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Original Article

Prevalence of use of dietary supplements and other substances by medical students in Salvador, Bahia, 2020

Prevalência de uso de suplementos nutricionais e outras substâncias por estudantes de medicina em Salvador, Bahia, 2020

Victoria Maria Arruda de Brito[1], Juarez Pereira Dias[2]

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ABSTRACT: *Objective:* To estimate the prevalence of the use of dietary supplements and other substances by medical students at a private institution in Salvador-Bahia in 2020. *Methods*: A prevalence study, with a probabilistic sample, and data obtained through the application of online questionnaires on demographic, social and economic information and on the use of dietary supplements and other substances. The prevalence, prevalence ratio and 95% confidence interval were estimated. *Results*: the sample consisted of 337 students, most aged between 21 and 23 years old, female, family income between R$ 5,000.00 and R$ 10,000.00, attending the pre-clinical stage in the course and practicing regular physical activities, the most frequent: weight training, running, and walking. Amino acids and protein concentrates, vitamins, vitamin complexes and other natural and energy products were the most used. The highest prevalence was in men, except for vitamins, vitamin complexes and other natural products. *Conclusion*: The importance of physical and mental health of university students is highlighted, since they suffer social and media influence related to the cult of the body, which can increase the risk of excessive and unnecessary use of dietary supplements and other substances.

Keywords: Dietary supplement; Amino acids; Vitamins.

RESUMO: *Objetivo*: Estimar a prevalência do uso de suplementos nutricionais e outras substâncias por estudantes de medicina de uma instituição privada em Salvador-Bahia em 2020. *Métodos*: Estudo de prevalência, com amostra probabilística, com dados obtidos através da aplicação de questionários on-line sobre informações demográficas, sociais e econômica e uso de suplementos nutricionais e outras substâncias. Foram estimados a prevalência, a razão de prevalência e o Intervalo de Confiança a 95%. *Resultados*: a amostra foi composta por 337 alunos, a maioria com idade entre 21 e 23 anos, sexo feminino, renda familiar entre R$5.000,00 e R$10.000,00, cursando o ciclo básico e praticantes de atividades físicas regulares, sendo as mais frequentes: musculação, corrida e caminhada. Aminoácidos e concentrados proteicos, vitaminas, complexos vitamínicos e outros produtos naturais e energéticos foram os mais utilizados. A maior prevalência foi nos homens, exceto para vitaminas, complexos vitamínicos e outros produtos naturais. *Conclusão*: Ressalta-se a importância da atenção à saúde física e mental dos universitários, visto que sofrem influência social e midiática relacionada ao culto ao corpo, que pode potencializar o risco do uso excessivo e desnecessário de suplementos nutricionais e outras substâncias.

Palavras-chave: Suplementos nutricionais; Aminoácidos; Vitaminas.

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1. Bahiana School of Medicine and Public Health. https://orcid.org/0000-0001-7208-0570. e-mail: victoriabrito17.2@bahiana.edu.br

2. Bahiana School of Medicine and Public Health. https://orcid.org/0000-0002-5012-5499. e-mail: juarezdias@bahiana.edu.br

Correspondence: Victoria Maria Arruda de Brito. Av. Sete de Setembro, 2125, apt. 2001, Edif. Torre Barcelona, Vitória. Salvador, BA, Brasil. CEP: 40080-002. E-mail: victoriabrito17.2@bahiana.edu.br.

INTRODUCTION

Dietary supplements are products made of vitamins, minerals, herbal products, tissue extract, amino acids, and other substances. They are recommended for health improvement, disease prevention and supplementation of one's diet with calories and/or nutrients, if it does not meet the expected nutritional requirements[1,2]. Therefore, it is possible to argue that dietary supplementation is not recommended for every individual, only for those who are afflicted by special cases such as dietary deficiency and immunosuppression[3]. Dietary supplements can also be used for the improvement of physical and competitive performance of athletes monitored by doctors, nutritionists, and physical educators[4]. However, the indiscriminate use of these substances among young people has become more evident due to the aspiration of increasing physical performance while exercising, aiming for faster achievement of desired aesthetic results[4]. Research conducted with health sciences students at the University of Santa Cruz do Sul in Santa Catarina shows a prevalence of 27.2% in the use of dietary supplements[5]. Another study of students and gym fitness instructors identified that 36.7% of those interviewed made use of other substances such as anabolic androgenic steroids[6]. Finally, a third research conducted in the countryside of São Paulo analyzed the profile and consumption of dietary supplements in gyms and established that 58.5% of the students regularly made use of some form of dietary supplements, the majority of these being self-prescribed[7].

The indiscriminate use of dietary supplements and the abuse of these substances is a concern expressed in the guidelines of the Brazilian Sports Medicine Society[8] nowadays, in Brazil, indiscriminate use of dietary supplements as well as drugs with ergogenic and aesthetic purposes is observed[4]. According to the *Global Dietary Supplements Market (2006),* the global dietary supplements market size was valued at USD 132.8 billion and is expected to reach the value of USD 220.3 billion in 2022 demonstrating the power of the dietary supplements market[9].

Considering the abuse of dietary supplements and other substances by university students, this paper aims to investigate its prevalence among medical students who practice physical activities in a medical school in Salvador-Bahia in 2020. The specific objectives were to describe their frequency of use according to the demographic, social and economic characteristics of the participants.

METHODOLOGY

This paper is a descriptive cross-sectional prevalence study, approved by the Committee of Ethics in Research of the School of Medicine and Public Health nº 4.232.318 on 08/24/2021. Considering the active students at the university, it was calculated a probability sample using as parameters: a finite population of 1499 students, an average expected prevalence[10-13] for physical activities of 50%, the error was set at 5% (α=5%), an effect size of 1.0 and a 95% confidence level. Therefore, it was estimated the number of 306 students with an addition of 10% for possible losses. Considering this number, a proportional division was calculated according to the number of students by the 12 semesters of the course, ranging from 22 to 34 students, an average of 28 per semester. In order to identify the students that would be invited to participate in this study, students were electronically randomly selected considering an alphabetic order of the active students of each semester. The software *Open Source Epidemiologic Statistics for Public Health* (OpenEpi) was applied for the sample calculation.

The data collection was made between October and December of 2020 and the participants were contacted through institutional email and *WhatsApp.* In this contact they had access to the Informed Consent Form (ICF), a questionnaire requiring demographic, social, economic, and behavioral information and, finally, the "Use of Dietary Supplement and Other substances" questionnaire. This last questionnaire was segmented in seven items: amino acids and protein concentrates; vitamins, vitamin complexes and other natural products; hypercaloric supplements; energy drinks; isotonic sports drinks; fat burners and anabolic steroids. All students that decided to participate in the study were required to mark "accepted" in the ICF form and after that, all the questionnaires became automatically available for completion through "*Google forms*" software. There was no location requirement for the completion of the forms. For those students who did not agree to participate, the questionnaires were unavailable, meaning a refusal to participate in the research; and those who, despite having marked the "accepted" field in the ICF, when reading the questionnaires did not want to answer any question or interrupted the process, even after starting, could do so. All questionnaires were identified by the numerical order of the students in the list provided by the Academic Secretariat. The questionnaires are original and produced by the authors.

Categorical variables were expressed by absolute and relative frequencies, and quantitative variables by median and the interquartile range, considering the assumptions of normality, using the test of *Kolmogorov-Smirnov.* Furthermore, it was measured the estimated prevalence, prevalence ratio and confidence interval at 95% for dietary supplements, in accordance with the demographic, social, economic, and behavioral variables. To analyze significant statistical differences in the categorical variables the chi-square test was used. The Poisson log-binomial regression model was used to estimate the prevalence, prevalence ratio and 95% Confidence Interval, using the variables that in

the bivariate model presented a value of <0.10. Storage and statistical analysis of the collected data were performed using the Statistical Package for Social Sciences software, version 25.0 for Windows (SPSS inc, Chicago, IL).

RESULTS

The research had the participation of 337 students with a prevalence of females (65%) and an age range of 21 to 23 years old (49.3%), considering a median and interquartile range of 22 (20.0-23.0) years old, without significant statistical difference. The majority of the participants declared to be heterosexual (87.5%), white (59.3%) and single (55.8%). The predominant religious denomination was catholic (34.7%) and the preponderant monthly family income (31.8%) was between R$5.00,00 and R$10.000,00. Furthermore, 94.4% of the students were born in Bahia, of those, 76.4% in the capital. There was also a prevalence of participants living with their parents (84.0%). Regarding the stage in the course, 39.8% of participants declared they were in the pre-clinical stage, 32.3% in the clinical stage and 27.9% in the internship stage.

Taking into consideration physical activity, it was decided to divide into two ranges periods of less than 150 min/week and greater than or equal to 150 min/week, 263 participants (78.0%) reported regularly practicing physical activity, the most frequent being: weight training (67.78%), running (20.9%) and walking (19.8%) (Table 1). In addition, it is noteworthy that the highest frequencies of concomitant activities were running with weight training (16.7%) and walking with weight training (12.5%).

Table 1. Number and percentage of regular physical activity according to the sport and duration by the medicine students at a Medical School. Salvador-Bahia, 2020 (n=263)

Sport	Duration of Physical Activity				Total	
	<150 min*		≥150 min*			
	n	%	n	%		%
Weight Training	31	17.4	147	85.6	178	67.8
Running	32	58.2	23	41.8	55	20.9
Walking	21	40.4	31	59.6	52	19.8
Martial Arts	8	53.3	7	46.7	15	5.7
Dancing	8	57.1	6	42.9	14	5.3
Cycling	7	58.3	5	41.7	12	4.6
Volleyball	5	45.5	6	54.4	11	4.2
Swimming	8	80.0	2	20.0	10	3.8
Ballet	-	-	3	100.0	3	1.1
Basketball	1	50.0	1	50.0	2	0.8
Others	33	39.8	50	60.2	83	31.5

All data was collected by the authors
*The World Health Organization suggests at least 150 minutes of physical activity per week[14].

From the data collection it was possible to conclude that there is a predominance of the following dietary supplements: amino acids and protein concentrates (30.3%), vitamins, vitamin complexes and other natural products (21.1%) and energy drinks (10.1%). On the other hand, hypercaloric supplements (1.8%) and anabolic steroids (0.9%) were the ones least consumed by the participants (Table 2).

The highest incidence of amino acids and/or protein concentrates use while exercising was by males, by those 22 years old or older (35.8%), by heterosexuals, white individuals, those in a stable relationship, religious, those with family income over R$10,000.00, those born outside Salvador, those living without family and by those in the clinical and internship stages in the course. The analysis of the Prevalence Ratio (PR) only presented statistically relevant numbers regarding gender, age, and stage in the course.

Table 2. Number and percentage of dietary supplements and other substances use while exercising by medicine students at a Medical School. Salvador-Bahia. 2020

Variable	n	%
Amino acids and/or protein concentrates	102	30.3
Vitamins, vitamin complexes and/or other natural products	71	21.1
Hypercaloric supplements	6	1.8
Energy Drinks	34	10.1
Isotonic Sports Drinks	16	4.7
Fat burner	29	8.6
Anabolic Steroids	3	0.9

All data was collected by the authors

Contrastingly, the prevalence of vitamins, vitamin complexes and/or other natural products was more significant among females, participants under 22 years old, the non-heterosexual, the non-white, those in a stable relationship, those with family income over R$10,000.00, those born outside Salvador, those living with family and by those in the pre-clinical stage in the course. It is relevant to mention that there was no difference in the prevalence when assessing religion. The analysis of the Prevalence Ratio (PR) only presented statistically relevant numbers regarding relationship status.

Considering the consumption of energy drinks there were more significant numbers among males, those 22 years old or older, the non-heterosexual, white individuals, those in a stable relationship, the non-religious, those with family income under or equal to R$10,000.00, those born outside Salvador and by those in the clinical and internship stage in the course. There was no difference in prevalence between those living with parents or not. The analysis of the Prevalence Ratio (PR) did not present any statistically relevant numbers for the variables.

Analyzing the frequency of the use of isotonic sports drinks it was possible to conclude that the majority of the intake was by males, those under 22 years old, heterosexual individuals, non-white participants, those without a stable relationship, the religious, those with family income over R$10,000.00, those born outside Salvador, those living with family and by those in the pre-clinical stage in the course. The Prevalence Ratio (PR) presented statistical relevant numbers for the variables gender and family income.

Further into the study was possible to establish that the intake of fat burners was more significant between females, those under 22 years old, the heterosexual, white individuals, those in a stable relationship, religious participants, those with family income over R$10,000.00, those born in Salvador, those living with family and by those in the clinical and internship stage in the course. The Prevalence Ratio (PR) presented statistically relevant numbers for the variables gender and relationship status (Table 3).

Table 3. Prevalence, prevalence ratio (PR) and confidence interval (CI) 95% for the consumption of amino acids and/or protein concentrates, vitamins, vitamin complexes and/or other natural products, energy drink, isotonic sports drinks and fat burner while exercising considering demographics, social, economics and stage in the course by the medical students of a Medical School. Salvador-Bahia. 2020

Characteristics	Amino acids and/or protein concentrates			Vitamins, vitamin complexes and/or other natural products			energy Drinks			Isotonic Sports Drinks			Fat Burner		
	Prev*	PR*	CI* (95%)	Prev	PR	CI (95%)	Prev	PR	CI (95%)	Prev	PR	CI (95%)	Prev	PR	CI (95%)
Gender															
Male	40.7	1.65	1.20-2.27*	20.3	0.95	0.61-1.47	11.9	1.30	0.68-2.48	8.5	3.09	1.15-8.30*	4.2	0.39	0.15-0.99*
Female	24.7	1		21.5	1		9.1	1		2.7	1		11.0	1	
Age group (years)															
<22	23.3	0.65	0.46-0.92*	22.7	1.15	0.76-1.73	8.7	0.77	0.40-1.49	6.0	1.60	0.61-4.20	8.7	1.01	0.50-2.03
≥22	35.8	1		19.8	1		11.2	1		3.7	1		8.6	1	
Sexual Orientation															
Heterossexual	31.5	1.54	0.81-2.91	20.7	0.89	0.48-1.66	9.2	0.51	0.24-1.09	5.1	1.98	0.27-14.6	8.8	1.15	0.36-3.61
Non-heterosexual	20.5	1		23.1	1		17.9	1		2.6	1		7.7	1	
Skin Color															
White	34.0	1.37	0.96-1.94	21.0	0.99	0.65-1.51	10.5	1.11	0.57-2.13	4.0	0.68	0.26-1.78	9.5	1.30	0.62-2.71
Non-white	24.8	1		21.2	1		9.5	1		5.8	1		7.3	1	
Relationship status															
Not in a stable relationship	27.1	0.79	0.57-1.09	16.5	0.61	0.40-0.93*	8.5	0.70	0.37-1.33	5.8	1.74	0.62-4.91	5.8	0.48	0.24-0.99*
In a stable relationship	34.2	1		26.8	1		12.1	1		3.4	1		12.1	1	
Religion															
Religious	30.4	1.02	0.69-1.52	21.6	1.08	0.71-1.67	9.6	0.71	0.36-1.42	5.2	1.92	0.44-8.33	9.2	1.14	0.48-2.68
Non-religious	29.7	1		21.6	1		13.5	1		2.7	1		8.1	1	
Family Income (Reais)															
>10,000.00	30.4	1.01	0.73-1.42	21.7	0.92	0.60-1.41	8.2	0.63	0.33-1.19	6.8	4.39	1.02-19.03*	8.7	1.03	0.50-2.11
≤10,000.00	30.0	1		20.0	1		13.1	1		1.5	1		8.5	1	
City of birth															
Salvador	28.4	0.83	0.59-1.17	20.9	0.97	0.61-1.54	9.8	0.91	0.46-1.84	4.5	0.84	0.30-2.35	9.4	1.46	0.61-3.47
Outside Salvador	34.4	1		21.5	1		10.7	1		5.3	1		6.4	1	
Living arrangements															
Without parents	46.7	1.58	0.90-2.79	6.7	0.31	0.48-2.19	.0.0	-		0.0	-		6.7	0.77	0.11-5.26
With parents	29.5	1		21.7	1		10.6	-	-	5.0	-	-	8.7	1	
Stage in the course															
Pre-clinical	20.9	0.57	0.39-0.83*	26.1	1.47	0.98-2.22	8.2	1		5.2	1.18	0.45-3.09	6.7	0.68	0.32-1.45
Clinical/internship	36.5	1		17.7	1		11.3	0.72	0.36-1.44	4.4	1		9.9	1	

All data was collected by the authors
*Prev: prevalence | Prevalence Ratio (PR) | Confidence Interval (CI)

When using the best adjusted model, according to the Akaike Information Criterion (AIC), the PRs remained statistically significant for gender and stage in the course for the use of amino acids and protein concentrates; for sex and family income for use of isotonic sports drinks; and for gender and affective status for use of fat burner (Table 4).

Table 4. Prevalence Ratio (PR), Confidence Interval (CI) and p-value between the consumption of amino acids and/or protein concentrates, isotonic sports drink, and fat burner considering demographics, social and behavioral variables. Salvador-Bahia, 2020

Variable	PR	Confidence Interval (95%)	P
Amino acids and/or protein concentrates			
Gender	1.66	1.21 – 2.27	0.002
Age group	0.82	0.55 – 1.23	0.044
Isotonic Sports Drinks			
Gender	3.07	1.15 – 8.19	0.025
Family Income	4.36	1.01 – 18.86	0.049
Fat burners			
Gender	0.38	0.15 – 0.98	0.045
Relationship status	0.48	0.23 – 0.98	0.045

All data was collected by the authors

DISCUSSION

The population of this study have a demographic, social and economic profile similar to other students of higher education institutions in Brazil. According to the V Survey of the Socioeconomic Profile of Undergraduate Students at Federal Universities (2019)[15] the predominant profile is female, aged between 20 and 23 years old and white. Furthermore, the fact that most participants declared to be white reflects the higher economic status of this racial group, and also the younger age range, since people with more buying power have more propensity to enter higher education sooner[16].

The majority of the participants have at least one physical activity in their routine, weight training being the most recurrent. This data is consistent with another similar study by Paranaense University, in which it could also be verified that most males and females in university prefer weight training as their physical activity[17]. This relevant number of young weight training practitioners is due to the culture of the "ideal" body, which according to current beauty standards would be a body with a very low level of fat, especially for women[18], and with a high degree of muscle hypertrophy for men, therefore, weight training comes in as a facilitator of achieving this beauty standard[19].

Young people, especially males, look for ways to achieve the current physical standard in a faster and more straightforward way. Among those possibilities are dietary supplements and other substances which, associated with physical activities, ensure people can achieve their objectives in a faster and more straightforward way[4]. In this study, the most used dietary supplements were amino acids and/or protein concentrates, a finding that is similar to another study performed with graduate students from Porto Alegre (RS)[19] and physical education students from a university in Paraná[20]. The great adherence of the students to weight training associated with the consumption of protein concentrates have been proven to be the most scientifically effective option in achieving the goal of muscle hypertrophy[21].

In addition, the other two most used categories of substances were vitamins, vitamin complexes and/or other natural products, and energy drinks. This result is similar to other studies such as Poll and Lima[4] which investigated the consumption of dietary supplements by health students at the University of Santa Cruz do Sul/RS. Although isotonic sports drinks were identified as the most consumed nutritional supplements, vitamin complexes and proteins were also highly mentioned. This data is also consonant with the Quintiliano and Martins[22] study, which has shown the three main substances used in Guarapuava (PR) gyms were proteins, followed by isotonic drinks and vitamin and mineral complexes.

Energy drinks and isotonic sports drinks appear in third and fifth place, respectively, in the ranking of substances most mentioned by students. A cross-sectional study conducted with students at a private university in São Paulo corroborates that most students use energy drinks in order to stay awake longer, in order to meet studies demands, also highlighting the high frequency of use of this substance at parties, bars and nightclubs associated with alcohol for recreational purposes[23].

Considering that in this present study the participants are medicine students, it may be inferred that they use more energy drinks due to the excitatory quality of this substance, which helps with sleep deprivation, thus enhancing the development of academic activities, a fact already observed in work with medical students from a university in the southernmost region of Brazil[24].

The substances consumed the least by the participants were fat burners and anabolic steroids, which is consistent with the Poll and Lima[4] study, which indicated fat burner as the second least used substance, not analyzing, however, the use of anabolic steroids. It is undeniable that there are social stigmas and fear related to anabolic steroids, especially considering the possible damage to health, such as liver complications, high blood pressure, severe acne,

gynecomastia, and testicular atrophy specifically in men, and, specifically in women, irregularities in the menstrual flow, facial hair, change in voice, among others. All of this may have been a factor that corroborates the low frequency referred in their use. The profile of anabolic steroid users in the present study was consistent with other studies, which also identified most of these users as males, who are frequently at the gym and who have the objective of gaining muscle mass[25,26].

It is paramount to highlight that, in gyms, there can usually be found a counter or stand with dietary supplements and other substances for sale without the need for prescription, which may facilitate access to those substance and increase the possibility of health problems[27]. Therefore, it is of great importance to point out that users may not have enough knowledge about the daily intake of nutrients, the origin and composition of what they are consuming, which entails the risk of overload or deficiency of certain nutrients, threatening their health[28].

In light of the data collected from the questionnaires, the male participants were found to use most of the analyzed substances, except for vitamins, vitamin complexes and/or other natural products. Another study with university students from São Paulo did not indicate a significant difference in vitamin use between the genders[29]. Further developing the analysis, other similar studies confirm that the majority of the gym clients in Brazil are male[30,31], however, it is possible to observe divergence in the factor of consumption of nutritional supplements, since there are studies that indicate females as the major consumers[4,32], while others indicate males[5,30,31].

It is possible to identify that the subgroups 'male' and 'below 22 years old' are prevalent in regard to substance use. Moreover, considering the stage in the course, the pre-clinical stage presented more prevalence for vitamins, vitamin complexes and/or other natural products and isotonic sports drinks; and, in the clinical and internship stages, amino acids and/or protein concentrates, energy drinks and fat burners. One reason that can explain this result for the pre-clinical stage is the fact that those substances are popular and of easy access in drugstores and supermarkets, while for the clinical and internship stage the more advanced biochemical and cellular knowledge compared to other group gives them a feeling of safety to put it into practice when using these substances.

The relationship status variable alternated between prevalences for all the analyzed substances. Along with that, the family income variable demonstrated a prevalence for those with income superior to R$ 10,000.00 for all substances, except for energy drinks. This high socioeconomic profile is justified because the participants are medical students at a private medical school, consequently, they have a higher economic level.

This study may present some limitations regarding information bias, considering that the data was collected using instruments developed by the authors, without prior testing to verify its internal and external validity. Moreover, the instruments contemplated issues involving sensitive and personal use, practices and conduct that may have made the participants uncomfortable, leading them to biased responses for fear of exposing themselves, which could compromise the reliability of the information, despite the guarantee of the participants' anonymity. Even considering all that was said, the use of anonymous questionnaires with objective answers and respect for privacy is still the best format for collecting this type of data.

CONCLUSION

It can be concluded from this study that most of the participants practice some physical activity, weight training being the most recurrent. In addition, most participants combine physical activities with dietary supplements and other substances, the most frequent being amino acids and/or protein concentrates. Taking that into account, it is necessary to provide better understanding of the objectives with the use, influences, side effects and indication, especially to ascertain the real need for consumption of these dietary supplements.

Thus, these results emphasize the importance of attention to physical and mental health of university students, considering that these individuals are being influenced by social and media factors related to the cult of the body, increasing the risk for the using of dietary supplements and other substances. This scenario requires educational institutions to adopt and/or increase students' awareness of the risk of indiscriminate use of substances, especially anabolic steroids, which pose a greater threat to the health. In addition, it is necessary to encourage a greater degree of study and research focused on the consumption of dietary supplements by medical students, since in Brazil there are still few studies carried out with this group, the vast majority coming from universities in the south and southeast of Brazil.

Authors' participation: *Victoria Maria Arruda de Brito:* literature review, data collection, manuscript writing*; Juarez Pereira Dias:* creator of the idea that originated the work, the questionnaires, the hypotheses and the methodology, research coordinator and manuscript advisor.

REFERENCES

1. Eliason BC, Kruger J, Mark D, Rasmann DN. Dietary supplement users: demographics, product use, and medical system interaction. J Am Board Fam Pract. 1997;10(4):265-71.
2. Conselho Federal de Nutricionistas. Resolução no. 380, de 9 de dezembro de 2005. Dispõe sobre a definição das áreas de atuação do nutricionista e suas atribuições, estabelece parâmetros numéricos de referência, por área de atuação, e dá outras providências. Diário Oficial da União, 10 jan. 2006; Seção 1 [citado 21 abr. 2020]. Disponível em: https://www.cfn.org.br/wp-content/uploads/resolucoes/Res_380_2005.htm
3. Alves C, Lima RV. Dietary supplement use by adolescents. J Pediatr (Rio J). 2009;85(4):287-294. doi: https://doi.org/10.2223/JPED.1907
4. Poll FA, Lima AP. Consumo de suplementos alimentares por universitários da área da saúde. Cinergis. 2013;14(1):33-37. doi: https://doi.org/10.17058/cinergis.v14i1.3961.
5. Jost P, Poll FA. Consumo de suplementos alimentares entre praticantes de atividade física em academias de Santa Cruz do Sul – RS. Cinergis. 2014;15(1):10-17. doi: https://doi.org/10.17058/cinergis.v15i1.4357.
6. Abrahin OSC, Souza NSF, Sousa EC, Moreira JKR, Nascimento VC. Prevalência do uso e conhecimento de esteroides anabolizantes androgênicos por estudantes e professores de educação física que atuam em academias de ginastica. Rev Bras Med Esporte. 2013;19(1):27-30. https://doi.org/10.1590/S1517-86922013000100005
7. Perfil e consumo de suplementos nutricionais de praticantes de exercícios físicos em academias. RBNE - Rev Bras Nutrição Esportiva. 2018;12:825-833. Disponível em: http://www.rbne.com.br/index.php/rbne/article/view/1146/821
8. Sociedade Brasileira de Medicina do Esporte (SBME). Modificações dietéticas, reposição hídrica, suplementos alimentares e drogas: comprovação de ação ergogênica e potenciais riscos para a saúde. Rev Bras Med Esporte. 2009;9(2):43-56. https://doi.org/10.1590/S1517-86922009000400001
9. Global Dietary Supplements Market will reach USD 220.3 Billion in 2022. Zion Market Research; 2017 [cited 2022 Nov 3]. Available from: https://www.globenewswire.com/news-release/2017/01/11/905073/0/en/Global-Dietary-Supplements-Market-will-reach-USD-220-3-Billion-in-2022-Zion-Market-Research.html
10. Soar C, Silva OS, Lira JG. Consumo alimentar e atividade física de estudantes universitários da Área de saúde. Rev Univap (São José dos Campos). 2012;18(1):41-47. Disponível em: https://revista.univap.br/index.php/revistaunivap/article/view/58/37
11. Costa MVC, Lopes Neto AO, Castro LKMM, Carvalho MSM, Freire MV, Oliveira AM. Correlação entre o nível de atividade física e o índice de ansiedade em universitários da área da saúde. Res Soc Develop. 2022;11(4):e53111427444. doi: http://dx.doi.org/10.33448/rsd-v11i4.27444
12. Takenaka TY, Pagin M, Neves LM, Santos AC, Santos GAB. Incidência de inatividade física e fatores associados em estudantes universitários. Rev Bras Cien Mov. 2016;24(4):55-62. Disponível em: https://portalrevistas.ucb.br/index.php/RBCM/article/view/6370
13. Martins MCC, Ricarte IF, Rocha CHL, Maia RB, Silva RB, Vera AB et al. Blood pressure, excess weight and level of physical activity in students of a public university. Arq Bras Cardiol. 2010;95(2). https://doi.org/10.1590/S0066-782X2010005000069.
14. World Health Organization (WHO). Global action plan on physical activity 2018–2030: more active people for a healthier world [cited 2019 Dec 29]. Available from: https://apps.who.int/iris/bitstream/handle/10665/272722/9789241514187 - eng.pdf?ua=1
15. Associação Nacional dos Dirigentes das Instituições Federais de Ensino Superior (ANDIFES). V Pesquisa do Perfil Socioeconômico dos Estudantes das Universidades Federais – 2019 [citado 29 mar. 2022]. Disponível em: https://www.andifes.org.br/wp-content/uploads/2019/05/V-Pesquisa-do-Perfil-Socioeconômico-dos-Estudantes-de-Graduação-das-Universidades-Federais-1.pdf
16. Vasconcelos AMN. Juventude e ensino superior no Brasil – repositório do conhecimento do IPEA. In: Dwyer T, et al. Jovens Universitários em um Mundo em Transformação: uma pesquisa sino-brasileira. Brasília: Ipea/SSAP; 2016 [citado 6 abr. 2021]. Disponível em: http://repositorio.ipea.gov.br/bitstream/11058/9062/1/Juventude%20e%20ensino.pdf
17. Antes DL, Bidinoto PP, Katzer JI, Corazza ST. O jovem universitário e a busca pela saúde através do exercício físico. Arq Ciênc Saúde Unipar. 2009;13(29-32). Disponível em: https://www.revistas.unipar.br/index.php/saude/article/view/2793/2079
18. Alves D, Pinto M, Alves S, Mota A, Leirós V. Cultura e imagem corporal. Rev Motricidade. 2009;5(1):1-20. Disponível em: https://www.revistamotricidade.com/arquivo/2009_vol5_n1/v5n1a02.pdf
19. Saudades JO, Kirsten VR, Oliveira VR – Consumo de proteína do soro do leite entre estudantes universitários de Porto Alegre, RS. Rev Bras Med Esporte. 2017;23(4). https://doi.org/10.1590/1517-869220172304167205
20. Miarka B, et al. Características da suplementação alimentar por amostra representativa de acadêmicos da área de educação física. Rev Movimento Percepção (Espirito Santo do Pinhal). 2007;8(11)278-287. Disponível em: https://www.academia.edu/14484450/Caracter%C3%ADsticas_da_Suplementação_Alimentar_por_Amostra_Representativa_de_Acadêmicos_da_Área_de_Educação_F%C3%ADsica
21. Menon D, Santos JS, Consumo de proteína por praticantes de musculação que objetivam hipertrofia muscular. Rev Bras Med Esporte, 2012;18(1)8-12. https://doi.org/10.1590/S1517-86922012000100001
22. Quintiliano EL, Martins JCL. Consumo de suplementos alimentares por homens praticantes de musculação, nas academias do município de Guarapuava – PR. Rev Polidisciplinar Eletrônica Fac Guaraicá. 2009;1(2)3-13. Disponível em: https://www.revistavoos.com.br/seer/index.php/voos/article/viewFile/66/01_Vol2_VOOS2009_CS

23. Ramada R, Nacif M. Avaliação do consumo de bebidas energéticas por estudantes de uma Universidade de São Paulo, SP. Rev Bras Obes Nutr Emagrecimento (São Paulo). 2019;13(77):151-156. Disponível em: http://www.rbone.com.br/index.php/rbone/article/view/905

24. Morgan HL, et al. Consumo de estimulantes cerebrais por estudantes de medicina de uma universidade do extremo sul do Brasil: prevalência, motivação e efeitos percebidos. Rev Bras Educ. Med. 2017;41(1):102-109. https://doi.org/10.1590/1981-52712015v41n1rb20160035

25. Lima SFS, Siqueira SF, Silva A. Avaliação do uso de anabolizantes em praticantes de atividade física: uma revisão narrativa. [Trabalho de Conclusão de Curso]. Caruaru: Centro Universitário Tabosa de Almeida; 2016 [citado 19 mar. 2021]. Disponível em: http://repositorio.asces.edu.br/handle/123456789/377

26. Lima TAM, Mazzoni JRB, Gonçalves RA, Pereira LLV, Godoy MF. Estudo da utilização de esteroides anabólicos androgênicos e suplementos alimentares por universitários em São José do Rio Preto, SP. Rev Bras Nut Esportiva. 2019;13(79):333-339. Disponível em: http://www.rbne.com.br/index.php/rbne/article/view/1339

27. Gonçalves das Neves DC, Pereira RV, Lira DS, Firmino IC, Tabai KC. Consumo de suplementos alimentares: alerta à saúde pública. Rev. Bras Eco Doméstica. 2017;28(1):224-238. Disponível em: https://periodicos.ufv.br/oikos/article/view/3724

28. Moreira FP, Rodrigues KL. Conhecimento nutricional e suplementação alimentar por praticantes de exercícios físicos. Rev Bras Med Esporte. 2014;20(5)370-373. http://dx.doi.org/10.1590/1517-86922014200500795.

29. Dos Santos KMO, Barros Filho AA. Consumo de produtos vitamínicos entre universitários de São Paulo, SP. Rev Saúde Pública 2002;36(2):250-3. https://doi.org/10.1590/S0034-89102002000200021

30. Hallak A, Fabrini S, Peluzio MCG - Avaliação do consumo de suplementos nutricionais em academias da zona sul de Belo Horizonte, MG, Brasil. Rev Bras Nutrição Esportiva. 2007;1(2):55-60. Disponível em: http://www.rbne.com.br/index.php/rbne/article/view/18

31. Gomes AC, Figueiredo SM, de Souza AA. Avaliação de suplementos por praticantes de musculação em academias de Ouro Preto – MG. Demetra. 2018;13(4):937-951. doi: 10.12957/demetra.2018.36643

32. Schuer AC, Rocha RER. Fatores associados à utilização de suplementos por universitários. Rev Bras Nutrição Esportiva. 2018;12(73):590-597. Disponível em: http://www.rbne.com.br/index.php/rbne/article/view/1086/793

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