PHYSICAL ACTIVITY, EATING AND SLEEP IN ATHLETES ONE YEAR AFTER THE COVID-19 PANDEMIC

ATIVIDADE FÍSICA, ALIMENTAÇÃO E SONO EM ATLETAS APÓS UM ANO DA PANDEMIA DE COVID-19

ACTIVIDAD FÍSICA, ALIMENTACIÓN Y SUEÑO EN ATLETAS DESPUÉS DE UN AÑO DE LA PANDEMIA DEL COVID-19

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ABSTRACT

Introduction: The pandemic caused by COVID-19 has resulted in worrying effects related to the "new" habits adopted by the population. The long period of school closures and social isolation have profoundly impacted the learning, health, and protection of children and adolescents. Objective: To re-evaluate school athletes quarantined by COVID-19, highlighting the main physical activity (PA), eating and sleeping habits, and the implications related to physical and mental health after one year of the pandemic in the city of Curitiba, Brazil. Methods: Two surveys were conducted, 342 attended the first assessment, and 222 attended the second. An online questionnaire (Google docs) was applied to the students, consisting of 18 closed and open questions in the first moment (beginning of the pandemic) and 22 at the second moment (after one year of the pandemic). Results: Half of the students (53.2%; 57%) reported eating up to three meals daily. With regard to sleeping hours, the majority of students (80%; 79.5%) were able to sleep at night between 6:00 and 10:00. There was a significant decrease in the time spent on social networks, migrating to school activities (p <0.005). Approximately a quarter of the student-athletes (27%) practiced PA every day and felt fulfilled in the first assessment, and in the second assessment, this number increased to 43% (p = 0.009). Conclusion: Despite the decrease in screen time and the increase in regular PA, there was an increase in body weight in more than a third of the athletes evaluated. Those who maintained their body weight maintained healthier lifestyles with several meals within the recommended range and slept 6 to 10 hours per night. ***Level of Evidence III; Retrospective comparative study.***

Keywords: Physical Activity; Sleep; Feeding Behavior; Adolescent; Sports; COVID-19.

RESUMO

Introdução: A pandemia provocada pelo COVID-19 resultou em efeitos preocupantes relacionados aos "novos" hábitos adotados pela população. O longo período de fechamento das escolas e o isolamento social têm impactado profundamente a aprendizagem, a saúde e a proteção de crianças e adolescentes. Objetivo: Reavaliar atletas escolares submetidos à quarentena por COVID-19, destacando os principais hábitos de atividade física (AF), alimentação e sono e as implicações relacionadas à saúde física e mental após um ano de pandemia na cidade de Curitiba, Brasil. Métodos: Foram realizadas duas pesquisas, 342 compareceram à primeira avaliação e 222 à segunda. Foi aplicado aos alunos um questionário online (Google docs), composto por 18 questões fechadas e abertas no primeiro momento (início da pandemia) e 22 no segundo momento (após um ano de pandemia). Resultados: Metade dos alunos (53,2%; 57%) relatou fazer até três refeições ao dia. Quanto ao horário de sono, a maioria dos alunos (80%; 79,5%) conseguiu dormir à noite entre 6h00 e 10h00. Houve diminuição significativa do tempo gasto nas redes sociais, migrando para atividades escolares (p <0,005). Aproximadamente um quarto dos alunos atletas (27%) praticava AF todos os dias e se sentiu realizado na primeira avaliação, e na segunda avaliação esse número aumentou para 43% (p = 0,009). Conclusão: Apesar da diminuição do tempo de tela e do aumento da AF regular, houve aumento do peso corporal em mais de um terço dos atletas avaliados. Os que mantiveram o peso corporal foram os que mantiveram estilos de vida mais saudáveis com várias refeições dentro da faixa recomendada e que dormiam de 6 a 10 horas por noite. ***Nível de Evidência III; Estudo retrospectivo comparativo.***

Descritores: *Atividade Física; Sono; Comportamento Alimentar; Adolescente; Esportes; COVID-19.*

RESUMEN

Introducción: La pandemia provocada por el COVID-19 trajo efectos preocupantes relacionados con los "nuevos" hábitos adoptados por la población. El largo período de cierre de escuelas y aislamiento social ha impactado profundamente en el aprendizaje, la salud y la protección de niños, niñas y adolescentes. Objetivo: Reevaluar atletas escolares sometidos a cuarentena por COVID-19, destacando los principales hábitos de actividad física (AF), alimentación y sueño y las implicaciones relacionadas con la salud física y mental después de un año de pandemia en la ciudad de Curitiba, Brasil. Métodos: Se realizaron dos encuestas, 342 asistieron a la primera evaluación y 222 a la segunda. Se aplicó un cuestionario en línea (Google docs) a los estudiantes, compuesto por 18 preguntas cerradas y abiertas en el primer momento (inicio de la pandemia) y 22 en el segundo momento (después de un año de pandemia). Resultados: La mitad de los estudiantes (53,2%; 57%) refirió tener hasta tres comidas al día. En cuanto

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al tiempo de sueño, la mayoría de los estudiantes (80%; 79,5%) pudo dormir por la noche entre las 6:00 y las 10:00. Hubo una disminución significativa en el tiempo dedicado a las redes sociales, migrando a las actividades escolares (p <0,005). Aproximadamente una cuarta parte de los estudiantes deportistas (27%) practicaban AF todos los días y se sentían realizados en la primera evaluación, y en la segunda evaluación este número aumentó al 43% (p = 0,009). Conclusión: A pesar de la disminución del tiempo de pantalla y del aumento de la AF regular, hubo un aumento del peso corporal en más de un tercio de los atletas evaluados. Los que mantuvieron su peso corporal fueron aquellos que mantuvieron estilos de vida más saludables con varias comidas dentro del rango recomendado y que dormían de 6 a 10 horas por noche. ***Nivel de Evidencia III; Estudio comparativo retrospectivo.***

Descriptores: *Ejercicio Físico; Sueño; Conducta Alimentaria; Adolescente; Deportes; COVID-19.*

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INTRODUCTION

The pandemic caused by the new coronavirus (COVID-19) has already affected more than 200 million people worldwide.[1] Brazil is in third place in the ranking of countries most affected by COVID-19, with more than 20 million confirmed cases.[2] In children and adolescents, there is a lower prevalence of severe cases, most of which asymptomatic however, the risk of infection is the same as for adults.[3,4] Thus, the biggest challenge encountered during this critical period is related to social isolation, a strategy adopted by the World Health Organization[2](WHO), which made it difficult to adopt healthy lifestyle habits.[5,6]

As schools were closed worldwide because of the pandemic, the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2021)[7] estimated that around 1.5 billion (87%) students were affected by the restriction on education. Also, the closing of schools may have resulted in negative effects related to physical, mental, and social health due to the adoption of an unhealthy lifestyle.[8] Indeed, studies observed that during the pandemic, adherence to the recommendations of 60min/day of moderate to vigorous PA[9] and less than two hours of recreational screen time[10] declined.[5,11]

The effects of the pandemic are concerning, as these "new" habits result in increased body weight and increased risks of developing co-morbidities,[12] such as high blood pressure,[13] dyslipidemias[14] and type 2 diabetes mellitus.[15] In addition, isolation increases the chances of developing depression, anxiety, stress, irritability and even insomnia.[16] Due to the difference in the impact strength of COVID-19 and the different forms of preventive strategies implemented in each country, state and city, the effects on the physical, social and mental health of adolescents can be diversified. Therefore, the aim of this study was to reassess school athletes submitted to quarantine due to COVID-19, highlighting the main habits of physical activity (PA), eating and sleeping patterns and the implications related to physical and mental health after one year of the pandemic in the city of Curitiba, Brazil.

METHODS

This is an observational, cross-sectional study, whose participants were selected by convenience from a state school in Curitiba, Brazil, using the non-probabilistic sampling process. The sample consisted of adolescents aged 12 to 17 years of both sexes. The G*Power software was used to determine the study's sample size with a power of 0.80, 95% confidence level and 5% sampling error was assigned, with an estimation of 208 participants and with 10% error, totaling 228 participants.

A sample of 450 public school students was recruited with regular practitioners in sports activities during after-school period. All participants agreed to participate in the study. 342 attendedthe first assessment and 222 in the second. All were from the sixth grade of elementary school to the third year of high school. The inclusion criterion was to be a student athlete enrolled in any sport in 2020 and continuing in 2021 at the school. The exclusion criterion was not providing a consistent response to the open-ended questions.

An online form (Google docs) was applied to students, consisting of 18 closed and open questions in the beginning of the pandemic and 22 after a year. The questionnaire was sent via a link by the sport's technical teacher in early April 2020 and in June 2021. Student athletes had 48 hours to answer the questions about their sport, gender, age, questions related to the number of residents, type of residence, risk groups in the family and who was working outside the home, questions about eating habits, sleep, PA and whether the student is receiving any assistance from the government or the community and if he needs any emergency help at this time, if so, he would need to identify himself. On the one-year form, questions about vaccination and COVID-19 contagion among the athletes' families were added.

Ethics Committee

A consent form explaining the research objectives and assessments to be performed was read and signed by the parents or legal guardians. All students signed an assent form. The study conducted in full-time schools was approved by the Ethics Committee on Human Research of the Universidade Federal do Paraná under protocol CEP 148.438/2012-11 and CAAE: 08389212.6.0000.009, in accordance with Resolution number 466 of December 12th, 2012, of the National Health Council.

Statistical methods

The answers were transferred to an Excel spreadsheet for further statistical analysis. The studied variables were expressed in means and standard deviations, as well as absolute and relative frequencies. The categorical variables were assessed via Pearson/Yates chi-squared test and Spearman Correlation. All analyses used theStatistic version 10.0. We considered the number of students enrolled in school of the municipal school network, with a 95% confidence level and 5% sampling error.

RESULTS

In total, 342 athletes accepted to participate in the first evaluation, while 222 attended in the second, representing approximately 76% of the athletes. The numerical difference in the evaluations is explained by the fact that some of the student athletes finished high school and some dropped out of sports. Only athletes who participated in the survey in the first assessment answered this form.

The mean age in both assessments was 15 years. Of the athletes who identified their gender in the first assessment, 42% were male and 58% female, and in the second 61% and 39%, respectively. The distribution of athletes by sport in the first and second assessments is shown in Figure 1.

From the beginning of the pandemic to one year later, there was a significant increase (17%, p<0.005) of families that required help from the government or other Social Entities.The open question related to the needof any kind of helpincreased in relation to the first evaluation,

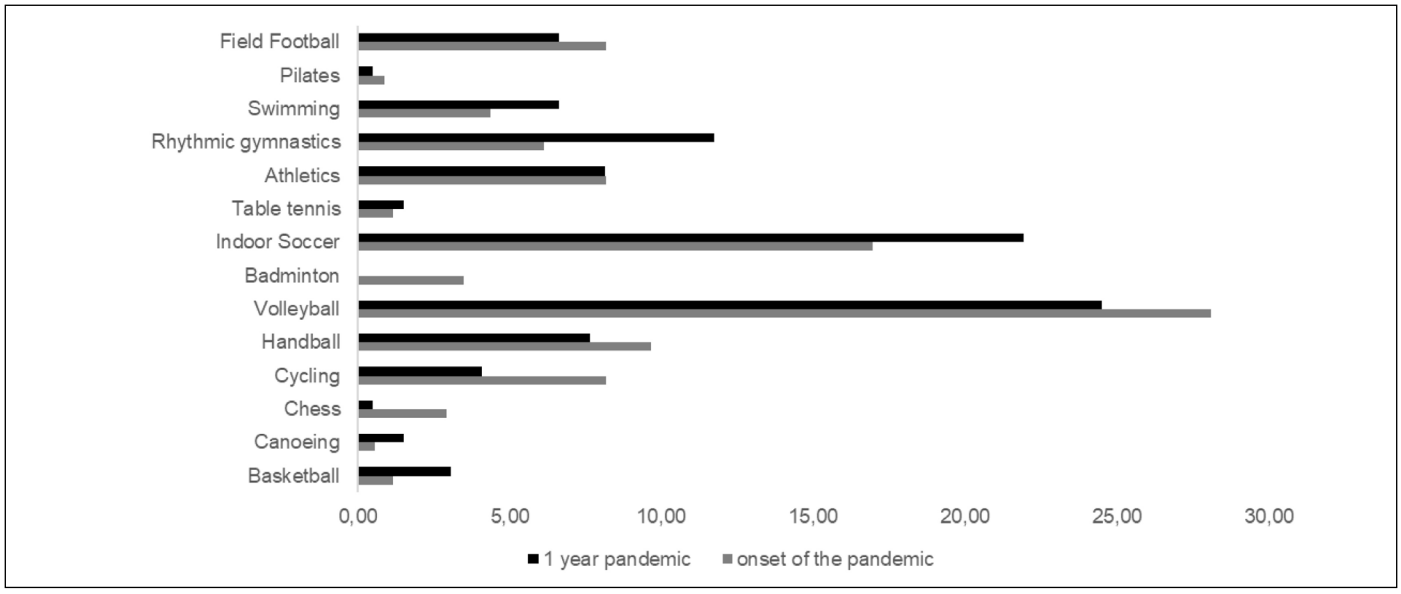

Figure 1. Percentage distribution of athletes in different sports modalities before and one year after pandemic. Curitiba, Parana (n=342; n=242), 2021.

with primarily requests for food (5 cases), employment (3 cases) and psychology services (2 cases).

Most students (95%) reported that families have followed the COVID-19 preventive care guidelines recommended by WHO.Half (50.6%) of the students' family members is in the risk group for COVID-19 in the first assessment, and in the second assessment the results were similar (45.6 %).In 37% of households had at least one person in their home contaminated with COVID-19, 7.7% were unsure because they had not tested and had mild symptoms.By the month of July 2021, in 97% of the families, a family member of the adolescent in close contact had already taken the first dose of the vaccine or a single dose. In 6.1% of the vaccinated families had COVID-19, some with an outcome of death.

Regarding health-related behaviors, half of the students (53.2%; 57) reported having up to three meals a day. As for sleep time, most students (80%; 79.5%) have been able to sleep during the night from 6:00 to 10:00 hours. The number of students that spend more time of the day on social networks reduced from 68.9% in the first evaluation to 34.3% in the second, migrating to school activities (p<0.005). Approximately a quarter of student athletes (27%) practiced physical activities every day and felt fulfilled in the first assessment. In the second assessment, this number increased to 43% (p=0.009).

Regarding body weight, 40% stated that they had gained weight during this year of quarantine. Percentage data of these results are shown in Table 1. When relating age group with body weight perception the athletes aged 15 years or older were the ones who most maintained their body weight and who kept the number of complete meals within the recommendation (p=0.01). As for sleep time, those who slept 6 to 10 hours per night were the group that most maintained their body weight (p<0.001).

Regarding the training frequency and intensity, the second evaluation resulted in 17.4%of adolescents who were training every day, 39.5% three to five times a week, 29.7% one to two times a week and 13.3% that were not training. In 37% of the cases, the training lasts up to one hour a day, 46.6% between one and two hours, and 3.6% more than two hours. Athletes were also asked after a year of pandemic about the importance of training they received from the College: most athletes (77%) responded that training is very important for their mental and physical health.

The Table 2 show that students maintained good frequency and intensity in training after one year of pandemic.

Table 1. Percentage data of responses on health-related behaviors in adolescents. Curitiba, Parana (n=342; n=222).

Health-related behaviors	1st	2st
Eating habits	**%**	**%**
Up to three meals a day	53.2	57
Have up to six meals	37.3	36.4
Multiple meals, no dietary control	9.5	6.6
Sleep time		
Has been able to sleep through the night from 6 am to 10 am	80	79.5
Unregulated sleep, or sleep less or more than 12 hours a day	20	20,5
Physical activities		
Time dedicated to social networks	68,9	34,3*
They practice physical activities every day and feel fulfilled	27	43*
Physical spaces most used for activity practice		
Rooms of the house	56.4	50
Covered outdoor área	15.2	7.7
Garden or outdoor área	16.9	5.6
In relation to body weight		
Weight gain	29.8	40
Weight stays the same	58.5	46.6
No tinterested in knowing	3.8	1.0
Managed to lose weight	7.9	12.3

Note: 1st = first assessement; 2st = second assessement; * p<0,05.

Table 2. Training frequency and intensity in adolescents.Curitiba, Parana (n=222).

Training frequency	Percentual of individuals (%)
Training every day	17.4
Training 3 to 5 times a week	39.5
Training 1-2 times a week	29.7
I'm not training	13.3
Time of each training session	Percentual of individuals (%)
Train up to one hour	37
They train between one to two hours a day	46.6
They train up to two hours a day	3.6

Source: The author (2021).

DISCUSSION

After a year of pandemic, there was a significant increase in the familynumbers that requested emergency assistance and government help, as well as an increase in requests for food, employment, and psychology services. These factsmay be associated with the maintenance of social isolation policies in this period, as these actions can

affect workers with reduced family income or even unemployment. The measures of total or partial blockadeaffected almost 2.7 billion workers around the world.[17]

All guidelines and maintenance of social distance established by the WHO, have caused society to isolate itself at home and stay much longer connected to the Internet, using various softwares, social networks and technological tools.[5,18,19] Therefore, school physical education has been replaced by sedentary activitiessuch as watching television and virtual games,[20] which contributed to the decrease in PA levels among children and adolescents. Thus, new habits and customs were created, such as remote classrooms and home office work, concomitant with reduced physical exercise and dietary changes.[5,19]

After one-year, there was a significant decrease in the time spent on social networks by student athletes, migrating to school activities, demonstrating an adaptation to this "new normal" of remotely classes, physical education professionals also needed to adapt to the new reality.[21] We emphasize that reducing the time devoted to social networks, time spent in sedentary behavior, interspersing the time sitting or lying down with periods of PA, is important for health maintenance during periods of isolation.[19]

Another very important and positive point was the increase in the proportion of student athletes who, after a year of the pandemic, practice daily physical activities and feel fulfilled (47%), however, more than half of the athletes do not maintain a daily exercise routine this year. A study showed that only 24% of the 377 adults evaluated reported practicing PA during the pandemic,[22] which corroborates to the present study.

The increase shown by student athletes who exercise regularly is an important factor in their health, since the risk of hospitalization due to COVID-19 reduces by 34.3% in sufficiently active individuals.[23] It is important to highlight those studies carried out during the pandemicthat reinforce the recommendationsof at least 60min of moderate-vigorous PA daily for children and adolescents, including muscle strength activities, at least three days a week.[24,25] Before social isolation, adolescent athletes had an intense training routine. In the second evaluation, regarding the frequency of training, the data showed heterogeneous results with a higher percentage for those who practice from 3 to 5 times a week (39.5%), in the same way, as for session time, 37% train up to one hour and 46.6% train between one and two hours a day.

During the pandemic, the main objective is to maintain the practice of PA to improve physical and mental health.[25] As for Physical Education Professionals, there was a need to adapt work during the pandemic.[21] Theparticipants reported that the prescribed activities were guided by teachers via cell phone, in the form of videos and photos.The online exercise program prescription must use digital tools that allow the application of the exercise components with guidance and supervision of these professionals.[26]

The presence of family members such as parents and siblings to perform exercises was mentioned by most athletes, this can lead to the maintenance of cardiorespiratory fitness during this period for both athletes and family members who participate together, especially if performed with moderate intensity. Therefore, it is suggested that physical training and high levels of cardiorespiratory fitness obtained through moderate-intensity aerobic training are immunoprotective, even in patients infected with SARS-CoV-2, and for people with other chronic comorbidities.[23,24]

As for eating patterns, this period showed no significant differences among most of the adolescents evaluated, who maintained three meals a day. However, there was an increase in the percentage of adolescents who reported an increase in body weight. Long-term increase in body weight can lead to obesity, which is a highly prevalent comorbidity in severe cases of COVID-19 in children and adolescents, and social isolation can lead to increased fat accumulation and lean mass deficit.[25]

As for those who reported maintaining body weight, the majority were athletes aged 15 years or more, who kept the number of complete meals within the recommendation and who slept for 6 to 10 hours a night. This demonstrates the importance of maintaining recommendations regarding the number of meals and sleep for weight maintenance. Regarding sleep, the SARS-cov2 pandemic brought high health risks with several factors that may contribute to poor sleep quality and duration, including stress due to illness, reduced activities in the morning, and increased screen time.[21] Most students have been able to sleep at night from 6:00 to 10:00, which is related to good physical and mental health, while sleep disorders can predispose to weight gain and abdominal adiposity, insulin resistance, poor school performance and sedentary lifestyle.[20,21]

As for the importance of training after a year of pandemic, most athletes answered that training is very important for their mental and physical health. This shows the importance of social interaction and sports in the lives of adolescents, reflecting on physical and mental health.There is a consensus that the COVID-19 pandemic affects not only physical health, but also mental health and well-being.[23,26] Social isolation and quarantine are sources of stress and impact everyone, especially children and the elderly.[23,24,26] The longer duration of this isolation is associated with a greater impact on mental health, especially symptoms of post-traumatic stress and irritability.In addition, the reduction of social interactions are important risk factors for mental disorders such as depression and anxiety.[24]

We can point out as limitations of the study the fact that it was carried out in a convenience sample with adolescent athletes, which limits the external generalization of the conclusions. In addition, as data collection instruments the use of electronic questionnaires. However, the relevant aspect of this research was the objective of showing the profile and routine of adolescents caused by the quarantine of COVID-19after one year of the pandemic.

CONCLUSION

Therefore, we can conclude that there were significant changes in the adolescents' routine during the one-year period of the pandemic due to COVID-19 with a reduction in daily physical activities. Despite the decrease in screen time, in the use of social networks and the increase in the number of adolescents who regularly practice physical activities, there was an increase in body weight in more than a third of the athletes evaluated. Those who most maintained their body weight were those who remained healthier lifestyle habits with a number of meals within the recommended range and who slept for 6 to 10 hours a night. Thus, it is necessary to devise strategies that encourage adolescents to maintain physical activity and healthy habits even in periods of pandemic and social isolation.

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