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The Impact of COVID-19 on Diet and Lifestyle Among Sports Students

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Abstract
The effect of the COVID-19 pandemic on way of lifestyle-associated behaviour amongst sports college students of Kerala is less explored. The research was conducted on a total of 202 sports students. The data was collected by using Google Forms and questionnaires. Data was gathered, and a comparison of nutritional health profiles before and during the pandemic was done t-test for a single mean. The study revealed that the intake of unhealthy food items such as fast food increased during the COVID-19 pandemic ($P<0.01$) while the frequency of fruit and vegetable intake, consumption of pulses, egg or meat, consumption of milk and its products, and consumption of a balanced diet had significantly reduced ($P<0.01$). However, there was no statistically significant change in routine consumption of meals at regular intervals during COVID-19. Participation in moderate-intensity aerobic exercises and leisure-related activities declined significantly ($P<0.01$), while a significant increase in screen time and stress levels ($P<0.01$) was observed. The K10 scores showed (61%) mild to severe stress disorders during the pandemic, and only 39% of the respondents could maintain healthy stress conditions. A detailed understanding of these factors can help to develop interventions to mitigate the negative lifestyle behaviours that have manifested during the pandemic.

Keywords- Nutrition, sport students, balanced diet, aerobic exercises, mental health, lifestyle behaviours.

1. Introduction

The outbreak of coronavirus disease 2019 (COVID-19), declared a global pandemic by the World Health Organization on March 11, 2020, has caused widespread disruptions in daily life across the globe. In response to the rapid transmission of the virus, numerous public health interventions—including lockdowns, quarantine, and social distancing—were implemented. These measures, while essential to limit viral spread, significantly impacted routine activities and mobility patterns. According to Google's COVID-19 Community Mobility Reports, global mobility trends showed a marked decline in visits to retail and recreation areas (-14%), transit stations (-34%), workplaces (-31%), and grocery stores/pharmacies (-5%), while time spent in parks and residential areas increased by 9% (as of March 9, 2021, compared to the baseline period of January 3 to February 6, 2020).

The period of the pandemic has negatively affected the lifestyle of people around the world. Many people have experienced adverse lifestyle changes[1]. One of the key aspects is changes in physical activity and amount of sitting time [2]. An important aspect related to imposed restrictions is their negative impact on nutrition [3], which may have very serious consequences in the future, such as being overweight, weakening of physical capacity, and civilization diseases. Physical activity and nutrition are both

important factors influencing immunity. A potentially better prognosis with COVID-19 infection is achieved by patients consuming more fiber and plants. Such a diet has a positive effect on the gut microflora[4]. While these changes were evident in the general population, their implications may be more pronounced among athletes and sports students, whose routines depend heavily on structured training and institutional support.

The pandemic also led to the postponement or cancellation of most organized sports and physical activity events worldwide, posing unique challenges for athletes and sports students. These individuals rely heavily on structured schedules, institutional training facilities, and team environments to maintain their physical performance and mental well-being. The disruption of regular training regimens, limited access to coaching, and the absence of competition created uncertainty regarding athletic continuity and health outcomes (Henriksen et al., 2020). Social isolation and reduced physical activity have been linked to increased anxiety, depressive symptoms, and substance use among athletes (Huber et al., 2021), as well as changes in dietary practices and body composition (Metzl et al., 2020). Furthermore, the prolonged restriction of movement and closure of fitness facilities contributed to a decline in physical activity levels, disrupted sleep routines, increased screen time, and psychological stress. For sports students—who typically follow rigorous routines to support performance and recovery—such abrupt changes may pose short- and long-term risks to their overall health, immune function, and athletic potential.

Given these concerns, there is a critical need to evaluate how the COVID-19 pandemic has impacted the lifestyle behaviors of sports students—a group uniquely dependent on structured routines and regular training. This study aims to [1] assess changes in dietary patterns, physical activity levels, and lifestyle behaviors among sports students during the COVID-19 pandemic; and [2] compare these behaviors before and during the pandemic to better understand the magnitude and nature of the impact.

2. Materials And Methods

A cross-sectional survey was conducted among 202 sports students enrolled in reputed sports schools and colleges. All participants were formally engaged in structured training for specific sports disciplines at their respective institutions. Inclusion criteria consisted of active enrolment in a sports program and regular participation in institutional training prior to and during the COVID-19 pandemic.

2.1 Tools and Instruments

A structured and validated questionnaire was used as the primary data collection tool. The questionnaire was developed based on an extensive review of existing literature and previous studies to ensure content validity. It comprised multiple sections to capture:

- Background information and demographic profile,
- Dietary intake and physical training,
- Sleep behavior and mental health status.

2.1.1 Socioeconomic Status (SES)

The sociodemographic profile was assessed using the Modified Kuppuswamy Scale by [5], a widely used index for determining the socioeconomic status of urban families. This scale incorporates three dimensions: educational level, occupational status, and monthly family income.

2.1.2 Lifestyle Behaviors

Lifestyle-related behaviors were assessed using a validated questionnaire developed by Chopra et al., 2020 from AIIMS, New Delhi, which evaluates changes in dietary patterns, physical activity, and sleep behavior specific to the COVID-19 context.

2.1.3 Physical Training

Physical training intensity, frequency, and session duration before and during the pandemic were evaluated using a questionnaire adapted from Washif et al. (2021), validated for use among athletic populations.

2.1.4 Psychological Distress

Psychological distress was measured using the Kessler Psychological Distress Scale (K10), a 10-item instrument designed to screen for non-specific psychological distress. The K-10 has been validated for assessing the risk of common mental health disorders in the general population [7]. The K10 includes ten items rated on a five-point Likert scale, with total scores ranging from 10 to 50. Based on established cut-offs, scores below 20 indicate likely wellness, 20–24 suggest mild mental disorder, 25–29 indicate moderate mental disorder, and scores of 30 and above point to a severe mental disorder.

2.2 Data Collection Procedure

A quota sampling method was employed to recruit participants, ensuring representative coverage across different sports disciplines and institutions. The questionnaire was administered both online and offline. A Google Form link was distributed via WhatsApp and email, while physical copies were administered in person at selected institutions. Participants were instructed to report lifestyle behaviors during the COVID-19 pandemic and compare them with their pre-pandemic routines. Additionally, they were asked to indicate possible reasons for any observed changes.

2.3 Data Analysis

The collected data were coded and entered into SPSS version 23.0 for statistical analysis. Descriptive statistics were used to summarize demographic variables and behavioral responses. Changes in lifestyle-related behaviors before and during the pandemic were analyzed using the one-sample t-test to determine significant deviations from baseline values. Behavioral scores were computed using a 5-point Likert scale as per [6], where a score of 1 represented the least desirable behavior and 5 the most desirable.

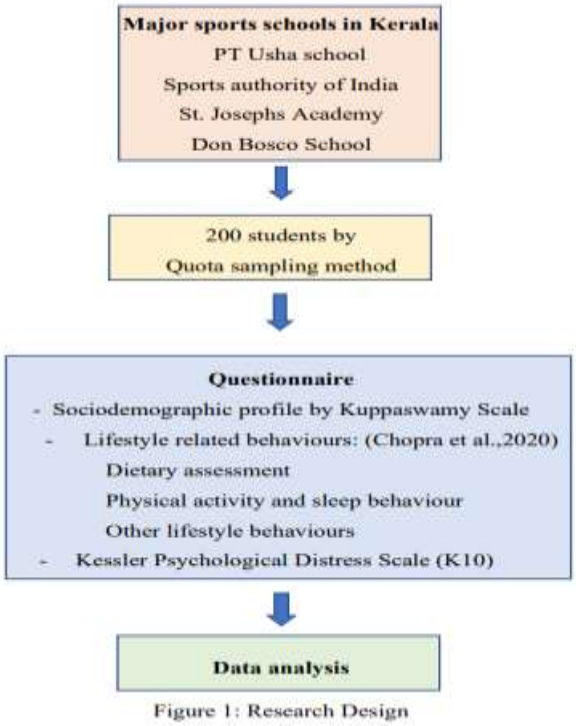

Figure 1: Research Design

3. Results And Discussions

3.1 Demographic Characteristics

The demographic profile of the participants represented in Table 1 revealed that a substantial majority of the sports students were male (78.7%), which may reflect a gender disparity in access to or participation in institutional sports training programs in the region. The age distribution indicated that more than half (55.3%) of the students were in late adolescence and early adulthood, a critical developmental stage characterized by significant physiological, psychological, and behavioral changes [8] . This age group is particularly sensitive to disruptions in routine, such as those caused by the COVID-19 pandemic, and may exhibit more pronounced alterations in lifestyle behaviors, including diet, physical activity, and mental health. Socioeconomic status (SES) classification using the Modified Kuppuswamy Scale revealed that 45% of the participants belonged to the *Upper Lower* category, followed by *Lower Middle* (23.8%), *Lower* (45%), and only 14.4% were from *Upper Middle* or *Upper* socioeconomic classes. Lower SES is often associated with reduced access to quality nutrition, healthcare, and fitness resources, which may have compounded the negative impact of pandemic-related restrictions on lifestyle behaviors. Prior research has demonstrated that socioeconomic disparities significantly influence dietary choices, physical activity levels, and health-seeking behavior, especially during times of crisis [9]. Therefore, these background characteristics likely played a critical role in shaping the dietary and lifestyle responses of the students during the pandemic period, highlighting the need for targeted interventions that are sensitive to both age and socioeconomic vulnerabilities.

Table 1: Background details of the sports students

Gender	**Percentage (%)**
Male	78.7
Female	21.3
Age in years	
Early Adolescence (11-13)	22
Mid Adolescence (14-16)	52
Late Adolescence (16-18)	59
Youth (19-21)	68
Socioeconomic status	
Lower	45
Lower middle	23.8
Upper middle	10.9
Upper	3.5

3.2 Body Mass Index and Weight Changes

Analysis of Body Mass Index (BMI) indicated that 71% of students were within the normal BMI range, while 14.9% were underweight, 13.4% overweight, and only 1% obese. Regarding weight changes during the pandemic, 43.6% of participants reported weight gain, 29.7% experienced no change, and 18.8% reported weight loss as shown in figure 2.

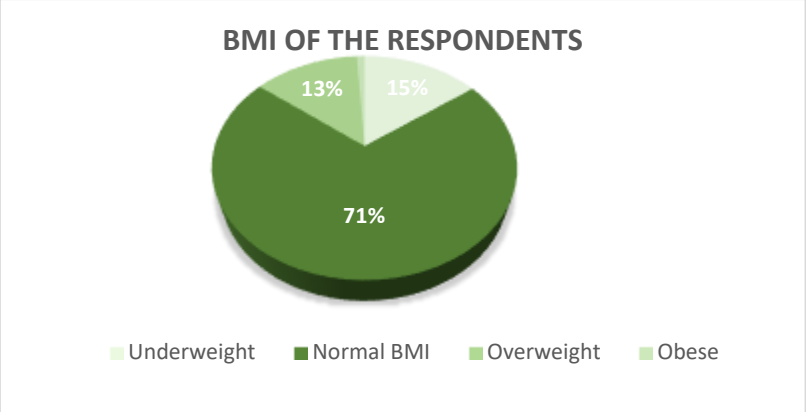

Figure 2: BMI of the respondents

Weight gain in nearly half of the respondents may be attributed to reduced physical activity due to closure of sports facilities, irregular training schedules, increased sedentary time, and elevated intake of calorie-dense foods, all of which have been widely reported during the pandemic period.[10] . Conversely, weight loss in some students could be linked to disrupted meal patterns, stress-related anorexia, or socioeconomic constraints affecting food availability[11]. These findings are in agreement with previous studies indicating that athletes, despite their baseline fitness, experienced weight instability during COVID-19 lockdowns as a result of altered routines and psychological stress.

3.3 Type of Sport and Training Routine

Given Kerala's strong football culture, football was the most common sport among participants (42.6%), followed by basketball (12.9%) and athletics (12.4%). Over 50% of students reported training for 5–10 hours per week. While 20.3% engaged in moderately intense training, a smaller proportion reported high-intensity practice. More than half (54%) had access to personal training equipment at home, whereas 46% did not. Equal proportions (36%) had and did not have access to regular coaching during the pandemic.

3.4 Changes in Lifestyle Behaviors During COVID-19

3.4.1. Dietary Habits

The analysis revealed that there was no statistically significant change in the regular consumption of meals among sports students during the COVID-19 pandemic ($P = 0.548$), suggesting that meal frequency remained relatively stable. However, a notable decline in dietary quality was observed. There was a significant reduction in the intake of key nutritious food groups, including fruits and vegetables ($P < 0.01$), pulses, eggs, or meat ($P < 0.01$), milk and dairy products ($P < 0.01$), and overall adherence to a balanced diet ($P < 0.01$). Conversely, there was a significant increase in the consumption of fast foods ($P < 0.01$) and the tendency to eat junk food due to boredom, stress, or emotional distress ($P < 0.01$). These findings, represented in Table 2, suggest a clear deterioration in dietary quality, despite consistency in meal timing. The score details are presented below, with an additional table provided in the supplementary material. These results are consistent with global observations reported during the pandemic. Ammar et al., 2020 found that confinement negatively impacted food consumption and meal patterns, with increased snacking, emotional eating, and decreased diet quality.[12] Similarly, Noll et al., 2020 reported that 45.6% of athletes skipped breakfast, 29.8% consumed sweets daily, and only 8.9% consumed fruits and vegetables regularly—highlighting a clear deviation from healthy eating patterns even among physically

active individuals. The study also found correlations between poor dietary habits and other unhealthy behaviors, including excessive screen time and weight-control practices such as laxative use.[13]
Further supporting this trend, Washif et al., 2022observed an increase in nighttime snacking (+8%), delayed meal timings (+6%), reduced fluid intake (-6%), and breakfast skipping (+7%) among athletes during lockdown, with these changes reversing during structured training camps. Huber et al., 2021 also found that 31.2% of individuals reported increased food intake during lockdown, which was associated with higher BMI, greater psychological stress, and changes in alcohol consumption, particularly among females. The observed decline in dietary quality among sports students may be attributed to a combination of reduced access to fresh foods, disrupted meal routines, increased stress, emotional coping mechanisms, and limited nutritional oversight during home confinement. These patterns raise concern as athletes' performance, immunity, and recovery are closely linked to dietary adequacy. Therefore, the deterioration in nutritional intake, despite consistent meal frequency, underlines the need for nutrition education and support systems during times of disruption to maintain athlete health and performance.[15]

Table 2: Comparison of Dietary Behaviors Among Sports Students Before and During the COVID-19 Pandemic

Question	Response Category	Before COVID-19	During COVID-19
Regular Meal Pattern	Not routinely	45 (22.3%)	63 (31.2%)
	One to two times a week	34 (16.8%)	41 (20.3%)
	Three to four times a week	24 (11.9%)	30 (14.9%)
	Five to six times a week	13 (6.4%)	10 (5.0%)
	Almost daily	86 (42.6%)	58 (28.7%)
Intake of Fast Food	Not routinely	103 (51.0%)	103 (51.0%)
	One to two times a week	74 (36.6%)	55 (27.2%)
	Three to four times a week	17 (8.4%)	27 (13.4%)
	Five to six times a week	5 (2.5%)	10 (5.0%)
	Almost daily	3 (1.5%)	7 (3.5%)
Fried Food Consumption	Not routinely	68 (33.7%)	69 (34.2%)
	One to two times a week	80 (39.6%)	75 (37.1%)
	Three to four times a week	31 (15.3%)	45 (22.3%)
	Five to six times a week	12 (5.9%)	8 (4.0%)
	Almost daily	11 (5.4%)	5 (2.5%)
Junk Food Consumption	Not routinely	94 (46.5%)	84 (41.6%)
	One to two times a week	60 (29.7%)	56 (27.7%)
	Three to four times a week	23 (11.4%)	39 (19.3%)

	Five to six times a week	14 (6.9%)	11 (5.4%)
	Almost daily	11 (5.4%)	12 (5.9%)
Milk and Milk Products	Not routinely	33 (16.3%)	34 (16.8%)
	One to two times a week	35 (17.3%)	52 (25.7%)
	Three to four times a week	33 (16.3%)	29 (14.4%)
	Five to six times a week	18 (8.9%)	23 (11.4%)
	Almost daily	83 (41.1%)	64 (31.7%)
Balanced Diet	Not routinely	29 (14.4%)	32 (15.8%)
	One to two times a week	39 (19.3%)	33 (16.3%)
	Three to four times a week	40 (19.8%)	50 (24.8%)
	Five to six times a week	28 (13.9%)	25 (12.4%)
	Almost daily	66 (32.7%)	62 (30.7%)
Fruits and Vegetables	Not routinely	23 (11.4%)	19 (9.4%)
	One to two times a week	35 (17.3%)	49 (24.3%)
	Three to four times a week	47 (23.3%)	41 (20.3%)
	Five to six times a week	21 (10.4%)	30 (14.9%)
	Almost daily	76 (37.6%)	63 (31.2%)

3.4.2 Physical Activity and Sedentary Behavior

During the COVID-19 pandemic, a significant decline was observed in moderate-intensity aerobic exercise participation ($P = 0.039$), with the proportion of individuals not exercising regularly increasing from 16.3% to 20.3%. Participation in leisure-related activities also declined significantly ($P < 0.001$), while household chores did not show a significant change ($P = 0.271$). Sedentary behaviors increased notably, as indicated by a rise in daily sitting time over 8 hours (4.0% to 8.9%) and screen time exceeding 5 hours (19.8% to 30.2%) with both trends being statistically significant ($P < 0.001$). Furthermore, breaks from sitting decreased significantly among those taking 3–4 breaks per day (34.2% to 25.7%, $P < 0.001$), suggesting reduced interruption of sedentary periods. Collectively, these findings highlight a significant shift towards a more sedentary lifestyle during the pandemic, with reduced physical activity and increased screen and sitting time as seen in Figure 3. These findings align with those reported by [16], who noted that 76% of athletes experienced reduced training during lockdown, primarily due to the inability to access teammates, appropriate facilities, or specialized equipment. Only 17% of their respondents maintained consistent training volume. Similarly, [17], in a multicentric retrospective study across 16 Spanish universities, reported a 29.5% reduction in moderate and 18.3% reduction in vigorous physical activity, accompanied by a 52.7% increase in sedentary time. Washif et al., 2022 further emphasized that fewer than 40% of athletes were able to maintain sport-specific training during lockdowns. Most athletes shifted toward general fitness and maintenance routines, with a focus on bodyweight (65%) and cardiovascular exercises (59%), often training alone (80%). There was a documented decline in training frequency (from 5–7 sessions/week to fewer than 4), session duration (from >60 minutes to <60 minutes), and sport-specific intensity, which dropped by 38%.[14] The similarities in the findings across multiple studies suggest that the lockdown period severely constrained physical activity levels among athletes, particularly those

dependent on structured institutional training environments. In this study, the reported reduction in training engagement and increase in sedentary behavior may have long-term implications for physical fitness, performance, and overall health among sports students. Addressing these gaps through adaptable home-based programs and virtual coaching could be critical in ensuring continuity of athletic development in the face of such public health crises.

Figure 3: Comparison Of Physical Activity Before and During COVID-19 Pandemic

The average number of hours of sleep per day increased significantly during the COVID-19 pandemic ($P < 0.01$). The percentage of participants reporting sleep durations exceeding 8 hours rose from 26.7% to 39.1%, with a substantial increase observed in those sleeping more than 9 hours, from 3.4% before the pandemic to 20.3% during ($P < 0.001$). Although sleep duration improved, sleep quality demonstrated only marginal gains, with a slight increase in participants reporting excellent sleep (from 23.3% to 29.2%) and a reduction in those reporting good sleep (from 39.1% to 29.2%) ($P < 0.01$) (Figure 4). Increased screen time, irregular sleep schedules, and reduced physical activity during the pandemic could contribute to both disrupted sleep and elevated psychological distress. While increased sleep duration might appear beneficial, Milewski et al. (2014) emphasized that optimal sleep quality and consistency, rather than quantity alone, are critical—especially for adolescents and young adults. Their findings suggest that individuals sleeping less than 8 hours per night were 70% more likely to report injuries, highlighting the importance of restorative sleep for physical resilience and well-being. Despite the increased sleep time, several participants reported disturbances contributing to suboptimal sleep quality. Daytime sleep (20.8%), heightened stress and anxiety (14.6%), and increased social media use (22.7%) were cited as major contributing factors. Additionally, some participants reported sleep disturbances due to shortness of breath (11.5%) and environmental noise (9.1%). Stress and anxiety levels also increased during the pandemic. The proportion of participants reporting "very much" or "extreme" stress rose from 9.5% to 15.3% ($P < 0.001$), while those reporting no stress decreased from 30.2% to 28.2%.[18] Comparable findings were reported by Cheikh Ismail Leila et al. (2020), who observed that a significantly higher proportion of participants rated their sleep quality as poor during the pandemic (29.6%) compared to pre-pandemic levels (22.1%, $P < 0.001$). Furthermore, stress-related symptoms such as physical exhaustion (increased from 18.7% to 24.9%) and emotional fatigue (from 14.1% to 27.9%) were notably elevated ($P < 0.001$), consistent with our findings of increased self-reported stress levels.[19]

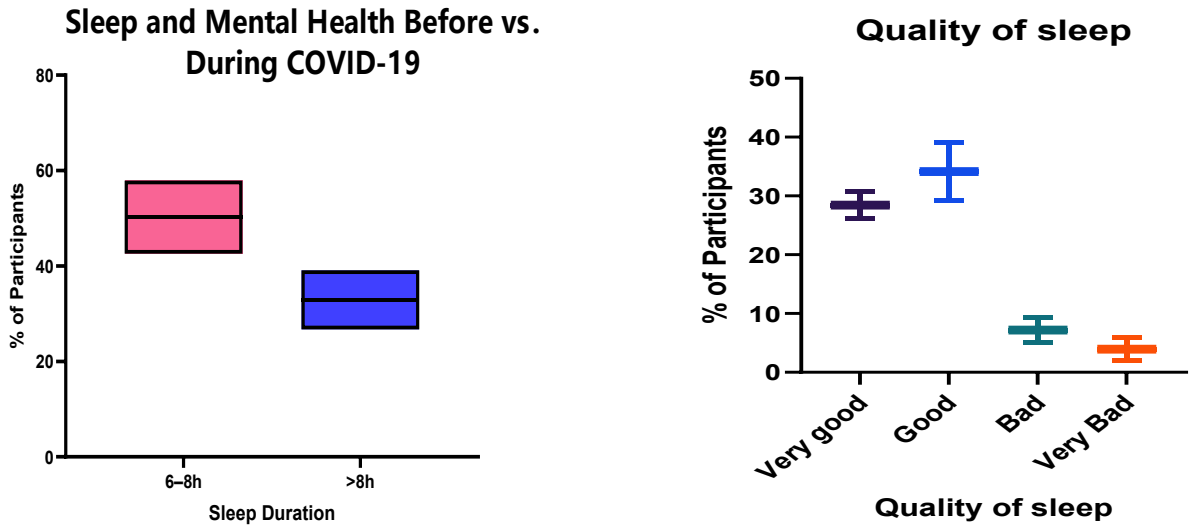

Figure 4: Comparison Of Sleep Patterns Before and During COVID-19 Pandemic

3.4.4 Mental Health and Substance Use

Analysis of participant responses revealed that a substantial proportion of students experienced elevated psychological distress during the pandemic. Specifically, 61% of the respondents scored within the mild to severe distress range (scores ≥ 20), while only 39% were classified as likely well (scores < 20). These

findings suggest that the COVID-19 pandemic significantly impacted students' mental health, with a notable portion exhibiting symptoms consistent with mental health disorders.

3.4.5 Social Support

Support from family and friends to maintain healthy lifestyle behaviors declined significantly, 3.4($P < 0.01$), which may have further exacerbated negative lifestyle trends.

4. Conclusion

The present study highlights the significant impact of the COVID-19 pandemic on various lifestyle-related behaviors, including dietary habits, physical activity, sleep patterns, and psychological well-being among sports students. The findings provide critical insights into how pandemic-related restrictions disrupted the routine of a highly disciplined and performance-driven population. The present study revealed several key findings regarding the impact of the COVID-19 pandemic on the lifestyle behaviors of sports students. A majority of the respondents were male (78.7%) and within the late adolescent and youth age group (55.3%). Socioeconomic classification using the Modified Kuppuswamy Scale (2023) [5] indicated that 45% of participants fell under the Upper Lower category, followed by 24% in the Lower Middle and 17% in the Lower category. Body Mass Index (BMI) assessments showed that 71% of students were within the normal range, while 14.9% were underweight, 13.4% overweight, and only 1% obese. During the pandemic, 43.6% of students reported weight gain, 29.7% maintained their weight, and 18.8% experienced weight loss. Dietary analysis revealed a significant decline in the intake of nutritious foods such as milk, fruits, vegetables, and protein-rich sources, along with a significant increase in fast food consumption ($P < 0.01$), although no significant change was observed in overall meal frequency. Reported barriers to healthy eating included limited cooking time (10.2%), lack of family support (8.7%), and stress-related factors (9.4%). Physical activity levels declined notably, with reduced participation in moderate-intensity aerobic and leisure activities, attributed to lack of motivation (26.8%), limited access to sports facilities (20.8%), and time constraints (16.3%). Sleep duration and screen time significantly increased, accompanied by heightened psychological stress. Contributing factors included excessive social media use (22.7%), boredom and loneliness (24.1%), and increased daytime sleeping (20.8%). Furthermore, psychological assessment using the Kessler Psychological Distress Scale (K10) [7] indicated that 61% of students experienced mild to severe psychological distress during the pandemic. In response to these findings, a set of lifestyle and wellness recommendations was compiled and shared with institutional authorities to support the health and well-being of sports students.

While this study offers valuable insights, it was not without limitations. Pandemic-related restrictions prevented in-person interviews, which limited the depth of qualitative understanding. Additionally, data collection through online surveys required repeated follow-ups, which may have influenced participation rates and response authenticity. Given these findings, there is a clear need for targeted interventions to support the health and resilience of sports students during public health emergencies. Future research should aim to distinguish the differential impacts of COVID-19 among infected and non-infected sports students, as well as conduct detailed nutritional profiling to assess dietary adequacy in this group. Longitudinal studies are also warranted to examine the long-term implications of disrupted training routines on physical performance, mental health, and emotional well-being. Based on this study, a set of actionable lifestyle and wellness recommendations was compiled and shared with institutional stakeholders to promote healthier behaviors and mitigate pandemic-induced setbacks in athletic development.

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