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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии
საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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

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

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

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

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

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

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

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

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

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

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

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

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

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

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

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

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

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

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

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

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

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

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

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

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

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

ავტორთა საყურადღებო!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

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

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

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

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

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

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

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

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

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

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

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

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

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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THE FREQUENCY AND IMPACT OF ENERGY DRINK CONSUMPTION ON BMI AMONG UNDERGRADUATE STUDENTS AT ALNOOR UNIVERSITY

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Abstract.

Background: Energy drink consumption has increased among college students, but its impact on health measures like body mass index (BMI) is not well understood, particularly in Iraqi populations.

Objectives: This study aimed to characterize energy drink intake patterns and investigate associations with BMI among undergraduate students at Alnoor University in Iraq.

Methods: A cross-sectional survey of 270 students collected data on demographics, energy drink intake frequency, sleep duration, physical activity levels, and measured BMI. Descriptive statistics, chi-square tests, and Fisher's exact tests analyzed relationships between variables.

Results: Over 45% of students consumed energy drinks, with 9.3% drinking them ≥ 4 times/week. Males consumed energy drinks more frequently than females ($p < 0.001$). Energy drink intake frequency was not significantly associated with BMI categories ($p = 0.399$) or sleep duration ($p = 0.632$). Half of students slept ≤ 6 hours/night and 53.7% exercised < 1 hour/week. Based on BMI, 35.9% were overweight, 13% obese, and 1.1% morbidly obese.

Conclusion: Energy drink consumption was common in this Iraqi college population, especially among males, but was not significantly related to BMI or sleep duration. Students had high rates of overweight/obesity and insufficient sleep and physical activity. Universities should promote healthy lifestyles in this at-risk group.

Key words. Body mass index, college students, energy drinks, sleep.

Introduction.

Energy drink consumption has markedly increased among college students in recent years, drawn by promises of boosting energy, wakefulness, and focus for academic demands [1]. In the United States, over one-third of young adults aged 18-34 years regularly consume energy drinks [2]. College students are particularly prone to energy drink use to cope with busy schedules, insufficient sleep, and challenging coursework [3]. However, frequent energy drink intake may negatively impact health measures such as body weight and obesity risk. Energy drinks are calorie-dense, with high amounts of sugar and stimulants like caffeine, taurine, and guarana [4]. Regular consumption can promote weight gain both through the additional energy intake and appetite-stimulating effects of caffeine and other ingredients [5]. Several studies have found positive associations between habitual energy drink use and higher body mass index (BMI) in young adults [6,7].

Prior research on this topic has primarily been conducted in Western countries. Evidence is lacking on energy drink intake

patterns and potential weight-related consequences among college populations in developing nations like Iraq. Iraqi youth have demonstrated high overweight/obesity rates, which may be exacerbated by adopting unhealthy behaviors during the college years [8].

A study of female college students in Baghdad found that 40% were overweight or obese [9]. Undergraduate students in Kurdistan reported even higher rates, with 37.5% overweight and 33.5% obese [10]. Frequent consumption of high-calorie beverages, physical inactivity, and poor sleep habits likely contribute to this problem. However, the specific impact of energy drinks has not been well characterized [11].

Findings can help inform health promotion efforts targeting dietary habits and weight management in this at-risk population. Universities play an important role in shaping students' long-term behaviors and have a responsibility to cultivate environments that encourage healthy lifestyles [12]. This study aimed to address these gaps by examining energy drink intake frequency and its relationship with BMI in a sample of undergraduate students at Alnoor University in Mosul, Iraq.

Materials and Methods.

Study Design and Participants:

This quantitative cross-sectional study was conducted at Alnoor University in Mosul, Iraq from January to March 2024. A convenience sample of 270 undergraduate students aged 18 years and above were recruited to participate. Google Form sent via official university email to all students: This method implies that the students are invited to participate in the survey using an official university email. By sending the survey through an official channel, students may be more likely to trust the legitimacy of the research and feel more comfortable participating. Implied consent was used in this study. The use of implied consent in this case suggests that by completing the survey, students are giving their consent to participate in the research. Participation was completely voluntary and anonymous. The study protocol was approved by the Institutional Review Board at Alnoor University.

Data Collection:

Participants completed a structured questionnaire to collect information on socio-demographics, lifestyle factors, and energy drink consumption habits. The survey was administered in a private setting and took approximately 10-15 minutes to complete. Socio-demographic data included age, gender, marital status, and year of study. Lifestyle factors assessed were sleep duration and physical activity levels. Sleep duration in

the past month was self-reported and categorized as very short (≤ 5 hours/night), moderately short (6 hours/night), average (7 hours/night), optimal (8 hours/night) or long sleep (≥ 9 hours/night) [13]. Weight and height measured by researchers in the university for each participants.

Sample size was calculated based on the following equation based on total population of eligible student in Alnoor university 9894:

$$n = \frac{z^2 p(1 - p)}{e^2}$$

Where,

n= sample size,

Z= confidence level (95%)

P= population proportion (50%)

e= margin of error (0.06).

Physical activity was defined as number of hours per week spent engaging in moderate-to-vigorous exercise, with responses grouped as <1 hour/week, 1-2 hours/week, 3-4 hours/week, or ≥ 5 hours/week.

The key independent variable was frequency of energy drink intake over the past month, with options categorized as non-consumer (never consumes energy drinks), infrequent (1-3 times per month), weekly (1-3 times per week), or daily/frequent (≥ 4 times per week) [14].

Anthropometric Measurements:

Body mass index (BMI) was calculated as weight (in kilograms) divided by height (in meters) squared. Using World Health Organization criteria, BMI was classified into five categories: underweight (<18.5 kg/m²), normal weight (18.5-24.9 kg/m²), overweight (25.0-29.9 kg/m²), obese (30.0-34.9 kg/m²), or morbidly obese (≥ 35.0 kg/m²).

Statistical Analysis:

Data were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics including frequencies, percentages, means and standard deviations were calculated to summarize the socio-demographic characteristics, lifestyle factors, and anthropometric measurements of the study population.

Differences in energy drink intake frequency by gender were assessed using chi-square tests. Fisher's exact tests were used to compare the relationship between the BMI and the four energy drink consumption categories (non-consumer, infrequent, weekly, daily/frequent). Fisher's exact tests examined the relationship between energy drink intake and categorical variables like BMI status and sleep duration. For all analyses, a p-value <0.05 was considered statistically significant.

Results.

Sample Characteristics: A total of 270 undergraduate students with a mean age of 20.4 ± 1.6 years participated in the study. The gender distribution of the sample, with males comprising 67.4% and females 32.6%, (Figure 1), which shows the breakdown by year of study, with the largest proportions being 3rd year (23.3% males, 10.4% females) (Figure 2).

The frequency of energy drink intake among the students, over half (54.4%) reported never consuming energy drinks, while 24.8% drank them 1-3 times per month, 11.5% 1-3 times per week, and 9.3% 4 or more times weekly, and the sleep duration and physical activity levels are reported in (Table 1), over one-third of students (34.4%) slept 5 hours or less per night on average, while only 8.5% achieved the optimal 8 hours. More than half (53.7%) engaged in less than 1 hour of moderate-to-vigorous exercise per week (Figure 3). Male shown significantly higher level of energy drink compared to female ($p < 0.05$).

Based on measured BMI (Figure 4), 7.0% of the sample was underweight, 43.0% normal weight, 35.9% overweight, 13.0% obese, and 1.1% morbidly obese. Half of the students had BMI values above the normal range.

The cross-tabulation of energy drink intake frequency and BMI classification. No significant association was found between these variables using Fisher's exact test (Table 2).

However, gender was significantly associated with energy drink use (Figure 4). Males were more likely than females to consume energy drinks at any frequency ($p < 0.001$). Only 24.0% of females reported some level of intake compared to 37% of males.

The association between energy drink intake frequency and gender has shown that this relationship between energy drink

Table 1. Distribution by sleep duration and physical activity levels.

Category			
Sleep Duration	n(%)	Physical Activity	n(%)
≤ 5 hrs (very short)	93 (34.4)	<1 hr/week	145 (53.7)
6 hrs (moderately short)	83 (30.7)	1-2 hrs/week	52 (19.3)
7 hrs (average)	54 (20)	3-4 hrs/week	37 (13.7)
8 hrs (optimal)	23 (8.5)	≥ 5 hrs/week	36 (13.3)
≥ 9 hrs (long sleep)	17 (6.3)	Total	270 (100)
Total	270 (100)		

Table 2. Cross-tabulation of Energy Drink Intake Frequency and BMI Classification.

BMI Classification	Energy Drink Intake Frequency				P value
	Never	1-3 times per month	1-3 times per week	≥ 4 times per week	
Underweight	11 (57.9%)	4 (21.1%)	3 (15.8%)	1 (5.3%)	0.26
Normal weight	65 (56.0%)	28 (24.1%)	14 (12.1%)	9 (7.8%)	
Overweight	55 (56.7%)	22 (22.7%)	11 (11.3%)	9 (9.3%)	
Obese	15 (42.9%)	12 (34.3%)	3 (8.6%)	5 (14.3%)	
Morbidly obese	1 (33.3%)	1 (33.3%)	0 (0.0%)	1 (33.3%)	
Total	147 (54.4%)	67 (24.8%)	31 (11.5%)	25 (9.3%)	270 (100%)

NS*= Non-Significant by Fisher's Exact Test

Table 3. Cross-tabulation of Energy Drink Intake Frequency and Sleep Duration.

Sleep Duration	Energy Drink Intake Frequency					P value
	Never	1-3 times per month	1-3 times per week	≥4 times per week	Total	
≤5 hrs (very short)	48 (51.6%)	24 (25.8%)	9 (9.7%)	12 (12.9%)	93 (100%)	0.11
6 hrs (moderately short)	44 (53.0%)	22 (26.5%)	12 (14.5%)	5 (6.0%)	83 (100%)	
7 hrs (average)	30 (55.6%)	13 (24.1%)	7 (13.0%)	4 (7.4%)	54 (100%)	
8 hrs (optimal)	15 (65.2%)	6 (26.1%)	2 (8.7%)	0 (0.0%)	23 (100%)	
≥9 hrs (long sleep)	10 (58.8%)	2 (11.8%)	1 (5.9%)	4 (23.5%)	17 (100%)	
Total	147 (54.4%)	67 (24.8%)	31 (11.5%)	25 (9.3%)	270 (100%)	

NS* Non-Significant by Fisher's Exact Test, Significant by Chi-Square Test (P: < 0.001)

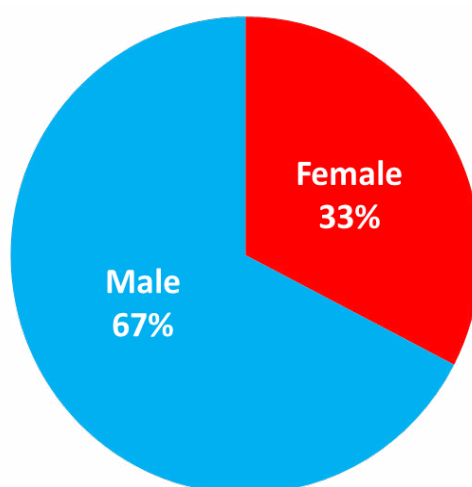


Figure 1. Gender distribution of the participants in the study.

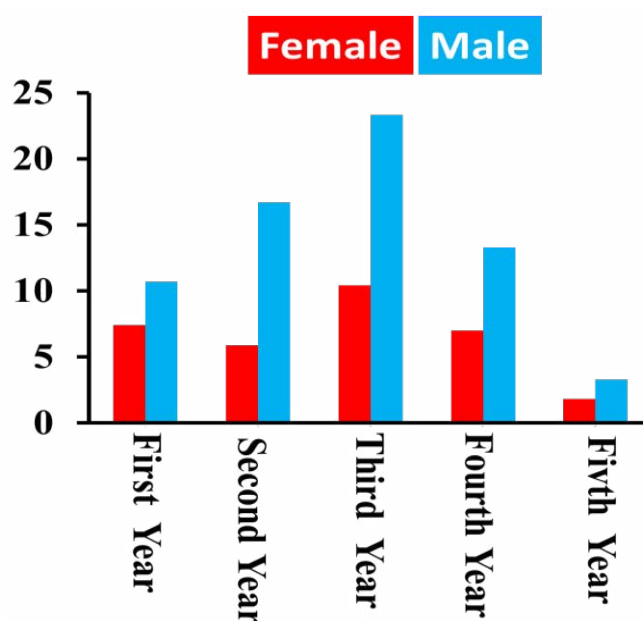


Figure 2. Distribution of Gender and Year of Study.

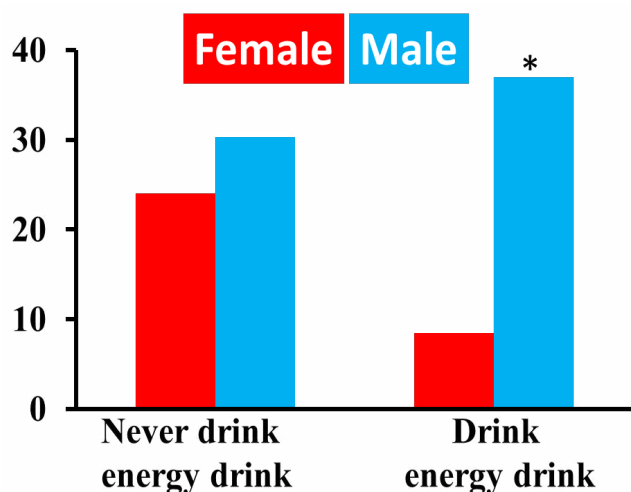


Figure 3. The energy drink rate of the participants.

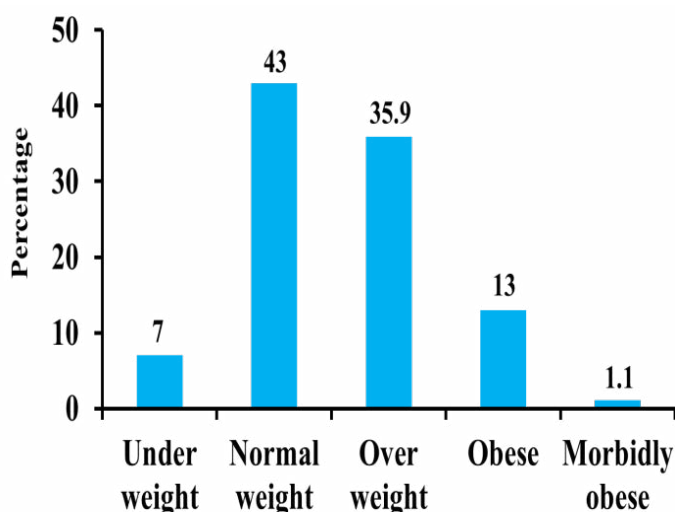


Figure 4. Distribution of energy drink by BMI classification.

consumption and sleep duration is no significant differences were detected across energy drink intake categories (Table 3).

Discussion.

This cross-sectional study examined patterns of energy drink consumption and its associations with BMI, sleep, and other factors among undergraduate students at Alnoor University in Iraq. Results showed that energy drink intake was prevalent in this population, with 45.6% consuming them at least once per month and 9.3% on a daily/frequent basis (≥ 4 times/week). This aligns with prior research indicating high rates of energy drink use in university students globally [10,15-18]. Notably, gender differences were observed, with males significantly more likely than females to consume energy drinks regularly. Over 60% of male students reported some frequency of intake compared to only 24% of females. Previous studies have consistently found higher energy drink consumption in college-aged males versus females [19,20]. This may be related to gender norms and marketing that targets young men with promises of masculinity, risk-taking, and performance enhancement [21].

Contrary to the hypothesis, energy drink intake frequency was not significantly associated with BMI status in this sample. Students who never consumed energy drinks had similar rates of overweight/obesity as those who drank them infrequently, weekly or daily. This contrasts with the positive correlations between energy drink use and BMI documented in other young adult populations [11,22,23].

The lack of association could be partly explained by the cross-sectional design, which cannot establish temporal relationships. Students' current consumption habits may not reflect long-term patterns that influence weight gain over time. Additionally, the study did not account for variations in serving sizes, brands or total volume of energy drinks consumed, which affect calorie and sugar intake. More detailed assessments are needed to fully capture the effects of energy drinks on energy balance and body composition.

Another key finding was the high prevalence of insufficient sleep, with 65.1% of students sleeping 6 hours or less per night on average. Short sleep duration is a well-established problem among university students worldwide [24]. Energy drink use is commonly motivated by the desire to compensate for lack of sleep and combat daytime fatigue [25]. However, in this study, intake frequency was not significantly related to self-reported sleep hours.

This may be due to limitations in the sleep measure used, which only assessed average nightly duration. Sleep quality, timing, and consistency across weekdays/weekends are also important dimensions that influence functioning. Poor sleep is associated with negative effects on cognitive performance, mental health, and cardiometabolic risk factors beyond just short duration. Future research should include validated tools like the Pittsburgh Sleep Quality Index for a multi-dimensional sleep assessment [26].

In terms of BMI, this sample of Iraqi undergraduates demonstrated alarming rates of excess body weight, with 35.9% classified as overweight, 13.0% as obese, and 1.1% as morbidly obese. This echoes the high burden of overweight/obesity in university student populations throughout the Middle East/North Africa region [27]. Sedentary behavior likely contributes to this trend, as more than half of the students reported engaging in less than one hour of moderate-to-vigorous physical activity per week. Low activity levels and prolonged sitting are common among university students, due to demanding academic schedules and increased screen time [28]. These lifestyle factors, along with dietary changes like frequent snacking and consuming large portions of energy-dense foods, can promote a positive energy balance and weight gain [29].

The major strengths of this study include the sample being representative of the undergraduate student body at Alnoor University in terms of age, gender, and year of study.

However, several limitations should be acknowledged. The cross-sectional design precludes inferences about causality and the long-term effects of energy drink consumption on BMI. Longitudinal studies are needed to examine the temporal relationships between these variables throughout students' academic careers. Additionally, all data on energy drink intake, sleep, and physical activity were self-reported and thus subject to recall and social desirability biases. Objective measures

such as sleepactigraphy and accelerometry for physical activity would provide more accurate assessments. The single 24-hour dietary recall used may not have adequately captured habitual energy drink consumption patterns.

Furthermore, this study was conducted at a single institution and the results may not be generalizable to all Iraqi university students. Multi-center studies with larger, more diverse samples are warranted to determine the impact of energy drink use on weight-related outcomes in this population.

Despite these limitations, the present findings highlight the need for health promotion interventions targeting energy drink consumption, sleep hygiene, and physical activity among university students in Iraq. Excessive intake of energy drinks can lead to negative health consequences beyond just weight gain, such as cardiovascular problems, anxiety, and substance abuse [30]. Educational campaigns should aim to increase awareness about the potential risks of energy drinks and promote alternative strategies for enhancing energy and performance, such as adequate sleep, regular exercise, and balanced nutrition. Colleges can work to create environments that facilitate healthy behaviors, such as providing access to recreation facilities, offering healthy food options, and implementing policies to limit the sale and marketing of energy drinks on campus [31]. Additionally, screening and counselling services should be available to help students manage stress, sleep difficulties, and unhealthy eating patterns that may motivate energy drink use. Promoting mental well-being is crucial, as psychological distress is a significant predictor of energy drink consumption in young adults [32].

Healthcare providers at university clinics play a key role in identifying and addressing these issues. Integrating brief assessments of energy drink intake, sleep, diet quality and physical activity into routine visits can help detect students at risk for weight-related problems and connect them with appropriate prevention and treatment resources [33]. Future research should explore the social and environmental factors that influence energy drink consumption in university settings, such as peer norms, advertising, and product availability. Understanding these contextual determinants can inform policy and environmental interventions to reduce energy drink use and promote healthier beverage choices [34].

Conclusion.

This study revealed that energy drink consumption was prevalent among undergraduate students at Alnoor University in Iraq, with higher usage observed in male students. However, no significant association was found between energy drink intake and BMI or sleep duration in this population. Notably, the study highlighted concerning health trends among participants, including high rates of overweight/obesity, insufficient sleep, and physical inactivity. These findings underscore the urgent need for targeted health promotion initiatives to address lifestyle-related risks in this student population. Universities have a unique opportunity to positively influence students' long-term health behaviors and outcomes. Implementing evidence-based programs and policies to reduce energy drink intake, improve sleep hygiene, and increase physical activity can help prevent weight gain and optimize wellbeing in this important life stage.

A multi-pronged approach involving education, environmental supports, and health services is recommended to effectively address these complex issues. By empowering students with the knowledge, skills, and resources needed to make healthy lifestyle choices, universities can cultivate a campus culture that prioritizes health and fosters academic success. Investing in the health of university students not only benefits individuals but also strengthens the future workforce and society as a whole.

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Ethical guidelines.

No experiments have been conducted to use these new compounds or complexes on humans or animals.

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