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The effects of the COVID-19 pandemic on college students' physical activity and nutrition

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Abstract: *Nutrition plays a crucial role in sports. Diet has an important role in human health, especially when the nutritional needs have to be adjusted for different sports. The aim of this study was to find how did COVID-19 impact nutrition and physical activity among students of AAB college. A survey was conducted among students of AAB College from 12-30 April 2023. The survey link was spread to students using Email. Questionnaire included questions regarding: height, weight, physical activity, nutrition, food supplements, during COVID-19 and after COVID-19. A total of 296 students completed the questionnaire, consisting of 211 females and 85 males. Economics had the highest number of students (22.3%) and Mass Communication had the lowest (2.4%); the statistical test (Chi-square) shows a significant difference between the fields. Wilcoxon signed-rank test indicates a significant difference, there is a notable difference in BMI between during COVID-19 and after COVID-19. Consumption of meat and cereals changed significantly during and after COVID-19 ($\chi^2 = 9.33$, $p = 0.003$), $\chi^2 = 20.06$, $p = 0.000$. Consumption of fruits, vegetables, dairy products, and foods high in fat, sugar, and salt did not change significantly. Physical activity levels during and after COVID-19 also showed a significant change ($\chi^2 = 4.96$, $p = 0.033$), indicating that some students started exercising again. Consumption of meat and cereals changed significantly during and after COVID-19 and the importance of wellbeing (nutrition, physical activity) can be used as an incentive to maintain an active lifestyle and healthy food consumption.*

Keywords: *Sports, Health, Nutritional needs, Differences.*

Abbreviations: *Body mass Index (BMI), Noncommunicable diseases (NCDs), World Health Organization (WHO), Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).*

Introduction

Diet has an important role in human health, especially when the nutritional needs have to be adjusted for different sports. Nutrition plays a crucial role in sports. The importance of an active lifestyle and healthy nutritional food habits, was shown significantly more during the COVID-19 pandemic. The immune system is activated by an active lifestyle, whereas it is suppressed by obesity and related disorders-this information emphasized the significance of maintaining an active lifestyle during this time (Khoramipour et al., 2021).

Regular exercise enhances quality of life, mental health and well-being; helps in prevention and treatment of noncommunicable diseases (NCDs), hypertension, overweight, and obesity (Global action plan on physical activity 2018–2030). World Health Organization (WHO) recommends that adults between the ages of 18 and 64 engage in at least per week (150 minutes of moderate-intensity physical activity, 75 minutes of vigorous-intensity physical activity or a relevant combination of moderate- and vigorous-intensity physical activity); this is the minimum amount of physical activity required to maintain adequate health and fitness (Lippi et al., 2020). Health is closely linked to nutrition. Evidence currently available shows that a person's immune system and susceptibility to disease are significantly impacted by their diet (Naja & Hamadeh, 2020). Immune system support requires proper nutrition-a healthy diet regulates immune homeostasis (Mentella et al., 2022). Minerals (zinc and selenium) and vitamins (A, C, D, E, and B complex) are found in diets rich in fruits and vegetables-these nutrients are crucial immune system modulators (de Faria Coelho-Ravagnani et al., 2020). Water, antioxidants, and fiber found in fruits and vegetables help prevent weight gain, diabetes, and hypertension-some of the major risk factors for COVID-19 problems (de Faria Coelho-Ravagnani et al., 2020). Fruits and vegetables' effectiveness to reduce disease may be partially attributed to their high flavonoid and antioxidant/anti-inflammatory contents (Khoramipour et al., 2021).

Healthy eating practices encourage health and the prevention of disease, whereas unhealthy eating practices affect metabolism and lead to health deterioration (Özen et al., 2021). Nutrition recommendations were given on the limitation of salt, sugar, and alcohol, the recommended daily intake of water was six to ten glasses (Detopoulou et al., 2022); eating homemade healthy balanced diet (Rafique, 2022), avoiding irregular snacking (Naja & Hamadeh, 2020). The lockdown could change weight-gain related health behaviors (Parekh & Deierlein, 2020). Adults are classified as obese if their body mass index (BMI) is greater than 30 kg/m² (Safaei et al., 2021). Sedentary behavior and unhealthy lifestyles grew as a result of COVID-19, particularly in the midst of youths *(*Akter et al., 2022). Students do not take enough care of their health or healthy lifestyle, neglecting physical activity and healthy eating, but giving more priority to the obligations in the faculty as well as entertainment (Myrtaj, Pireva, & Mikić, 2023). The impact of this physical inactivity is likely to have consequences in many areas such as: health and social care, mental well-being of people, education, etc. (Rexhepi, Pireva, Vehapi, & Gashi, 2020). In some research there was noticed the increase in Physical activity during the COVID-19 pandemic, compared to physical activity before the pandemic. A large part of research participants (85.5%) stated they liked online teaching of PE, while 80.1% stated that online teaching helped them stay physically active (Antekolović & Kovačić, 2020). Regular physical exercise has significant impact on human body and is important factor of enhancing immune system, which enables faster recovery and easier dealing with symptoms of COVID-19 (Šebić, Suhonić, Kovačević, Čović, Bajramović, 2023). During the pandemic time the negative impact of e-sports as a phenomenological phenomenon for children's health, their psychological and physical development has been proven (Milić, 2020).

The objective of this study was to investigate the impact of COVID-19 on nutrition and physical activity among students at AAB College. Specifically, the study aimed to assess how the duration of the pandemic and the associated public health measures—such as isolation and movement restrictions—affected students' behavioral patterns. Additionally, the study sought to examine how these behavioral changes influenced physical activity levels and body mass index (BMI) across different student groups, stratified by faculty.

Material and Methods

A survey was conducted among students of AAB College from 12-30 April, 2023. The survey link was spread to students using Email. Nutrition approach test questionnaire: For the online survey the Nutritional Habits Questionnaire was used. The questionnaire was prepared by (Altun et all. 2021). The questions proved validity of the researches which have been done on the subject before have been used. Basic informational questions involved: gender, age, and the field of study. Questionnaire included questions regarding: height, weight, physical activity, nutrition, food supplements, during COVID-19 and after COVID-19. Questions during the COVID-19 period and after COVID-19 period contained: The current body weight? Did the body weight have any significant variation during the COVID-19 pandemic compared to the period prior to the pandemic? How frequently per day do you consume meals? Which food categories are most predominant in your diet? Do you use nutritional supplements? Which types of nutritional supplements do you use? Are you physically active? Type of physical activity? How many times per week do you engage in physical activity? The duration of your physical activity session? Where do you exercise?

The tested hypotheses were: Did eating habits during COVID-19 period became unhealthier, so the students BMI increased? What are the differences during and after COVID-19 at students in: frequency of consuming meals, food categories in diet, nutritional supplements, physical activity (type, duration, place). The collected data were analyzed with SPSS 25.0 software (SPSS, Chicago, IL, USA). The non-parametric statistics used for the data analyses are Chi-square test and Wilcoxon signed-rank test.

Results

A total of 296 students completed the questionnaire, consisting of 211 females and 85 males. The majority number of students were in the (>23) age group. Economics had the highest number of students (22.3%) and Mass Communication had the lowest (2.4%); the statistical test () shows a significant difference between the fields. Among students 86.5% were at the Bachelor level (256), and 13.5% were at the Master level (40). With COVID-19 were infected 52.7% of students (156) and 47.3% of students (140) were not; the Chi-square test ($\chi^2 = 0.865$, $p = 0.352$) indicates no significant difference. Wilcoxon signed-rank test indicates a significant difference, ($Z= 6.675$, $P=0.000$*) there is a notable difference in BMI between during COVID-19 and after COVID-19.

Table 1. *Descriptive statistics and Ch-square of the study participants (n = 296)*

Variables		Frequency (N)	Percentages (%)	Distribution differences
Gender	Female	211	71.3	χ^2 (1. N = 296) = 53.635. P = 0.000*
	Male	85	28.7	
Age	>23	233	78.7	χ^2 (3. N = 296) = 460.73. P = 0.000*
	24-30	37	12.5	
	31-36	12	4.1	
	37+	14	4.7	
Study field	Physical Education and Sports	24	8.1	χ^2 (9. N = 296) = 88.730. P = 0.000*
	Social Sciences	38	12.8	
	Economics	66	22.3	
	Psychology	44	14.9	
	Mass Communication	7	2.4	
	Public Administration	24	8.1	
	Computer Science	35	11.8	
	Law	23	7.8	
	Health Sciences	11	3.7	
	English Language	24	8.1	
Study level	Bachelor	256	86.5	χ^2 (1. N = 296) = 157.622. P = 0.000*
	Master	40	13.5	
Participants infected with COVID -19	Yes	156	52.7	χ^2 (1. N = 296) = 0.865. P = 0.352
	No	140	47.3	

The significant difference was found between the students according to age, gender, study field and study level but there was no significant difference according to the infection with Covid 19 virus ($p < 0.05$).

Table 2. *Chi-square test and Wilcoxon signed-rank test for BMI*

Variables	Metrics and changes before vs. after	Statistical Test Results	P-Value
COVID-19 & BMI	22.42 ± 3.83 23.12 ± 3.52	Z (296) = -6.675	P=0.000*
COVID-19 & Meals	Mean Rank = 1.49 Mean Rank = 1.51	χ^2 (296) = 0.117	P = 0.732
COVID-19 & Supplements	23 (No → Yes) 78 (Yes → No)	χ^2 (1. 296) = 29.95	P =0.000*
Vitamin C & COVID-19	Mean Rank = 36.29 Mean Rank = 23.5	Z (134) = -5.589	P=0.000*
Vitamin D & COVID-19	Mean Rank = 30.40 Mean Rank = 27.55	Z (134) = -0.455.	P=0.649
Multivitamin & COVID-19	Mean Rank = 28.78 Mean Rank = 26.26	Z (134) = -2.813	P=0.005*
Omega 3 & COVID-19	Mean Rank = 18.83 Mean Rank = 19.45	Z (134) = -2.464	P=0.014*
Creatine & COVID-19	Mean Rank = 5.25 Mean Rank = 6.43	Z (134) = -1.089	P=0.276
Protein Powder & COVID-19	Mean Rank = 7.64 Mean Rank = 9.95	Z (134) = -1.137	P=0.256

Fruit and Vegetables & COVID-19	21 (No → Yes) 17 (Yes → No)	χ^2 (1. 296) = 0.421	P = 0.627
Dairy products & COVID-19	32 (No → Yes) 28 (Yes → No)	χ^2 (1. 296) = 0.267	P = 0.699
Meat products & COVID-19	46 (No → Yes) 21 (Yes → No)	χ^2 (1. 296) = 9.33	P =0.003*
Cereals & COVID-19	55 (No → Yes) 17 (Yes → No)	χ^2 (1. 296) = 20.06	P =0.000*
High sugar foods & COVID-19	30 (No → Yes) 41 (Yes → No)	χ^2 (1. 296) = 1.704	P = 0.235
High salt foods & COVID-19	25 (No → Yes) 32 (Yes → No)	χ^2 (1. 296) = 0.86.	P = 0.427
High fat foods & COVID-19	23 (No → Yes) 29 (Yes → No)	χ^2 (1. 296) = 0.692	P = 0.488

The significant difference was found between the students in the BMI index, supplements intake, multivitamins, omega 3, usage of meat productions and cereals. In other components there was not significant differences at the level of significance ($p < 0.05$).

Table 3. *The effect of COVID-19 on students` physical activity (n = 296)*

Variables	Metrics and changes before vs. after	Statistical Test Results	P-Value
Physical Activity & COVID-19 (before & during)	0 (No → Yes) 66 (Yes → No)	χ^2 (1. 296) = 66	P = 0.000*
COVID-19 & Physical Activity (during & after)	55 (No → Yes) 34 (Yes → No)	χ^2 (1. 296) = 4.96	P = 0.033*
COVID-19 & Exercise Frequency	Mean Rank = 1.48 Mean Rank = 1.52	χ^2 (1. 79) = 0.36	P = 0.549
COVID-19 & Exercise Duration	Mean Rank = 1.43 Mean Rank = 1.57	χ^2 (1. 79) = 4.172	P = 0.041*
COVID-19 & Exercise Location	32 (Home → Gym) 0 (Gym → Home)	χ^2 (1. 79) = 32	P = 0.000*

The significant difference was on the level of student's activity before and during covid, physical activity during and after covid. Exercise duration and Exercise location. There was not significant difference at the Exercise frequency ($p < 0.05$).

Discussion

The aim of this study was to investigate the impact of COVID-19 on nutrition and physical activity among students at AAB College. Specifically, the study aimed to assess how the duration of the pandemic and the associated public health measures—such as isolation and movement restrictions—affected students' behavioral patterns. Additionally, the study sought to examine how these behavioral changes influenced physical activity levels and body mass index (BMI) across different student groups, stratified by faculty.

There was no significant difference in number of meals consumed during COVID-19 and after COVID-19. Supplement use changed during and after COVID-19: there were no notable changes in the use of vitamin D, creatine, or protein powder, there were notable changes in the usage of vitamin C, multivitamins, and omega 3. Consumption of meat and cereals changed significantly during and after COVID-19. Consumption of fruits, vegetables, dairy products, and foods high in fat, sugar, and salt did not change significantly. Physical activity levels before and after COVID-19 changed significantly ($\chi^2 = 66$, $p = 0.000$), many students stopped physical activity during COVID-19. Physical activity levels during and after COVID-19 also showed a significant change ($\chi^2 = 4.96$, $p = 0.033$), indicating that some students started exercising again. Exercise duration ($\chi^2 = 4.172$, $p = 0.041$) and physical activity ($\chi^2 = 4.96$, $p = 0.033$) increased significantly during and after COVID-19. Exercise frequency did not change significantly ($\chi^2 = 0.36$, $p = 0.549$). After COVID-19, there was a noticeable return to gym workouts from at-home workouts.

According to the study by Zahri et al. (2022) students' intakes of dietary supplements and micronutrients in-

creased during the COVID-19 pandemic compared to their pre-pandemic intakes; most commonly students consumed vitamins. In the study of Altun et al. (2022) students of sports faculty made better choices for nourishment- due to the fact that they participate in sports and receive nutritional education, leading to higher nutrition scores than students from other faculty.

In the study of Jalal et al. (2021) poor physical exercise and a sedentary lifestyle were linked to the students' elevated BMI; half of the students held their BMI constant during lockdown. The period of COVID-19 had an impact on nutritional consumption, dietary choices, physical activity, lifestyle behaviors- which impacted body weight and general health in the short and long term (Antwi et al., 2021). Of the approximately 900 persons in the United States whose data were collected, 44% self-reported having made a beneficial dietary change (Jaeger et al., 2021). The lessons during COVID-19: the importance of wellbeing (nutrition, physical activity) can be used as an incentive to maintain an active lifestyle and healthy food consumption.

Conclusion

Consumption of meat and cereals changed significantly during and after COVID-19 Consumption of fruits, vegetables, dairy products, and foods high in fat, sugar, and salt did not change significantly. Wilcoxon signed-rank test indicates a significant difference, there is a notable difference in BMI between during COVID-19 and after COVID-19. Physical activity levels during and after COVID-19 also showed a significant change ($\chi^2 = 4.96$, $p = 0.033$), indicating that some students started exercising again. The lessons during COVID-19: the importance of wellbeing (nutrition, physical activity) can be used as an incentive to maintain an active lifestyle and healthy food consumption.

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