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Physical Activity, Rational Nutrition and Health Education in the University Environment Aimed at Preventing Russian Male Students' Overweight/Obesity (Mini-review)

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Abstract. Overweight and obesity risk is recognized as a global threat to human population. Full success in the obesity combat depends on the professionals combined efforts in the field of health, medicine and education. The aim of this study – search and analysis of significant studies by Russian investigators on effective counteraction to overweight/obesity risk in Russian male students.

The search for scientific data was conducted in the international scientific data bases: Web of Science, SCOPUS, PubMed, Google Scholar, eLIBRARY. The summary, review and analysis of scientific data were carried out in accordance with the recommendations of the implementation of the systematic review and meta-analysis protocols (PRISMA-P).

64 studies were found. All studies can be divided into 4 collections: assessment of morphological and somatic profile of male students (23 studies); various physical education strategies and methods for correcting body mass of students' (19 studies); health educational

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courses (15 studies); assessing the relationship of everyday diet and physical training with the BMI dynamics of male students (7 studies).

A studies review shows the positive impact of using health education courses and individual physical education in reducing of BMI in Russian overweight male students. Some lack of scientific knowledge on counteracting the obesity risks in male students recently (2016–2021) has been identified. Most health educational courses and physical education strategies are privately implemented without national government or grant support. Professionals expressed a unanimous opinion on the need to reducing the calorie content of daily nutrition (per 1000 kcal) and increasing of Russian male students' daily physical activity (by 30–40 minutes).

Key words: male students, BMI, physical activity, nutrition, health educational courses, studies.

Research area: theory and methodology of physical education, sports training, health improving and adaptive physical culture; public health and healthcare.

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Физическая активность, рациональное питание и оздоровительное просвещение в университетской среде, направленные на профилактику избыточного веса/ожирения у мужчин – студентов российских вузов (мини-обзор)

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Аннотация. Риск избыточного веса и ожирения признан глобальной угрозой для человечества. Окончательный успех в борьбе с ожирением зависит от объединения усилий профессионалов в области здравоохранения, медицины и образования. Цель исследования – поиск и анализ значимых методик российских ученых по эффективному противодействию риску избыточного веса/ожирения у мужчин – студентов российских вузов.

Поиск научных данных выполнен в базах: Web of Science, SCOPUS, PubMed, Google Scholar, eLIBRARY. Резюме, обзор и анализ научных данных подготовлены в соответствии с рекомендациями по использованию протоколов систематического обзора и метаанализа (PRISMA-P).

Обнаружено 64 исследования. Все исследования можно разделить на 4 коллекции: оценка морфологического и соматического профиля студентов мужского пола (23 исследования); различные стратегии физического воспитания и методы коррекции массы тела студентов (19 исследований); курсы оздоровительного просвещения (15 исследований); оценка взаимосвязи ежедневного питания и физической подготовки с динамикой ИМТ студентов (7 исследований).

Обзор показывает положительное влияние использования курсов оздоровительного просвещения и индивидуального физического воспитания на снижение ИМТ у российских мужчин-студентов с избыточным весом. В исследуемый период (2016–2021 годы) был выявлен некоторый недостаток научных знаний о противодействии рискам ожирения у студентов-мужчин. Большинство курсов оздоровительного просвещения и стратегий физического воспитания осуществляются в частном порядке без поддержки правительственных программ или грантов. Специалисты высказали

единодушное мнение о необходимости снижения калорийности ежедневного питания (на 1000 ккал) и увеличения ежедневной физической активности российских студентов (на 30–40 минут).

Ключевые слова: мужчины-студенты, ИМТ, физическая активность, питание, оздоровительное просвещение, научные исследования.

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Introduction

Overweight and obesity is related to broad range of internal conditions, including hypertension, heart disease, diabetes and reduced musculoskeletal mobility (Kim & Kim, 2019). Physicians and health professionals state, that the prevalence of overweight and obesity is increasingly evident in both richer and poorer countries. Because of the established health risks and substantial increases in prevalence, obesity has become a global health challenge (Ng et al., 2013). Investigators agree that the main risk factors for obesity in modern students are: irrational (excess calorie) nutrition (Podrigalo et al., 2019), and lack of daily physical activity (PA) needful level (Uchoa et al., 2019). It has been revealed that the actual nutrition of undergraduate students during the process of socio-psychological adaptation to the educational process does not meet the requirements of healthy nutrition, does not satisfy the physiological needs of the body for food and biologically active substances (Zhamsaranova et al., 2019). Scientists indicate the need for an intervention that will effectively increase regular PA and ensure proper food intake in the student population (Acampado & Valenzuela, 2018). Professionals point out that combining PA with calorie restriction can significantly reduce the risk of obesity (Leskova et al., 2019).

Research findings show that male students are more at obesity risk than female students (Osipov et al., 2018). Peltzer et al. indicate that the number of students who are overweight or

obese is generally about 25 % in men and about 19 % in women (Peltzer et al., 2014). Russian investigators recent data show that overweight and obesity are characteristic of most male students. Female students by a lack of normal BMI are characterized. The most significant deviations from normal BMI indicators were identified in senior courses (Gansburgskiy, 2019). A similar increase in BMI indicates a low level of quality of educational programs in the field of student health. Varriale et al. point to the need to implemented educational strategies at universities that increase the level of motor and dietary literacy among students. Proper education and training of students may have a positive impact on preventing physical inactivity and poor diet phenomena (Varriale et al., 2019).

Alomari et al. emphasize the importance of physical fitness in improving brain activity and reducing the risk of obesity in young people (Alomari et al., 2020). Bioimpedance analysis showed that physically active students have a lower percentage of adipose tissue (Ochoa-Martinez et al., 2018). Is known, that the overall amount of PA carried out by university students is low (Romero-Blanco et al., 2020). Investigators state that in Russian university students, sitting time can exceed 6–9 hour a day (Kudryavtsev et al., 2016). Direct dependence between the decrease in the level of physical fitness and increase in body weight of male and female students is defined (Kolokol'tsev & Iermakov, 2019). Russian investigators indicate that weekly level of PA of significant

part in male students does not meet the health recommendations – at least 6.000 minutes per week or more (Loginov et al., 2021; Osipov et al., 2020). Kabachkova state that weekly level of PA in one of three sampled individuals' being under the health minimum, irrespective of the academic year, schedule and intensity PA (Kabachkova, 2019). Is known, that the lack of regular PA has a significant impact on the predisposition to obesity in a significant part of Russian males – carriers of certain genotypes (Bondareva et al., 2019).

Investigators point out that is no significant national success in countering the increasing of obesity in modern youth (Ng et al., 2013). Kastrati & Georgiev emphasize the importance of the preparation of a national plan and programme to promote regular PA to help young people change unhealthy lifestyle habits and increase PA, thereby to improve their health (Kastrati & Georgiev, 2020). Sánchez Castillo et al. recommended implementing PA programs to improve body image and body composition of modern adolescents (Sánchez Castillo et al., 2019). Yarmak et al. indicate the need to create an optimal (at least 6 hours per week) motor activity regime of university male students. Professionals confirm that the motor activity regime serves as an obligatory condition of supporting the normal functioning of all the physical condition components (Yarmak et al., 2018). Russian investigators state to the need to improve the process of physical education (PE) in various educational institutions: secondary schools, institutes and universities. Particularly relevant is the search for new non-traditional forms of PA for the younger generation (Shutova et al., 2020; Nagovitsyn, Tutolmin et al., 2019).

A literature review identified the concern of health professionals and educational scientists about the development of obesity among university students and the lack of national health education programs to prevent the risk of overweight and obesity. The aim of this study – search and analysis of Russian health/educational professionals' recent studies results on effective counteraction to the overweight/obesity risk in Russian male students. We evaluated the research papers on the possible success of the fight against overweight/obesity in

male students by means of health educational courses and physical education in universities.

Material & methods

The search for scientific data was conducted in the international scientific information bases: Web of Science (SCIE, SSCI, ESCI and RSCI), SCOPUS, PubMed, Google Scholar, eLIBRARY (Russian national scientific database). Scientific search included special terms: obesity prevention, body mass, male students, physical health, student's BMI, body mass correction, health educational strategies. For the summary composition, the authors sought systematic reviews of practical intervention studies whose strategies were developed in the university environment, aiming at preventing and/or reducing overweight/obesity in male students. Additionally, manual search for cross-references were performed. The search for scientific information is limited to the period from 2016 to 2021.

The summary, review and analysis of scientific data were carried out in accordance with the recommendations of the implementation of the systematic review and meta-analysis protocols (PRISMA-P). Limiting criteria for including scientific evidence in the review: the presence of a topical problem and the achievement of the aim of research, a significant sample of the studied male students (the presence of a control and experimental group), a sufficient period of research (at least 6 months), tests and measurements availability and correct statistical data analysis. A mandatory criterion for the selection of scientific data from eLIBRARY database is the publication of study findings in scientific journals approved by the Higher Attestation Commission of the Ministry of Science and Education of the Russian Federation. Data from the studies were extracted by four investigators. Extracted scientific data included: authors, year of publication, participant data, theory used, study design, outcomes, intervention dosage and duration, strategies utilized, and follow-up rates.

Results

The search criteria matched is 64 studies by Russian investigators. All data are published

findings of studies involving male students who are overweight or obese. The total number of studied individuals (male students) was more than 9 thousand people (n=9245). The number of overweight or obese students – 2126 (23 %). Most of studies (Study Collection-1) are an assessment of morphological and somatic profile of male students using various methods: BMI, determination of lipid profile, bioimpedance analysis. A significant part of published studies (Study Collection-2) are strategies and methods for correcting body mass of students' by means of health physical training (self training and PE classes). Part of studies (Study Collection-3) contains data on the need for correction of students' educational programs of higher education in the field of saving health and PE of a person. Remaining studies (Study Collection-4) contain the results of assessing the relationship of everyday diet and physical training with the BMI dynamics of male students. This distribution is somewhat arbitrary, since some studies can be attributed to several subjects at once.

Studies of the morphological and somatic profile of male students show the predominance of abdominal obesity (from 4 to 9 % of individuals) over visceral (from 1 to 2 % of individu-

als). Overweight in 17 % of male students (from 10 to 31 % of individuals according to various Russian investigators) was found. Russian scientists agree on a significant correction in students' body mass. Various forms of PE classes changing to increase total amount aerobic fitness and motor exercises are offered. A significant positive effect of correction of BMI for male students using health-saving educational courses in higher education was revealed. The possibility of significant correction of BMI and weight loss of male students by reducing daily caloric intake (800–1000 kcal) and increasing daily PA (30–40 minutes of aerobic fitness activity) was identified. Main conclusions of Russian health/educational professionals on the research topics outlined in Table 1.

Discussion

Physicians and health/educational professionals consider obesity a global threat today. The scientific databases present a significant amount on this issue research (Peltzer et al., 2014). This mini-review was based on data from 64 scientific studies developed at the university environment aimed to prevent and/or reduce overweight/obesity in Russian male students. We found a some lack of Russian

Table 1. Highlights of studies included in the mini-review.

| Topic studies | Research period | Number of male students | Outcomes |
|--|-----------------|-------------------------|---|
| Assessment of somatic and morphological profile (*SC-1=23 studies) | 0.5–6 years | 5422 | Total number of overweight and obese students reaches 23 % of individuals. Prevalence of abdominal obesity over visceral. |
| Students' body mass correcting (*SC-2=19 studies) | 0.5–3 years | 1813 | Individualization of PE classes. More aerobic fitness training. Increase overall mobility of male students. |
| Educational programs (PE and Health) correcting (*SC-3=15 studies) | 0.5–6 years | 1046 | Formation basic health knowledge (PA importance in health saving). Significant impact of health-saving courses in educational practice on students' BMI. |
| Assessment of rationale daily nutrition and PA (*SC-4=7 studies) | 0.5–2 years | 964 | An excess of high-calorie nutrition in 64 % of students of the participants. Diet violation. Changing and reducing daily diet (at least 800–1000 kcal) and increase in daily PA (30–40 minutes – intensive aerobic training) recommended. |

Legend: *SC – Study Collection.

experts' scientific information to counter the threat of obesity in male students. A total of 64 scientific studies over the past 5 years discovered. Today there are more than 4 million students (male students – 48 %) in Russia. Such a significant total number of individuals allows for significant scientific research on the prevention of the threat of obesity with educational influences and health physical education (PE) technologies. Today it is necessary to increase the scientific activity of combating obesity among students in Russian Federation. Perhaps scientists should be encouraged with grant applications and national study projects.

Unfortunately, a small number of studies recommended the development of continued strategies that included PA intervention in the planned contents. Today in Russian Federation only one national project is being implemented related to strengthening the physical health of the population – the sports and health complex “Ready for Work and Defense” (complex GTO). Complex GTO involves the assessment of physical fitness indicators of the population by testing of physical fitness level. Ibragimov et al. indicate the possibility of using the physical-sports complex GTO in the prevention of physical inactivity and obesity in students. A positive relationship was found between the results of passing the standards of the complex GTO and data on a decrease in the number of obese students in a number of regions of the Russian Federation (Ibragimov et al., 2019). However, other studies show a rather low efficiency of the complex GTO in the practice of increasing the level of students' physical fitness profile. Kharisov et al. conducted an analysis of the results of the complex GTO by male students from universities of the Russian Federation (more than 18 thousand students from 226 universities). It was revealed that more than 65 % of students could not successfully fulfill the regulatory requirements of the complex GTO. The main reason is the lack of physical fitness profile of male students (Kharisov et al., 2020). It was revealed that a significant part of the students are experiencing quite substantial difficulties in passing the test qualifying standards of the complex GTO. Investigators point to the need to use individually-differentiated programs for

additional preparation of students for complex GTO testing. Nagovitsyn et al., indicate that such programs should have a duration of at least one semester of study (5–6 months) and a intensity of at least 5 training sessions per week (Nagovitsyn, Osipov et al., 2019). It should be recognized that participation in the complex GTO requires students to significantly increase PA level. However, the positive impact of the complex GTO on the overweight and obese students BMI is not well understood and needs additional research.

An analysis of the data collected shows significant differences in assessing the total number of overweight or obese male students. Shestera et al. indicate that approximately 10 % of students are overweight (Shestera et al., 2019). Kobayakova et al. provide data on 14 % of overweight students and 2 % of students diagnosed with obesity (Kobayakova et al., 2019). Goldaeva & Pavlenko indicate 31 % of students who are overweight or obese (Goldaeva & Pavlenko, 2016). All research findings are based on BMI data of male students. An analysis of this findings revealed their dependence on the region where the research was conducted (the lowest total number of students with obesity and overweight was found in Vladivostok – 10 %, the highest in Buryatia – 30 % and Tomsk – 31 %). The total percentage of overweight or obese students is more than 30 % of participants in large cities of Russia. About 33 % of overweight students identified in Moscow universities (Puzanova & Tertyshnikova, 2017). This data coincide with the opinions foreign scientists' opinions. Yurdakul & Baydemir, concluded that students studying in the city center have less PA level and more overweight risk than students living in the rural area (Yurdakul & Baydemir, 2020).

Russian health/educational professionals agree on the need to change the diet and reduce the caloric content of students' daily nutrition. However, the assessments of caloric intake of male students are some differences. Daily caloric intake of some students' diet reaches 5000 kcal today with an actual need of 2200–2400 kcal (Anischenko et al., 2016). A controlled decrease in the daily total number of kilocalories and a change in the usual diet are needed

(refusal of fast food). Zhamsaranova et al. indicate an excess of daily caloric intake by an average of 300–400 kcal. (normal daily intake is 2300–2400 kcal; the actual intake is 2700–2800 kcal). Students' nutrition is characterized by a lack of protein, an excess of fat, high cholesterol, an excess of fast carbohydrates. The data on the positive results of the correction of BMI with the help of programs for a controlled reduction in the calorie content of the students' daily diet (average of 800–1000 kcal). This reduction in daily caloric intake due to increase daily PA (30–40 minutes of walking) and restriction of consumed fats in nutrition (Zhamsaranova et al., 2019).

An analysis of the data showed some differences of opinion among Russian health/educational professionals on the period developing obesity risks of male students. Shestera et al. indicate an overweight in a significant part of male undergraduate students already in their first year of study (Shestera et al., 2019). Osipov et al. state a significant increase in body mass (more than 3 kg) in male students from the middle of the second year of study (Osipov, Iermakov et al., 2018). Gansburgskiy indicated that the most significant deviations from normal BMI values in the direction of increasing the body mass of young men were identified in senior (4–6) courses of study (Gansburgskiy, 2019). This findings show that today the all period of study in university environment (4–6 years) is a period of significant risk of increasing overweight/obesity. Prevention and effective medical control measures over the dynamics of students' body mass are needed today.

Health/educational professionals emphasize the lack of quality knowledge in the saving health in most modern Russian students (Nagovitsyn et al., 2018). The lack of overall health knowledge leads to a lack of significant motivation for changing the familiar lifestyle of modern young people (Ashastin, 2016). A low level of theoretical knowledge in the field of prevention of the risk of developing non-communicable diseases, including obesity, of modern Russian students has been revealed (Kobyakova et al., 2019). Educational changes should be aimed at high-quality informing students about the main factors of cardiovascular risk and factors of obesity development.

Russian scientists' opinions coincide on the inclusion in the educational program of data on rational nutrition, balanced diets, principles of a healthy lifestyle, to increase daily PA level. Differences of educational courses duration are identified. Gavrilova & Yashina suggest the use of special educational courses ("Health School") in the learning process of students. These courses represent 8 academic classes with students (each class – 60 minutes). Investigators suggest using "Health School" courses in the first semester of student learning (Gavrilova & Yashina, 2017). Volsky, et al. recommend the use of additional educational strategies for students to form basic knowledge of a health lifestyle for 6 semesters of study, in parallel with PE. Formation of basic knowledge about the basics of a health lifestyle was carried out by the method of providing students with independent tasks. Control over the implementation of independent tasks was carried out by lecturers at each practical class during the all period of study (Volsky et al., 2019). *Yarushin* proposes to use the technology of students' formation of health-saving competencies through changes in physical education programs (1–2 courses of study). The changes are aimed at informing young people about the opportunities for the rational use of physical exercises, the requirements for a balanced diet, and the optimal combination of PA and nutrition during the learning day (Yarushin, 2019).

Sociological studies state that modern students are not aware of the need to strengthen their physical health. A low level of students' motivation to regular PA and sports practice in learning period was revealed (Puzanova & Tertyshnikova, 2017). Professionals offer various options for solving the problem of low motivation of male students: PE sportization (Kovalev et al., 2021), PE specialization (Osipov et al., 2021) and PE individualization in universities (Revenko & Salnikov, 2018). Sport is one of the most important activities to combat the problem of weight gain because, through the rules of sports disciplines, it favors the acquisition of correct lifestyles (Montesano & Mazzeo, 2019). Fenyves, et al. state, that for higher education students, health is a important motivational factor – in sports relation (Fenyves

et al., 2019). Kolomiietseva et al. indicate that the main motives for male students to choose sports programs in PE classes are: to adjust the body shape, make more courageous and athletic, increasing level of PA (Kolomiietseva et al., 2020). The analysis of scientific data revealed contradictions in the assessment of the use of sports in PE practice of students. Most students practicing sports in PE are characterized by normal BMI (Mikhaylova et al., 2018). Osipov et al. examined students (male and female) practicing PE according to the programs of various sports specializations. The dynamics of a significant increase in BMI of students over 3 years of this PE classes was revealed (Osipov, Iermakov et al., 2018).

Some differences in the individualization PE methods of overweight and obese students are indentified. Kolokoltsev & Iermakov recommend the use of differentiated methods for conducting PE classes for obese students. Such PE classes are focused on the differentiated decrease in fat mass content and increase in muscle mass in the component structure of students' bodies (Kolokoltsev & Iermakov, 2019). These investigators point to the need for development of the methodology of individually differentiated physical training of students with overweight. Overweight students should have a large volume of aerobic fitness in PE (Kolokoltsev et al., 2019). Anischenko et al. point out the need for special PE programs for obese students. Their basic movements should be focused on flexibility rather than on reaching standards; they should be reasonably slow and move "from simple to complex"; they should also be logically understandable, easy to remember and easy to repeat. Experts recommend using Ashtanga-Based Yoga complexes as the optimal method for conducting PE classes with overweight or obese students (Anischenko, Arkhangelskaya et al., 2016). Professionals point out that modified PE classes using yoga exercise complexes increase the overall level of students' physical activity, even after completing a physical education course at a university (4–6 courses) (Anischenko, Zaborova et al., 2019). Alexeeva et al. recommend the use of intensive aerobic training programs (running + health walking) in PE of obese

students. PE classes are held 3 times a week (the volume of each PE class is 120 minutes) throughout the semester of study. Control over the level of functional load was carried out using heart rate monitors. The critical pulse when running is 130–140 bpm, recovery when walking is 70–90 bpm. In the next semester, the critical values of heart rate during running increased to 150–160 bpm. Investigators say that this practice of aerobic training allowed students to significantly (from 5 to 9 kg) reduce excess body mass (Alexeeva et al., 2018). There is evidence of the possibility of universities using a rating system to reward students for a high level of regular PA. Rating points stimulate students to increase PA and sports. It was revealed that students actively participating in the ranking of physical education and sports achievements do not increase BMI. Students' physical fitness profile also significantly increased (Osipov, Zhavner et al., 2018).

Conclusions

A studies mini-review shows the consistency of Russian health/educational professionals' opinion on the need to correct the daily diet and PA of male students. Professionals insist on reducing the daily diet (at least 800–1000 kcal) and increasing daily PA (aerobic training – 30–40 minutes per day). Data analysis showed that the total number of overweight or obese Russian male students is about 23 %. The largest percentages of overweight or obese male students (more than 30 %) are found in universities in large cities. Some lack of scientific knowledge on counteracting obesity was revealed during data mining. Perhaps the total number of studies is affected by the lack of state and grant support. Most scientific research has been carried out privately without the support of government ministries or grant funds. This mini-review highlights the need for further studies to test different practical models of educational and PA interventions, to identify the best overweight/obesity prevention strategies regarding male students in university environment.

Limitations

Limitations within this review should be noted. The main limitation of this study lies

in the fact that the reading and data extraction of the studies were conducted by a four investigators, and main review was conducted by a single investigator only (first author). Another limitation of this study is the difficulty in comparing information, given the great heterogeneity between the methods used by the included studies. The strong part of the review that studies were included if they were not in English, which could no limit the appli-

cability of this review to other countries also suffering from a students' overweight/obesity epidemic.

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Conflicts of interest – The authors declare that there is no any conflict of interest.

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