THE IMPACT OF COVID19 ON DIET AND LIFESTYLE AMONG SPORTS STUDENTS

Dissertation submitted to

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In partial fulfilment of the requirement for the award of the

DEGREE OF MASTER OF SCIENCE IN

FOOD SCIENCE AND NUTRITION

By

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CERTIFICATE

I hereby certify that the dissertation entitled 'The Impact of Covid19 on Diet and Lifestyle Among Sports Students' prepared and submitted by Ms. Naomi Vincent is an original research work carried out under my guidance and supervision.

Signature of the Head of the Department   **Dr. Shilpa Jose**

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DECLARATION

I hereby declare that this research work entitled 'The Impact of Covid19 on Diet and Lifestyle Among Sports Students' is an original research work carried out by me under the supervision and guidance of Dr. Shilpa Jose, Assistant Professor, Department of Home Science, St. Teresa's College Ernakulam.

Place: Naomi Vincent

Date:

ACKNOWLEDGEMENT

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I.   INTRODUCTION

In the modern era, people are generally more aware of health parameters and the role, sports and games play in developing human minds and bodies, particularly in adolescents. From an early age, parents encourage their children to participate in sports to develop healthy lifestyles and build habits for a good quality of life ahead. Sport is a type of physical activity that helps people maintain their health and avoid chronic diseases like obesity, anxiety, depression, heart attacks and diabetes. According to Ferron (1999), teenagers who participate in outdoor sports are more energetic and physically fit because they are able to burn fat and reduce calories.

Engaging in sporting activities promote good health among students, build greater stamina comparable to their peers, improve body coordination and develop muscles. They are

found to be more energetic and self-assured, attentiveness in class room is found to be better, gains greater cognitive development, thereby better academic performance and efficiency.

World Health organization (WHO,) has recommended for children and adolescents aged 5-17 to engage in 60 minutes of moderate-to-vigorous physical activity, primarily aerobic in nature to live a healthy life. Adults aged 18-64 should engage in 150–300 minutes of moderate-intensity aerobic physical activity, or 75–150 minutes of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous intensity activity.

However, a number of obstacles that prevent students from actively participating in sports. For example, due to the contemporary living style, more and more kids are interested in playing games online instead on the playgrounds. Students tend to live in the virtual world of computers ignoring the significance of physical activities needed in life. The level of physical activity further got reduced during the COVID -19 imposed locked downs when social distancing was legally enforced by governments all over the world.

First discovered in China in December of 2019, the coronavirus disease 19 (COVID-19) is a droplet transmitted by a potentially fatal coronavirus pandemic affecting the world in 2020. It is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV2), and its genomic analysis revealed that it is genetically connected to the SARS outbreak. In the span of three months, the World Health Organization declared COVID-19 as a pandemic (March 11, 2020). Large spectating crowds are well known to be an infectious hazard for COVID transmission. In order to safeguard the health of athlete's and others involved, most of the sporting events were suspended and/or postponed. Global out beak of COVID -19 has resulted in closure of gyms, stadiums, parks, playgrounds preventing individuals and teams in engaging in physical activity. Under such conditions, many tend to be less physically active, have longer screen time, irregular sleep patterns as well as worse diets, resulting in weight gain and loss of physical fitness.

Proper nutrition is essential for child and adolescent athletes to achieve optimal growth and performance in sports. A well-balanced diet rich in macronutrients (protein, carbohydrates, and fat) and micronutrients (vitamins and minerals) is required to provide adequate energy for growth and activity.   A sports person's health and performance can be improved through nutrition, by reducing fatigue, decreasing risk of injury, optimising training and enhancing

recovery. It is essential to balance energy intake and expenditure with the ingestion of necessary nutritional constituents, which is why nutrition is so important to sports person.

People participating in a general fitness programme (e.g., exercising 30–40 minutes per day, 3 times per week), their caloric demands from exercise are not too great (e.g., 200–400 kcals/session) and can typically meet nutritional needs by eating a normal diet (e.g., 1800–2400 kcals/day or about 25–35 kcals/kg/day for a 50–80 kg individual). Athletes that engage in moderate levels of intensive training (e.g., 2–3 hours per day of strenuous exercise done 5–6 times per week) or high-volume intense training (e.g., 3–6 hours per day of hard training in 1–2 sessions for 5–6 days per week) can burn 600–1200 calories per hour.

Exercise of moderate level or intense intensity for 150 minutes a week is recommended by the World Health Organization (WHO). Regular exercise has proven to be quite beneficial, especially during times of anxiety, stress, and terror.

Lack of access to exercise and physical activity increases mental health issues. Further, inaccessibility to nutritionists results in poor dietary choices. Inadequate psychological counselling increases the gravity of traumatic stress, despair, and anxiety. Potential causes for all these are possible loss of family or friends, one's own worsening economic prosperity and struggle for sustenance which in total amplify these negative impacts of the infection.

Energy expenditure during rigorous training or competition will be even higher for elite athletes and their caloric needs may approach 40–70 kcals/kg/day (2000–7000 kcals/day) for a 50–100 kg athlete. Fluids are also required for hydration. Staying hydrated increases energy, improves recovery, agility and aids in mental clarity and activity all of which can improve physical performance and reduce the risk of injury. Meal timing is critical and must be tailored to the individual.

Sleep is an important aspect in avoiding overtraining because it aids in considerable recuperation from a variety of exhausting events, including both cognitive and physiological demands. Sleep deprivation affects performance, motivation, and arousal levels, as well as cognitive functions, resulting in poor attention and concentration, as well as increased feelings of exertion and pain. Seven to nine hours of sleep, according to American Academy of Sleep Medicine, is sufficient for psychological (capacity to learn, motivation, and memory) and physiological (metabolism and inflammation) recovery. Furthermore, it has been reported that athletes need more sleep to recover from injuries, intensive training sessions and competitions.

If insufficient and/or incorrect training stimuli are given, athletes are likely to experience some level of detraining (i.e., the partial or entire loss of training-induced morphological and physiological adaptations) resulting in reduced performance and increased injury risk (e.g., ligament rupture and muscle problems). During COVID-19, due to home confinement many sports students could not undergo regular training and if a suitable sport-specific reconditioning cannot be provided upon resumption, it can result in decreased performance.

Academic, athletic, social and spiritual success of any athlete is dependent on their emotional well-being. As a result of untreated mental health issues, people suffer undue hardship as well as lose their positive outlook on life. After proper therapy, most student-athletes' psychiatric issues improve. Organized sports involvement, according to the American Psychological Association, exposes athletes to a particular mix of obstacles and conditions, which can leave them sensitive to depression or anxiety. Small daily accomplishments might help people perceive the progress of their job and boost their self-esteem.

The influence of COVID-19 lockdown measures on food pattern has been studied in a number of different population categories and countries, but no such data has been recorded among Kerala sports students. Therefore, the present study entitled 'The impact of covid19 on diet and lifestyle among sports students' was designed to assess the impact of COVID-19 on the sports students of Kerala leading to an understanding of their dietary pattern changes and life style changes during pandemic.

AIM

The aim of the study is to assess the influence of pandemic situation on diet and lifestyle among sports students.

OBJECTIVES

1. To assess the background details of sports students in selected sports schools.
2. To analyze impact of Covid on lifestyle related behaviours like dietary habits, sleep, physical activity, substance abuse and stress of Sports students.
3. To ascertain the reasons behind lifestyle changes, if any, during Covid.

4. To provide healthy recommendations for proper physical and mental health of sports students.

HYPOTHESIS

Null Hypothesis: There will not be a significant difference in lifestyle and dietary habits among sports students before and during Covid 19 pandemic.

OPERATIONAL DEFINITION

Sports student -A student of reputed sports school / college who is involved in formal training of a sports item at the institution of study.

II. REVIEW OF LITERATURE

The review of literature for the study titled **'The Impact of Covid19 on Diet and Lifestyle Among Sports Students'** is discussed under the following headings:

1. Energy Expenditure Modifications Imposed by Lockdown

2. Changes in Dietary Habits During Lockdown

3. Sleep and mental health in athletes during COVID-19 lockdown

2.1 ENERGY EXPENDITURE MODIFICATIONS IMPOSED BY LOCKDOWN

Ali Bowes et al. (2020) highlighted that 76% of respondents indicated that the amount of training during the lockdown period had decreased, with only 17% highlighting it stayed the same, and the remainder reporting changes in the volumes across different types of training. Seventy-four per cent of participants noted problems specific to their sport had affected training practices (such as not able to train with teammates, in appropriate specialist facilities, or using specialist equipment), with a further 5% describing the closure of gyms as impacting on their training practices.

A similar retrospective study of Spanish students enrolled in 16 universities, and involving a total of 13,754 valid survey responses conducted by Francis (2021), described reduced moderate (-29.5 percent) and vigorous (-18.3 percent) physical activity during confinement and increased sedentary time (+52.7 percent).

Giustino et al. (2020) observed a similar result showing a significant decrease of the total weekly energy expenditure during the COVID-19 quarantine. The responses analysis for the before COVID-19 quarantine conditions showed 49 low active participants (6%); 352 moderately active participants (44%); and 401 high active participants (50%); meanwhile, the during COVID-19 quarantine condition results showed an increase of 19% of low active participants and an increase rate of 7% of moderately active participants, with a related decrease of 26% of high active participants. The physical activity level was lower in the male group than in the female group. The young and the elderly, in instance, reported the greatest and lowest levels of physical activity before and after quarantine, respectively.

Before the implementation of the lockdown in China, Gang et al. (2021) found that low-intensity exercise was 1.32%, moderate-intensity exercise was 20.76% and high-intensity exercise was 77.92%. During the lockdown there was an increase of low-intensity exercise (2.47%) and a decrease of 0.17% after the lockdown. Moderate intensity training during lockdown saw an increase of 75.45% and an increase of 29.66% after lockdown. There was a 29.49% decrease in high-intensity training after lockdown but there was a drastic decrease in high-intensity training during lockdown.

Similar results were found in other studies. According to Washif et al. (2022), less than 40% of those in lockdown were able to sustain sport-specific training (e.g., long endurance [39%], interval training [35%], weightlifting [33%], plyometric activity [30%]), with the majority (83%) training for "general fitness and health maintenance." Athletes exercised alone

(80%) and concentrated on bodyweight (65%) and cardiovascular (59%) exercise/training during lockdown. Regardless of athlete classification, most athletes reported lower training frequency (from five to seven sessions per week to four or fewer), shorter training sessions (from >60 to <60minutes), and lower sport-specific intensity (38 percent drop) when compared to before lockdown.

Notable reductions in overall training frequency were reported in a study conducted by Jagim et al. (2020) during the COVID-19-related shutdown period. Pre-COVID-19, 83 (79%) athletes reported training 5–6 days per week compared to only 48 (45.7%) during the COVID-19-related shutdown period. Female athletes self-reported a greater decrease in time spent doing sport-specific and mobility training compared to males.

According to the study conducted by Gang et al. (2021) in Vietnam, they found that low-intensity exercise before implementation of lockdown was 14.53%, moderate intensity exercise and high-intensity exercise is 79.49% and 5.98%respectively. Low-intensity training experienced a decrease of 2.99% after implementing the lockdown and an increase of 22.22% during the implementation of the lockdown when compared to before the implementation of the lockdown. There was a decrease in moderate-intensity training by 16.24% during the implementation of the lockdown and 2.99% after the implementation of the lockdown. High-intensity training was the same as in other countries when the lockdown was implemented in Vietnam but there was an increase of 5.98% after the implementation of the lockdown.

Chandler et al. (2021), in his study of 401 American college athletes, showed that 80.7% of respondents' students indicated training for their sport, and of these, 64.6% ($n = 239$) responded they were following a specific training program. 44.6% of males ($n = 50$) and 36.1% of females reported they could fully perform their training programs, and 13.4% of males and 16.0% of females reported being unable to perform their training program at all.

According to Anne (2021) the data contradicted with the above studies showing that the COVID-19 crisis led to an increase in online training (both in groups and individually) and a decrease in training activity in sports facilities (both in groups and individually). The results also show that the athletes rated online training as 'somewhat important' for their training during the lockdown. Outdoor training activities in groups were the least impacted by the COVID-19 lockdown (50.8% before lockdown, 44.6% during lockdown), whilst the lockdown caused a small rise in outdoor individual training, from 54.9% before lockdown to 76.8% during lockdown. The data shows that 76.5% of the participating athletes had experienced

having sports competitions cancelled due to COVID-19, 54% had their training load reduced during lockdown and 70.6% experienced being less motivated for training due to the COVID-19 crisis.

In another study conducted by Jagim et al. (2020) seventy-one (67.6%) athletes reported a decrease in the level of motivation to train compared to pre-COVID-19 times, while 18 (17.1%) reported the same level of motivation to train. Sixty-nine (65.7%) athletes reported lower training satisfaction scores while only 14 (13.3%) reported the same levels of training satisfaction, compared to pre-COVID-19 times.

Ambroży et al. (2021) evaluated the differences between physical fitness before the COVID-19 outbreak and during the pandemic after re-opening sports facilities were and found out that temporary closing of sports clubs has led to the increase in body mass of the participants by 2.65 kg on average and significantly deteriorated physical fitness.

A similar study was conducted among 174 physical education students aged 18 to 29 years was enrolled in the study conducted by El Zoghbi et al. (2022) and was found that body mass of the participants increased on average by 1.9 kg in male students and 2.0 kg in female students during the three months of COVID-19 lockdown.

2.2 CHANGES IN DIETARY HABITS DURING LOCKDOWN

The COVID-19 home confinement on food consumption and meal patterns (type of food, eating out of control, snacks between meals, number of main meals) were unhealthier during confinement, with only alcohol binge drinking decreasing significantly, according to Ammar et al. (2020).

Similar results were reported in other studies as well. According to the findings by Noll (2020), 45.6 percent of the athletes missed breakfast, 29.8% consumed sweets on a daily basis, and just 8.9% consumed vegetables and fruit on a regular basis. Breakfast skipping and vomiting or using laxatives to lose weight; poor fruit and vegetable intake and taking medications to lose weight; high sweets consumption and female athletes; high sweets consumption and more than 2 hours spent watching TV found beneficial relationships.

According to the findings of a research done by Washif et al. (2021), more athletes reported higher night time snack consumption (+8%), later meal times (+6%), lower fluid

intake (6%), and no breakfast (+7%) during lockdown. During training camps, these alterations were reversed (12–18 percent improvements).

According to Huber (2021) it was found that 31.2 percent of individuals increased their overall food intake during lockdown, whereas 16.8 percent decreased. More food intake was associated with a higher BMI, increased sports activity, increased mental stress, and a change in alcohol use in female participants.

The COVID-19 pandemic has negative impacts on nutritional and alcohol intake of Masers cyclists, according to Keely et al. (2021). During the pandemic, individuals consumed less fibre, vitamin A, omega-3 fatty acids, and potassium while drinking more alcohol and taking more vitamin C but energy intake was unchanged during the pandemic.

Food consumption was observed to be greater in 36 percent of rugby athletes, according to Charlie et al. (2020). In lockdown, participants consumed fewer fruits and vegetables (17%) and consumed fewer packaged/convenience foods (41.9%). When asked how often they ate whole high-protein foods, 49.2 percent said they ate more than two times each day. 53.3 percent of respondents said they didn't use any dietary supplements throughout the lockdown.

Only 9% of the individuals met their energy demands, according to the findings, and their energy and carbohydrate intakes were below the minimum suggested amounts. Seventy-five percent of the participants did not ingest the recommended quantity of carbs to support training. The majority of the participants said they didn't have a regular breakfast, 36% said they ate 5 meals per day, and just 16% said they kept track of their water. (Shriver et al., 2013).

In a study conducted by Pillay et al. (2021) among 692 athletes they noted that even though not statistically significant, more than half of the athletes admitted to the worsening of their diet, with females significantly more than males. Excessive carbohydrate consumption was significantly more than excessive fizzy drinks, poor hydration during and after exercise, processed foods, and red meat.

Contrary to the above findings, studies conducted by Diego et al. (2021) concluded that half of the rugby players total food consumption stayed the same or increased during tha pandemic. More than half of the participants (59.1%) said they increased their consumption of healthy foods during the pandemic, with 24 percent saying they ate more fruits and vegetables, The consumption of healthy drinks has grown among the sample, with 37.7% reporting an increase in natural water consumption and 30.2 percent reporting an increase in natural juice

consumption. A lower percentage said they have increased their alcoholic beverage usage (0.6 percent).

The findings of Russo (2020) revealed that during the COVID-19 lockdown phase, young athletes were forced to stop swimming training; additionally, the recent closure of schools and increased contact with families resulted in better nutrition control, with a higher intake of fruits and vegetables and a better distribution of food throughout the day, aided by the lack of social obligations. A same amount of food consumption combined with an inversion of the fat-protein ratio resulted in a little weight gain as well as a beneficial influence on the optimum macronutrient ratio.

2.3 SLEEP AND MENTAL HEALTH IN ATHLETES DURING COVID-19 LOCKDOWN

In total, 3911 athletes study conducted by Romdhani et al. (2021) concluded that poor sleepers increased to 49% during lockdown. Additionally, 10% of athletes reported highly disrupted sleep pre-lockdown, increasing to 22% during lockdown. Pre-lockdown, 5% of athletes reported moderate or severe clinical insomnia, increasing to 15% divided into moderate 12% and severe 3%, clinical insomnia during lockdown.

According to a recent study, National Basketball Association professional athletes have scored fewer points and get fewer rebounds the day after late-night activity on Twitter. In this regard, numerous studies supported the conclusion that partial and/or total sleep deprivation impaired cognitive and physical performance among athletes (Scioscia,2015)

A similar study in ten male Taekwondo players performed the Yo-Yo intermittent recovery test (YYIRT) in three sleep conditions (reference sleep night [RN], partial sleep deprivation at the beginning of night [PSDBN], partial sleep deprivation at the end of night [PSDEN]) in a counterbalanced order, allowing a recovery period ≥36 hr in between them. The findings of this study imply that one night of PSD, whether scheduled at the start or end of the night, reduced Taekwondo players' intermittent performance (i.e., YYIRT) the following evening. (Mejri, 2016).

In another study of middle and high school athletes, Milewski et al. (2014) found that those individuals who slept less than 8 h per night on average were 70% more likely to report an injury than those who slept more than 8 h.

Throughout history, mental illness and the stigma linked to people who suffer from its effects have been a part of human existence. A study conducted in the United States by Gulliver (2012) found that 21.4% of athletes self-reported clinically significant symptoms of depression. This compares with prevalence rates of 33% in a general sample of college students, and 29.2% in community-based young adults aged 18–25 years. The high level of participation in physical activity by young elite athletes may exert a protective effect and thus yield lower prevalence rates of depression in this age group. However, there is currently insufficient evidence to evaluate this possibility.

Observing 692 athletes' mental states Pillay et al. (2021), revealed that 52 percent of the athletes experienced depression at some point, with females reporting a much greater proportion. Female athletes reported more energy loss and a lack of motivation than male athletes, despite the fact that 54 percent of all athletes did not report energy loss and 55 percent struggled to stay inspired. Most respondents reported no change in libido, while males reported considerably higher libido than females. Many athletes were not aware of online psychological and mental health programmes; however, females were significantly more mindful.

According to Nieman et al. (2019) periods of isolation and confinement away from training, reduced access to daily requirements, financial constraints and the sense of insecurity can lead to psychological stress and anxiety. This may lead to elevated levels of glucocorticoids which will inhibit many critical functions of our immune system, resulting in increased host susceptibility to infections and non-communicable diseases (NCD).

Jelena Soki (2021) performed two research on distinct samples to evaluate the mental health components of psychological distress and subjective well-being. The results of Study 1 revealed that exceptional athletes and people who engage in a lot of physical exercise had the least amount of distress. Furthermore, the effects of changes in the training routine on distress among physically active individuals differed depending on the level of sports participation, with elite athletes who reduced trainings showing less anxiety than recreational athletes who reduced trainings or maintained the same training routine. Results of Study 2 revealed that while all the participants had decreased well-being during the curfew, compared to the period before the pandemic and the curfew, there were no differences in well-being between elite and recreational athletes, who had higher well-being compared to non-athletes.

III. METHODOLOGY

The methodology pertaining to the study **'The Impact of Covid19 on Diet and Lifestyle Among Sports Students' is** given under the following heads:

3.1 Selection of the subjects

3.2 Selection of the tool

3.3 Collection of the data

3.4 Analysis of the data

3.1 Selection of the subjects

For the purpose of the study, sports students in Kerala were chosen as subjects, as few studies have been conducted among the sports students in Kerala. Among the total number of sports students, students of reputed sports schools / colleges who were involved in formal training of a sports event at the institution was selected as the population. As the number of total sports students were large, quota sampling method was selected to select the sample size.

In quota sampling, participants or locations are selected nonrandomly according to a fixed quota or percentage of the population based on one or more characteristics. The quota selected may be proportional or nonproportional to the actual population distribution. From total number of sports schools in Kerala, PT Usha school, Sports authority of India schools, St. Josephs Academy, Don Bosco School, were selected as they volunteered to be part of the study. All sports students of these schools who were willing to be part of the study were included.

3.2 Selection of the tool

The tool selected for the present study was a self-formulated questionnaire. Questionnaires provide a quick and efficient way of eliciting information from a large sample of people. It was a validated questionnaire based on information collected from previous research journals and articles. The questionnaire consisted of the various aspects related to background information and demographic profile of the subjects, dietary intake, physical training among sports students and also questions related to sleep and mental health status.

The sociodemographic profile was determined using Kuppaswamy scale. This is the most often used scale for measuring a family's socioeconomic status in a urban family. Kuppaswamy scale was developed for assessing the SES of an urban individual. It took three parameters into account - education, occupation and income of the individual.

The lifestyle behaviours were assessed using a validated questionnaire prepared by Chopra et al. (2020) of AIIMS, New Delhi assessed the significant aspects of eating, activity and sleep behaviour specific to COVID-19.

Physical training was assessed using a validated questionnaire which assessed intensity, frequency, and session duration on their training before and during lockdown (Washif et al.,2021).

To measure psychological distress during the pandemic, the 10 items from the Kessler Psychological Distress Scale (K10) were employed. The K-10 was created and validated as a screening tool for determining the risk of common mental illnesses among the general public (Kessler et al., 2002).

3.3 Collection of the data

Before participating in the study, all participants were fully informed about the study requirements and data confidentiality under sharing and privacy policy. Participants filled out a survey that was directly linked to the Google platform and also filled the form through the offline mode. To safeguard and protect confidentiality, participants' personal information, including names, were not recorded.

The investigator developed the questionnaires and a questionnaire link was shared using Google Forms, through WhatsApp and email. Participants were asked to answer questionnaires lifestyle-related changes experienced during COVID-19 in comparison with pre-pandemic behaviours and also the probable reasons for these changes. The data was also collected through the offline forms by directly administering to the sports students at their institutions.

3.4 Analysis of the data

The gathered data from the selected samples was tabulated and consolidated using SPSS version 23. The comparison of nutritional and health profile before and during covid 19 lockdown was done using the Statistical Test called t-test for Single Mean. Scores were computed from the questionnaire as suggested by Chopra et al. (2020) using the Likert scale of 1- 5. A score of 1 being least acceptable behaviour and 5 being the most acceptable behaviour. Tables and figures were presented to arrive at conclusion. Figure1 presents the Research Design of the study.

Major sports schools in Kerala

PT Usha school

Sports authority of India

St. Josephs Academy

Don Bosco School

200 students by

Quota sampling method

Questionnaire

- Sociodemographic profile by Kuppaswamy Scale

- Lifestyle related behaviours: (Chopra et al.,2020)

Dietary assessment

Physical activity and sleep behaviour

Other lifestyle behaviours

- Kessler Psychological Distress Scale (K10)

Data analysis

Figure 1: Research Design

IV. RESULTS AND DISCUSSION

The results of the study entitled **'The Impact of COVID 19 pandemic on the lifestyle changes among Sports Students'** is discussed under the following headings:

4.1 Background details of sports students

4.2 Impact of covid 19 pandemic on lifestyle related behaviours

    4.2.1   Dietary assessment

    4.2.2   Physical activity and sleep behaviour

4.1   BACKGROUND DETAILS OF SPORTS STUDENTS

In a survey, demographic questions allow researchers to learn more about their respondents. These questions provide context for the collected survey data, allowing researchers to describe their participants and better analyse their data. Background information include age, gender and socioeconomic status.

Table 1: Gender and age details of subjects

Gender	Frequency	Percentage (%)
Male	159	78.7
Female	43	21.3
Age of sports students*		
Early Adolescence (11-13)	22	10.9
Mid Adolescence (14-16)	52	25.9
Late Adolescence (16-18)	59	29.4
Youth (19-21)	68	33.8
Total	202	100

*PAHO classification,2005 (WHO)

More than three fourth (78.7%) were males. Students were of age ranging 11 to 21yrs. However, majority (55.3%) of the students were under the category of late adolescence and youth. Figure 2 and 3 presents gender and age of the subjects.
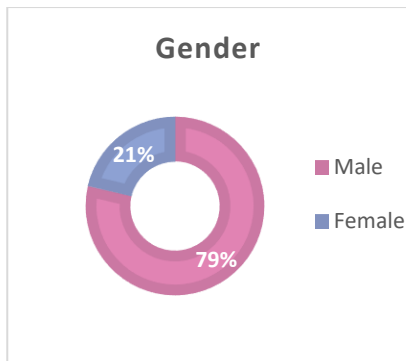
Figure 2: Gender of subjects
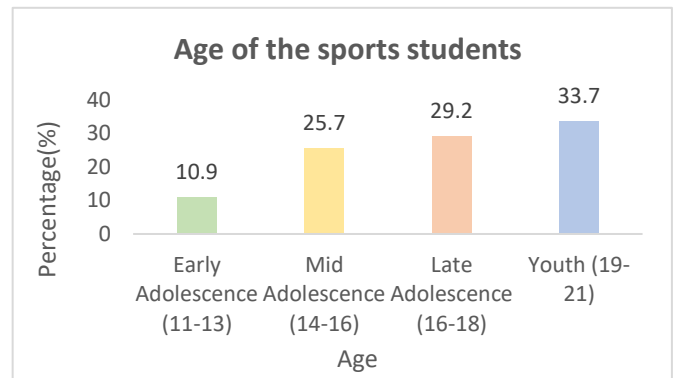
Figure 3: Age of subjects

- **Socioeconomic status**

One of the most important elements impacting a country's health is its socioeconomic status level (SES). It is a measure of an individual's or family's social and economic status, and it has significant influence on an individual's or family's health, educational achievement, food, and lifestyle, among other things. Citizens' per capita income is a fundamental determinant of the population's socioeconomic status. Kuppaswamy scale as given below is used to explain the socioeconomic status of the participants. The total score of Kuppuswamy SES ranges from 3 to 29 and it classifies families into 5 groups, upper class, upper middle class, lower middle class, upper lower and lower socio-economic class based on Consumer Price Index (CPI).

Table 2: Socioeconomic status of Students

Socioeconomic status	Frequency	Percentage (%)
Lower (*01-04)*	34	16.8
Upper lower (*5-10)*	91	23.8
Lower middle (*11-15)*	48	45.0
Upper middle (*16-25)*	22	10.9
Upper (*26-29)*	7	3.5
Total	202	100

Majority of the participants (45%) were classified under the Upper Lower Category followed by Lower Middle and Lower-class Category with 24% and 17% respectively. Only 14.4% belonged to upper middle- or upper-class category. Figure 4 presents socioeconomic status of the subjects.
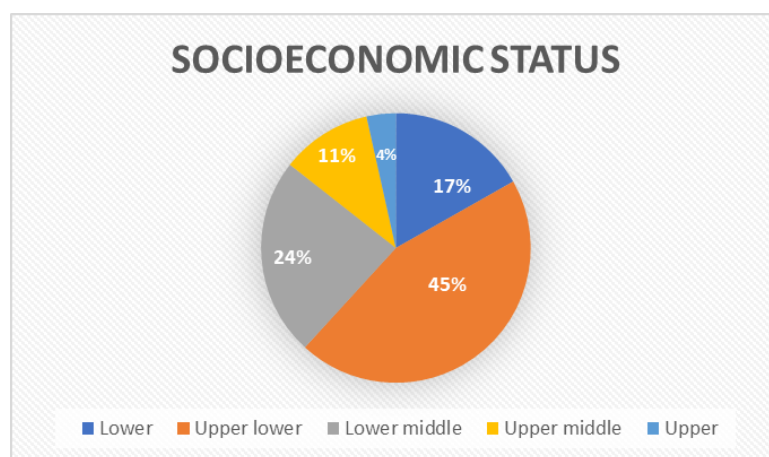
Figure 4: Socioeconomic status of subjects

Table 3: Type of Sports involved by subjects

Type of sport	Frequency	Percentage (%)
• **Power events**		
Martial arts	21	10.4
Kabaddi	4	2.0
• **Endurance events**		
Athletics	25	12.4
Swimming	5	2.5
Badminton	3	1.5
• **Team events**		
Football	86	42.6
Cricket	11	5.4
Volleyball	21	10.4
Basketball	26	12.9
Total	202	100.0

Kerala being a football ardent state in India, we can see that majority of the students were getting trained in football - (42.60%) which was followed by basketball - (12.9%) and athletics - (12.40%). The data reveals that there is preference for team games to individual events. Figure 5 presents type of sport played by the subjects.
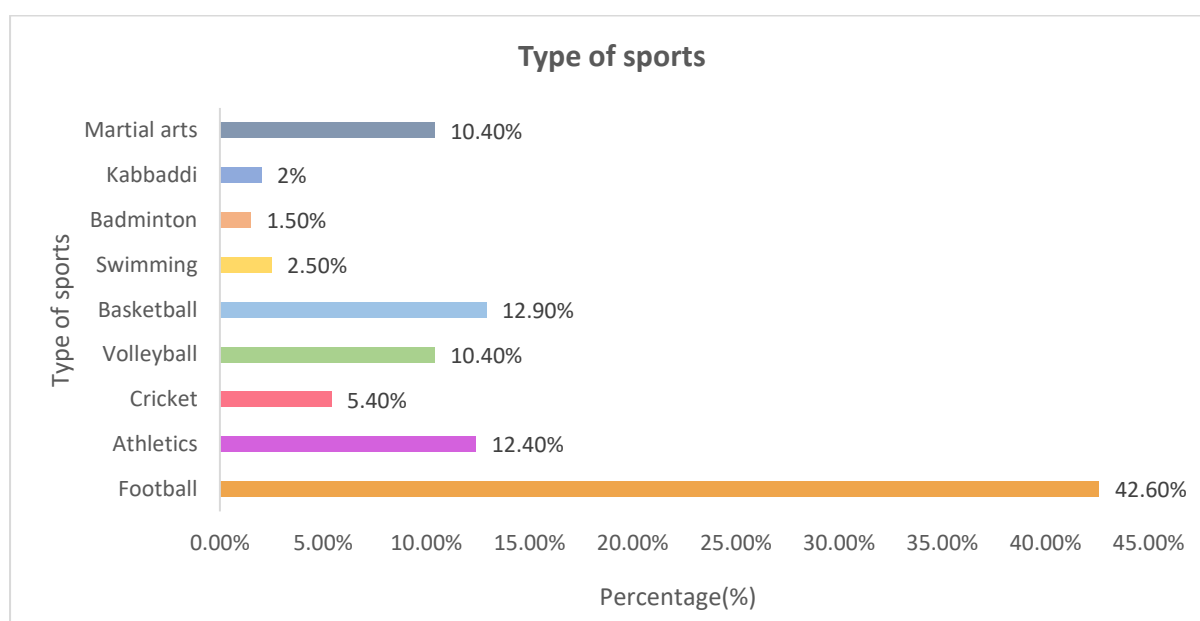
Figure 5: Type of Sports involved

Table 4: Years of experience in sports

Years	Frequency	Percentage (%)
1-3	51	25.2
4-6	102	50.5
7-9	40	19.8
10-12	7	3.5
13-15	2	1.0
Total	202	100.0

More than half of the subjects (50.5%) had 4 to 6 years of training in their respective sports and 25.2% of the respondents had 1 to 3 years of experience. Almost one-fifth (19.8%) of the subjects had experience in the range of 7 to 9 years. Figure 6 presents the years of sport experience by students.
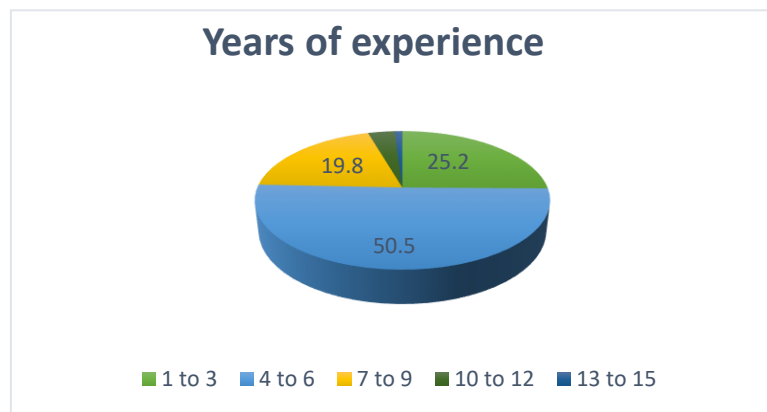
Figure 6: Years of sport experience by students

- **Anthropometric Assessment**

An Expert Consultation Group formed by World Health Organization (WHO) in 1993 adopted a consistent BMI classification. The Body Mass Index (BMI) classifications were Chronic Energy Deficiency (CED), normal, overweight, and obese. The BMI is computed by dividing the self-reported body weight (kg) by the squared height (m2).

Table 5: Body Mass Index of the sports students

Body Mass Index	Frequency	Percentage (%)
CED (<18.5)	30	14.9
Normal BMI (18.5-24.9)	143	70.8
Overweight (25-29.9)	27	13.4
Obese (>30)	2	1.0
Total	202	100.0

The data revealed that majority of the sports students (71%) were under the category of normal range of BMI, while the prevalence of underweight and overweight was very low (14.9% and 13.4% respectively) and only one percent was found to be obese. Figure 7 presents Body Mass Index of the subjects.
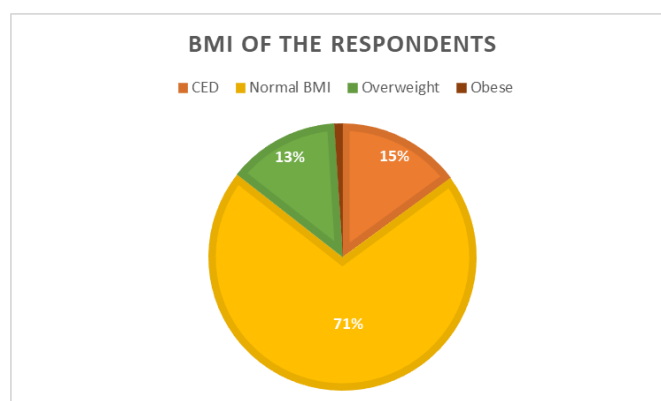
Figure 7: BMI of the respondents

Table 6: Change in Body weight of subjects during pandemic

Weight change	Frequency	Percent
Gain weight	88	43.6
Lost weight	38	18.8
Stable weight	60	29.7
Don't know	16	7.9
Total	202	100.0

Significant percentage of respondents (43.6%) gained weight, 29.7% experienced no weight change, and 18.8% lost weight. These results are contradictory to report, by Palmer et

al. (2021) in which half of the adolescents (50.7%) experienced no weight change, 27.5% gained weight, and 21.9% lost weight during the pandemic. Figure 8 presents the change in weight of subjects as observed in the present study.
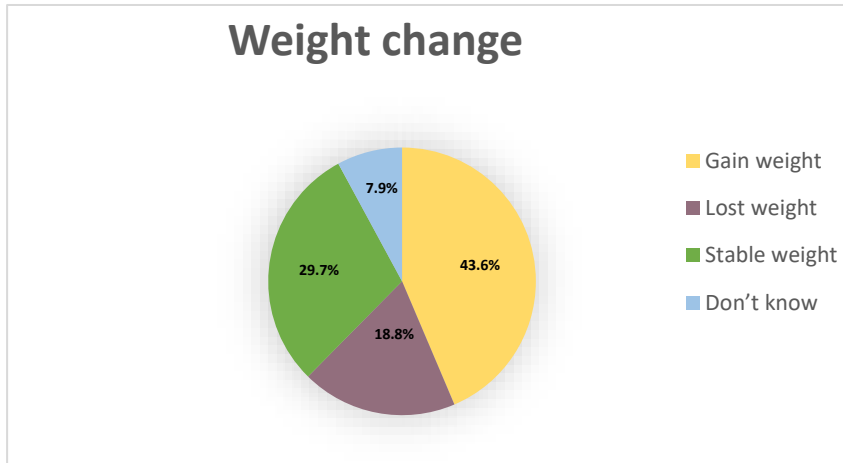
Figure 8: Change in weight of the subjects

- **Physical Training**

The objective was to explore the training related knowledge, beliefs and practices of sports students and the influence of pandemic enforced lockdowns on these parameters.

Table 7: Training details of sports students

Parameters	Frequency	Percentage (%)
Physical Training time(hrs/week)		
5-10	120	59.4
11-15	41	20.3
16-20	21	10.4
21-25	9	4.5
More than 25	11	5.4
Equipment Availability at home		
Yes	109	54.0
No	93	46.0
Coaching Support at school	74	36.6
Yes	74	36.6

No	54	26.7
Sometime	202	100.0
Total		

More than half of the students participated in 5-10 hours of training per week which a few (20.3%) who did moderately intense practice. Those who did high intense practice were lesser. More than half of the participants (54%) had equipment to do the physical training at home while 46% did not have the access to personal equipment's. Equal percentage of subjects (36%) reported having and not having access to regular coaching at school. The remaining participants only had access to coaching occasionally (26.7%). Figure 9 presents the physical training time of the sports students.

Physical training time (hrs/week)

Hrs/week	Percentage
More than 25	5.4
21 to 25	4.5
16 to 20	10.4
11to15	20.3
5 to 10	59.4
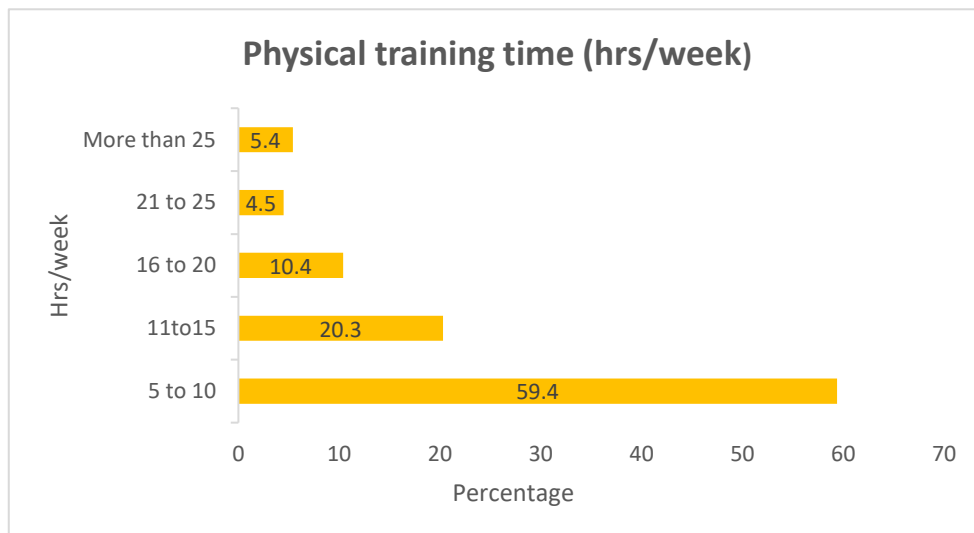
Figure 9: Physical Training time(hrs/week)

- **Athlete practices during lockdown**

Table 8: Training strategies during pandemic

Sl.no	Training Strategies	Frequency*	Percentage
1.	Own training programe	73	24.3%
2.	Training programe with coach or trainer	49	16.3%
3.	Combined own training and coach or trainer	80	26.6%
4.	Found training material from an external source	99	32.9%
5.	Total	301	100.0

*Multiple responses

During pandemic, all students were at home. Therefore, the training strategy adopted by them was important. 32.9% of the students found training material from an external source followed by 27% who combined own training and online coach assisted training as the strategy during pandemic.

Table 9: General purpose of training

Sl.no	Practice Objectives	Frequency*	Percentage
1.	To maintain general fitness	60	12.0%
2.	To maintain or develop skill or technique	36	7.2%
3.	To maintain or develop strength and power	47	9.4%
4.	To maintain or develop muscular endurance	48	9.6%
5.	To maintain or develop abdominal strength	63	12.6%
6.	To maintain or develop aerobic fitness	70	14.0%
7.	To maintain or develop general flexibility	49	9.8%
8.	To improve muscle balance	61	12.2%
9.	Weight management	65	13.0%
	Total	499	100.0

*Multiple responses

Most of students did training to maintain aerobic fitness (14%), maintain weight management (13%), maintain general fitness, improve muscle balance and maintain abdominal strength (12%) even during the lockdown days.

Table 10: Types of Training during lockdown

Sl.no	Types of Training	Frequency*	Percentage
1.	Body weight-based exercise	120	26.8%
2.	Weight lifting	55	12.3%
3.	Technical skills	93	20.8%
4.	Imitation or simulation of techniques	64	14.3%
5.	Cardiovascular training	43	9.6%
6.	Plyometric training	73	16.3%
7.	Total	448	100.0

*Multiple responses

Participants were majorly involved in various types of training such as body weight-based exercise (26.8%), technical skills (20.8%) and plyometric training (16.3%), weight lifting, imitation techniques and cardiovascular training also reported.

Table 11: Physical Activity among subjects

Sl.no	Reasons	Frequency*	Percentage
1.	At home aerobics	83	15.5%
2.	Yoga	76	14.2%
3.	At home workout	75	14.0%
4.	Gyming	88	16.4%
5.	Walks	92	17.2%
6.	Dancing	58	10.8%
7.	Not doing any activities	64	11.9%
	Total	536	100.0

*Multiple responses

Students were involved in various activities such as walking (17.2%), doing home workout sessions and yoga (14%) and gyming (16%) while rest of them did dancing (10.8%) and it was interesting to note that 12% did not involve in any of the activities.

4.2   IMPACT OF COVID 19 PANDEMIC ON LIFESTYLE RELATED BEHAVIOURS

During the pandemic, changes in several lifestyle-related behaviours such as food habits, physical activity, and sleep patterns were evaluated. Meal pattern, portion size, frequency of meals, food category, consumption pattern, emotional eating, and intake of high fat, salt, and sugar (HFSS) foods and sugar-sweetened drinks (SSB) consumption were all included in the eating behaviour domain. The physical activity pattern domain has six questions that focus on diverse aspects of activity such as aerobic exercise, leisure-related activity, sitting, and screen time. Sleep patterns, daily stress levels and stress-related addictive behaviours like smoking and drinking also analyzed.

4.2.1 DIETARY ASSESSMENT

Table 12: Change in regular meal pattern during pandemic

Regular Meal intake	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
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	-0.50(-0.04)	0.548^{ns}
Five to six times a week	13	6.4	10	5.0		
Almost daily	86	42.6	58	28.7		
Total	202	100.0	202	100.0		
Mean	3.3(1.658)		2.8(1.619)			

ns   Not significant

During pandemic, the habit of eating meals at regular intervals got reduced (42.6 % vs 28.7 %) while the habit of irregular eating of meals increased (22.3% vs 31.2%). Eating regular meals only one to two times a week and three to four times a week increased by 4 to 5%. However, the difference was statistically insignificant. (P >0.5).

In another study conducted among the general population of age group between 18-25 years of subjects consuming five or more meals per day increased significantly from 4.9% pre-COVID-19 to 12.3% during COVID-19 ($P< 0.01$). Also, there was a decrease in the percentage of individuals skipping breakfast on most days of the week from 36.3% pre-COVID-19 to

31.9% during the pandemic (P < 0.01). (Leila et al., 2021). Figure 10 presents the change in regular meal pattern by sports students.
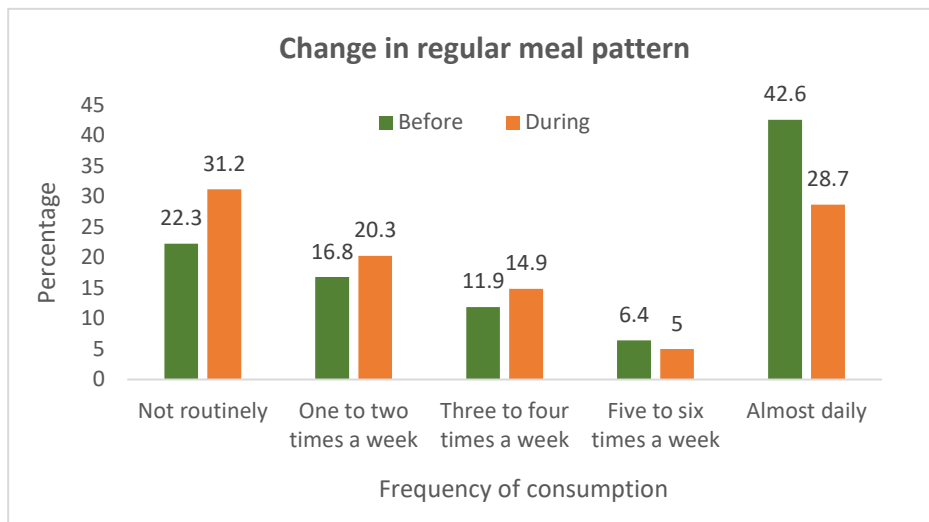
Figure 10: Change in regular meal pattern by subjects

Table 13: Fast-food consumption during pandemic

Fast food consumption	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
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	0.16(0.21)	0.000***
Five to six times a week	5	2.5	10	5.0		
Almost daily	3	1.5	7	3.5		
Total	202	100.0	202	100.0		
Mean	3.31(1.458)		3.26(1.447)			

There was a modest increase in the frequency of unhealthy eating behaviours such as fast-food intake (1.5 % vs. 3.5 %). Students who did not consume fast foods routinely maintained the good habit. However, majority of the subjects reported increased frequency of

fast-food intake. However, the t-test revealed that intake of unhealthy food items such as fast food significantly increased during COVID-19. (P <0.01).

Contradictory to the above study, Chopra et al. (2020) conducted the study among Indian population with a mean age of 33 years during the pandemic and reported that population refraining from unhealthy eating behaviours such as consumption of fast food (64.1% *vs* 81.6%) increased. The intake of unhealthy food items such as fast food (P < 0.001) significantly declined during pandemic. Figure 11 presents the fast-food intake of sports students.
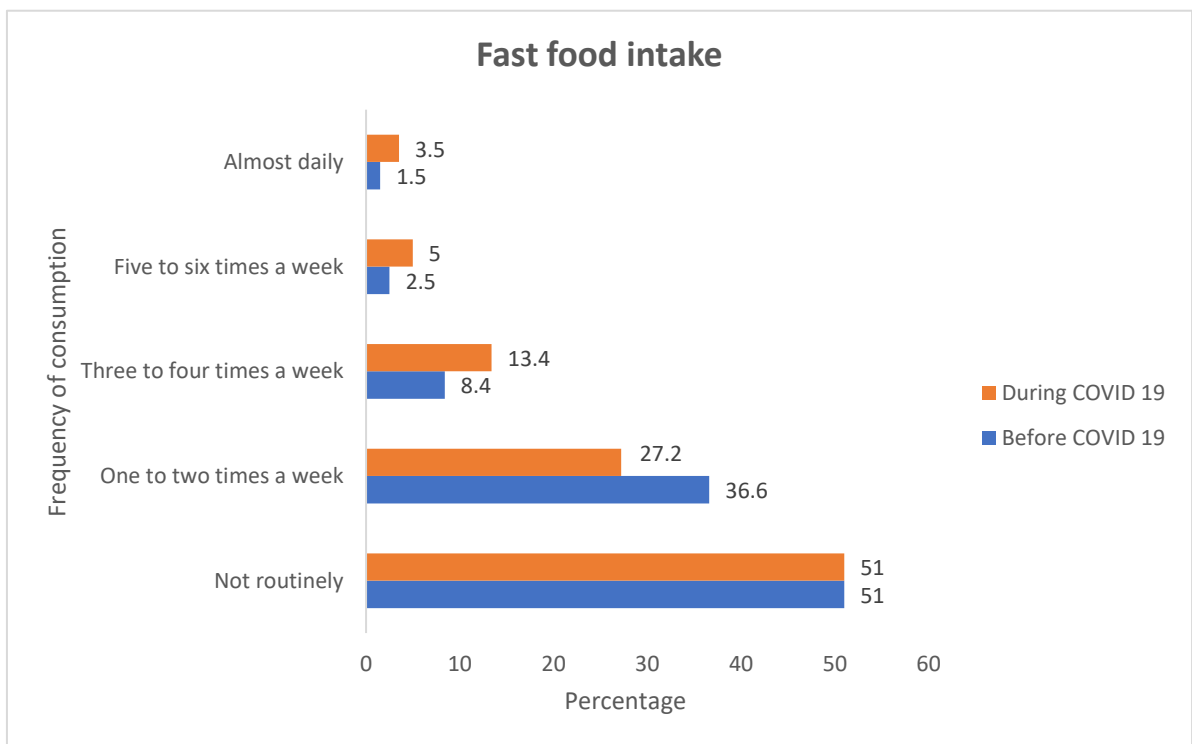
Figure:11: Fast food intake pattern

Table 14: Frequency of fruit and vegetable intake

	Before COVID 19	During COVID 19		t-Test

Intake of fruit and vegetable	Frequency	Percentage	Frequency	Percentage	Δ Change (Dur – Bef) Mean (SD)	P-value
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	-0.12(-0.05)	0.000***
Five to six times a week	21	10.4	30	14.9		
Almost daily	76	37.6	63	31.2		
Total	202	100.0	202	100.0		
Mean	3.46(1.428)		3.34(1.381)			

*** Significant at 1% level

During pandemic, participants reported a decrease in the frequency of intake of fruit and vegetables regularly (37.6% vs 31.2%) Frequency of fruit and vegetables intake (P< 0.01) had significantly reduced during the pandemic.

According to Charlie et al. (2020) participants consumed fewer fruits and vegetables (17%) and consumed fewer packaged/convenience foods (41.9%) during the lockdown. In another study conducted among the population age between 18-25 years by Leila et al. (2021) it was found that 44.7% of the participants did not eat fruits every day and 35.3% did not eat vegetables daily.

Participants reported marginal improvement in the frequency of consumption of different food groups such as fruits and vegetables (34 *vs* 38%) and showed a significant improvement in healthy eating in terms of frequency of your fruits and vegetables intake (P < 0.05). (Chopra et al.,2020). Figure12 presents the pattern of fruit and vegetables consumption by sports students.
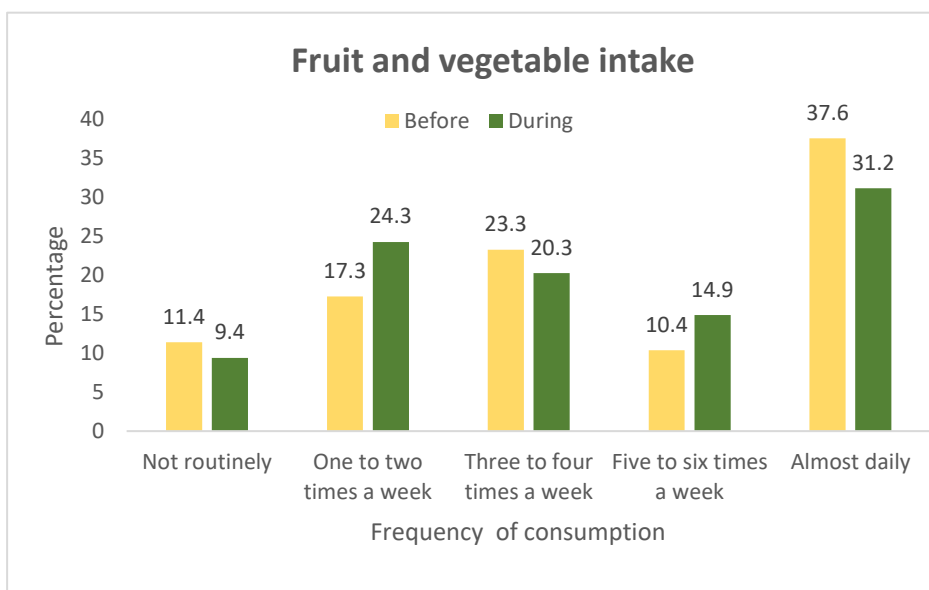
Figure 12: Frequency of fruit and vegetable intake

Table 15: Frequency of the consumption of balanced diet

Balanced diet	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
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	-0.05(-0.01)	0.000***
Five to six times a week	28	13.9	25	12.4		
Almost daily	66	32.7	62	30.7		
Total	202	100.0	202	100.0		
Mean	3.31(1.458)		3.26(1.447)			

*** Significant at 1% level

Consumption of balanced diet had significantly (P < 0.01) reduced during the pandemic. A small decrease in daily adherence to a well-balanced diet (32.7 % vs 30.7 %) was obvious. Figure 13 presents the frequency of the consumption of balanced diet.
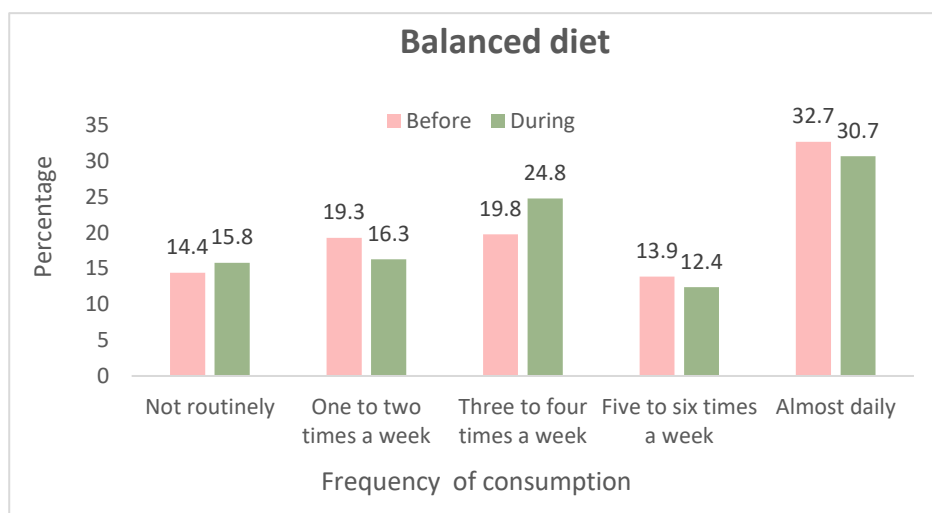
Figure 13: Pattern of balanced diet intake

Table 16: Frequency of consumption of different food Groups

	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
Intake of milk and milk products	83	41.1	64	31.7	-0.26(-0.03)	0.000***
Consumption of protein foods	56	27.7	49	24.3	-0.16(0.03)	0.000***
Consumption of high sugar foods	9	4.5	6	3.0	-0.17(-0.09)	0.000***

*** Significant at 1% level

During pandemic, participants reported a decrease in the frequency of intake of milk and its products regularly (41.1% vs 31.7%). The decrease in the frequency of consumption of milk and its products (P<0.01) was statistically significant.

During COVID-19, participants reported a decrease in the frequency of intake of protein foods regularly (27.7% vs 24.3%) while students who did not consume protein sources regularly increased (9.9% vs 13.9%). Students who consumed pulses, meat or egg one to two times a week remained the same (20.8%). Thus, the frequency of pulses, meat or egg intake (P < 0.01) has significantly reduced during the pandemic.

Contradictory to the above, a study conducted by Chopra et al. (2020) observed among participants of mean age 33 years showed there was significant improvement in consumption of pulses, egg or meat (P< 0.05) during the pandemic.

It was also noted that intake of high sugar foods (P <0.01) significantly reduced during pandemic, Similar results conducted among swimmers were reported by Newbury et al. (2022) that a 37% reduction occurred from before to during lockdown (p = 0.038) on sugar intakes, and returned to similar levels after lockdown had ended (p = 0.223). Figure 14-16 presents the consumption pattern of milk and milk products, protein foods, high sugar foods respectively.

Consumption of milk and milk products

Frequency of consumption (y-axis), Percentage (x-axis)

Frequency of consumption	During	Before
Almost daily	31.7	41.1
Five to six times a week	11.4	8.9
Three to four times a week	14.4	16.3
One to two times a week	25.7	17.3
Not routinely	16.8	16.3
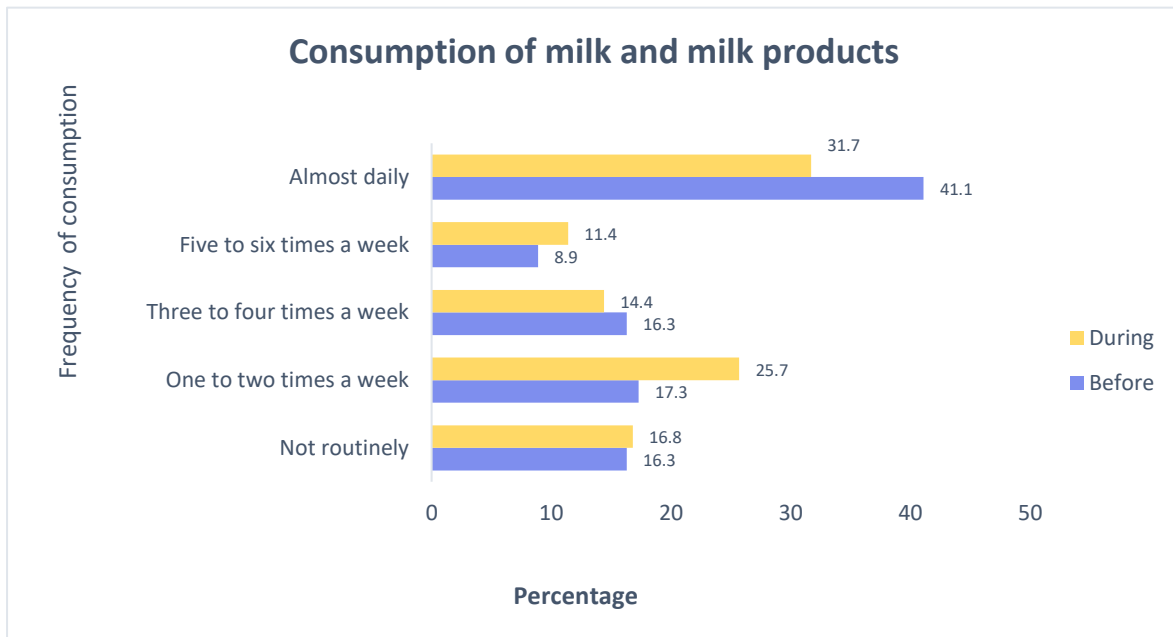
Figure 14: Intake milk and milk products
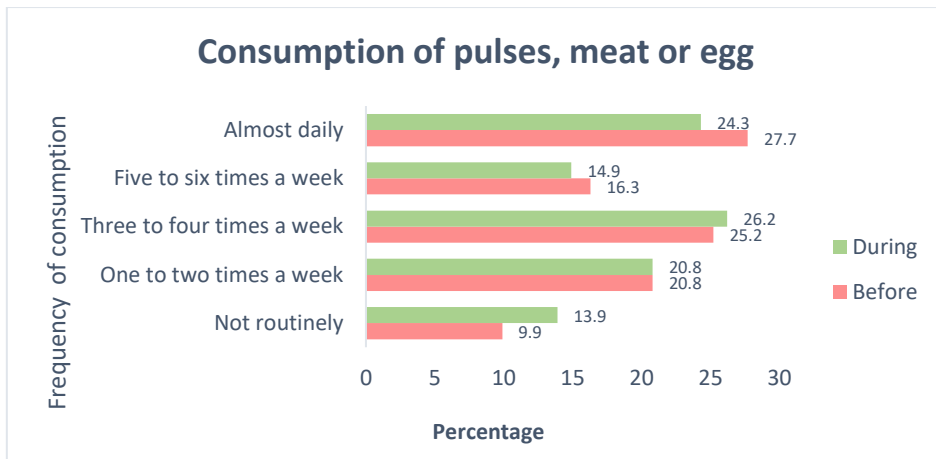
Figure 15: Consumption pattern of pulses, egg or meat
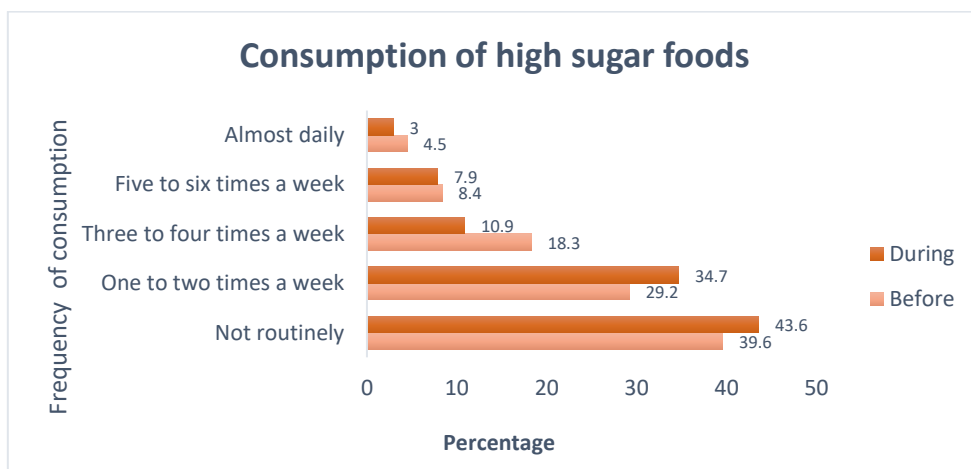
Figure 16: Consumption pattern of high sugar foods

Table 17: Emotional eating behaviour during pandemic

Emotional eating	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
Not routinely	113	55.9	83	41.1		
One to two times a week	52	25.7	56	27.7		
Three to four times a week	26	12.9	36	17.8	0.39(0.22)	0.000***
Five to six times a week	6	3.0	15	7.4		
Almost daily	5	2.5	12	5.9		
Total	202	100.0	202	100.0		
Mean	1.7(0.973)		2.09(1.191)			

***Significant at 1% level

Emotional eating (EE) is characterized by episodes of binge eating to cope with unwanted feelings or serve as a positive reward, and the binges are often followed by feelings of guilt or loss of control. There are many physical and psychological factors that influence eating behaviours. Psychological eating factors include stress, depression, anxiety, body dissatisfaction, low self-esteem/self-efficacy and a preoccupation with food, weight, and body shape.

Based on the data tabulated and the statistical t-test using the single mean, it was derived that there was a significant increase ($P<0.01$) in eating due to boredom. This can be correlated with the results of the statistical analysis conducted by Ozen et al. (2021) revealed that there was a significant relationship between negative mood and emotional eating ($P<0.05$). Figure 17 presents the emotional eating pattern during pandemic among sports students.
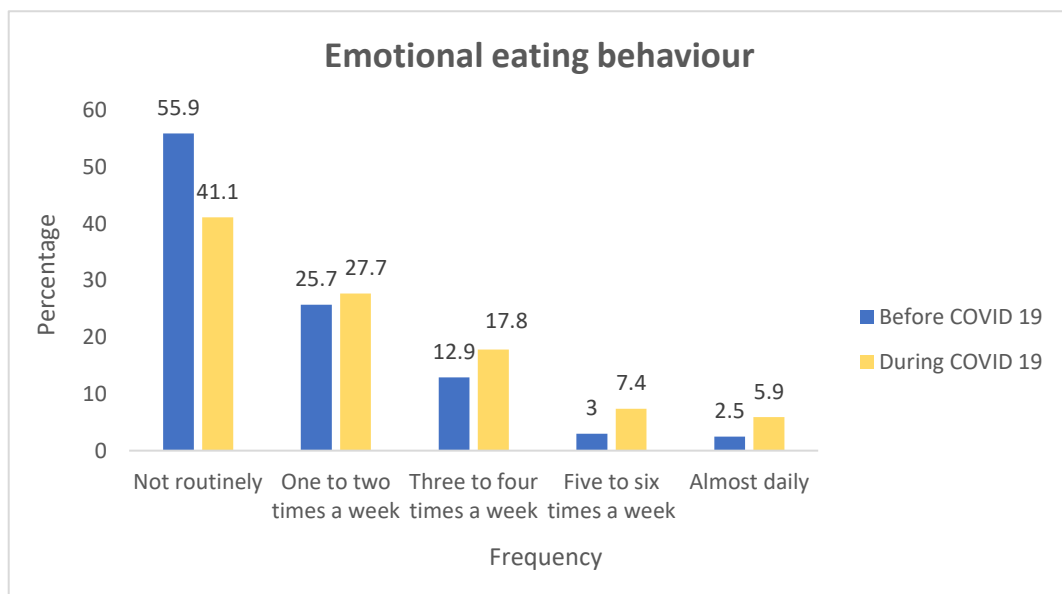
Figure 17: Emotional eating pattern during pandemic

4.2.2 PHYSICAL ACTIVITY AND SLEEP BEHAVIOUR

Table 18: Frequency of participation in intensity aerobic exercises

Participation in physical activity	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
Not routinely	33	16.3	41	20.3		
One to two times a week	31	15.3	46	22.8		
Three to four times a week	47	23.3	43	21.3	-0.33(0)	0.039**
Five to six times a week	21	10.4	18	8.9		
Almost daily	70	34.7	54	26.7		
Total	202	100.0	202	100.0		
Mean	3.32(1.486)		2.99(1.486)			

** Significant at 5% level

In the physical activity space, there was an increase in the number of people who did not exercise for 30 minutes on a regular basis (16.3 % vs 20.3 %). Participation in moderate intensity aerobic exercises declined significantly ($P < 0.05$).

Similarly, in another study conducted among adolescents in the physical activity domain, an increase in participants not routinely exercising for 30 min was observed (38.5% vs 50.5%). Although, participants exercising more than three days a week (45.4% vs 45.2%) before the pandemic maintained the habit of exercising during the pandemic as well. Participation in moderate intensity aerobic exercises declined significantly ($P < 0.05$). (Leila et al., 2021). Figure 18 presents the frequency of participation in aerobic exercises.
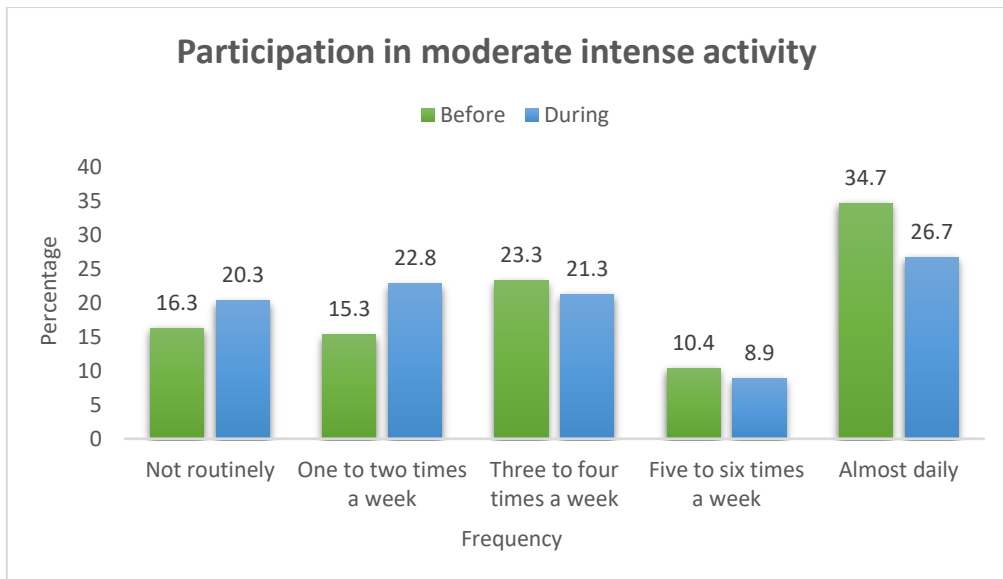
Figure 18: Frequency of participation in aerobic exercises

Table 19: Participation in leisure related activities during the pandemic

Participation in leisure	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
Not routinely	45	22.3	56	27.7		
One to two times a week	56	27.7	57	28.2		
Three to four times a week	52	25.7	40	19.8	-0.11(0.05)	0.000***
Five to six times a week	22	10.9	22	10.9		
Almost daily	27	13.4	27	13.4		
Total	202	100.0	202	100.0		
Mean	2.65(1.304)		2.54(1.353)			

***Significant at 1% level

Participants who engaged in leisure-related activities almost daily before and during pandemic (13.4% and 13.4%) maintained their habit. But the frequency of leisure related activity participation generally decreased and this was found to be statistically significant (P < 0.01).

Similarly, a study conducted among the adolescents showed that participants refraining from routine involvement in leisure-related physical activity increased by more than double (29.4% vs 65.9%) during the pandemic. (Leila et al., 2021). Figure 19 presents the pattern of participation in leisure related activities among the subjects.
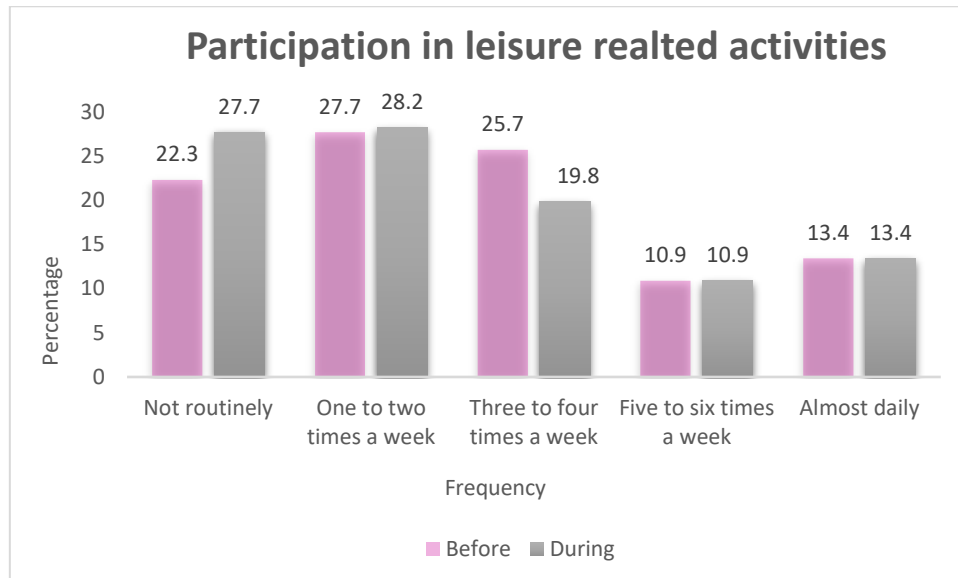
Figure 19: Pattern of participation in leisure related activities

Table 20: Change in daily sitting time of subjects

Daily Sitting time	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
Less than 2 hours	33	16.3	74	36.6		
2-4 hours	56	27.7	51	25.2		
4-6 hours	67	33.2	37	18.3	-0.36(0.22)	0.000***
6-8 hours	38	18.8	22	10.9		
More than 8 hours	8	4.0	18	8.9		
Total	202	100.0	202	100.0		
Mean	2.66(1.082)		2.3(1.306)			

*** Significant at 1% level

During pandemic, there was a sharp increase in daily sitting time at work of more than 8 hours (4% vs. 8.9%). Using the statistical t-test, it was found that daily sitting time ($P < 0.01$) significantly increased. This may be due to restrictions imposed by the government and

increased access to internet that made possible increased screen time on numerous activities like video games, easy access to entertainment channels etc.

Table 21: Daily screen time of subjects during pandemic

Daily screen time	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
0-1 hour	30	14.9	23	11.4		
1-2hours	67	33.2	43	21.3		
2-4 hours	65	32.2	75	37.1	0.28(-0.02)	0.000***
More than 5 hours	40	19.8	61	30.2		
Total	202	100.0	202	100.0		
Mean	2.59(1.01)		2.87(0.994)			

***Significant at 1% level

During pandemic, 30.2% participants reported daily screen usage of more than 5 hours. Daily screen time use significantly increased ($p < 0.01$) as per the test. Similarly, in another study conducted among the Lebanese adult population 34.8% of participants spent more than 5 h in front of the screen for study or work purposes during COVID-19 compared to 19.9% before the pandemic ($P < 0.01$). Spending screen time for entertainment purposes increased significantly from 11.2% before the lockdown to 38.8% during the COVID-19 lockdown ($P < 0.01$). (Leila et al., 2020). Figure 20 presents the daily screen time pattern during pandemic among the subjects.
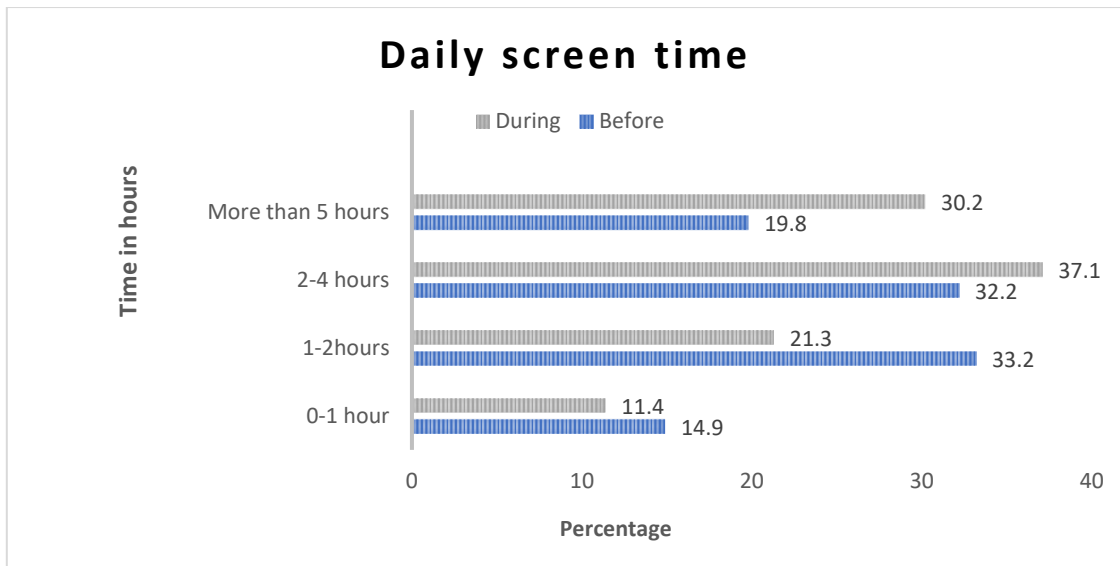
Figure 20: Daily screen time pattern

4.2.3 SLEEP PATTERN

Sleep is extremely important for performance, learning and development of physical and mental health. Some of the consequences of inadequate sleep includes reduction in performance, decision making ability, learning and increase susceptibility to weight gain.

Table 22: Daily hours of sleep during pandemic

Daily hours of sleep	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
Less than 6 hours	30	14.9	37	18.3		
6-8 hours	117	57.9	86	42.6		
More than 8 hours	54	26.7	79	39.1	0 0.08(0.08)	0.000***
Total	202	100.0	202	100.0		
Mean	2.13(0.649)		2.21(0.731)			

***Significant at 1% level

The study revealed that there was significant increase in the number of hours of sleep in the category of 8 hours and more from 26.7% to 39.1%. The statistical analysis t-test scored p<0.01 denotes a significant increase in the hours of sleep by sports students during pandemic. Figure 21 presents the sleep pattern of subjects during the pandemic.
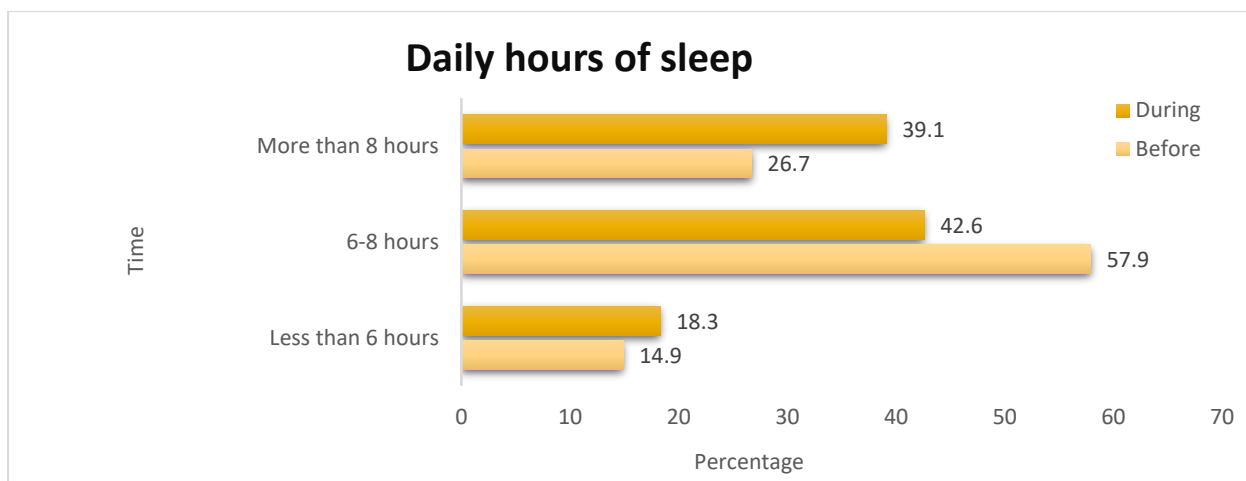
Figure 21: Sleep pattern of subjects during pandemic

Table 23: Sleep quality during pandemic

Quality of sleep	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
Excellent	47	23.3	59	29.2		
Very good	62	30.7	53	26.2		
Good	79	39.1	59	29.2	0.05(0.22)	0.000***
Bad	10	5.0	19	9.4		
Very Bad	4	2.0	12	5.9		
Total	202	100.0	202	100.0		
Mean	2.32(0.951)		2.37(1.169)			

***Significant at 1% level

Responses to the quality of seep was mixed with minor differences in the excellent (23.3 vs 29.2) and very good (30.7 vs 26.2) responses. However, there were significant increase in quality of sleep (P<0.01) during pandemic times among sports students.

However, in another study a significantly higher percentage of participants classified their sleep quality as poor during the pandemic (29.6%) compared to before the pandemic (22.1%) (P< 0.001). (Leila et al., 2020)

In a study conducted by Nirala et al. (2022) observed that 33.9% had no change in the sleep pattern in lockdown compared to before lockdown. Overall sleep quality was reported to be very good by 42.1% students and very bad by 4.8%. Figure 22 presents the sleep quality during the pandemic.

Quality of sleep

■ Before ■ During

Level	Before	During
Excellent	23.3	29.2
Very good	30.7	26.2
Good	39.1	29.2
Bad	5	9.4
Very Bad	2	5.9

Percentage (y-axis) vs Levels of quality of sleep (x-axis)
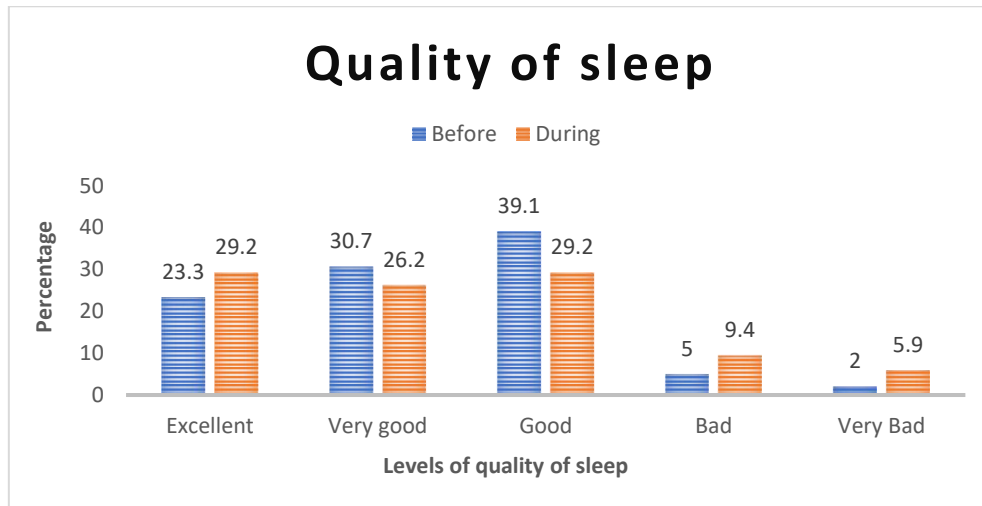
Figure 22: Sleep quality of the subjects during pandemic

Table 24: Level of stress and anxiety among subjects

Level of stress or anxiety	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
Not at all	61	30.2	57	28.2		
A little	94	46.5	80	39.6		
Much	28	13.9	34	16.8	0.18(0.12)	0.000***
Very much	10	5.0	19	9.4		
Extremely	9	4.5	12	5.9		
Total	202	100.0	202	100.0		
Mean	2.07(1.02)		2.25(1.142)			

*** Significant at 1% level

Data reveals that there was a increase in the levels of stress or anxiety among sports students during the pandemic.

Similarly, in another study conducted among the Lebanese adult population, participants claimed to be more irritable and tense most of the time during the pandemic (from

15.2–17.7% and from 16.5–29.3% respectively, $P < 0.001$). (Leila et al., 2020). Figure 23 presents the pattern of stress level among subjects during pandemic.
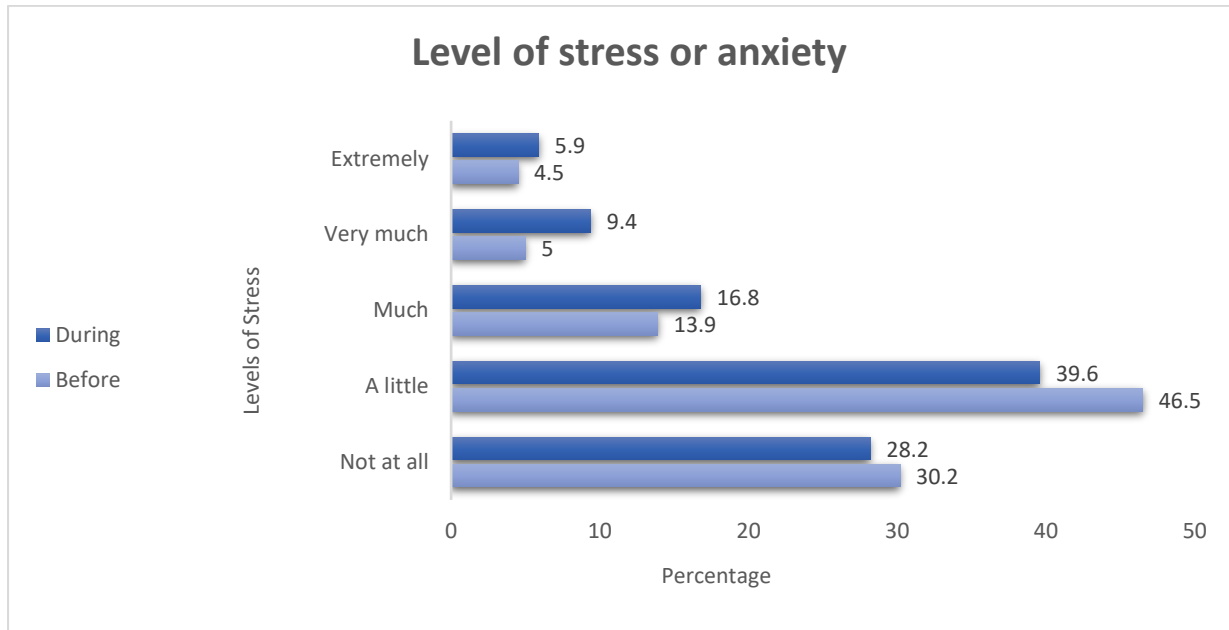
Figure 23: Stress pattern during pandemic

OTHER LIFESTYLE BEHAVIOURS

Table 25: Cigarette smoking among sports students

Smoking	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
No	182	90.1	185	91.6		
Yes, 1-3 cigarettes per day	12	5.9	10	5.0		
Yes, 4-6 cigarettes per day	7	3.5	4	2.0	-0.01(0.02)	0.000***
Yes, 7-9 cigarettes per day	1	.5	3	1.5		
Total	202	100	202	100		
Mean	1.14(0.472)		1.13(0.196)			

*** Significant at 1% level

Vast majority of the sports students who were subjects of the study did not indulge in the habit of smoking. During pandemic, it was further noticed that there was significant

reduction in their habit of smoking as revealed through statistical test (P <0.01). Figure 24 presents the smoking pattern among subjects during pandemic.
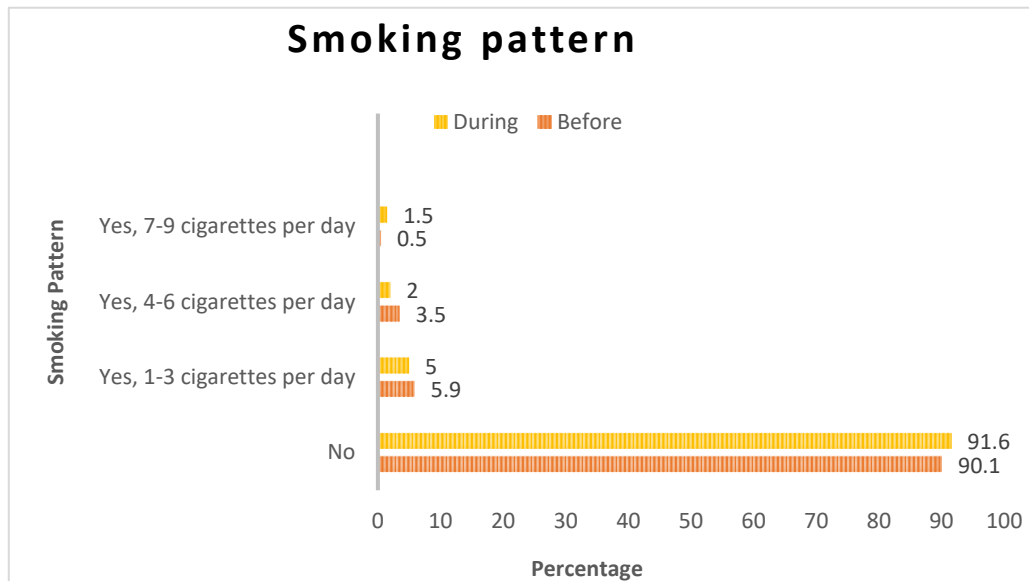
Figure 24: Smoking pattern among subjects

Table 26: Alcohol consumption during pandemic

Alcohol Consumption	Before COVID 19		During COVID 19		Δ Change (Dur – Bef) Mean (SD)	t-Test P-value
	Frequency	Percentage	Frequency	Percentage		
No	165	81.7	165	81.7		
Yes occasionally	28	13.9	27	13.4		
Yes, on weekends	7	3.5	6	3.0	0.00(-0.01)	0.000***
Yes, almost daily	2	1.0	4	2.0		
Total	202	100	202	100		
Mean	1.25(0.613)		1.25(0.607)			

*** Significant at 1% level

Alcohol consumption being injurious to health has been clearly understood by the sports students. Even among the sports students who had the habit of drinking alcohol a decrease in alcohol intake and is revealed in the statistical t-test score of P<0.01. Figure 25 presents the alcohol consumption pattern among subjects during pandemic.
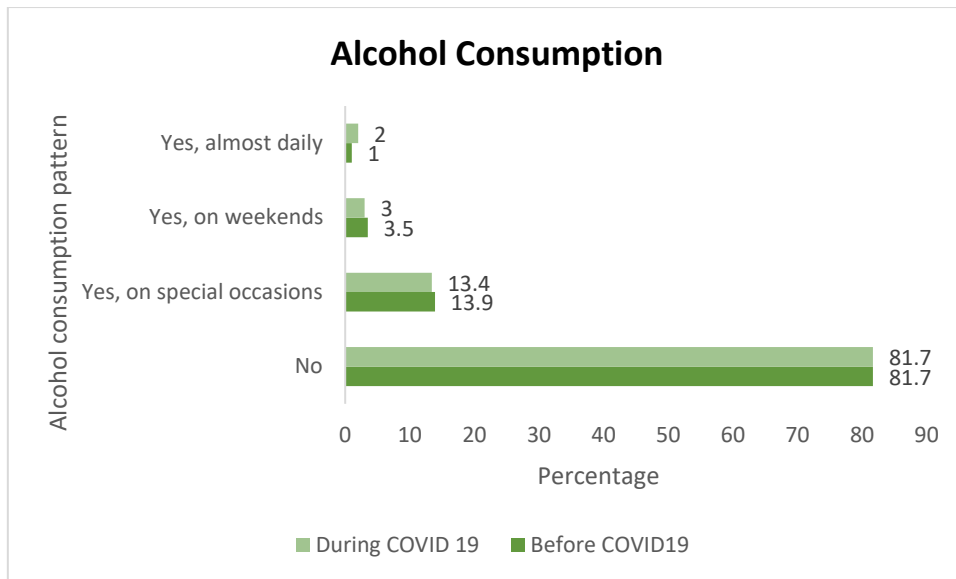
Figure 25: Alcohol consumption during pandemic

4.2.4 PSYCHOLOGICAL STRESS ASSESSMENT OF SPORTS STUDENTS

The Kessler Psychological Distress Scale (K10) is a commonly used, basic self-report measure of psychological distress that can be used to identify people who need to be evaluated further for anxiety or depression. This measure was created for use in the general population, but it might also be beneficial in therapeutic settings.

The K10 consists of ten questions that are answered on a five-point scale (where 5 equals 100% and 1 equals 0%). For each question, the participant answers the most accurate for them in the previous four weeks. The total score is then added up, with a maximum of 50 indicating severe discomfort and a minimum of 10 indicating no distress.

Table 27: K10 psychological test of sports students

Mental Health Parameters	Frequency	Percent
• **K10 scores** Likely to be well (<20)	79	39.1
Likely to have a mild disorder (20-24)	48	23.8
Likely to have a moderate disorder (25-29)	49	24.3
Likely to have a severe disorder (>30)	26	12.9

• **Mental Health Support**	111	55.0
Yes	47	23.3
No	44	21.8
Sometime		
Total	202	100.0

The scores given above reveal that majority of the students (61%) were showing mild to severe stress disorders during COVID and only 39% of the respondents could maintain a healthy stress conditions. The study revealed that 55% of the respondents were getting adequate mental health support while 23% did not have any support.

Similarly in another study conducted by Welsh et.al (2020) among adults of age above 25years, 26.3% of the sample was categorised as having low psychological distress, however 38.9% had mild stress, 19.9% had moderate stress and 14.9% had high levels of stress using K10 stress assessment tool. Figure 26 presents the Stress assessment among the subjects during pandemic.
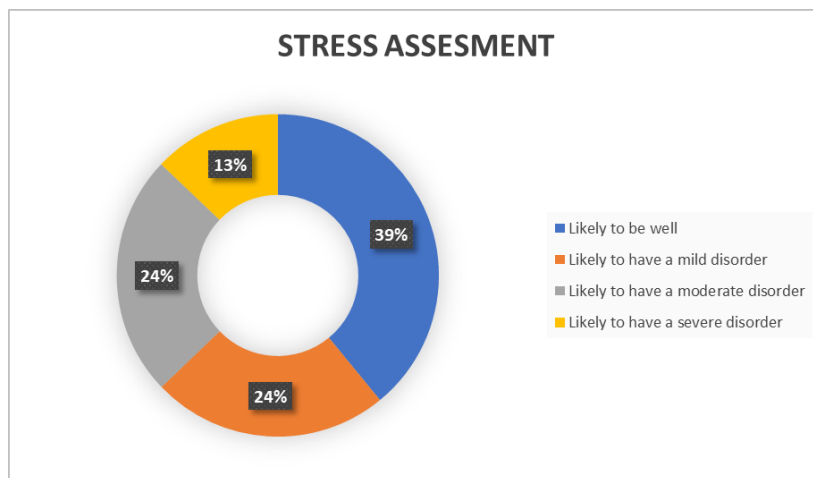
Figure 26: Stress assessment using K10 scale

4.3 REASONS FOR LIFESTYLE CHANGES

From the foregoing discussion it may be concluded that there was a significant impact of the pandemic on lifestyle of sports students. To probe into the reasons behind these changes, subjects were further asked to state reasons for positive and

negative changes they experienced. Tables 28-32 presents the reasons pointed out by subjects for their change in lifestyle habits.

Table 28: Reasons for change in intake of nutritious foods

Reasons	Frequency*	Percentage (%)
Lack of Cooking time	57	10.2%
Lack of family support	49	8.7%
Stress and anxiety	53	9.4%
Lack of access to fresh fruits and vegetables	42	7.5%
Higher cost of the ingredients	42	7.5%
Improved knowledge	95	16.9%
Better family support	68	12.1%
Less eating out	70	12.5%
Relaxed mind	54	9.6%
No change	31	5.5%
Total	561	100.0

*Multiple responses

With respect to significant decrease in dietary pattern, some of the reasons reported were lack of cooking time (10.2%), lack of family support (8.7%), stress and anxiety (9.4%) and higher cost of ingredients (7.5%) were pointed out. However positive changes were reported due to improved knowledge (16.9%) and less eating out (12.5%).

Table 29: Reasons for change in physical activity pattern

Reasons	Frequency*	Percentage
Lack of motivation	120	26.8%
Lack of knowledge of exercises	55	12.3%
Lack of access to sport facilities	93	20.8%
Social restrictions	64	14.3%
Lack of social support	43	9.6%
Lack of time	73	16.3%
Total	448	100.0

*Multiple responses

The above table shows that there was a significant decrease in physical activity levels due to lack of motivation (26.8%), lack of access to sports facilities (20.8%), lack of time availability (16.3%), social restrictions (14.3%) and lack of social support (9.6%).

Similar results were obtained in a study conducted among the adult population by Chopra et al. (2020). Some of the reasons reported for adverse changes in physical activity levels were due to lack of motivation (24.5%), time availability (25.3%) and restricted access to parks, dance and fitness centre (28.6%).

Table 30: Reasons for junk food consumption

Reasons	Frequency*	Percentage
Fear of COVID 19	74	11.0%
Non availability of cook	51	7.6%
Less eating out	80	11.9%
Availability of cooking time	99	14.7%
Prefer home cooked food	96	14.2%
Eating healthy	108	16.0%
Food craving	90	13.3%
Lack of family support	35	5.2%
Stress and anxiety	42	6.2%
Total	675	100.0

*Multiple responses

The above statistics reveal that there was significant increase in the fast-food consumption and some of the factors influencing unhealthy eating behaviour included food cravings (13.3%), lack of family support (5.2%) and stress and anxiety (6.2%). Decline in junk food consumption was due to various factors such as fear of coronavirus infection (11%), preference for home-cooked food (14.2%) and eating healthy (16%).

Contradictory to results obtained above, Chopra et al. (2020) reported factors such as fear of coronavirus infection (43.8%), preferring home-cooked food (25.2%) and less involvement in eating out and socializing (23.6%) as the prime reasons for improvement in healthy eating and decline in junk food consumption.

Table 31: Reasons for change in sleeping pattern

Reasons	Frequency*	Percentage
Increased social media usage	142	22.7%
Daytime sleeping	130	20.8%
Stress and anxiety	91	14.6%
Long working hours	64	10.2%
Noise	57	9.1%
shortness of breath	72	11.5%
Flexibility in days' time	69	11.0%
Total	625	100.0

*Multiple responses

When the sleep pattern of sports students was analysed, data revealed that there was significant increase in the sleeping hours due to daytime sleeping (20.8%) and increased stress and anxiety (14.6%) increased social media usage (22.7%) while some of the participants reported of issues with shortness of breath (11.5%), noise (9.1%).

In a study conducted among swimmers Nirala (2022) observed that almost half, (49.8%) reported that they slept late in the night while (15.4%) had excessive daytime sleeping. 21.8% reported having interrupted sleep and (6.8%) had difficulty falling asleep due to fear of COVID-19.

Table 32: Reasons for change in stress or anxiety levels

Reasons	Frequency*	Percentage
Fear of Covid 19 infection	104	17.9%
Worrying about family and friends	52	9.0%
Stigma or discrimination	43	7.4%
Frustration	140	24.1%
Financial loss	64	11.0%
Overuse of social media	119	20.5%
Lack of support	59	10.2%
Total	581	100.0

*Multiple responses

Higher stress was attributed by subjects to participant's fear of getting infected by coronavirus (17.9%), boredom and loneliness (24.1%) coupled with overuse of social media (20.5%) and financial loss (11%).

The study conducted by Chopra et al. (2020) reported reasons for adverse changes in stress and anxiety levels during COVID-19 which included participants' fear of getting infected by coronavirus (23.6%), worrying about their family (20.2%) followed by boredom and loneliness (18.2%) and financial loss (14.7%). Figure 27 presents the above results in detail

Change in intake of
nutritious food
- Lack of cooking time(10%)
- Lack of social support(9%)
-Higher cost of ingredients(8%)

Change in physical
activity pattern
- Lack of motivation(27%)
- lack of access to
facilities(21%)
- Lack of time(16%)

Stress
- Frustrations (24%)
- Social media
usage(20%)
- Lack of support(10%)

Change in the pattern of
junk food consumption
- Lack of support(7%)
- Food craving(13%)
-Lack of time(8%)

Change in sleep pattern
- Increased social media usage(23%)
- Day time sleeping(21%)
-Long working hours(10%)

Figure 27: Reasons for lifestyle changes

To conclude, stress among adolescents was found to be a major and central reason for lifestyle changes. Increased social media usage, lack of time and lack of social supprt were also found to risk factors.

Recommendation:

To conscientise sports students, a powerpoint presentation compiling all related information on diet, physical activity and stress management has been developed (Plates 1-24). The ppt was shared to the school athourities.

Plates 1-4 - Conclusions of the research study

NUTRITIONAL REQUIREMENTS OF SPORTS STUDENTS

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5

ENERGY REQUIREMENTS

- People who participate in a **general fitness program** - 1800–2400 kcals/day or about 25–35 kcals/kg/day for a 50–80 kg individual.

- Athletes involved in **moderate levels of intense training** (e.g., 2–3 h per day of intense exercise performed 5–6 times per week) or **high volume intense training** (e.g., 3–6 h per day of intense training in 1–2 workouts for 5– 6 days per week) –
Require caloric needs up to 40–70 kcals/kg/day or (2000–7000 kcals/day) for a 50–100 kg athlete.

6

SOURCES OF CHO

- **Complex CHO** sources like whole grains, fruits ,vegetables, peas, pulses , to be included liberally.
- During recovery period medium and high GI foods are preferred.

Medium GI-Sucrose, Basmati rice, wheat, millet porridges ,corn ,honey

High GI -Corn flakes ,potato ,white bread ,syrupy foods

7

Pattern of Carbohydrate (CHO) Loading/Glycogen loading

Days Before Competition	6 days	5 days	4 days	3 days	2 days	Previous day
Exercise Time	60	40	40	20	20	rest
CHO (grams)	450	450	450	600	600	600

8

PROTEIN REQUIREMENTS

- Dietary protein intake necessary to support metabolic adaptation, repair, remodeling, and for protein turnover generally ranges from **1.2 to 2.0 g/kg/day.**

Daily Protein Requirements		
Group	Protein Intake (g/kg/day)	
	Men	Women
Sedentary Adults	0.8-1.0	0.8-1.0
Endurance Athletes		
Elite	1.6	1.4
Moderate Intensity (a)	1.2	1.0
Recreational (b)	0.8-1.0	0.7-9
Football, Power Sports	1.4-1.7	1.2-1.4
Resistance Athletes (early training)	1.5-1.7	1.3-1.4
Resistance Athletes (steady state)	1.0-1.2	0.9-1.0

Source: Burke & Deakin, Clinical Sports Nutrition, 3rd Edition, McGraw-Hill Australia Pty Ltd, 2006
(a) Exercising approximately 4-5 times/wk for 45-60 min
(b) Exercising 4-5 times/wk for 30 min at <55% VO2peak

9

- **SOURCES-**

If a protein source comes from an animal, such as beef, pork, fish, egg, milk (or dairy products), and poultry, such as chicken or turkey, it is considered a complete source of protein.

- Soy is an extremely popular vegetable source of protein.

- Other isolates of protein which can be included- isolates of whey and casein

10

FAT REQUIREMNETS

- Fats should **comprise 25% to 35% of total energy intake**
- Saturated fats should comprise no more than 10% of total energy intake.
- **Good sources** of fat include lean meat and poultry, fish, nuts, seeds, dairy products, and olive and canola oils. Fat from chips, candy, fried foods and baked goods should be minimized.
- Clinical research has confirmed ability of **omega 3 fatty acid intake** to decrease inflammatory markers, increase blood flow upto 36 % during exercise.
- **Fish oil supplementation** studies provide preliminary evidence that it may offset soreness and inflammation after intense,damaging exercise.

11

FLUID REQUIREMENTS

- A loss of 1 kg Body weight represents approximately 1 L sweat loss.
- The fluid plan that suits most athletes and athletic events will typically achieve an intake of **0.4 to 0.8 L/h.**

12

Timing	Amount	Type of Beverage
Before Activity		
1-2 hours	500 mL	Plain cold water
10-15 minutes	Up to 600 mL	Plain cold water, diluted fruit juice, glucose-electrolye drink
During Activity		
Every 10-15 minutes	150-250 mL	Plain cold water, glucose-electrolyte drink, diluted fruit juice
After Activity		
Begin immediately	Compensate loss in body weight (in grams) with equal amount of fluid (in mL).	Plain water, sweet-tasting beverage

13

SAMPLE MEAL PLAN – 3000Kcal

MEAL	PREPARATION	RAW WEIGHT
Bed Tea:	1 cup (with milk & 2tsp. sugar)	120ml
Breakfast:	Bread 4 Slices	80g
	Butter (1Pck)	10g
	Jam (3 tsp.)	15g
	Eggs (1 nos.)	50g
	50g Milk (with 2tsp. Sugar)	180ml
Mid-Morning:	Lime Juice (with 2tsp sugar)	220ml
Lunch:	Rice	150g
	Dal	30g
	Vegetable curry(11 / 2 katori)	200g
	Curd (1 cup)	125g
	Fruit (1-2 nos.)	150g
Evening: (4.00pm)	Biscuits (2 nos.)	10g
	Tea (with milk & 2tsp sugar)	120ml
Evening: (6.00pm)	Lime Juice (with 3tsp sugar)	220ml

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Dinner:	Rice	150g
	Dal	25g
	Vegetable curry(11 / 2 katori)	150g
	Meat Preparation (Chicken/ Mutton-Bone less)	100g
	For Vegetarians:	
	Soya Bean preparation(Nutri-nuggets)	25g
	Cheese(1 piece)	20g
	Dessert (1 serving)	100g
Bed time	Warm Milk (with 2tsp. Sugar)	180ml

Note: 50g. Of oil should be used for cooking. 100g. of vegetables in the form of onions, Tomatoes Etc. to be used in gravy preparations.

Source: National Institute of Nutrition

15

Plates 5- 15: Nutritional Requirements for sports students

TIPS TO IMPROVE SLEEP PATTERNS

CHECKLIST FOR ATHLETES TO CONSIDER TO ENHANCE SLEEP

RECOVERY

16

RECOMMENDATIONS

- A frequent and generalized recommendation is that athletes need at least 7–9 hours of sleep per day; however, this will vary between individuals

- Ensure going to bed at night and morning waking are around the same times each day as often as possible. This helps form a regular sleep routine, which promotes good-quality sleep.

- Naping can be included but should be limited to around 30 minutes and be avoided in the late afternoon/evening.

- Adequate recovery after training sessions has been reported to enhance restoration of physiological and psychological processes. Reductions in muscle soreness, inflammation, and pain may allow for improved sleep quality.

- Specifically, relaxation techniques such as positive suggestion/creative visualization (visualization therapy) are recommended as part of the sleep routine to ensure a clear mind and relaxed state when going to bed

17

RELAXATION TECHNIQUES

The following is a **visualization therapy techniques** for improved athletic performance

(a) Ask the athlete to close their eyes and focus on letting go of all muscular tension, beginning with the top of the head, progressing then to the forehead, face, neck, back, abdomen, stomach, legs, and feet;

(b) Simultaneously, have the athlete control their breathing, allowing his or her breathing to become slower and deeper;

(c) Have the athlete describe their optimal performance if they were competing right now; and

(d) Repeat the use of key words such as calm and confident, relaxed and focused

18

Plate 16- 18 – Methods to improve sleep patterns

TIPS TO DECREASE STRESS LEVELS

Techniques to Reduce Stress

30 minutes of daily moderate exercise

Mindfulness and meditation

Progressive muscle relaxation

Yoga

Visualization

Slow, deep breaths

19

- **Meditate**: A few minutes of practice per day can help ease anxiety

- **Breathe Deeply**- Take a 5- minute break and focus on your breathing. Sit up straight, eyes closed, with a hand on your belly. Slowly inhale through your nose, feeling the breath start in your abdomen and work its way to the top of your head. Reverse the process as you exhale through your mouth

- **Reach Out**: Your social network is one of your best tools for handling stress. Talk to others --preferably face to face, or at least on the phone. Share what's going on.

- **Listen to Music**: Research shows that listening to soothing music can lower blood pressure, heart rate, and anxiety.

20

- **Decompress** - Place a warm heat wrap around your neck and shoulders for 10 minutes. Close your eyes and relax your face, neck, upper chest, and back muscles. Remove the wrap, and use a tennis ball or foam roller to massage away tension.

- **Development self confidence** before and during the competition and engaging in positive self statement.

- Eliminating **inhibitory messages and statements**

21

The ABCs of dealing with stress

metrifit
ready to perform

CHOOSE
You have the power to choose what to think, feel or do next.
Focus on controlling the controllables.

ACCEPT
Accepting the situation can sometimes be half the battle.
Acceptance, acknowledgement and appreciation of the situation that is causing you stress is a good first step in coping and dealing with that stress

BREATHE
Taking a deep breath and focusing your mind to slow down can help your body. Deep breathing doesn't take away your stress, but it can decrease these affects and bring a calmness that can help you look at your situation in a more positive manner. Meditation and mindfulness programs are being increasingly implemented in many sporting environments.

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RELAXATION TECHNIQUES TO REDUCE STRESS

Tai Chi

Relaxing Music

Guided Visualization

Progressive Muscle Relaxation

Laughing

23

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Plate 19- 24 – Methods to decrease stress levels among sports students

V. SUMMARY AND CONCLUSION

During the Covid pandemic, significant changes in several lifestyle-related behaviours such as food habits, physical activity, and sleep patterns were observed in the population.

The present study entitled 'The Impact of Covid19 on Diet and Lifestyle Among Sports Students' was undertaken in the context with the following specific objectives

- To assess the background details of sports students in selected sports schools.
- To analyze impact of Covid on lifestyle related behaviours like dietary habits, sleep, physical activity, substance abuse and stress of Sports students.
- To ascertain the reasons behind lifestyle changes, if any, during Covid.
- To provide healthy recommendations for a proper physical and mental health.

The methodology followed for the study included the following steps. Sports students of reputed sports schools / colleges who were involved in formal training of a sports event at the institution was selected by quota sampling method. The tool selected for the present study was a questionnaire which included the socioeconomic status using assessment Kuppaswamy scale(2019), Physical training was assessed using the validated questionnaire developed by Washif et al. (2021), Lifestyle related behaviours such as eating pattern, physical activity behaviour, sleep patterns, daily stress levels and stress-related addictive behaviours like smoking and drinking was assessed using the validated questionnaire prepared by Chopra et al. (2020) and the stress among the subjects was assessed using the Kessler psychological distress scale (Kessler et al., 2002).

The data was collected by using google forms and distributing questionnaires directly to the students. The gathered data from the selected samples was consolidated and the comparison of nutritional and health profile before and during pandemic was done using the Statistical Test called t-test for Single Mean.

The major results of the study are given below:

- More than three fourth (78.7%) of subjects were males and majority (55.3%) of the students were under the category of late adolescence and youth.

- Majority of the participants (45%) were classified under the Upper Lower Category followed by Lower Middle (24%) and Lower-class Category (17%) as per Kuppaswamy scale.

- The data revealed that majority of the sports students (71%) were under the category of normal range of BMI, while the prevalence of underweight (14.9%) and overweight 13.4%) was very low.

- Significant percentage of respondents (43.6%) gained weight, 29.7% experienced no weight change and 18.8% lost weight.

- The analysis of dietary pattern before and during the pandemic revealed that there was a significant decrease in the intake of nutritious food such as milk and protein sources. The statistics showed that there was a significant increase in the consumption of fast foods. However, there was a no significant difference found in the regular dietary pattern.

- With respect to reasons for change in intake of nutritious foods, lack of cooking time (10.2%), lack of family support (8.7%) and stress and anxiety (9.4%) were reported.

- The analysis of physical pattern before and during the pandemic revealed that the participation in moderate intensity aerobic exercises and leisure related activities significantly declined.

- Some of the reasons reported for decrease in physical activity were included lack of motivation (26.8%), lack of access to sports facilities (20.8%) and lack of time availability (16.3%).

- The analysis of change in sleep and stress pattern before and during the pandemic revealed that the sleep pattern and stress levels significantly increased. Some of the reasons reported included increased social media usage (22.7%), boredom and loneliness (24.1%) and daytime sleeping (20.8%). The study conducted among students also revealed that there was a significant increase in the screen time.

- The K10 scores reveal that majority of the students (61%) were showing mild to severe stress disorders during COVID and only 39% of the respondents could maintain a healthy stress conditions.

- Recommendations to motivate sports students to adhere to healthy lifestyle behaviour were compiled as a PowerPoint presentation and shared to the concerned authorities.

Limitations
- Since it was a pandemic period there was restriction in conducting face to face interview with the respondents.
- Online google forms were filled up only after repeated requests and persuasion.

Scope for future Research

- The study could go deeper into differentiating the impact of covid 19 pandemic on diet and lifestyle factors of covid affected versus non covid affected sports students.
- To have a detailed understanding of the nutritional intake among sports students and their profiling.
- Further research could be done to understand the impact of lack of organized training on the emotional and psychological well being of the sports students.

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APPENDIX

Questionnaire to assess the impact of covid-19 pandemic on lifestyle related behavior of major sports school students in Kerala

The aim of the study is to assess the influence of the pandemic situation on diet and lifestyle among sports students. The emails / telephone numbers/specific data of individual students will be kept in absolute confidentiality. Collected individual data will be aggregated for analysis. A student will require no longer than 15 minutes to fill the questionnaire. The results of the study are purely for academic purposes.

The findings of the study will be shared with you and it will consist of:
1.   Food and lifestyle habits observed by sports students during lockdown
2.   Recommendations for improved healthy lifestyle

SECTION I: SOCIODEMOGRAPHIC PARAMETERS

1.1 Age:

1.2 Gender:

1.3 Socio-economic status:

MONTHLY INCOME (rs)	Put a tick (✓) mark
≥ 1,23,322	
61,663 - 1,23,321	
46,129 - 61,662	
30,831 - 46,128	
18,497 - 30,830	
6,175 - 18,496	
≤ 6,174	
LEVEL OF EDUCATION	

Profession or Honours	
Graduate	
Intermediate or diploma	
High school certificate	
Middle school certificate	
Primary school certificate	
LIST OF OCCUPATION	
Legislators, Senior Officials & Managers	
Professionals	
Technicians and Associate Professionals	
Clerks	
Skilled Workers and Shop & Market Sales Workers	
Craft & Related Trade Workers	
Plant & Machine Operators and Assemblers	
Elementary occupation	
Unemployment	

Interpretation of the scores

26–29 Upper (I)

16–25 Upper Middle (II)

11–15 Lower Middle (III)

5–10 Upper Lower (IV)

< 5 Lower (V)

1.4 Type of sport-

1.5 Sport experience (years)-

SECTION II.: IMPACT OF COVID-19 PANDEMIC ON LIFESTYLE RELATED BEHAVIOR

This section consists of questions on the lifestyle related behavior that you might have practiced before and during COVID-19 pandemic. Lifestyle related behavior consists of three components: eating habits, daily activity and sleep pattern.

Baseline information on lifestyle related behaviours <u>before</u> COVID-19 pandemic

2.1 A regular meal pattern consists of 3 main meals and 2 snacks. Before COVID-19 pandemic, how often did you maintain a regular meal pattern?

a. Not routinely
b. One to two times a week
c. Three to four times a week
d. Five to six times a week
e. Almost daily

2.2. Before COVID-19 pandemic, how often did you consume fast food like pizza, burger, pasta or noodle as snacks or meals?

a. Not routinely
b. One to two times a week
c. Three to four times a week
d. Five to six times a week
e. Almost daily

2.3. People often include fruits and vegetables in their diet. Before COVID-19 pandemic, what was the frequency of your fruits and vegetables intake?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

2.4 Before COVID-19 pandemic, how often did you have a balanced diet by including healthy ingredients (whole wheat, pulses, legumes, eggs, nuts, fruits and vegetables) in your meals?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

2.5 Before COVID-19 pandemic, how often did you have 2-3 servings of milk or its products (curd, buttermilk, cheese, paneer etc) in a day?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

2.6 Before COVID-19 pandemic, how often did you have one or more servings of pulses, egg or meat in a day

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

2.7. Before COVID-19 pandemic, how often did you consume foods with high sugar (such as sweet porridges, pastries, sweets and chocolate etc)?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

2.8. Before COVID-19 pandemic, how often did you eat junk food/fast food due to boredom/distress/disappointment?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

2.9. Exercises in which the breathing and heart rate increases are called aerobic exercises. Some examples of moderate intensity exercises are brisk walking, static jogging, home based aerobic workouts, treadmill, static cycling and dancing. Before COVID-19 pandemic, how often did you participate in 30 minutes of moderate intensity aerobic exercises/sports?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

2.10. Before COVID-19 pandemic, how often did you participate in leisure related activities (grocery shopping, walking in park, gardening)?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

2.11. Before COVID-19 pandemic, how much was your daily sitting time at work?

a. Less than 2 hours

b. 2-4 hours

c. 4-6 hours

d. 6-8 hours

e. More than 8 hours

2.12. Before COVID-19 pandemic, how much screen time did you spend daily for watching television, using social media, mobile phones and playing video games?

a. 0-1 hour

b. 1-2 hours

c. 2-4 hours

d. >5 hours

2.13. Before COVID-19 pandemic, how many hours did you sleep daily?

a. <6 hours

b. 6-8 hours

c. >8 hours

2.14. Before COVID-19 pandemic, how would you rate your quality of sleep?

a. Excellent

b. Very good

c. Good

d. Bad

e. Very bad

2.15. Before COVID-19 pandemic, how much stress or anxiety did you feel in a day?

a. Not at all

b. A little

c. Much

d. Very much

e. Extremely

2.16. Before COVID-19 pandemic, did you smoke?

a. No

b. Yes, 1-3 cigarettes per day

c. Yes, 4-6 cigarettes per day

d. Yes, 7-9 cigarettes per day

e. Yes, >10 cigarettes per day

2.17. Before COVID-19 pandemic, did you drink alcohol?

a. No

b. Yes, on special occasions

c. Yes, on weekends

d. Yes, more than once in a week

e. Yes, almost daily

SECTION III: LIFESTYLE RELATED BEHAVIORS <u>DURING</u> COVID-19 PANDEMIC

3.1. A regular meal pattern consists of 3 main meals and 2 snacks. During COVID-19 pandemic, how often did you maintain a regular meal pattern?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

3.2. During COVID-19 pandemic, how often do you consume fast food like pizza, burger, pasta or noodles as snacks or meals?

a. Not routinely

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c. Three to four times a week

d. Five to six times a week

e. Almost daily

3.3. People often include fruits and vegetables in their diet. During COVID-19 pandemic, what is the frequency of your fruits and vegetables intake?

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c. Three to four times a week

d. Five to six times a week

e. Almost daily

3.4. During COVID-19 pandemic, how often do you have a balanced diet by including healthy ingredients (whole wheat, pulses, legumes, eggs, nuts, fruits and vegetables) in your meals?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

3.5. During COVID-19 pandemic, how often do you have 2-3 servings of milk or its products (curd, buttermilk, cheese, paneer etc) in a day?

a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

3.6. During COVID-19 pandemic, how often do you have one or more servings of pulses, egg or meat in a day?

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b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

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d. Five to six times a week

e. Almost daily

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a. Not routinely

b. One to two times a week

c. Three to four times a week

d. Five to six times a week

e. Almost daily

3.9 Exercises in which the breathing and heart rate increases are called aerobic exercises. Some examples of moderate intensity exercises are brisk walking, static jogging, home based aerobic workouts, treadmill, static cycling and dancing. During COVID-19 pandemic, how often do you participate in 30 minutes of moderate intensity aerobic exercises/ sports?

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c. Three to four times a week

d. Five to six times a week

e. Almost daily

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c. Three to four times a week

d. Five to six times a week

e. Almost daily

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a. Less than 2 hours

b. 2-4 hours

c. 4-6 hours

d. 6-8 hours

e. More than 8 hours

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a. 0-1 hour

b. 1-2 hours

c. 2-4 hours

d. >5 hours

3.13. During COVID-19 pandemic, how many hours do you sleep daily?

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b. 6-8 hours

c. >8 hours

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b. Very good

c. Good

d. Bad

e. Very bad

3.15. During COVID-19 pandemic, how much stress or anxiety do you feel in a day?

a. Not at all

b. A little

c. Much

d. Very much

e. Extremely

3.16. During COVID-19 pandemic, do you smoke?

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d. Yes, 7-9 cigarettes per day

e. Yes, >10 cigarettes per day

3.17. During COVID-19 pandemic, do you drink alcohol?

a. No

b. Yes, on special occasions

c. Yes, on weekends

d. Yes, more than once in a week

e. Yes, almost daily

The five-point Likert-response choices are as follows: 'not routinely', 'one to two times a week', 'three to four times a week', 'five to six times a week' and 'almost daily'. The magnitude of the response's ranges from 5 (most acceptable behaviour) to 1 (least acceptable behaviour).

SECTION IV: REASONS FOR LIFESTYLE CHANGES DURING COVID-19 PANDEMIC

Kindly give answers to the following questions based on your eating, activity and sleep routine in the last month. You can mark more than one option and provide other reasons.

4.1. What are the reasons for changes in dietary pattern in comparison to pre-COVID-19 times?

a. Improved knowledge about nutrition

b. Lack of access to fresh fruits and vegetables

c. Higher cost of ingredients

d. More available cooking time

e. Better family support

f. Less eating out

g. Lack of family support

h. Stress and anxiety

i. Relaxed mind

j. No change

k. Any other, please specify_____

4.2. What are the reasons for changes in junk food/fast food consumption pattern in comparison to pre-COVID-19 times?

i. Fear of coronavirus spread through food

ii. Non-availability of cook

iii. Less eating out/socializing

iv. Availability of cooking time

v. Preferring home cooked food

vi. Focus on eating healthy to build immunity

vii. Managing food craving using different techniques such as listening to songs, taking a walk

viii. Lack of family support

ix. Stress and/or anxiety

x. Any other, please specify_____

4.3. In order to increase your physical activity, which activities have you included?

i. At-home aerobics

ii. Yoga

iii. At-home workout videos

iv. Gyming (treadmill, cycle and weights)

v. Walks

vi. At- home dancing and stretching

vii. Not doing any activities

viii. Any other, please specify_____

4.4. What are the reasons for your change in physical activity regime during COVID-19?

i. Lack of motivation

ii. Lack of knowledge of exercises

iii. Lack of access to sport facilities and gym

iv. Social restrictions to parks and public places

v. Lack of social support

vi. Lack of time

vii. Any other, Please specify_____

4.5. What are the reasons for a change in sleeping pattern during COVID-19?

i. Increased social media usage

ii. Daytime sleeping

iii. Stress and anxiety

iv. Long working hours

 v. Environmental factors such as noise and lighting

vi. Shortness of breath during sleep

vii. Flexibility in days' time

viii. Any other, please specify_____

4.6. What are the reasons for a change in stress and anxiety levels during COVID-19?

i. Fear of COVID infection

ii. Worrying about family and friends

iii. Stigma or discrimination from other people (e.g., people treating you differently because of your identity, having symptoms, or other factors related to COVID-19)

iv. Frustration/boredom/loneliness

v. Financial loss

vi. Overuse of social media

vii. Lack of support from family and friends

viii. Any other, please specify_____

SECTION V : PHYSICAL TRAINING

5.1 Hours of training per week pre COVID-19

5-10

11-15

16-20

21-25

25+

5.2 How has quantity of training been affected by COVID-19

Increased

Decreased

Stayed the same

Other

5.3 Has equipment available been affected by COVID-19

Yes

No

Other

5.4 Has adequate coaching support been received through COVID-19

Yes

Some

No

5.5 Has adequate mental health support been received through COVID-19

Yes

Some

No

5.6 Has the impact of COVID-19 on training practices been different for women

Yes

No

Unsure

Athlete practices during COVID-19 lockdown

Athletes could select multiple answers for all questions.

5.7   What are/were your general purpose(s) of training during the lockdown?

i. To maintain/develop general fitness/health

ii To maintain/develop skills/technique

iii To maintain/develop strength and power

iv To maintain/develop muscular endurance

v To maintain/develop abdominal strength

vi To maintain/develop aerobic fitness

vii To maintain/develop general flexibility

viii To improve muscle balance

ix Weight management

x Other

5.8 Who is prescribing/prescribed the training program during the lockdown?

i. Own training program

ii. Training program from my coach/trainer

iii Combined own training and coach/trainer

iv Found training material from an external source: online/social media/TV, a friend, etc.

v Other

5.9. What are the types of exercises that you are doing/have been doing consistently (at least twice a week) during lockdown?

 i. Bodyweight-based exercises with limited equipment
 ii. Weightlifting/strength training with suitable equipment (dumbbells, weights, etc.)
iii. Technical skills (sport-specific skills)
iv. Imitation or simulation of the techniques of my sport
v. Cardiovascular training (running, cycling, jogging, rowing)
vi. Plyometric training (repeated jumping)
 vii. Other

SECTION VI: STRESS ASSESSMENT
These questions concern how you have been feeling over the past 30 days.

6.1. During the last 30 days, about how often did you feel tired out for no good reason?

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

6.2. During the last 30 days, about how often did you feel nervous?

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

6.3. During the last 30 days, about how often did you feel so nervous that nothing could calm you down?

a. None of the time

b. A little of the time

c. Some of the time

d. Most of the time

e. All of the time

6.4. During the last 30 days, about how often did you feel hopeless?

a. None of the time

b. A little of the time

c. Some of the time

d. Most of the time

e. All of the time

6.5. During the last 30 days, about how often did you feel restless or fidgety?

a. None of the time

b. A little of the time

c. Some of the time

d. Most of the time

e. All of the time

6.6. During the last 30 days, about how often did you feel so restless you could not sit still?

a. None of the time

b. A little of the time

c. Some of the time

d. Most of the time

e. All of the time

6.7. During the last 30 days, about how often did you feel depressed?

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

6.8. During the last 30 days, about how often did you feel that everything was an effort?

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

6.9. During the last 30 days, about how often did you feel so sad that nothing could cheer you up?

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

6.10. During the last 30 days, about how often did you feel worthless?

a. None of the time
b. A little of the time
c. Some of the time
d. Most of the time
e. All of the time

SECTION VII - ANTHROPOMETRIC ASSESMENT

7.1 Height (Self-reported):

7.2 Weight (Self-reported):

7.3 During COVID-19 pandemic, did you gain weight?

a. No, my weight is stable

b. No, I think I lost weight

c. Yes, I think I gained some weight

d. I don't know

Interpretation of scores - (Each item is scored from one 'none of the time' to five 'all of the time)

10 - 19 Likely to be well
 20 - 24 Likely to have a mild disorder
25 - 29 Likely to have a moderate disorder
30 - 50 Likely to have a severe disorder

ABSTRACT

The impact of the COVID-19 pandemic on lifestyle-related behaviour among sports students of Kerala has been less explored. The current study was undertaken to assess the impact of COVID-19 on lifestyle-related behaviour changes in eating, physical activity, sleep and stress. The present study entitled 'The Impact of Covid-19 on Diet and Lifestyle Among Sports Students' was undertaken with the following specific objectives.

● To assess the background details of sports students in selected sports schools.
● To analyze the impact of Covid on lifestyle-related behaviours like dietary habits, sleep, physical activity, substance abuse and stress of sports students.
● To ascertain the reasons behind lifestyle changes, if any, during Covid.
● To provide healthy recommendations for proper physical and mental health.

Sports students of reputed sports schools/colleges who were involved in formal sports event training at the institution were selected by quota sampling method. The tool selected for the present study was a questionnaire which included the socioeconomic status assessment by Kuppaswamy scale(2019), physical training was assessed using the validated questionnaire developed by Washif et al. (2021), lifestyle-related behaviours such as eating patterns, physical activity behaviour, sleep patterns, daily stress levels and stress-related addictive behaviours like smoking and drinking was assessed using the validated questionnaire prepared by Chopra et al. (2020) and the stress among the subjects was assessed using the Kessler psychological distress scale (Kessler et al., 2002).

The data was collected using google forms and distributing the questionnaires directly to the students. The gathered data from the selected samples were consolidated and the comparison of nutritional and health profile before and during pandemic was done using the statistical test called t-test for single mean.

A total of 202 responses were collected. The intake of unhealthy food items such as fast food increased during COVID-19 pandemic ($P<0.01$). The frequency of fruit and vegetable intake, consumption of pulses, egg or meat, consumption of milk and its products and consumption of balanced diet had significantly reduced ($P<0.01$) during the pandemic. 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 ($P<0.01$). The study also revealed that there was a significant increase in screen time and stress levels ($P<0.01$).The K10 scores reveal that majority of the students (61%) were showing mild to severe stress disorders during a pandemic and only 39% of the respondents could maintain healthy stress conditions.

Reasons for the lifestyle changes were also explored . Stress among adolescents was found to be a major and central reason for lifestyle changes. Increased social media usage, lack of time and lack of social supprt were also found to be the risk factors.

Thus it was concluded that COVID-19 pandemic had lead to a significant decline on dietary pattern and physical activity coupled with increase in screen and sleep time. Mental health was also adversely affected. A detailed understanding of these factors can help to develop interventions to mitigate the negative lifestyle behaviours that have manifested during the pandemic.