., Kaniušonytė, G., Li, J., Lim, Y.-J., Lodi, E., Mannerström, R., Marcionetti, J., Neto, F., Osin, E., et al. (2022). The Satisfaction with Life Scale in adolescent samples: Measurement invariance across 24 countries and regions, age, and gender. Applied Research in Quality of Life, 17(4), 2139–2161.
3. Mix Georgia, 2018, Multi-Indicator Cluster Survey, https://www.unicef.org/georgia/media/5896/file/Mics_Georgian.pdf
4. Nima, A. A., Cloninger, K. M., Persson, B. N., Sikström, S., & Garcia, D. (2020). Validation of subjective well-being measures using item response theory. Frontiers in Psychology, 10, 3036
5. James E. Maddux, SUBJECTIVE WELL-BEING AND LIFE SATISFACTION, An Introduction to Conceptions, Theories, and Measures, 2018 Taylor & Francis.

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Reasoned Research Article

A computer method for biomechanical analysis of the balance of acrobatic figures performed by two gymnasts

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Abstract

In this paper, we present a biomechanical analysis of the balance of an acrobatic figure constructed by two girls. For the analysis, the Kinovea computer software was used. We demonstrate that the balance in the sagittal plane depends on the size of the base gymnast's feet and the angle between her feet: increasing the size of the feet of the base gymnast improves the balance, while increasing the angle between her feet weakens the balance. Balance also depends on the heights and masses of gymnasts: increasing the gymnasts' heights and/or the top gymnast's mass weakens the balance, while increasing the base gymnast's mass improves it. Such analysis is especially important when acrobats are relatively young (10-15 years old), as their bodies are undergoing growth and body parameters (such as sizes and weights of body parts) change non-proportionally.

Keywords: Acrobatic gymnastics, sports biomechanics, balance, equilibrium.

Introduction. In many sports, the quality of performance depends on the athletes' ability to maintain balance. In some sports such as acrobatics, gymnastics, weight lifting and surfing, this ability plays a decisive role. To assess the balance of acrobatic figures, researchers use force plates and calculate deviations of the center of pressure from the average value [1, 2].

Scientists also use video-computer analysis, where the coordinates of athletes' centers of gravity may be calculated from video recordings [3-8].

At the same time, we know that the result in many sports also depends on the physical parameters of athletes such as their heights, masses, etc [9, 10]. In this paper, we study how the balance of the hand-to-hand stand in Fig. 1 depends on the heights, masses and other physical parameters of the athletes.

Research methods. From the photo, using line calibration and the human model tool available in the Kinovea computer program, we can find the coordinates of the centers of mass for each gymnast and then calculate the coordinates of the total center of mass of the whole acrobatic figure CM(X_{CM}, Y_{CM}). CM_1(78.86 cm, 92.89 cm) and CM_2(83.65 cm, 258.02 cm) – are the centers of mass of the base and top gymnasts, respectively, while CM(80.60 cm, 152.94 cm) is the total center of mass of the whole acrobatic figure, which may be obtained using standard formulas:

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$X_{CM}=(m_1/(m_1+m_2))\cdot X_{CM}'+(m_2/(m_1+m_2))\cdot X_{CM}''$ and $Y_{CM}=(m_1/(m_1+m_2))\cdot Y_{CM}'+(m_2/(m_1+m_2))\cdot Y_{CM}''$, where m_1=42 kg is the mass of the base gymnast, m_2=24 kg is the mass of the top gymnast, h_1=160 cm and h_2=130 cm are their heights, and (X_{CM}', Y_{CM}') and (X_{CM}'', Y_{CM}'') are the coordinates of their centers of mass.

Fig. 1. The figure shows the centers of mass of the gymnasts obtained using Kinovea software and the calculated total center of mass of the whole acrobatic figure.

The balance of the hand-to-hand stand in the frontal plane is achieved by keeping a fairly large distance between the feet of the base gymnast. While balance in the sagittal plane during backward and forward leanings is much more difficult to achieve. As it was shown in our recent publication the balance of the stand in the sagittal plane may be characterized by four angles α_{cr}', α_{cr}'', $\alpha_{opt}=\alpha_{cr}'$ and $\alpha_{cr}=\alpha_{cr}'+\alpha_{cr}''$ [10].

The first angle α_{cr}' characterizes the maximum leaning of the body in the backward direction while maintaining balance, the second angle α_{cr}'' characterizes the maximum leaning in the forward direction without losing equilibrium, the third angle α_{opt} desribes the optimal position of the total center of gravity of the acrobatic stand when it is exactly over the geometric center of the base of support and the fourth angle $\alpha_{cr}=\alpha_{cr}'+\alpha_{cr}''$ characterizes the overall stability of the acrobatic figure in the sagittal plane during leanings backwards and forwards.

These angles depend on $Y_{CM}\approx$153 cm - the vertical coordinate of CM and $l=|KM|=|LN|$=22 cm - the base gymnast's foot length, and $\alpha_{feet}\approx70°$ - the angle between her feet (Fig. 2).

$\alpha_{cr}'=\arcsin((1/4)\cdot d/Y_{CM})$ and
$\alpha_{cr}''=\arcsin((3/4)\cdot d/Y_{CM})$,(1)
where $d=|AB|=l\cdot\cos(\alpha_{feet}/2)$.

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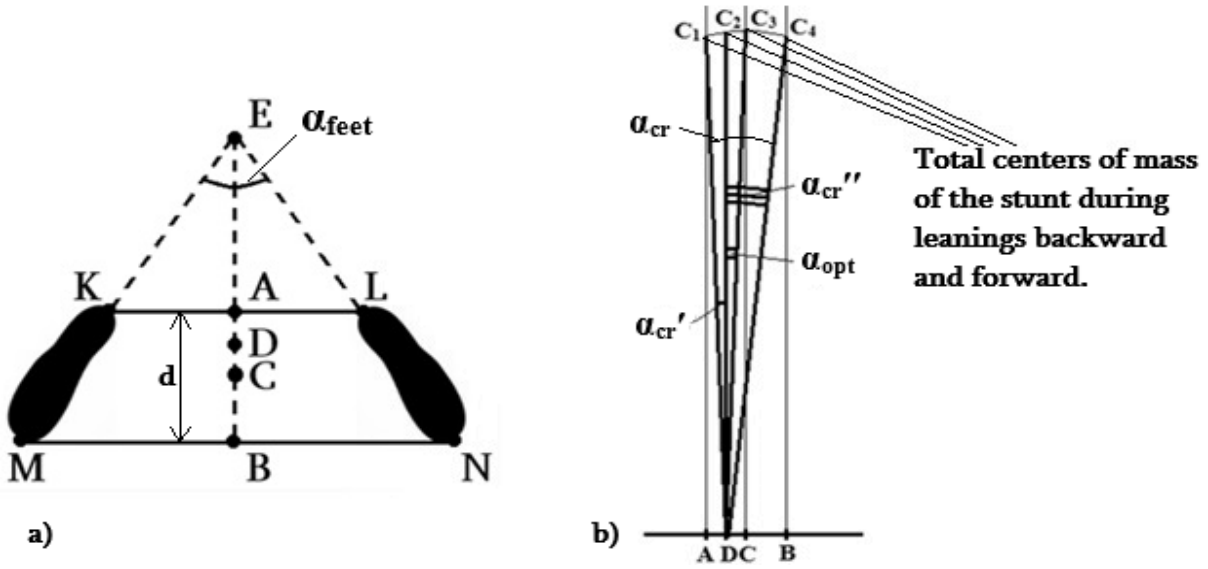

Fig. 2. a.) the feet of the base gymnast; b.) the angles α_{cr}', α_{cr}'', $\alpha_{opt}=\alpha_{cr}'$ and α_{cr} describing the balance of the acrobatic figure in the sagittal plane.

Using formulas (1), we can calculate values of the critical angles $\alpha_{cr}'=1.69°$, $\alpha_{cr}''=5.07°$, $\alpha_{opt}=1.69°$ and $\alpha_{cr}=6.76°$.

Discussion of the results of the study Table 1 demonstrates how variations of the basic physical parameters of the gymnasts m_1, m_2, h_1, h_2, l, and the angle between the feet of the base gymnast α_{feet} affect the calculated values of the critical angles α_{cr}', α_{cr}'', $\alpha_{opt}=\alpha_{cr}'$ and α_{cr}.

Table 1. The table shows how the changes of the physical parameters of the gymnasts affect the balance of the whole acrobatic figure.

Table 1. The table shows how the changes of the physical parameters of the gymnasts affect the balance of the whole acrobatic figure

#	Variations of m_1, m_2, h_1, h_2, l and α_{feet}						Calculated parameters		
	Δm_1	Δm_2	Δh_1	Δh_2	Δl	$\Delta\alpha_{feet}$	$\Delta\alpha_{cr}'$	$\Delta\alpha_{cr}''$	$\Delta\alpha_{cr}$
1	5 kg	0	0	0	0	0	0.05°	0.14°	0.19°
2	0	5 kg	0	0	0	0	-0.08°	-0.23°	-0.31°
3	0	0	10 cm	0	0	0	-0.08°	-0.25°	-0.33°
4	0	0	0	10 cm	0	0	-0.02°	-0.06°	-0.08°
5	0	0	0	0	2 cm	0	0.15°	0.46°	0.62°
6	0	0	0	0	0	10°	-0.11°	-0.33°	-0.44°

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From Table 1, we can see that the balance of the whole acrobatic figure is most sensitive to the base gymnast's foot length l and the angle between her feet α_{feet}: the increase of the foot length l by 2 cm improves α_{cr} by 0.62°, while the increase of the angle α_{feet} by 10° decreases α_{cr} by 0.44°.

α_{cr} is also sensitive to the height of the base gymnast and the mass of the top gymnast: the increase of h_1 by 10 cm decreases α_{cr} by 0.33°, while the increase of m_2 by 5 kg leads to the decrease of α_{cr} by 0.31°. From Table 1 we see, that α_{cr} is less sensitive to variations of m_1 and h_2.

Conclusions. In this study, we show that the balance of the hand-to-hand stand depends not only on the professionalism of gymnasts, but also on their physical parameters and is most sensitive to the changes of two parameters: the foot size l and angle α_{feet} between the feet of the base gymnast. This fact is very important when working with young gymnasts, who are in the stage of intensive growth and development accompanied by changes in physical parameters. Trainers can use force plates to evaluate the quality of performance, but they should also take into account changes in the physical parameters of athletes.

ორი ტანმოვარჯიშის მიერ შესრულებული აკრობატული ფიგურების წონასწორობის ბიომექანიკური ანალიზის კომპიუტერული მეთოდი

ალექსანდრე ეგოიანი [1], კარლო მოისწრაფიშვილი [1], ნინო გერიანიძე [1], მანანა მესხი [1]*

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აბსტრაქტი

ნაშრომში წარმოდგენილია ორი გოგონასაგან აგებული აკრობატული ფიგურის ბალანსის ბიომექანიკური ანალიზი. ანალიზი ჩატარდა კომპიუტერული პროგრამული უზრუნველყოფა Kinovea-ს გამოყენებით. შედეგად, ნაჩვენებია, რომ საგიტალურ სიბრტყეში ბალანსი დამოკიდებულია ქვედა ტანმოვარჯიშის ტერფის ზომაზე და კუთხეზე ტერფებს შორის: ტერფის ზომის გაზრდა ზრდის ბალანსის მდგრადობას, ხოლო ტერფებს შორის კუთხის გაზრდა პირიქით ამცირებს წონასწორობას.

ბალანსი, ასევე, დამოკიდებულია ტანმოვარჯიშეების სიმაღლეებზე და მასებზე: ტანმოვარჯიშეების სიმაღლეების და ზედა ტანმოვარჯიშის წონის ზრდა ამცირებს ბალანსს, ხოლო ქვედა ტანმოვარჯიშის მასის ზრდა აუმჯობესებს მას. ასეთი ანალიზი განსაკუთრებით მნიშვნელოვანია, როდესაც აკრობატები შედარებით პატარა ასაკის არიან (10-15 წელი), როცა მათი ორგანიზმები განიცდიან ზრდას და სხეულების პარამეტრები (სხეულის ნაწილების ზომები და წონები) არაპროპორციულად იცვლება.

საკვანძო სიტყვები: აკრობატული ტანვარჯიში, სპორტის ბიომექანიკა, წონასწორობა, ბალანსი.

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References

1. Leite, I., Fonseca, P., Ávila-Carvalho, L., Vilas-Boas, J. P., Goethel, M., Mochizuki, L., & Conceição, F. (2023). Biomechanical Research Methods Used in Acrobatic Gymnastics: A Systematic Review. Biomechanics, 3(1), 52-68. https://doi.org/10.3390/biomechanics3010005
2. Floria, P., Gomez-Landero, L. A., Harrison, A. J. (2015). Balance variability during the pyramid execution in acrobatic gymnastics. ISBS - Conference Proceedings Archive (Konstanz), 33(1), 884-887.
3. Piranashvili, G.I., Egoyan, A.E., Mirtskhulava, M.B. (2003). Biomechanical analysis of long jumps based on video computer modeling. VII International Congress "Modern Olympic Sport and Sport for All", Vol. II, 264-266.
4. Egoyan, A.E., Piranashvili, G.I., Mirtskhulava, M.B. (2003). Using the method of video computer 3D modeling based on the principle of direct kinematics to improve sports results. VII International Congress "Modern Olympic Sport and Sport for All", Vol. II, 242-243.
5. Chitashvili, D.M., Mirtskhulava, M.B., Egoyan, A.E., Khipashvili, I.A. (2005). Using information technologies to improve the skills of young football players. IX International Scientific Congress "Olympic Sport and Sport for All", 294.
6. Moistsrapishvili K.M., Egoyan A. E., Mirtskhulava M. B. et al. (2005). Biomechanical Analysis of Certain Sport Movements by Means of Video-Computer Modelling, Bulletin of the Georgian Academy of Sciences, vol. 172, 3, 543-545.
7. Egoyan, A.E., Mirtskhulava, M.B., Chitashvili, D.M. (2007). Aspects of Complex Use of Information Technologies in Sport. Physical Education of Students of Creative Specialties, 4, 15-19.
8. Egoyan, A., Khipashvili, I. (2017). Use of psychophysiological computer tests during the process of sportsmen's preparation. Pszicho-fiziológiai teszt alkalmazása a sportolók felkészítésében Testnevelés, sport, tudomány 2 (3), 8-17.
9. Egoyan, A.E., Gobirakhashvili, A.D., Moistsrapishvili, K.M. (2023). Biomechanical analysis of the dependence of the high jump result on the height and weight of an athlete. III international scientific and practical conference "Nation's health and improvement of physical and sports education", Kharkiv National Technical University, 79-83.
10. Egoyan, A. & Moistsrapishvili, K. (2013). Equilibrium and stability of the upright human body. The General Science Journal, 2, 1-10.

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Reasoned opinion

Domestic and external debts, ways and mechanisms to overcome them (Using the example of Georgia)

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Abstract

Public debt in Georgia is one of the most important challenges for the state budget, which is of particular importance in implementing the country's long-term economic stability and development plan. State debt is divided into internal and external debts, which differ by employer, currency and risk. Internal debt is a liability that the government assumes within Georgia, in GEL. Georgia's internal debt mainly arises to cover the budget deficit. The process of taking on domestic debt is regulated by the Law "On the Budget System" (Parliament of Georgia, 2005). This allows the government to protect the fiscal balance and reduce the risk of external crises. It mainly involves: bonds and state loans with local banks and financial institutions; covering the budget deficit; financing domestic infrastructure projects. Domestic debt reached approximately 10.9% of GDP after 2024. The main advantage of domestic debt is that it is less sensitive to exchange rate fluctuations, but its servicing requires regular financial resources from the budget. External debt includes credits and loans received from international organizations and foreign banks. External debt is related to international loans and affects the exchange rate and economic stability. According to historical data, excessive growth of external debt has created the most severe financial crises for many countries. In the example of Georgia, according to the National Bank, the structure of external debt is mainly loans taken in foreign currencies. External debt is particularly important because: it increases debt service risks when the exchange rate of the lari changes in foreign currencies; determines international economic dependence; is important for foreign investment and development when financing projects. Domestic and external debts represent a significant challenge for the Georgian economy, however, structural reforms, promoting economic growth, fiscal discipline and prudent debt management allow the country to maintain stability and reduce the debt burden in the coming years.

Keywords: Domestic debt, external debt, refinancing, risks, regulatory mechanisms, Debt management.

Introduction

Public debt in Georgia is one of the most Important challenges for the state budget, which is of particular importance in implementing the country's long-term,

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economic stability and development plan. Public debt is divided into internal and external debts, which differ by employer, currency, and risks.

Domestic debt is a liability that the government incurs within Georgia, in GEL. Domestic debt of Georgia mainly arises for the purpose of covering the budget deficit. The process of taking on domestic debt is regulated by the Law "On the Budget System" (Parliament of Georgia, 2005). This allows the government to maintain fiscal balance and reduce the risk of external crises. It mainly includes:

• Bonds and state loans with local banks and financial institutions;

• Covering the budget deficit;

• Financing domestic infrastructure projects.

Domestic debt reached approximately 10.9% of GDP after 2024.

The main advantage of domestic debt is that it is less sensitive to exchange rate fluctuations, but its servicing requires regular financial resources from the budget.

External debt includes credits and loans received from international organizations and foreign banks. External debt is related to international loans and affects the exchange rate and economic stability. According to historical data, excessive growth of external debt has created severe financial crises for many countries. In the example of Georgia, according to the National Bank, the structure of external debt is mainly loans taken in foreign currencies. External debt is particularly important because:

• Increases debt service risks when the exchange rate of the lari in foreign currencies changes;

• Determines international economic dependence;

• Is important for foreign investments and development when financing projects.

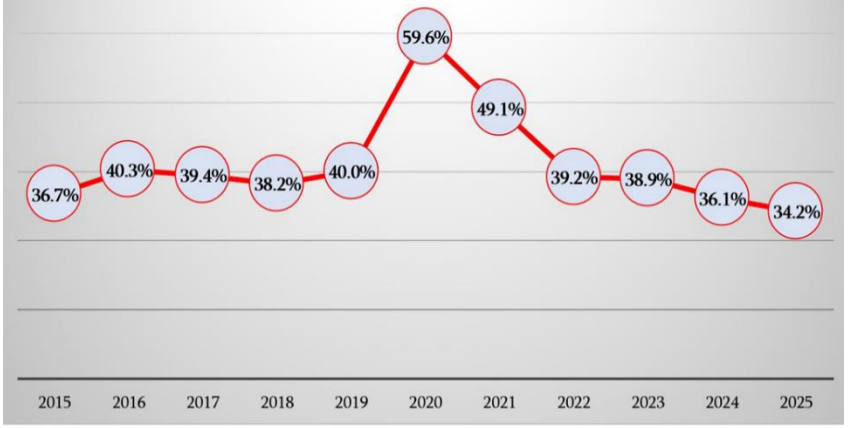
External public debt has fluctuated between 24-33% of GDP over the years. Georgia's total public debt is estimated at 36 billion GEL as of 2025, with external debt being the most important. Problems with internal and external debt include:

• High external debt increases the economy's sensitivity to international shocks;

• Internal debt increases budget expenditures, despite being less sensitive to exchange rate changes;

• Increases currency and financial risks. Excessive debt-to-GDP ratio.

Georgian Government debt to GDP in 2015-2025



Source: International Monetary FundSource

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1. Long-term strategy for public debt - the upper limit of debt (in % of GDP), e.g., the 60% limit, exceeding which will automatically activate correction mechanisms.

• Debt structure - including (what part should be fixed, what share should be long-term, how to distribute debt in foreign and national currencies, risk management plan - strategy for responding to the impact of exchange rate, interest rate risks, global financial changes).

• Risk management plan - strategy for responding to the impact of exchange rate, interest rate risks, global financial changes.

2. Refinancing mechanism with favorable terms - Georgia should create an active debt refinancing program, which includes:

• Refinancing old, high-interest debt with cheap resources, this reduces budget spending annually.

• Strategic agreements with international financial institutions - IMF, World Bank, EBRD, and ADB - so that the country can attract cheap and long-term resources during a crisis.

3. Automatic risk containment mechanism - this mechanism works successfully in Europe. In Georgia, if the debt/GDP ratio increases sharply, then automatic restrictions are activated:

• Temporary suspension of new debt;

• Cessation of non-vital expenses;

• Adjustment of interest and tax policy.

This mechanism prevents the deepening of the crisis and acts as a "signaling system".

4. Mechanism for regulating debt and high-interest loans Many families in Georgia are under a heavy credit burden. The mechanisms necessary for its elimination are: "Modern Restructuring Program", a model developed together with banks and microfinance institutions, which includes:

• Reduction of interest rates;

• Extension of the payment schedule;

• Gradual abolition of fines and penalties;

• Tightening of responsible lending standards. To prevent citizens from being offered loans that do not match their income level.

5. Mechanism for stimulating economic growth, the basis of debt management

Debt reduction is impossible without economic growth. Needed:

• Export development strategy

• Agriculture, wine, IT services, manufacturing industry, tourism.

• Mechanism for supporting local production When a country imports less, it needs less foreign debt;

• Attracting investments through the principle of a single window.

Fast permit system, less bureaucracy, protected judicial environment.

6. Protective mechanisms against external shocks - the mechanism should have safety buffers:

• Increase in foreign exchange reserves - this reduces fluctuations in the lari and, accordingly, debt service costs.

• Fiscal Risk Fund - finances emergency situations. (pandemic, war, energy shocks).

7. Debt transparency mechanism - public control is necessary:

• Full transparency of all debt agreements - all information published on the website (term, interest, creditor).

• Timely monitoring and public reporting, twice a year – to the Parliament and the

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public. This increases trust and reduces corruption risks.

Impact of domestic debt

Domestic debt in Georgia is mainly borne by the government, which is financed by the domestic budget and through banks. DSGE model simulations show that the increase in domestic debt:

• Increases future tax risk;

• Makes monetary policy more difficult, as inflation control and debt service become intertwined;

• Increases the economy's drain on resources through a reallocation of resources, often referred to as the "crowding out" effect.

Impact of external debt

Georgia's external debt is owed primarily to foreign creditors. DSGE analysis highlights that rising external debt:

• Increases sensitivity to external shocks, particularly foreign capital shocks;

• Increases the risk of currency fluctuations, which directly impacts the volume of economic activity;

• Creates dependency on international financial institutions, which requires greater precision and consistency in fiscal and monetary policies.

Policy Recommendations:

DSGE[1] simulations in the Georgian context indicate the following:

1. Effective management of domestic debt: It is recommended to optimize the debt service structure and stimulate investment growth.

2. Ensuring external debt sustainability: It is important to manage currency risks, use the currency regime of sanctions flexibly, and diversify foreign investment.

3. Coordination of monetary and fiscal policies: DSGE models show that a combined policy reduces the negative impact of shocks on the economy. By switching to loans; controlling the allocation of currency.

External debt includes both the state (government + state organizations), and the private and banking sectors — that is, all debt that the country receives in foreign currency. In the 2nd quarter of 2025, it was $ 26.5 billion.

"Domestic debt" is debt that the government incurs within the country, in GEL (for example, government bonds, domestic loans, etc.).

As of October 2025, the volume of domestic debt was 11.26 billion lari.

"Total state debt" = domestic + external — that is, all debt owed to the state: this amounted to 36.2 billion lari at the end of 2025.

Main ways to manage and overcome debt

• Promoting economic growth, where domestic production will be developed, exports will be expanded, and innovations will be introduced.

• Fiscal discipline, where budget deficit will be controlled, and government spending will be optimized.

• Improving the debt structure, focusing on domestic debt to reduce external debt; optimizing debt financing terms and interest rates.

[1] National Bank of Georgia (NBG) sources,
NBG uses DSGE models for monetary policy and inflation forecasts:
Describes the use of DSGE for inflation targeting and policy assessment

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• International support, grants, and development assistance that do not have the characteristics of a loan.

• Refinancing and risk management, reducing expensive debts.

Georgia's Public Debt Forecast (2025–2030)
(Realistic Option)

Year	Domestic Debt (billion L)	External Debt ($ billion)	Total Debt (to GDP)
2025	11.2	8.9	40-41%
2026	11.6	9.1	40%
2027	12.1	9.2	40-41%
2028	12.6	9.3	41%
2029	13.1	9.4	40-41%
2030	14	9.5	42%

Georgia's Public Debt Forecast (2025–2030)
(Optimistic Scenario, Rapid Economic Growth)

Year	Domestic Debt (billion L)	External Debt ($ billion)	Total Debt (to GDP)
2025	11.2	8.9	40%
2026	11.4	8.8	38%
2027	11.6	8.7	37%
2028	11.9	8.6	36-37%
2029	12.1	8.5	36%
2030	12.3-12.7	8.3-8.4	35-36%

Georgia's Public Debt Forecast (2025–2030)
(Risks, Negative Developments)

Year	Domestic Debt (billion L)	External Debt ($ billion)	Total Debt (to GDP)
2025	11.2	8.9	41%
2026	12	9.8	45%
2027	13	10.4	48%
2028	14	10.9	50%
2029	15	11.2	51-52%
2030	15.5-16	11.5	52-53%

What does this forecast mean in practice?

1. Georgia will not be able to move to a sharp reduction in debt, but it can slow down the growth rate and shift the burden to domestic debt.

2. The most critical factor is the GEL exchange rate, external debt is in foreign currency, which makes exchange rate

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fluctuations very significant.

3. The next 5 years depend on:

- economic growth;
- geopolitical stability;
- development of ports and corridors;
- attraction of investments;
- the quality of fiscal discipline.

The above tables show that the realistic option indicates a stable but slowly growing debt. The optimistic option indicates a decrease in debt relative to GDP, which means a healthy trajectory, and the risks are a sharp increase in debt (especially foreign debt) in the event of external shocks. Has the greatest impact on: lari exchange rate, economic growth, foreign investments, budget deficit.

Conclusion

Domestic and external debt pose a significant challenge for the Georgian economy, but structural reforms, promoting economic growth, fiscal discipline, and prudent debt management allow the country to maintain stability and reduce its debt burden in the coming years.

DSGE models are a powerful tool for analyzing Georgia's domestic and external debt. Their use makes it possible to accurately assess how the economy will respond to various shocks and to develop structural policies to ensure debt sustainability. Such an approach significantly increases the predictability of economic decisions and contributes to strengthening the country's financial stability.

The most effective for Georgia is a combination of fiscal discipline, monetary stability, structural reforms and investments. This allows the country to reduce the debt burden, increase economic activity and restore financial stability, despite the crisis. Georgia's debt has increased over the past 10 years, both in total and in the volume of external debt, and there is also a significant increase in domestic debt. The increase observed in the past is partly manageable and is part of the economic gro strategy, but there are clear risks - especially in terms of currency and refinancing. It is important for the country to continue and timely manage its debt - policies that ensure uninterrupted debt service, optimization of maturities and diversification of debt should remain a top priority. "Domestic debt" - this is debt that the government incurs within the country, in GEL (for example, government bonds, domestic loans, etc.). As of October 2025, the volume of domestic debt was ₾ 11.26 billion. Government debt — According to CEIC data, government debt to GDP was approximately 37.2% in the third quarter of 2024. The Public Debt Management Strategy (2024-2027) states that their goal is to maintain debt at approximately 40% of GDP. Gross external debt: According to the National Bank, at the end of 2024, Georgia's external debt amounted to $ 25.2 billion, which is approximately 74.5% of GDP based on the six-month indicator. Net external debt (assets less expenses) at the end of 2024 was $ 12.3 billion, which is approximately 36.4% of GDP. The total amount of state debt (domestic + external) according to the Ministry of Finance, as of October, is 36.17 billion.wth and financing.

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აბსტრაქტი

საქართველოში საჯარო ვალი წარმოადგენს სახელმწიფო ბიუჯეტის ერთ-ერთ მნიშვნელოვან გამოწვევას, რომელსაც განსაკუთრებული მნიშვნელობა ენიჭება ქვეყნის ეკონომიკური სტაბილურობისა და განვითარების გრძელვადიანი გეგმის შესრულებაში. სახელმწიფო ვალი იყოფა **შიდა** და **გარე ვალებად**, რომლებიც განსხვავდებიან დამსაქმებლების, ვალუტისა და რისკების მიხედვით. **შიდა ვალია** ვალდებულება, რომელსაც მთავრობა იღებს საქართველოს შიგნით, ლარში. საქართველოს შიდა ვალი ძირითადად წარმოიშობა ბიუჯეტის დეფიციტის დაფარვის მიზნით. შიდა ვალის აღების პროცესი რეგულირდება კანონით „ბიუჯეტის სისტემის შესახებ (საქართველოს პარლამენტი, 2005). ეს საშუალებას აძლევს მთავრობას დაიცვას ფისკალური ბალანსი და შეამციროს საგარეო კრიზისების რისკი. იგი ძირითადად კი გულისხმობს: ობლიგაციებს და სახელმწიფო სესხებს ადგილობრივ ბანკებთან და ფინანსურ ინსტიტუტებთან; ბიუჯეტის დეფიციტის დაფარვას; შიდა ინფრასტრუქტურული პროექტების დაფინანსებას. შიდა ვალმა 2024 წლის შემდეგ მიაღწია დაახლოებით 10.9% მშპ-ს. შიდა ვალის მთავარი უპირატესობაა ის, რომ იგი ნაკლებად მგრძნობიარეა ვალუტის კურსის რყევებზე, მაგრამ მისი მომსახურება ითხოვს რეგულარულ ფინანსურ რესურსებს ბიუჯეტიდან. **გარე ვალი** მოიცავს კრედიტებსა და სესხებს, რომლებიც მიღებულია საერთაშორისო ორგანიზაციებისა და უცხოური ბანკებისგან. გარე ვალი დაკავშირებულია საერთაშორისო სესხებთან და ზემოქმედებს ვალუტის კურსსა და ეკონომიკურ სტაბილურობაზე. ისტორიული მონაცემებით, ბევრ ქვეყანას გარე ვალის ზედმეტი ზრდა უმწვავეს ფინანსურ კრიზისებს უქმნიდა. საქართველოს მაგალითში, ეროვნული ბანკის მონაცემებით, საგარეო ვალის სტრუქტურა ძირითადად უცხოური ვალუტებით აღებული სესხებია. გარე ვალი განსაკუთრებით მნიშვნელოვანია, რადგან: ვალის მომსახურების რისკებს ზრდის უცხოურ ვალუტაში ლარის კურსის ცვლილებისას; განაპირობებს საერთაშორისო ეკონომიკურ დამოკიდებულებას; პროექტების დაფინანსებისას მნიშვნელოვანია უცხოური ინვესტიციებისა და განვითარებისათვის. შიდა და გარე ვალები მნიშვნელოვან გამოწვევას წარმოადგენს საქართველოს ეკონომიკისთვის, თუმცა სტრუქტურული რეფორმები, ეკონომიკური ზრდის ხელშეწყობა, ფისკალური დისციპლინა და გონივრული ვალის მართვა საშუალებას აძლევს ქვეყანას შეინარჩუნოს სტაბილურობა და შემცირდეს ვალის ტვირთი მომავალი წლების განმავლობაში.

საკვანძო სიტყვები: შიდა ვალი, გარე ვალი, რეფინანსირება, რისკები, ვალის დაძლევა, რეგულირების მექანიზმები.

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References

1. Kakhidze, A. (2019). Modern Challenges of Public Debt Management in Georgia. Tbilisi: Ivane Javakhishvili Tbilisi State University.

2. Bakhtadze, L. (2022). Features of Public Debt Regulation in Georgia: Current Circumstances and Modern Challenges. European University Journal, №11.

3. Meladze, T. (2020). External Debt and Economic Growth in Georgia. Proceedings of the Faculty of Economics and Business, TSU.

4. Tkemaladze, Z. (2018). Georgia's External Financial Security and External Debt. Economic Policy Studies.

5. Hyman, D. N. (2015). Public finance: A contemporary application of theory to policy (11th ed.). Boston, MA: Cengage Learning.

6. Krugman, P., Obstfeld, M., & Melitz, M. (2018). International economics: Theory and policy (11th ed.). Boston, MA: Pearson.

7. Reinhart, C. M., & Rogoff, K. S. (2009). This time is different: Eight centuries of financial folly. Princeton, NJ: Princeton University Press.

8. Panizza, U. (2008). Domestic and external public debt in developing countries. UNCTAD Discussion Paper, 184.

9. Parliament of Georgia. (2005). Law “On the Budget System”. Tbilisi: Parliament of Georgia.

10. Parliament of Georgia. (2005). Law “On State Debt”. Tbilisi: Parliament of Georgia.

11. Ministry of Finance of Georgia. (2024). Statistics of State Debt. Tbilisi: Ministry of Finance of Georgia.

12. National Bank of Georgia. (2024). External Sector Review. Tbilisi: National Bank of Georgia.

13. On State Debt: 2025: https://pbo.parliament.ge/media/k2/attachments/kvleviTi_publikacia_mTavrobis_valze.pdf

14. State Debt: 2025: https://www.mof.ge/ka/Debt

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Original Research Article

The methodology of developing speed and strength abilities in boys aged 10-12 who are engaged in Greco-Roman wrestling

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Abstract

In scientific and methodological sources devoted to wrestling, much attention is paid to the problem of organizing an effective training process. However, research results often present scattered data on the individual characteristics of wrestlers and do not provide a complete picture of training in this sport. This is due to the fact that an important role in wrestling is played not by any one quality of an athlete, but by a complex of various qualities that interact with each other.

The issue of improving speed and strength qualities is widely studied in various types of martial arts. It is especially important to develop scientifically based approaches to speed and strength training of high-level athletes in modern wrestling.

This study presents the methodology we have developed for developing speed and strength qualities in young wrestlers and evaluating its effectiveness. For this purpose, tests for pedagogical testing were developed, which made it possible to evaluate the effectiveness of the methodology. Testing was conducted before and after the experiment, which lasted 8 weeks.

Pedagogical testing of speed and strength training of boys 10-12 years old engaged in Greco-Roman wrestling included the following exercises:

- standing long jump (cm);
- high jump from a standing position (cm);
- triple jump (m);
- pull-up on the crossbar in 20 seconds (number of times);
- flexion and extension of the arms in the prone position in 20 seconds (number of times);
- lifting the torso while lying on your back in 20 seconds (number of times).

Keywords: Wrestling, speed and strength training, development of physical qualities.

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Introduction. In the modern world of sports, particularly in wrestling, outstanding results are largely determined by an athlete's ability to demonstrate strength quickly and efficiently. The development of speed-strength qualities enables wrestlers to increase their activity during competitions and improve the execution of technical maneuvers, which is a decisive factor in achieving success.

One of the key objectives is to identify the most effective methods and tools for the physical training of young wrestlers. Although specialized literature on wrestling devotes significant attention to organizing an effective training process [1-10], research findings often present fragmented data on athletes' individual characteristics, without forming a comprehensive understanding of the training system in this sport.

A review of scientific and methodological literature, combined with an analysis of advanced practices, underscores the relevance of this study. While the topic of physical training has been extensively explored in sports science, the evolution of the sport and innovations in training methods create new opportunities for developing more effective approaches to enhancing wrestlers' physical qualities. This is because success in wrestling depends on a complex interplay of various interconnected athletic attributes.

Materials and Methods. The study was conducted at the Department of Physical Education within the Institute of Physical Culture, Sports, and Youth Policy at the Ural Federal University named after the First President of Russia B.N. Yeltsin (UrFU), as well as at the Municipal Budgetary Educational Institution of Additional Education "Crystal" Sports School.

An analysis of scientific and methodological literature was performed to identify the specifics of planning specialized physical training during the initial stages of the long-term training process in wrestling.

Pedagogical testing was carried out using control exercises outlined in the Federal Sports Training Standard for the sport of wrestling. These exercises included:

- Standing long jump;
- Standing high jump;
- Standing triple jump;
- Pull-ups on a horizontal bar within 20 seconds;
- Push-ups within 20 seconds;
- Sit-ups from a supine position within 20 seconds.

The pedagogical experiment involved participants from the initial training groups in their third and fourth years of training in Greco-Roman wrestling. The experimental group (n=15) underwent an 8-week training program based on a methodology we developed to enhance the speed–strength abilities of boys aged 10-12 engaged in Greco-Roman wrestling. The control group (n=15) followed a conventional training methodology.

During the study, training sessions focused on developing strength and speed-strength qualities were conducted five times per week for both the control and experimental groups. The control group trained according to the

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methodology outlined in the program for youth sports schools specializing in Greco-Roman wrestling. The experimental group followed an original methodology developed by the authors, based on an analysis of scientific and methodological literature.

The methodology designed for boys aged 10-12 actively incorporated the short-duration tension method, which included a series of specialized exercises such as push-ups, pull-ups, and squats with a partner of equal weight. These exercises were performed in sets with progressively increasing repetitions, with rest intervals of 3-5 minutes between sets. Rest periods were filled with relaxation techniques. Additional methods included exercises with medicine balls and shot puts, as well as activities requiring participants to overcome their own body weight or that of a partner. Furthermore, strength-based games and other exercises demanding both speed and strength were utilized.

The exercise system was designed to address the primary objective of enhancing movement speed and strength in specific muscle groups. This was achieved through three training focuses: speed, speed-strength, and strength.

The development of speed-strength abilities using the repeated effort method was implemented twice per week at the end of the main training session, following the practice of technical maneuvers. Each exercise consisted of 2-3 sets.

Circuit training sessions, aimed at improving physical qualities, were conducted twice per week. The number of circuits ranged from 4 to 5, depending on the selected exercises and intensity level.

The game-based method was employed during the concluding part of each training session. The games included activities such as push-and-pull contests, ball wrestling, leg-grappling struggles, gaining top position in parterre, lifting off the mat, and “third point” challenges.

To evaluate the effectiveness of the developed methodology for enhancing speed–strength abilities in boys aged 10-12 engaged in Greco-Roman wrestling, pedagogical testing was conducted. The results are presented in Tab 1.

Results and Discussion. A statistically significant improvement in standing long jump performance was observed in the experimental group, with the average result increasing by more than 25 cm. The significance of this exercise underscores its relevance in assessing the speed-strength preparedness of wrestlers, as it reflects the development of speed-strength qualities in the leg muscles, which influence movement speed and the execution of techniques in Greco-Roman wrestling. In contrast, the control group showed only a slight and statistically insignificant improvement in performance.

Similar results were observed in the standing high jump. Athletes in the experimental group significantly improved their performance by an average of 16 cm, whereas the control group’s improvement was only 6 cm.

The standing triple jump is used as a qualifying standard for enrollment in

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wrestling training groups and also reflects the development of speed-strength qualities in the leg muscles. Participants in the experiment, who are in their third and fourth years of initial training, find this standard particularly relevant. Before the pedagogical experiment, the results of athletes in both groups were significantly below the normative benchmark (at least 5 m). After the experiment, the performance of the experimental group improved by 1.5 m, approaching the target benchmark, while the control group's performance improved by 0.7 m. However, no statistically significant differences were observed within the control group's results.

In the control exercise "pull-ups on a horizontal bar in 20 seconds" a statistically significant improvement in performance was observed in both groups post-experiment. The control group's average improvement was 1.2 repetitions, whereas the experimental group achieved an average increase of 3 repetitions.

Following the pedagogical experiment, statistically significant differences were identified between the results of the experimental and control groups, indicating the greater effectiveness of the methodology we developed for fostering speed-strength abilities in young Greco-Roman wrestlers compared to the conventional methodology. Specifically, in the exercise "push-ups in 20 seconds" both groups demonstrated statistically significant improvements.

However, the average performance of the experimental group post-experiment was significantly higher than that of the control group.

Table 1. Results of Pedagogical Testing of Speed-Strength preparedness in boys aged 10-12 engaged in Greco-Roman wrestling.

Exercise Group	Standing Long Jump (cm)	Standing High Jump (cm)	Standing Triple Jump (m)	Pull-Ups on a horizontal bar in 20 seconds (number of repetitions)	Push-Ups in 20 seconds (number of repetitions)	Sit-Ups from a supine position in 20 seconds (number of repetitions)	
Experimental group	Before the experiment	122,3±7,8	21,2±9,8	3,1±0,6	1,2±0,6	8,4±2,4	5,4±2,6
	After the experiment	148,6±5,7*	37,5±4,9*	4,6±0,5*	4,2±0,8*	12,2±0,8*	16,4±2,4
Control group	Before the experiment	118,9±5,9	22,4±7,6	3,2±0,8	1,4±0,8	8,0±1,4	6,4±2,2
	After the experiment	129,4±6,3	28,6±4,2	3,9±0,6	2,6±0,8*	10,2±1,2*	10,8±2,0

The final control exercise, aimed at assessing speed-strength qualities, was the sit-up from a supine position, which evaluates the capabilities of the core muscles. This exercise,

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along with pull-ups from a hanging position and push-ups, was performed with a 20-second time limit due to the specific energy demands of speed-strength exercises. The evaluation of the core muscles' speed-strength capabilities in athletes from both groups showed statistically significant improvements following the experiment. However, athletes in the experimental group demonstrated a significantly greater improvement in performance, with an average increase of 11 repetitions, compared to an average increase of 4 repetitions in the control group.

Conclusions. The results of the pedagogical study, utilizing the developed methodology for enhancing speed-strength qualities in young Greco-Roman wrestlers, confirming statistically significant improvements in the performance of test exercises. These exercises enabled an objective assessment of the speed-strength capabilities of the muscles in the upper and lower extremities, as well as the core muscles, of athletes in the experimental group. Overall, these findings demonstrate the effectiveness of the methodology for developing speed-strength abilities in boys aged 10-12 engagedin Greco-Roman wrestling.

სისწრაფისა და ძალის უნარების განვითარების მეთოდოლოგია 10-12 წლის ჭაბუკების მაგალითზე ბერძნულ-რომაულ ჭიდაობაში

ედიშერ მაჩაიძე[1], სერგეი ნოვაკოვსკი[2], სვეტლანა კონდრატოვიჩი[2], ნიკიტა კუჩერი[2]*

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აბსტრაქტი

ჭიდაობისადმი მიძღვნილ სამეცნიერო და მეთოდოლოგიურ წყაროებში, დიდი ყურადღება ეთმობა ეფექტური სავარჯიშო პროცესის ორგანიზების პრობლემას. თუმცა, კვლევის შედეგები ხშირ შემთხვევაში ფრაგმენტულ მონაცემებს წარმოაჩენს მოჭიდავეთა ინდივიდუალური მახასიათებლების შესახებ, რაც სრულ სურათს ვერ ასახავს. აღნიშნული განპირობებულია იმითაც, რომ ჭიდაობაში მნიშვნელოვან როლს თამაშობს არა სპორტსმენის რომელიმე თვისება, არამედ ერთმანეთთან ურთიერთქმედების მქონე სხვადასხვა თვისებების კომპლექსი.

სისწრაფისა და ძალის თვისებების გაუმჯობესების საკითხი ფართოდ არის შესწავლილი საბრძოლო ხელოვნების სხვადასხვა სახეობაში. თანამედროვე ჭიდაობაშიც განსაკუთრებით მნიშვნელოვანია მაღალი დონის სპორტსმენების სიჩქარისა და ძალის ვარჯიშისადმი მეცნიერულად დასაბუთებული მიდგომების შემუშავება.

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ეს კვლევა წარმოადგენს ჩვენს მიერ შემუშავებულ მეთოდოლოგიას ახალგაზრდა მოჭიდავეებში სიჩქარისა და ძალის თვისებების განვითარებისა და მისი ეფექტურობის შესაფასებლად. ამ მიზნით, შემუშავდა პედაგოგიური ტესტირების ტესტები, რამაც მეთოდოლოგიის ეფექტურობის შეფასება შესაძლებელი გახადა. ტესტირება ჩატარდა ექსპერიმენტამდე და მის შემდეგ, რაც 8 კვირა გაგრძელდა.

ბერძნულ-რომაული ჭიდაობით დაკავებული 10-12 წლის ჭაბუკების სიჩქარისა და ძალის ვარჯიშის პედაგოგიური ტესტირება მოიცავდა შემდეგ სავარჯიშოებს:

- სიგრძეზე ნახტომი ადგილიდან (სმ);
- სიმაღლეზე ნახტომი ფეხზე დგომიდან (სმ);
- სამმაგი ნახტომი (მ);
- ძელზე აწევა 20 წამში (რამდენჯერმე);
- ხელების მოხრა და გაშლა წოლით მდგომარეობაში 20 წამში (რამდენჯერმე);
- ტორსის აწევა ზურგზე წოლის დროს 20 წამში (რამდენჯერმე).

საკვანძო სიტყვები: ჭიდაობა, სისწრაფისა და ძალის ვარჯიში, ფიზიკური თვისებების განვითარება.

References

1. Bleer, A. N. Management of physical training of highly qualified Greco-Roman wrestlers based on integrated control data / A. N. Bleer, A. I. Laptev, S. P. Levushkin // Bulletin of Sports Science. - 2013. – No. 2. – pp. 14-19.
2. Borisenko, O. V. Modular technology for the development of coordination abilities of young judoists at the sports and recreation stage: abstract of the dissertation. ... Candidate of Pedagogical Sciences / O. V. Borisenko. – St. Petersburg, 2018. – 23 p.
3. Interrelation of physical fitness of wrestlers with the process of formation of technical and tactical skills / B. N. Karuyev, D. Y. Titeev, B. A. Zodbaev [and others] // Colloquium-Journal. – 2020. – № 2-8(54). – Pp. 20-21.
4. Kalmykov, I. Y. Improving physical performance and speed-strength abilities of wrestlers using running and speed-strength exercises / I. Y. Kalmykov // Eurasian Scientific Association. – 2019. – № 5-7(51). – Pp. 497-501.
5. Kolinenko, E. A. The development of strength endurance in freestyle wrestlers at the stage of sports specialization / E. A. Kolinenko, A. O. Khandamaev // Proceedings of Tula State University. Physical Culture. Sport. – 2022. – No. 12. – pp. 112-117.
6. Kuznetsov, A. S. The construction of the training process of Greco-Roman wrestlers, taking into account the means of recovery / A. S. Kuznetsov // Pedagogical, psychological and biomedical problems of physical culture and sports. – 2021. – Vol. 16. – No. 3. – pp. 11-19.

DOI: 10.56580/GEOMEDI65

7. Nazarenko, L. D. Methods of increasing the level of physical fitness of qualified Greco-Roman wrestlers / L. D. Nazarenko, D. A. Osipov, A. N. Ilkin // Volga pedagogical search. – 2020. – № 3(33). – Pp. 71-76.

8. Ryabinin, S. P. Speed and strength training in martial arts / S. P. Ryabinin, A. P. Shumilin. Krasnoyarsk: Siberian Federal University, 2007. 153 p.

9. Tarabrina, I. V. The training and educational process of an athlete-wrestler // Psychology and pedagogy: methods and problems of practical application: collection of materials of the XV International Scientific and practical Conference / Under the general editorship of S.S.Chernov. Novosibirsk: NSTU Publishing House, 2010. 466 p., pp. 425-430.

10. Shumakov, A.V. Pedagogical control in the system of athletes' training / A.V. Shumakov, V. V. Ivanitsky, L. V. Zakharova // Problems of modern pedagogical education. - 2018. – No. 58-1. – pp. 299-302.

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Medical Case Report

COVID-19 infection and hypertensive heart disease in the elderly (Clinical case study)

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Abstract

Among the risk factors for severe course and poor outcome of coronavirus infection, hypertensive heart disease and old age are noteworthy, which is determined by the high prevalence of hypertension (30-45% in the adult population), its leading position among the causes of mortality (cause of death of 10.4 million people per year), the participation of components of the renin-angiotensin-aldosterone system in facilitating the entry of the COVID-19 virus into the body, and the high mortality rate from COVID-19 in the elderly (95% of those who died from COVID-19 in Europe were >60 years old). The analysis of the course of the new coronavirus infection was carried out in an elderly (95 years old) patient who had hypertensive heart disease as a comorbidity. The disease began acutely. COVID-19 was diagnosed on the very first day, immediately after the onset of clinical symptoms (fever, muscle and joint pain), a rapid COVID-19 test was positive, symptomatic treatment and monitoring were carried out by the family doctor. The condition worsened in dynamics, new symptoms appeared, in the form of dry cough and shortness of breath, due to which the patient was hospitalized on the fourth day of the disease. Covid-19 infection was confirmed in the clinic, complex treatment was carried out in accordance with the guideline and protocol, due to oxygenation-desaturation, against the background of which oxygenation indicators were improving. Despite the complex treatment, on the tenth day from the onset of the disease, the condition worsened due to the development of complications of Covid-19 infection (pneumonia, acute respiratory failure). Treatment continued in the general intensive care unit. Against the background of the treatment (oxygenation, breathing exercises, antibiotic therapy (Cefamed, Dominal, Steptenbakt), infusion, inhalation bronchodilators and glucocorticosteroids, sedatives, hormone therapy with dexamethasone, anticoagulants, gastroprotectors, control and correction of volemia, glycemia, electrolyte balance), the condition improved. Hemodynamic-oxygenation parameters stabilized. Disease management and rehabilitation continued at home and he recovered within 6 months. Therefore, it can be noted that despite the aggravated premorbid background, which to some extent determines the severe course of the disease and the development of complications, timely diagnosis of COVID-19 infection, positive oxygenation indicators, adequate treatment and monitoring contribute to the development of a favorable outcome of the disease. Timely and continuous rehabilitation accelerates the recovery process.

Key words: Coronavirus Infection, Pneumonia, Old age, Hypertensive Heart Disease.

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Introduction

Noncommunicable diseases, including arterial hypertension, are one of the major public health problems in all countries, as approximately 70% of deaths worldwide are caused by noncommunicable diseases.

The prevalence of hypertensive heart disease in the general adult population is 30–45%. High blood pressure (hypertension) remains the leading cause of death worldwide, accounting for 10.4 million deaths per year, since hypertension is a risk factor for cardiovascular diseases (myocardial infarction, stroke, ischemic heart disease, chronic heart failure), cerebrovascular diseases (ischemic, hemorrhagic stroke, transient ischemic attack) and is a leading risk factor for the development of kidney disease. However, the sudden emergence of an infectious disease - the new coronavirus infection - has changed established ideas about the diseases that pose the greatest threat to health. The coronavirus pandemic has affected all areas of people's lives, including health, economics, education, and psychological aspects. Due to the coronavirus pandemic, patients with hypertension are of primary concern, regarding the high rate of disease spread and components of the renin-angiotensin-aldosterone system, in the view of their role in facilitating the entry of the novel coronavirus into the body [4]. The death rate among people over 80 years of age with confirmed COVID-19 infection is five times higher than the global average [2].

More than 95% of deaths from COVID-19 in Europe occur in people aged 60 and over [5]. In the United States, 80% of deaths occurred in people aged 65 and older [4]. In China, approximately 80% of deaths occurred in people aged 60 and older [4].

According to literature data, elderly patients may often experience a latent course of infectious diseases, which is associated with a decrease in the body's resistance and which complicates the timely diagnosis of the disease [3], as a result, the start of treatment is delayed, which, along with other factors, leads to an unfavorable outcome. Based on all of the above, chronic disease in the form of hypertension and old age are risk factors for the development of a severe course and lethal outcome of COVID-19 infection.

Goal of the research: The goal of the research was to study the characteristics of the course of coronavirus infection (COVID-19) in an elderly patient with hypertensive disease, in the context of a favorable outcome.

Research material and methods. An analysis of the course of a novel coronavirus infection (COVID-19) with a favorable outcome was conducted in an elderly patient with concomitant hypertensive heart disease. The medical record of a 95 year old patient, who was being treated for a diagnosis of COVID-19 was retrospectively analyzed.

In accordance with the principles of evidence-based medicine, epidemiological, clinical, and paraclinical research methods were used to analyze the patient database.

The results of the clinical course of the infection were discussed in accordance with the existing scientific guidelines and protocols for this disease [1]. In the research process, we also used the interview method according to a pre-designed questionnaire. The respondent patient was under the supervision of a family doctor, receiving appropriate treatment and rehabilitation. The

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survey was conducted once every 3 months for 1 year.

The patient's personal data, which is recorded in the electronic health record system, is "visible". The patient gave the doctor informed consent to use her medical data for research possibilities.

Research results and discussion: Clinical case. Patient D. (Female), 95 years old, was admitted to the emergency department on the fourth day after the onset of the disease, 2021.05.10 to the emergency department of St. Michael's Hospital. Complaints: severe general weakness, easy fatigue, muscle and joint pain, dry cough, periodic episodes of shortness of breath. **Anamnezis morbi:** the disease began on 2021.10.06, acutely, with hyperthermia (t-38.2°C), muscle and joint pain. On the same day, a rapid test for COVID-19 was performed on the recommendation of the family doctor, and the new coronavirus infection was confirmed. The patient was staying at the apartment, receiving symptomatic treatment and being monitored by the family doctor. The patient's condition deteriorated over time, and complaints increased. On the fourth day after the onset of the disease, episodes of shortness of breath, a dry cough, and severe general weakness were noted, along with a subfebrile temperature, which is why he was transferred to the clinic. **Epidemiological history:** Contact with a patient with a novel coronavirus infection was unknown. The patient was unvaccinated. Among chronic diseases, the patient had hypertensive heart disease (16 years). Due to her advanced age, the patient did not fully develop symptoms of COVID-19 infection. Although the symptoms were consistent with an acute respiratory viral infection, due to the epidemiological situation, a COVID-19 infection was suspected in a timely manner, and a rapid test for COVID-19 was performed.

Objectively: The general condition was of moderate severity, consciousness was clear, communicative, the skin was pale, the oral and pharyngeal mucosa was hyperemic, the heart tones were rhythmic and moderately muffled, and on auscultation of the lungs, breathing was weak. The abdomen was soft, painless on palpation. The patient was severely oxygen-dependent, saturation was decreasing without oxygenation, and she was in a forced sitting position, requiring continuous oxygenation and monitoring. SpO2- 87% on ambient air, SpO2- 90% (with oxygenation). On 16.05.21 at 13:20, the patient's general condition deteriorated sharply. Complications of Covid infection were identified: J18.9 - pneumonia, unspecified, J96.0 - acute respiratory failure, J94.8 - other specified pleural conditions, right-sided hydrothorax. Chronic metabolic, metabolic and destructive changes in older people, changes in the activity of gene sets involved in inflammation, apoptosis, oxidative stress and immune exhaustion processes, Age-related declines in estrogen and testosterone levels are associated with increased susceptibility to COVID infection, which may be an important factor in the development of severe COVID-19.

Against the background of complex intensive treatment, the patient's general condition was steadily severe, manifested by general weakness, periodic shortness of breath, cough, hyperthermia, muscle and joint pain. T-38.2, hemodynamics stable: TA 120/65mmHg, HR-90, rhythmic. She was on spontaneous breathing, desaturating on ambient air, oxygen was delivered via nasal mask at 5-6 L/min, and inhalation therapy with bronchodilators and corticosteroids, non-invasive breathing exercises, etc. were also administered. Against this background,

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oxygenation indicators were improving. Atmospheric SPO2- 88%. Against oxygenation background SPO2- 95% RR-20'. Against the background of the treatment carried out (oxygenation, breathing exercises, antibiotic therapy, infusion, inhalation, sedative, hormone therapy, anticoagulant, gastroprotective, control and correction of volemia, glycemia, and electrolyte balance), the patient's condition has improved, and she was discharged home on the 25th day after hospitalization under the supervision of her family doctor. Upon discharge, the following symptoms were noted: general weakness, easy fatigue, periodic headaches and joint pain, and insomnia.

A follow-up chest radiograph showed positive dynamics: ground-glass opacities were detected in the left lung parenchyma in the midfield and predominantly basally, Inhomogeneous inflammatory infiltrative changes with areas of consolidation, which is an indicator of the transition of acute inflammatory foci to the next phase. She underwent both medical and physical rehabilitation at the apartment (breathing exercises, dosed physical activity), and also underwent sanatorium-resort treatment.

2.5 months after discharge, laboratory test results (complete blood count, coagulogram, C-reactive protein, D-dimer) normalized. After 6 months, chest X-ray showed no inflammatory infiltrative changes in the lungs. The patient has recovered.

Currently, the patient is 100 years old, feels well, is under the supervision of a family doctor, and due to hypertensive heart disease, he periodically undergoes clinical and laboratory tests and appropriate drug treatment.

Conclusion. Timely diagnosis and appropriate treatment of COVID infection and its complications, regardless of risk factors, can lead to a favorable outcome. In patients over 80 years of age, despite the risk of severe COVID infection, a positive response to oxygenation can be considered a positive event in terms of prognosis and survival. On time rehabilitation (medication, physical, sanatorium-resort) included in the management of COVID-19 infection can help accelerate recovery processes, even in elderly patients with risk factors.

ხანდაზმულთა covid-19 ინფექცია და გულის ჰიპერტონული ავადმყოფობა (კლინიკური შემთხვევის ანალიზი)

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[1]საქართველოს სპორტის სახელმწიფო უნივერსიტეტი.

[2]თბილისის სახელმწიფო სამედიცინო უნივერსიტეტი, ასისტენტ-პროფესორი.

[3]მთავარანგელოზ მიქაელის ჰოსპიტალი.

[4]თბილისის ჰუმანიტარული უნივერსიტეტი.

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აბსტრაქტი

კორონავირუსული ინფექციის მძიმე მიმდინარეობის და არაკეთილსაიმედო გამოსავლის რისკ-ფაქტორებს შორის, აღსანიშნავია გულის ჰიპერტონული ავადმყოფობა

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და ხანდაზმულობა, რასაც განაპირობებს ჰიპერტონიის გავრცელების მაღალი მაჩვენებელი (ზრდასრულ პოპულაციაში 30-45%), სიკვდილიანობის მიზეზთა შორის წამყვანი პოზიცია (წელიწადში 10.4 მილიონი ადამიანის გარდაცვალების მიზეზი), რენინ-ანგიოტენზინ-ალდოსტერონის სისტემის კომპონენტების მონაწილეობა COVID-19-ის ვირუსის ორგანიზმში შეღწევის ხელშეწყობაში, COVID-19-ით სიკვდილიანობის მაღალი მაჩვენებელი ხანდაზმულებში (ევროპაში კოვიდ-ინფექციით გარდაცვლილთა 95%-ის ასაკი >60 წელზე). ახალი კორონავირუსული ინფექციის მიმდინარეობის ანალიზი განხორციელდა ხანდაზმულ (95 წლის) პაციენტში, რომელსაც აღენიშნებოდათ გულის ჰიპერტონული ავადმყოფობა, თანმხლები დაავადების სახით. დაავადება დაიწყო მწვავედ. COVID-19-ის დიაგნოსტირება მოხდა პირველსავე დღეს, კლინიკური სიმპტომების (ტემპერატურის მომატება, კუნთების და სახსრების ტკივილი) გომოვლენისთანავე, COVID-19-ს სწრაფი ტესტი იყო დადებითი, ოჯახის ექიმის მიერ უტარდებოდა სიმპტომური მკურნალობა და მონიტორინგი. დინამიკაში მდგომარეობა გაუარესდა, გამოიხატა ახალი სიმპტომები, მშრალი ხველის და ქოშინის სახით, რის გამოც დაავადების მეოთხე დღეს განხორციელდა პაციენტის ჰოსპიტალიზაცია. კლინიკაში დადასტურდა კოვიდ-ინფექცია, უტარდებოდა კომპლექსური მკურნალობა გაიდლაინისა და პროტოკოლის შესაბამისად, ოქსიგენაცია-დესატურაციის გამო, რის ფონზეც ოქსიგენაციის მაჩვენებლები უმჯობესდებოდა. მიუხედავად ჩატარებული კომპლექსური მკურნალობისა დაავადების დაწყებიდან მეათე დღეს მდგომარეობა დამძიმდა კოვიდ-ინფექციის გართულებების (პნევმონია, სუნთქვის მწვავე უკმარისობა) განვითარების გამო. მკურნალობა გაგრძელდა ზოგადი რეანიმაციის განყოფილებაში. ჩატარებული მკურნალობის ფონზე (ოქსიგენაციური, სუნთქვითი ვარჯიშები, ანტიბიოტიკოთერაპია (ცეფამედი, დომინალი, სტეპტენბაქტი), ინფუზიური, ინჰალაციური ბრონქოდილატატო-რებით და გლუკოკორტიკო-სტეროიდებით, სედაციური, ჰორმონოთერაპია დექსამეტა-ზონით, ანტიკოაგულაციური, გასტროპროტექტორული, ვოლემიის, გლიკემიის, ელექტროლიტური ბალანსის კონროლი და კორექცია) მდგომარეობა გაუმჯობესდა. ჰემოდინამიკა-ოქსიგენაციის პარამეტრები დასტაბილურდა. დაავადების მართვა და რეაბილიტაცია გაგრძელდა ბინაზე და 6 თვეში პაციენტი გამოჯანმრთელდა. აქედან გამომდინარე, შეიძლება აღინიშნოს, რომ მიუხედავად დამძიმებული პრემორბიდული ფონისა, რაც რამდენადმე განაპირობებს დაავადების მძიმე მიმდინარეობასა და გართულებების განვითარებას, COVID-19-ის ინფექციის დროული დიაგნოსტიკა, ოქსიგენაციის დადებითი მაჩვენებელი, ადექვატური მკურნალობა და მონიტორინგი ხელს უწყობს დაავადების კეთილსაიმედო გამოსავლის განვითარებას. დროული და უწყვეტი რეაბილიტაცია კი აჩქარებს გამოჯანმრთელების პროცესს.

საკვანძო სიტყვები: კორონავირუსული ინფექცია, პნევმონია, ხანდაზმულობა, გულის ჰიპერტონული ავადმყოფობა.

References

1. Order No. 01-232/o of the Minister of IDPs from the Occupied Territories of Georgia from October 21, 2021 “On approval of the State Standard (Protocol) for Post-Covid19/SARS-CoV-2 - Further Outpatient Medical Rehabilitation and Resort Treatment

DOI: 10.56580/GEOMEDI69

(Clinical Condition Management)" [In Georgian].
2. Updated version of the COVID-19 strategy - 14 April 2020. World Health Organization. https://www.who.int/publications-detail/covid-19-strategy-update---14-april-2020
3. Shchelkanov M.Yu., Kolobukhina L.V., Burgasova O.A., Kruzhkova I.S., Maleev V.V. COVID-19: etiology, clinical features, treatment // Infection and immunity. 2020. Vol. 10, No. 3. P. 421-445. DOI: https://doi.org/10.15789/2220-7619-CEC-1473 [In Russian].
4. Chazova I. E., et al. Consensus of experts of the Russian Medical Society on arterial hypertension: arterial hypertension and COVID-19 / Systemic Hypertension. 2020; 17 (3): 35–41. https://doi.org/10.26442/2075082X.2020.3.200362 [In Russian].

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Review Article

Specific Aspects of Teaching Geographical and Origin Names to Foreign Language Students of the Faculty of Medicine

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Abstract
This paper explores the specific features and instructional process of teaching geographical and origin-related nouns to foreign students of the Faculty of Medicine at University Geomedi. The students are learning Georgian as a second language. These types of lexical units play an essential role both linguistically and in everyday communication, as they express the connection between people or objects and geographical spaces. For foreign learners, acquiring and understanding such nouns presents challenges due to the complexity of word formation processes, the diversity of affixes, and the nuances of meaning. The study analyzes the structural characteristics of geographical and origin-related nouns, identifies typical learner errors, and investigates their underlying causes. Special attention is given to effective teaching strategies, including the use of visual materials, dialogic texts, and intercultural activities. These approaches significantly contribute to the development of students' linguistic competence and the enhancement of their cultural awareness. The proposed methods facilitate a clearer understanding of how spatial relationships are expressed in Georgian and promote their functional use in communication.

Keywords: Georgian as a second language for foreign students; geographical and origin-related nouns; affixes; teaching strategies

Introduction. The Georgian language is taught to international students at the Faculty of Medicine of University Geomedi. The course is divided into four parts. The first three parts focus on grammar and aim develop basic communicative competence in to Georgian at the A1 level.

These sections include essential nouns, verbs, phrases, and grammatical structures necessary for the student's daily life. The fourth part is specifically dedicated to medical phrases, dialogues, and conversations commonly used in clinical settings.

This article discusses a specific topic taught to second-year medical students of University Geomedi, which, in our view, is essential from a practical standpoint.

In the modern world, one of the primary goals of teaching a second foreign language is to develop linguistic competence that enables

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students to communicate effectively in diverse cultural environments. In the Georgian language, ethnonymic names require the addition of various suffixes to convey different meanings, which sometimes creates difficulties for foreign language learners when studying these names. For learner groups, it is important not only to memorize such types of names but also to understand their correct grammatical forms and situational usage. Therefore, it is essential to present appropriate analytical materials and carefully selected exercises, and to work on them thoroughly.

The aim of this paper is to analyze the difficulties encountered by foreign language students during the learning process. The study focuses on how geographical and ethnonymic names should be taught correctly and effectively, examining their grammatical structure, semantic content, teaching methods applied, challenges faced, and practical recommendations.

Methodology. To achieve the objectives of the study, a desk researcher method was applied, specifically the review and analysis of existing scholarly literature, which helped shape the theoretical framework of the study. Additionally, analytical and descriptive methods were used.

Disscusion on the Topic. Geographical and origin-based nouns are formed through the addition of various affixes, and they differ by type and origin. A geographical noun refers to a specific geographical location and is formed using suffixes such as ***-et, -is, -a, -ia*** and prefix-suffix combinations like ***sa–o, sa–et*** (e.g., *Fineti, Dmanisi, litva (Lithuania), italia (Italy), saphrangeti (France).*

The suffix ***-et*** is the most widely used and is added to the root of nouns denoting countries, tribes, rivers, regions, etc., thus forming a geographical noun (e.g., *Svaneti, Kakheti, Somkheti (Armenia), rumineti (Romania), dasavleti (West).*

According to *V. Topuria*, most geographical names are either of composite origin or formed through prefix-suffix combinations. He considers the suffixes ***-et and -ta*** as phonetically related and cites Niko Marr's view, who believed that the suffix -et signified both plurality and location in toponyms (5. 286).

A. Shanidze also views the suffix ***-et*** as the primary marker of geographical names. He notes that some geographical names are based on words denoting plants, animals, birds, or minerals, and many originate from surnames—especially common in villages of Kakheti, Pshavi, and Khevsureti: *Kaishaurni, Machkhaani, Vachnadziani, Gogolaurta* (11. 136).

Geographical names ending in ***-is*** often derives from the genitive case, although the root has lost its genitive meaning. According to A. *Shanidze*, such names are remnants of Old Georgian usage, where the -is ending is no longer understood as a genitive but rather as a fossilized form. Hence, the -is suffix is not considered a productive affix but rather a case ending whose meaning has shifted (11. 114). Examples include: *manglisi, kutaisi, inglisi (England), urbnisi, tbilisi, dmanisi*.

B. Jorbenadze refers to these ***-is*** suffix nouns as "***pseudo-genitive substantives***" (e.g., Shindisi) and calls the ***-et*** suffix a ***"localizing***

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formant" (e.g., Russia – Ruseti) (13. 51–52).

An origin-based noun, on the other hand, denotes a person's or object's geographical, ethnic, or cultural origin (*Kartveli [Georgian], Kutaisuri [from Kutaisi], Megruli [Mingrelian]).* The most productive suffixes to express origin are -***el*** and ***-ur / -ul***.

The suffix ***-el*** indicates a person's place of origin (11. 127). *Shanidze* mentions that historically, the suffix ***-el*** was used instead of -*et* or -*is*, which points to its antiquity. For example, people from Shindisi or Ts'avkisi call themselves Shindelebi or Ts'avkelebi. Similarly, we have Dusheti – Dusheli, Tbeti – Tbeli. (11.127). Today, however, these suffixes are no longer dropped, and both forms are commonly used: *Mangliseli, Kutaiseli, Tbiliseli, Dusheteli, Tbeteli.*

The suffixes -***ur / -ul*** are used to denote the origin of non-human entities (11. 127): *Imeruli [Imeretian], Kartluri [from Kartli], Dasavluri [Western], Espanuri [Spanish], Islandiuri [Icelandic*]. These types of nouns always refer to inanimate objects: *imeruli saxli (Imeretian house), qartuli dialeqti (Kartlian dialect), dasavluri kultura (Western culture), espanuri ph;amengo (Spanish flamenco), islandiuri ludi (Icelandic beer*), etc. Foreign students are introduced to the main affixes from the beginning of their studies, through tables and charts containing relevant examples.

Examples of Geografical Nouns:

Sa – o *saqartvelo (Georgia), samacgablo ..*

-et *– indoeti (India), bulfareti (Bulgaria), rumineti (Romania)…*

-ia *- italia (Italy), norvegia (norway), brazilia (Brasil), irlandia (Irland), iaponia (Japan)…*

Sa – et *saphrangeti (France), saberdzneti (Greece)…*

-is *inglisi (Ingland), tbilisi, bolnisi, dmanisi*

Origin-Based Nouns:

With ***–el*** suffix (used **only for people**): *ukraineli (Ukrainian), holandieli (Dutch), kakheli (Kakhetian), imereli (Imeretian), vietnameli (Vietnamese), pakistaneli (Pakistani), nepaleli (Nepali), etc.* These nouns indicate a person's nationality or geographical origin: *danieli profesori (Danish professor), germanely iuristi (German lawyer), espaneli zhurnalisti (Spanish journalist), kanadeli masts'avlebeli (Cuban teacher).*

Some origin-based names in Georgian **do not use the -el suffix**. These exceptions require focused memorization and contextual understanding, supported by varied exercises. The comparative method is particularly effective when teaching these forms. Students are provided with short texts where they identify affixed and non-affixed forms and analyze them.

Practical experience has shown that this independent, analytical work identifying noun types, suffixes, their meanings, and providing corresponding examples is highly interesting for students, as it fosters independent thinking and conclusion-drawing.

with suffix -el	*Without suffix*
Danieli (Danish)	slovaki (Slovak)
espaneli (Spanish)	turqi (Turkish)
brazilieli (Brazilian)	phrangi (French)
kolumbieli (Colombian)	berdzeni (Greek)

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with suffix -el	*Without suffix*
norvegieli (Norwegian)	მონღოლი (Mongolian)
Chineli (Chinese)	shvedi (Swedish)
iaponeli (Japanese)	khorvati (Croatian)
portugalieli (Portuguese)	tajiki (Tajik)
irlandieli (Irish)	serbi (Serbian)
islandieli (Icelandic)	belorusi (Belarusian)
eraqeli (Iraqi)	q'irgizi (Kyrgyz)
libaneli (Lebanese)	uzbeki (Uzbek)

The suffixes -***ur / -ul*** are used to indicate the origin of **non-human entities** (11. 127).

- *Inglisuri dzaghli / germanuli ludi (an English dog / a German beer)*
- *Induri cekva / qartuli satchmeli (an Indian dance / Georgian food)*
- *Aphrikuli lomi / italiuri ghvino (an African lion / Italian wine)*

While the suffixes ***-ur/-ul*** may appear in various syntactic positions, it is generally advisable not to emphasize this variation at the early stages of instruction, as it may further complicate the learning process for foreign students.

Particularly important. The distinction between the questions ***"Where are you from?" (saidan khar?) vs "What is your origin?" (sadauri khar?) requires special*** attention:

- The **first question** requires a country's name, typically using the ablative suffix -***idan/-dan:***
  saidan khar? (**Where are you from**?) — *me var indoetidan/germaniidan/monakodan* (**I am from India / from German / from Monaco)**
- The **second question** requires nationality, formed with the -***el*** suffix: *sadauri khar?* (**What is your origin?)** — *me var indoeli/serbi/monakoeli/7ermanely* (I **am Indian / Serbian / Monacan/German).**

Common Difficulties (Typical Errors):

1. Incorrect use of case endings:
   Students often omit the -***idan/-dan*** **suffix and instead use the nominative or locative** case's (-***shi)*** forms: *me var indoeti (I am India) or me var indoetshi (I am in India)* **instead** of the correct: *me var indoetidan (I am from India).*
2. **Misplacement** of suffixes -***eli and -uri/-uli:***
   Errors include using human-related suffixes for non-human nouns or vice versa, e.g.:*Amerikuli kata (an American cat) or kanaduri gogo (a Canadian girl) ungreli prophesori (a Hungarian professor) or rumineli koleji (a Romanian college).*
   In English, such distinctions are not morphologically expressed (e.g., Hungarian can refer to both a person and an object), which leads to interference.
3. **Incorrect affix combination**: Students sometimes combine the root of a place with the wrong suffix:
   Indoeteli, Ungreteli, Kakheteli (instead of indoeli, ungreli, kakheli)

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4. **Mixing up** the questions leads to incorrect answers:
   Where are you from? – I am Indian
   What is your origin? – I am from India
5. Difficulty in **memorizing and pronouncing suffixe**s, especially -el, -ur, -idan, etc. However, with frequent repetition and exposure to structured patterns and examples, these **challenges can be overcome**.

Sample Exercises (From a Large Set):

1. Chemi megobari ……. → amerikelia / amerikulia
   My friend is American.
2. …….ena dzalian dzvelia. → qartveli / qartuli
   Georgian language is very old.
3. Giorgi akhla ……. (saberdznetshi / berdznetshi) aris, ……... (berdznuli / berdzeni) kultura dzalian sainteresoa.
   Giorgi is now in Greece; Greek culture is interesting.
4. Zhorzhi saphrangetidanaa. is …… → phrangia / phrangelia / phrangulia.
   George is from France. He is French.
5. Sharlota aris …… (inglisidan/inglisi) da is ……. (ingliselia / inglisuria)
   Charlotte is from England, and she is English girl.

Sample Dialogue:

- gamarjoba!
- Hello!
- gamarjoba!
- Hello!
- Saidan khar?
- Where are you from?
- Me ukrainidan var, shen saidan khar?
- I am from Ukraine. Where are you?
- Me saberdznetidan var. shen sadauri khar?
- I am from Greece. What is your nationality?
- Me ukraineli var, shen?
- I am Ukrainian and you?
- Me saberdznetshi vtckhovrob, magram ar var berdzeni, poloneli var.
- I live in Greece, but I am not Greeke, I am Polish.

Sample Text:

Sharlota chemi megobaria. is tskhovrobs londonshi. Is ingliselia. is akhla saphrangetshia da parizis universitetshi sts'avlobs. misi mshobliuri ena inglisuria, magram man aseve itsis phranguli dzalian kargad. Mec vsts'avlob parizshi da vitsi phranguli da qartuli enebi. Qartuli chemi mshobliuri enaa. inglisuri ar vitsi kargad.

Charlotte is my friend. She lives in London. She is English.

Now she is in France, studying at the University of Paris.

Her native language is English, but she also knows French very well.

I am also studying in Paris. I know French and Georgian.

Georgian is my native language. I don't know English well.

Conclusion. The teaching of geographical and origin-based nouns in Georgian is not limited to grammatical form recognition. Rather, it facilitates deeper communicative functions — enabling students to adapt to new environments, engage in interpersonal

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communication, construct dialogues, and express their own identity.

According to modern pedagogical principles, grammar instruction should serve communicative goals. Therefore, the most effective approaches for teaching these noun forms include:

- Explicit explanation
- Question-and-answer activities
- Dialogue practice
- Comparative analysis
- Demonstration-based methods

These methods not only improve linguistic competence but also support intercultural awareness and learner autonomy – both essential components of successful second language acquisition.

References

1. Gabunia K. Kartuli enis sametkveło punkciebi (laparaki, mosmena). Part I. Tbilisi: Saimedo; 2012.
2. Gabunia K. Kartuli enis gramatikis zogadi kursi. Kartuli, rogorc meore ena. Stsavlebis programa "Irbakhi". Tbilisi; 2016:14-16.
3. Danelia N. *Basic Georgian*. 3rd ed. Tbilisi: Universali; 2020:113-119. ISBN: 978-9941-22-000-5.
4. Zekalashvili R. *Kartuli ena. Mokle praktikuli kursi*. Tbilisi: Logos; 2018:46-48. ISBN: 978-9941-468-45-2.
5. Topuria V. *Geograpiuli saxelta -ta sufiksisatvis kartulshi, saxelta bruneebis istoriisatvis kartvelur enebshi*. Vol I. Tbilisi; 1956:286.
6. Gabunia K. Kartuli enis sametkveło punkciebi (laparaki, mosmena). Part I. Tbilisi: Saimedo; 2012.
7. Gabunia K. Kartuli enis gramatikis zogadi kursi. Kartuli, rogorc meore ena. Stsavlebis programa "Irbakhi". Tbilisi; 2016:14-16
8. Gabunia K. Kartuli enis sametkveło punkciebi (laparaki, mosmena). Part I. Tbilisi: Saimedo; 2012.
9. Gabunia K. Kartuli enis gramatikis zogadi kursi. Kartuli, rogorc meore ena. Stsavlebis programa "Irbakhi". Tbilisi; 2016:14-16.
10. Danelia N. *Basic Georgian*. 3rd ed. Tbilisi: Universali; 2020:113-119. ISBN: 978-9941-22-000-5.
11. Zekalashvili R. *Kartuli ena. Mokle praktikuli kursi*. Tbilisi: Logos; 2018:46-48. ISBN: 978-9941-468-45-2.
12. Topuria V. *Geograpiuli saxelta -ta sufiksisatvis kartulshi, saxelta bruneebis istoriisatvis kartvelur enebshi*. Vol I. Tbilisi; 1956:286.
13. Gabunia K. Kartuli enis sametkveło punkciebi (laparaki, mosmena). Part I. Tbilisi: Saimedo; 2012.
14. Gabunia K. Kartuli enis gramatikis zogadi kursi. Kartuli, rogorc meore ena. Stsavlebis programa "Irbakhi". Tbilisi; 2016:14-16

DOI: 10.56580/GEOMEDI72

15. Gabunia K. Kartuli enis sametkveło punkciebi (laparaki, mosmena). Part I. Tbilisi: Saimedo; 2012.
16. Gabunia K. Kartuli enis gramatikis zogadi kursi. Kartuli, rogorc meore ena. Stsavlebis programa "Irbakhi". Tbilisi; 2016:14-16.
17. Danelia N. *Basic Georgian*. 3rd ed. Tbilisi: Universali; 2020:113-119. ISBN: 978-9941-22-000-5.
18. Zekalashvili R. *Kartuli ena. Mokle praktikuli kursi*. Tbilisi: Logos; 2018:46-48. ISBN: 978-9941-468-45-2.
19. Topuria V. *Geograpiuli saxelta -ta sufiksisatvis kartulshi, saxelta bruneebis istoriisatvis kartvelur enebshi*. Vol I. Tbilisi; 1956:286.
20. Kighuradze T, Kutateladze E. *Kartulis, rogorc ucnobi enis, stsavlebis metodika. Teoriuli kursi*. Tbilisi; 2013:44-52, 5-13. ISBN: 978-9941-0-6797-6.
21. Maghlakelidze N. *Kartulis, rogorc meore enis, stsavleba. Kartuli enis stsavlebis metodika*. Tbilisi: Meridiani; 2013:106-118. ISBN: 978-9941-10-732-0.
22. Teteloshvili T. *Kartuli ena ucnobel shemswavlelebistvis. Agmarti. A1. Shemswavlelis tsigni*. Tbilisi; 2013:8. Accessed October 17, 2025. www.geofl.ge.
23. Teteloshvili T. *Kartuli ena ucnobel shemswavlelebistvis. Agmarti. A1. Samushao rveuli*. Tbilisi; 2013:8. Accessed October 17, 2025. www.geofl.ge.
24. Shavtvaladze N. *Biliki. Tsigni I. Kari Mesame*. Tbilisi: Lega; 2006:31-41. ISBN: 99940-879-8-3.
25. Shanidze Ak. *Kartuli enis gramatikis sapudzvlebi*. 2nd ed. Tbilisi; 1973:114, 127, 136-139.
26. Sharashenidze N. *Midamo 1. Kartuli ena arakartulenovani studentebistvis*. Tbilisi: Grafema; 2015:78-79. ISBN: 978-9941-0-8070-8.
27. Jorbenadze B. *Kartuli enis morfologia. Programa-prospeqti*. Tbilisi; 1995:51-52.

გეოგრაფიული და წარმომავლობის სახელების სწავლების მნიშვნელოვანი ასპექტები მედიცინის ფაკულტეტის უცხოენოვან სტუდენტებთან

დაფინე სვანიძე

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აბსტრაქტი

ნაშრომი ეხება გეოგრაფიული და წარმომავლობის სახელების სწავლების თავისებურებებს და სწავლების პროცესს უნივერსიტეტ გეომედის მედიცინის

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ფაკულტეტის უცხოენოვანი სტუდენტებისათვის. ისინი სწავლობენ ქართულს, როგორც მეორე ენას. გეოგრაფიული და წარმომავლობის სახელი მნიშვნელოვან როლს ასრულებს როგორც ენობრივი, ისე ყოველდღიური ურთიერთობისას, რადგან ისინი გამოხატავენ ადამიანისა თუ საგნის კავშირს გეოგრაფიულ სივრცესთან. უცხოენოვანი სტუდენტებისათვის ამ ტიპის ლექსიკური ერთეულების სწავლა/გააზრება/სწავლება სირთულეებთან არის დაკავშირებული სიტყვაწარმოების წესების, აფიქსების მრავალფეროვნებისა თუ მნიშვნელობების გამო. ნაშრომში განხილულია ამ სახელების სტრუქტურული თავისებურებები, ტიპური შეცდომები და ეფექტური სწავლების სტრატეგიები. განსაკუთრებული ყურადღება ეთმობა ვიზუალური მასალისა და ინტერკულტურული ელემენტების გამოყენებას (კითხვა-პასუხები, საუბრები, დიალოგები, სავარჯიშოები), რაც ხელს უწყობს სტუდენტთა ენობრივი კომპეტენციის განვითარებას და მათი კულტურული ცნობიერების გაფართოებას.

საკვანძო სიტყვები: ქართული ენა, როგორც მეორე ენა უცხოენოვანი სტუდენტებისათვის, გეოგრაფიული და წარმომავლობის სახელები, აფიქსები, სწავლების სტრატეგიები.

შესავალი

თანამედროვე მსოფლიოში მეორე უცხო ენის სწავლების ერთ-ერთ მთავარ მიზანს წარმოადგენს ისეთი ენობრივი კომპეტენციის ჩამოყალებება, რომელიც საშუალებას მისცემს სტუდენტებს ეფექტურად იურთიერთონ მრავალფეროვან კულტურულ გარემოში.

სტატიაში განხილულია უნივერსიტეტ გეომედის მედიცინის ფაკულტეტის მეორე კურსის უცხოენოვან სტუდენტებთან ქართული ენის სწავლების საკითხი, რომელიც, ჩვენი აზრით, საჭიროა პრაქტიკული თვალსაზრისით.

ქართული ენის სწავლება ოთხნაწილიანია. სწავლების *პირველი სამი ნაწილი* მოიცავს გრამატიკულ საკითხებს და მისი მთავარი მიზანი ქართული ენის შესწავლაა საერთიერთო დონეზე (A1). ვას წავლით იმ სახელებს, ზმნებს, ფრაზებს, გრამატიკულ ფორმებს, რომლებიც აუცილებელია უცხოენოვანი სტუდენტების ყოველდღიური ცხოვრებისათვის. *მეოთხე ნაწილი* კი უშუალოდ სამედიცინო ფრაზებსა და კლინიკებში გამოსაყენებელ დიალოგებსა და საუბრებს ეთმობა.

ქართულ ენაში წარმომავლობის სახელები სხვადასხვა მნიშვნელობის გამოსახატავად სხვადასხვა სუფიქსების დართვას მოითხოვს, რაც ზოგჯერ დაბრკოლებას უქმნის უცხოენოვან სტუდენტებს სახელების სწავლებისას. შემსწავლელი ჯგუფებისთვის მნიშვნელოვანია არა მხოლოდ მსგავსი ტიპის სახელების დამახსოვრება, არამედ მათი სწორი გრამატიკული ფორმების გააზრება და სიტუაციური გამოყენება. ამიტომ აუცილებელია შესატყვისი

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საანალიზო მასალისა და ზუსტად შერჩეული სავარჯიშოების ჩვენება და მათზე მუშაობა.

ნაშრომის მიზანია, გააანალიზოს ის სირთულეები, რომლებსაც აწყდებიან უცხოენოვანი სტუდენტები სწავლებისას. ნაშრომში ყურადღება გამახვილებულია იმაზე, თუ როგორ უნდა მოხდეს გეოგრაფიული და წარმომავლობის სახელების სწორი და ეფექტური სწავლება, განხილულია ამ სახელების გრამატიკული სტრუქტურა, მათი სემანტიკური დატვირთვა, სწავლების პროცესში გამოყენებული მეთოდები, სირთულეები და პრაქტიკული რეკომენდაციები.

მეთოდოლოგია. სწავლების მიზნების მისაღწევად გამოყენებულია სამაგიდე კვლევის მეთოდი, კერძოდ, შესწავლილი და განხილულია სამეცნიერო ლიტერატურა და შემუშავებულია ნაშრომის თეორიული ჩარჩო. გარდა ამისა, გამოყენებულია ანალიზისა და აღწერის მეთოდები.

ძირითადი ნაწილი

გეოგრაფიული და წარმომავლობის სახელები სხვადასხვაგვარი აფიქსების დართვის შედეგად მიღებული სიტყვებია და ისინი სხვადასხვა ტიპისა და სხვადასხვა წარმოშობისაა.

გეოგრაფიული სახელი აღნიშნავს კონკრეტულ გეოგრაფიულ ადგილს. ის იწარმოება ***-ეთ, -ის, -ა, -ია*** სუფიქსებით, ***სა-ო, სა-ეთ*** პრეფიქს-სუფიქსებით: ფინეთი, დმანისი, ლიტვა, იტალია, საფრანგეთი....

-ეთ სუფიქსი არის ყველაზე **გავრცელებული სუფიქსი,** იგი ერთვის ქვეყნის, ტომის, მდინარის, მხარის და ა.შ. სახელის ფუძეს და ამ გზით კეთდება გეოგრაფიული სახელი. როგორიცაა: სვანეთი, კახეთი, სომხეთი, რუმინეთი, დასავლეთი....

ვ. თოფურია წერს, რომ გეოგრაფიული სახელების ,,მეტი წილი წარმოშობილია ან კომპოზიტურად ან პრეფიქს-სუფიქსებით. ***-ეთ*** და ***-თა*** სუფიქსებს მეცნიერი ფონეტიკურად ახლოს მდგომ სუფიქსებად განიხილავს და მოჰყავს *ნიკო მარის* მოსაზრება, რომელსაც ***-ეთ*** სუფიქსი მრავლობითობისა და ადგილის სახელწოდებათა დაბოლოებად მიაჩნია. (5. 286)

აკ. შანიძესაც ***-ეთ*** სუფიქსი გეოგრაფიული სახელების ძირითად მაწარმოებლად მიაჩნია და წერს, რომ ზოგ გეოგრაფიულ სახელს საფუძვლად უდევს მცენარის, ცხოველის, ფრინველის, მინერალის აღმნიშვნელი სახელი, ასევე მრავლადაა გვარებისგან ნაწარმოები გეოგრაფიული სახელები, რასაც ,,ხშირად ვხვდებით კახეთის, ფშავის, ხევსურეთის სოფლებში - კაიშაურნი, მაჩხაანი, ვაჩნაძიანი, გოგოლაურთა“. (11. 136).

-ის დაბოლოების მქონე გეოგრაფიული სახელები ხშირ შემთხვევებში ***ნაგენეტივარი სახელებია,*** ფუძეს დაკარგული აქვს გენეტივის (ნათესაობითის) გაგება. *აკ. შანიძის* აზრით, **,,ამ ტიპის სახელები,** ახალი ქართულის თვალსაზრისით, გადმონაშთია, -ის დაბოლოება წარმოქმნის აფიქსებად ვერ ჩაითლება, აქ საქმე გვაქვს ***ბრუნვის ფორმის მნიშვნელობის შეცვლასთან და არა წარმოქმნასთან“.*** (11. 114). მსგავსი ნაგენეტივარი ***-ის***

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სუფიქსიანი გეოგრაფიული სახელებიც მრავლადაა ენაში: მანგლისი, ქუთაისი, ინგლისი, ურბნისი, თბილისი, დმანისი...

გ. ჯორბენაძე ***-ის*** სუფიქსიან სახელებს ***„ნაგენეტივარ სუბსტანტივებს“*** (შინდისი) უწოდებს, ხოლო ***-ეთ*** სუფიქსს - ***„მალოკალიზებელ ფორმანტს“*** (რუსეთი). (13. 51-52).

წარმომავლობის სახელი კი მიუთითებს კონკრეტული პირის ან საგნის გეოგრაფიულ, ეთნიკურ ან კულტურულ წარმომავლობაზე - ქართველი, ქუთაისური, მეგრული.... წარმომავლობას ყველაზე აქტიურად ***-ელ, -ურ/ულ*** სუფიქსები გამოხატავენ.

-ელ სუფიქსიანი სახელები **ადამიანის სადაურობას** (11.127) გამოხატავს. აკ. *შანიძე* წერს გრამატიკის საფუძვლებში, რომ -ის და -ეთ სუფიქსის ნაცვლად ძველად იხმარეობდა -ელ სუფიქსიანი სახელები, რაც -ელ სუფიქსის სიძველეზე მიუთითებს. „შინდისსა და წავკისში მაცხოვრებლები ამბობენ, რომ ისინი არიან წავკელები და შინდელები“, ასეთივეა დუშეთი - დუშელი, ტბეთი - ტბელი, (11. 127), თუმცა დღეს აღარ ხდება -ის და -ეთ სუფიქსების მოკვეცა და შეიძლება ითქვას, ორივე სუფიქსი ჩვეულებრივ იხმარება: მანგლისელი, ქუთაისელი, წავკისელი, თბილისელი, დუშეთელი, ტბეთელი....

-ურ/-ულ სუფიქსები აღნიშნავს **არაადამიანის სადაურობას (11.127)** (იმერული, ქართლური, დასავლური, ესპანური, ისლანდიური) და ამ ტიპის სახელი ყოველთვის **უსულო საგანს უკავშირდება:** იმერული სახლი, ქართლური დიალექტი, დასავლური კულტურა, ესპანური ფლამენგო, ისლანდიური ლუდი და მსგავსი.

უცხოენოვანი სტუდენტები დასაწყისშივე ეცნობიან ძირითად აფიქსებს შესაბამისი მაგალითებით წარმოდგენილი ცხრილებისა და ტაბულების მეშვეობით.

გეოგრაფიული სახელები:

სა-ო - საქართველო, სამაჩაბლო..

-ეთ - ინდოეთი, ბულგარეთი, რუმინეთი, პოლონეთი, კახეთი...

-ია - იტალია, ნორვეგია, ბრაზილია, ირლანდია, იაპონია...

სა-ეთ - საფრანგეთი, საბერძნეთი...

-ის - ინგლისი თბილისი, ბოლნისი, დმანისი...

წარმომავლობის სახელები:

-ელ სუფიქსით ნაწარმოები სახელები ეროვნების მაჩვენებელია: უკრაინელი/ჰოლანდიელი/კახელი/იმერელი/ვიეტნამელი/პაკისტანელი/ნეპალელი და სხვა ბევრი.....

-ელ სუფიქსიანი სახელები მხოლოდ ადამიანს უკავშირდება და ***ადამიანთა წარმომავლობასა და სადაურობაზე მიანიშნებს:*** დანიელი პროფესორი, გერმანელი იურისტი, ესპანელი ჟურნალისტი, კანადელი მასწავლებელი.....

ქართულში დაიძებნება ისეთი სახელები, რომლებიც წარმომავლობას - ***ელ*** სუფიქსის ***გარეშე*** გამოხატავენ, ამ ტიპის სახელები ***გამონაკლისებია*** და მათ დამახსოვრებასა და გააზრებას მრავალფეროვანი სავარჯიშო მასალა და საკმაო მუშაობა სჭირდება, გამონაკლისი (***-ელ*** სუფიქსის გარეშე) ფორმების სწავლებისას ***შედარებითი მეთოდი*** შედეგიანია. სტუდენტებს ეძლევათ რამდენიმე მცირე მოცულობის ტექსტი, ხდება სუფიქსიანი

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და უსიფიქსო ფორმების ამორჩევა და მათზე მსჯელობა. პრაქტიკამ აჩვენა, რომ ამგვარი დამოუკიდებელი და მსჯელობითი მუშაობა (რა ტიპის სახელია, რომელი სუფიქსია, რას გამოხატავს, შესატყვისი მაგალითების დასახელება) სტუდენტებისათვის საინტერესოა, რადგან ისინი აზროვნებენ, მსჯელობენ, ასრულებენ დავალებებს და აკეთებენ დასკვნებს დამოუკიდებლად.

-ელ სუფიქსიანი	*-ელ სუფიქსის გარეშე*
დანიელი	სლოვაკი
ესპანელი	თურქი
ბრაზილიელი	ფრანგი
კოლუმბიელი	ბერძენი
ნორვეგიელი	მონღოლი
ჩინელი	შვედი
იაპონელი	ხორვატი
პორტუგალიელი	ტაჯიკი
ირლანდიელი	სერბი
ისლანდიელი	ბელორუსი
ერაყელი	ყირგიზი
ლიბანელი	უზბეკი

და სხვა.

-ულ//-ურ *სუფიქსები* ***არაადამიანთა სადაურობას*** *აღნიშნავს. (11. 127)*

იტალიური ღვინო //გერმანული ლუდი...

ინდური ცეკვა//ქართული საჭმელი...

აფრიკული ლომი//ინგლისური ძაღლი...

-ურ//-ულ სუფიქსების გამოყენება ***სხვადასხვა პოზიციებში*** ხდება, ჩვენი აზრით, ამის მინიშნება საჭირო არ არის, ეს კიდევ უფრო გაართულებს შესასწავლ მასალას.

განსაკუთრებით საყურადღებოა **საიდან ხარ//სადაური ხარ?** შეკითხვები. **პირველი** შეკითხვა მოითხოვს ქვეყნის დასახელებას (***-იდან//-დან*** სუფიქსიან სახელებს), **მეორე** - ეროვნების დასახელებას (***-ელ*** სუფიქსიანი სახელები):

საიდან ხარ? - მე ვარ ინდოეთ**იდან**/გერმანი**იდან**/მონაკო**დან**.... (**ქვეყანა**)

სადაური ხარ? - მე ვარ ინდო**ელი**/სერბი/მონაკო**ელი**/გერმან**ელი** .... (**ეროვნება**)

სირთულეები (ტიპური შეცდომები):

1. ***-იდან//-დან*** სუფიქსიანი ფორმების ნაცვლად მხოლოდ სახელობითი ან -ში თანდებულიანი ფორმები ვლინდება: მე ვარ *ინდოეთი* ან მე ვარ *ინდოეთში* **მე ვარ ინდოეთიდან** ნაცვლად;
2. ***-ელ და -ურ/-ულ*** სუფიქსების ***არასწორ პოზიციებში*** გამოყენება: *ამერიკელი კატა ან კანადური გოგო, უნგრული პროფესორი ან რუმინელი კოლეჯი.* ინგლისურში ამ მხრივ განსხვავება არ არის. (American cat – American girl ან Hungarian professor – Hungarian college);
3. გეოგრაფიული და წარმომავლობის სუფიქსების ***ერთად მოხმარება:*** მე *ვარ ინდოეთელი/ მე ვარ უნგრეთელი/მე ვარ კახეთელი...*
4. ***შეკითხვების არევა პასუხების არევასაც იწვევს:*** *საიდან ხარ? - მე ვარ ინდოელი ან სადაური ხარ? - მე ვარ ინდოეთიდან... ;*
5. სუფიქსების დამახსოვრება და მათი წარმოთქმა ***სერიოზულ სირთულეებს ქმნის,*** თუმცა ხშირი გამეორებით და შესატყვისი ნიმუშების ჩვენებით ამ ***დაბრკოლების დაძლევა შესაძლებელია.***

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მცირედი **საანალიზო/სამუშაო მასალა** უამრავიდან:

1. ჩემი მეგობარი .... (ამერიკელია/ამერიკულია).
2. .....ენა ძალიან ძველია. (ქართველი/ქართული).
3. გიორგი ახლა ..... (საბერძნეთში/ბერძნეთში) არის, ... (ბერძნული/ბერძენი) კულტურა ძალიან საინტერესოა.
4. ჟორჟი საფრანგეთიდანაა, ის ..... (ფრანგელია/ ფრანგულია/ფრანგია).
5. შარლოტა .... (ინგლისია/ინგლისიდანაა) და ის ..... (ინგლისელია/ინგლისურია).

დიალოგი:

- გამარჯობა!
- გამარჯობა!
- საიდან ხარ?
- მე უკრაინიდან ვარ. შენ საიდან ხარ?
- მე საბერძნეთიდან ვარ. შენ სადაური ხარ?
- მე უკრაინელი ვარ. შენ?
- მე ვცხოვრობ საბერძნეთში, მაგრამ არ ვარ ბერძენი, პოლონელი ვარ.

ტექსტი:

შარლოტა ჩემი მეგობარია. ის ცხოვრობს ლონდონში. ის ინგლისელია. ის ახლა საფრანგეთშია და პარიზის უნივერსიტეტში სწავლობს. მისი მშობლიური ენა ინგლისურია, მაგრამ მან ასევე იცის ფრანგული ძალიან კარგად. მეც ვსწავლობ პარიზში და ვიცი ფრანგული და ქართული ენები. ქართული ჩემი მშობლიური ენაა. ინგლისური არ ვიცი კარგად.

დასკვნა

გეოგრაფიული და წარმომავლობის სახელების სწავლება მხოლოდ გრამატიკული ფორმების გაცნობას არ გულისხმობს, მათი შესწავლით სტუდენტებს შეეძლებათ უცხო გარემოსთან ადაპტირება, უცხო ადამიანებთან კომუნიკაცია და დიალოგების აგება, საკუთარი იდენტობის წარმოჩენა. თანამედროვე მეთოდიკის მიხედვით, გრამატიკის საკითხების სწავლება საკომუნიკაციო მიზნებს უნდა ემსახურებოდეს, ამიტომ ყველაზე ეფექტური გეოგრაფიული და წარმომავლობის სახელების სწავლებისას არის საუბრის, კითხვა-პასუხის, დემონსტრირების, ახსნა-განმარტებითი და შედარებითი მეთოდები.

გამოყენებული ლიტერატურა:

1. გაბუნია კ. ქართული ენის სამეტყველო ფუნქციები (ლაპარაკი, მოსმენა). I ნაწილი. საკითხავი. გამომცემლობა ,,საიმედო“. თბილისი, 2012.
2. გაბუნია კ. ქართლი ენის გრამატიკის ზოგადი კურსი. ქართული, როგორც მეორე ენა. სწავლების პროგრამა

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,,ირბახი“. თბილისი, 2016; (2.1.3.2//2.1.3.3): 14-16.

3. Danelia N. Basic Georgian. Third Edition. Publishing House Universali”. Tbilisi, 2020: 113-119. ISBN 978-9941-22-000-5.
4. ზექალაშვილი რ. ქართული ენა. მოკლე პრაქტიკული კურსი. ლოგოსი. თბილისი, 2018: 46-48. ISBN 978-9941-468-45-2.
5. თოფურია ვ. გეოგრაფიულ სახელთა სუფიქსისათვის ქართულში, სახელთა ბრუნების ისტორიისათვის ქართველურ ენებში, I, თბილისი, 1956: 286.
6. კიღურაძე თ., ქუთათელაძე ე. ქართულის, როგორც უცხო ენის, სწავლების მეთოდიკა. თეორიული კურსი. თბილისი, 2013: 6 (44-52), 1 (5-13). ISBN 978-9941-0-6797-6.
7. მაღლკელიძე ნ. ქართულის, როგორც მეორე ენის, სწავლება. ქართული ენის სწავლების მეთოდიკა. მერიდიანი, თბილისი, 2013: XI (231), IV.3.4. (106-118). ISBN 978-9941-10-732-0.
8. ტეტელოშვილი თ. ქართული ენა უცხოელი შემსწავლელებისათვის. აღმართი. A 1. შემსწავლელის წიგნი. სწავლების პროგრამა ,,ირბახი“. თბილისი, 2013: 8. www.geofl.ge
9. ტეტელოშვილი თ. ქართული ენა უცხოელი შემსწავლელებისათვის. აღმსრთი. A1. სამუშაო რვეული. სწავლების პროგრამა ,,ირბახი“. თბილისი, 2013: 8. www.geofl.ge
10. შავთვალაძე ნ. ბილიკი. წიგნი I. კარი მესამე. გამომცემლობა ,,ლეგა“, თბილისი, 2006: 31-41. ISBN 99940-879-8-3.
11. შანიძე აკ. ქართული ენის გრამატიკის საფუძვლები. მეორე გამოცემა, თბილისი, 1973: 114, 127, 136, 136-139.
12. შარაშენიძე ნ. მიდამო 1. ქართული ენა არაქართულენოვანი სტუდენტებისათვის. გამომცემლობა ,,გრაფემა“, თბილისი, 2015: 78-79. ISBN 978-9941-0-8070-8.
13. ჯორბენაძე ბ. ქართული ენის მორფოლოგია. პროგრამა-პროსპექტი. თბილისი, 1995: 51-52.

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უნივერსიტეტი გეომედი ულოცავს ზაზა კაპანაძეს 80 წლის იუბილეს

ბატონმა ზაზა 1962 წელს დაამთავრა ქუთაისის მე-4 საშუალო სკოლა. სავალდებულო სამხედრო სამსახურიდან დაბრუნების შემდეგ, 1972 წელს ჩაირიცხა ქ. თბილისის სახელმწიფო სამედიცინო ინსტიტუტის სამკურნალო ფაკულტეტზე, რომელიც წარჩინებით დაამთავრა 1978 წელს. 1978-1979 წლებში ასევე წარჩინებით, წითელ დიპლომზე დაასრულა ინტერნატურა ზოგად ქირურგიაში, ქ. თბილისის N1 საავადმყოფოს ზოგადი ქირურგიის კათედრაზე, პროფესორ ა. კუტუბიძის ხელმძღვანელობით და მიენიჭა ზოგადი ქირურგის მე-3 ხარისხი.

ინსტიტუტის დამთავრების შემდეგ, მუშაობას იწყებს უკრაინაში, ჟიტომირის ოლქის ქ. კოროსტენის საავადმყოფოში ონკოქირურგის თანამდებობაზე. ქირურგიულ ოპერაციებთან ერთად, აკეთებს საშვილოსნოს გარე ორსულობის და საკვერცხის კისტის გინეკოლოგიურ ოპერაციებს. შესაბამისი კვალიფიკაცია მიიღო სათანადო პრაქტიკის მიღების შემდეგ და აგრძელებს მოღვაწეობას ქ. კიევში, მეორე სამეანო-გინეკოლოგიური საკვლევი ინსტიტუტის ბაზაზე აკადემიკოს ა. დავიდენკოს ხელმძღვანელობით და ღებულობს მეანობა-გინეკოლოგის კვალიფიკაციას.

1984 წლის 1-ლი სექტემბრიდან მუშაობას იწყებს გარდაბანის სამშობიარო საავადმყოფოში მეან-გინეკოლოგად. სამეანო სამსახურთან ერთად, ნერგავს გინეკოლოგიური, როგორც დაავადებების, ასევე, საჭირო ოპერაციული ჩარევების პრაქტიკას.

1992 წელს დაინიშნა სამშობიაროს მთავარ ექიმად და დაიწყო დაუღალავი ზრუნვა არსებული პირობების გაუმჯობესებაზე.

2021 წლიდან დღემდე მუშაობს უნივერსიტეტ გეომედში, სადაც ეწევა როგოც თავის პროფესიულ საექიმო საქმიანობას, ასევე აქტიურ პედაგოგიურ მუშაობას.

University Geomedi congratulates Zaza Kapanadze on his 80th anniversary

Mr. Zaza graduated from Kutaisi Secondary School No. 4 in 1962. After returning from compulsory military service, in 1972 he enrolled in the Faculty of Medicine of the Tbilisi State Medical Institute, which he graduated with honors in 1978. In 1978-1979, he also completed his internship in general surgery with honors, with a red diploma, at the Department of General Surgery of Tbilisi Hospital No. 1, under the guidance of Professor A. Kutubidze, and was awarded the 3rd degree of general surgeon.

After graduating from the institute, he began working in Ukraine, in the Korosten Hospital of the Zhytomyr Region, as an oncologist. Along with surgical operations, he performs gynecological

operations for ectopic pregnancy and ovarian cysts. He received the relevant qualification after receiving the appropriate practice and continues to work in Kiev, on the basis of the Second Obstetrics and Gynecology Research Institute under the leadership of Academician A. Davydenko and receives the qualification of an obstetrician-gynecologist.

Since September 1, 1984, he has been working as an obstetrician-gynecologist at the Gardabani Maternity Hospital. Together with the obstetrics department, he introduces the practice of gynecological diseases, as well as necessary surgical interventions.

In 1992, he was appointed the chief physician of the maternity hospital and began to tirelessly care for the improvement of existing conditions.

Since 2021, he has been working at the Geomed University, where he is engaged in both his professional medical activities and active pedagogical work.

უნივერსიტეტ გეომედის მულტიპროფილური საუნივერსიტეტო კლინიკა

ავტორთა საყურადღებოდ!

1. ნაშრომი შესაძლებელია წარმოდგენილი იყოს როგორც ქართულ ენაზე (სრული ინგლისური თარგმანით), ასევე ინგლისურ ენაზე (ქართულ რეზიუმეს რედაქცია უზრუნველყოფს), ელექტრონული სახით, მეცნიერების შესაბამისი დარგის სპეციალისტის რეცენზიასა და ანტიპლაგიატის პროგრამაში შემოწმების პასუხთან ერთად. ჟურნალში გამოქვეყნებული სტატიის ავტორი ან ავტორთა ჯგუფის ხელმძღვანელი (corresponding author) შეიძლება იყოს მეცნიერების დოქტორი ან დოქტორანტი.
2. ნაშრომში დაცული უნდა იყოს შემდეგი თანმიმდევრობა:
ა) ნაშრომის სათაური, ავტორ(ებ)ის გვარი და სახელის ინიციალი, მონაცემები ავტორ(ებ)ზე - ქვეყანა, საფოსტო ინდექსი, სამუშაო ადგილი, ელექტრონული ფოსტა.
ბ) გამოყოფილი - აბსტრაქტი, საკვანძო სიტყვები (არაუმეტეს 300 სიტყვა).
გ) ტექსტი: შესავალი, მასალები და მეთოდები, მიღებული შედეგების განხილვა, დასკვნები, გამოყენებული ლიტერატურა. ფოტომასალა (JPG, TIFF ფორმატში - მინიმუმი რეზოლუციით 300 DPI), ცხრილები, სურათები, ნახაზები, გრაფიკები, სქემები და დიაგრამები - დასათაურებული და დანომრილი ; ფორმულები უნდა აღინიშნოს Microsoft Equation - ში.
3. ნაშრომის მოცულობა არ უნდა აღემატებოდეს 10 გვერდს, აბსტრაქტისა და გამოყენებული ლიტერატურის ჩათვლით.
4. ნაშრომი უნდა შესრულდეს Microsoft Word-ში Sylfaen შრიფტით.
5. ფურცლის ზომა A4, ველები: ზედა-2.0 სმ, ქვედა-2.0 სმ, მარცხენ -2.0 სმ, მარჯვენა-2.0 სმ; შრიფტის ზომა -12, ინტერვალი -1,15.
6. სამეცნიერო ნაშრომში დამოწმებული წყაროებისა და ლიტერატურის მითითების წესი: Chicago Manual of Style's "Author-Date": https://www.chicagomanualofstyle.org/tools citationguide/citation- guide-2.html. გამოყენებული ლიტერატურის სია უნდა მოიცეს ანბანური თანმიმდევრობით, მათ შორის ყოველი ავტორი აღინიშნოს გვარითა და სახელით, გვარის მძიმით გამოყოფით სახელისგან, რომლის შემდგომ აღინიშნება შრომის დასახელება და წიგნისა ან ჟურნალის სტატიის რეკვიზიტები. მაგალითად: Keng, Shao-Hsun, Chun-Hung Lin, and Peter F. Orazem. 2017. "Expanding College Access in Taiwan, 1978–2014: Effects on Graduate Quality and Income Inequality." Journal of Human Capital 11, no. 1 (Spring): 1–34. https://doi.org/10.1086/690235. შესაბამისად, ციტატები ტექსტში უნდა აღინიშნოს, როგორც (Keng, Lin, and Orazem 2017, 9–10).
7. სამეცნიერო ნაშრომი მიიღება ელექტრონულ ფოსტაზე journal@geomedi.edu.ge და ექვემდებარება სავალდებულო რეცენზირებას (peer review). თითოეული მიმართულებისათვის სარედაქციო კოლეგია არჩევს მინიმუმ ორ სპეციალისტს.
8. ნაშრომის გამოქვეყნების ან უარის შესახებ გადაწყვეტილება, ავტორს ეცნობება ნაშრომის წარდგენიდან არაუგვიანეს 5 სამუშაო დღის განმავლობაში.
9. ნაშრომში გამოქვეყნებულ მასალაზე პასუხისმგებელია ავტორი.
10. გამოქვეყნებულ ნაშრომზე ყველა ავტორს გადაეცემა შესაბამისი სერტიფიკატი.
11. ნაშრომის გამოქვეყნების საფასური 50 ლ-ია, სხვა ქვეყნის მოქალაქეებისათის - 50 აშშ დოლარის ექვივალენტი ლარი. ქართველი და სხვა ქვეყნის ავტორების ერთობლივი ნაშრ მის შემთხვევაში კი - 50 ლარი. უნივერსიტეტი აფილირებული აკადემიური პერსონალის სტატიების განსახილველად მიღება უფასოა. პუბლიკაციასთან დაკავშირებული ხარჯებს აფინანსებს უნივერსიტეტი.
12. უნივერსიტეტი იტოვებს უფლებას პლაგიატის აღმოჩენის შემთხვევაში იმოქმედოს უნივერსიტეტის „პლაგიატის აღმოჩენისა და რეაგირების წესის" შესაბამისად.

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