"COVID 19 PANDEMIC AND ITS EFFECT ON THE NUTRITIONAL STATUS OF ADOLESCENTS- A STUDY IN SURAT"

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ABSTRACT

Children between the age of 10-18 years are defined to be adolescence by WHO. After infancy this is the second stage of growth spurt. A sudden increase in the growth rate is referred to as growth spurt. The growth rate is not consistent for both gender, it occurs in spurt. On December 2019, an outbreak of pneumonia of then unknown etiology emerged in the city of Wuhan, in Hubei Province of China. The causal agent was later identified as a new beta coronavirus called SARS-CoV-2, which can affect the lower respiratory tract and cause bilateral pneumonia in humans. The World Health Organization (WHO) termed it as COVID-19; it infected and killed thousands of people throughout the world. Extraordinary measures have been taken in most countries, including India, Spain, Italy, Brazil, Chile, and Colombia. One of the drastic measures taken was that of the total confinement of the population in their homes, also known as lockdown. There were total 80 participants out of which 55 were male and 25 were female. For data collection, a google form was formulated which included the anthropometric information during and after lockdown, meal pattern and a food frequency questionnaire. 51.25% (n=41) of participants were underweight. Whereas 41.25% (n=33) were having normal weight and 5% (n=4) participants were overweight. 1.25% (n=1) participants were reported pre-obese, while 1.25% (n=1) participants were categorized as type II obese. It was seen that 26.3% of participants skipped their meals during lockdown. 25% of adolescent skipped their breakfast during lockdown and 35% skipped it after lockdown.

Key words: COVID 19, *Pandemic, nutritional status, adolescents, BMI, food frequency*

Introduction

Children between the age of 10-18 years are defined to be adolescence by WHO. After infancy this is the second stage of growth spurt. A sudden increase in the growth rate is referred to as growth spurt.

Growth and development in adolescents -

Change in adolescence is as rapid as that of early childhood compared to the period of late childhood where the growth is slow. Puberty is the physical development from a child to an adult, which is initiated by physiological factors and includes maturation of the total body. Rate of length gain is highest during infancy which can never be replaced whereas rate of weight gain is rapid during both infancy and adolescence years. Therefore, adolescence is one of the most challenging periods of human development.

At the end of puberty, failure of the skeleton to show catch-up growth after early bouts of under nutrition is important reason why total growth of the body is affected. Therefore, muscles can increase in diameter late in life but can grow no longer than the bones do.

Due to different growth patterns observed in boys and girls after 10 years of age, nutrient requirements are spelled out separately for 10+ years adolescents of both sexes. The criteria of meeting energy and protein requirements adequately are assessed from adequate weight and height instead of weight-for-age [1].

Sexual maturity

Sexual maturity is developed along with growth spurt in adolescence. Girls stops growing on attaining menarche (puberty). Recent researches has shown, girls are attaining menarche at a younger age than earlier times. This is because of better nutritional status. The other changes seen in sexual maturity of girls is development of breasts, axillary hair and pubic hair. Menarche occurs only after this growth.

There are distinct changes in hormonal milieu. Thermogenesis, moods, food intake and body composition are determine by the sex hormones [1].

Psycho-social Change

Adolescence is a period marking major shift between protected parental care and moving into adult life. During this transition, they try to build their self-identity. They often feel uncomfortable with these changes and with their rapidly changing bodies. It is a period of development of self -image which is usually intertwined by nutritional issues. They are under a great influence of their peers. Their food habits, and other characteristics like dressing and group conduct are determined by peer pressure or some adult idol. Mass media has the highest impact on this group of children.

COVID-19

On December 2019, an outbreak of pneumonia of then unknown etiology emerged in the city of Wuhan, in Hubei Province of China [2]. The causal agent was later identified as a new beta coronavirus called SARS-CoV-2, which can affect the lower respiratory tract and cause bilateral pneumonia in humans [2]. The World Health Organization (WHO) termed it as COVID-19; it infected and killed thousands of people throughout the world. Extraordinary measures have been taken in most countries, including India, Spain, Italy, Brazil, Chile, and Colombia. One of the drastic measures taken was that of the total confinement of the population in their homes, also known as lockdown. This measure led to the disruption of most daily activities [3]. The entire country as at a standstill. Different governments took different measures, but lockdown policies were universal. A national quarantine was imposed in India on 21st March 2020. Offices, schools, colleges, transportation, malls, market, cinema halls, everything was shutdown. Only essential services like hospitals, medical stores, milk supply was functional.

Confinement influences lifestyle, especially diet and physical activity. The World Health Organization indicate that a healthy diet is very important in the prevention and treatment of the disease [4]. Thus, recommendations have been published for food and nutrition during the period of confinement of the population, because there is a close relationship between the quality of a population's food and its health [5]. Adequate nutrition is considered a potential factor for health in the early stages of life especially during adolescence [6]. During confinement, it became difficult to shop for fresh groceries and shortages of certain food products happened. The Food and Agriculture Organization (FAO) has recognized that, the COVID-19 pandemic has caused disruptions in food chains around the world, affecting both supply and demand [7]. Further, COVID-19 has made visible and magnified social inequalities, with the poorest families being the most affected ones [8].

Impact of COVID-19 on nutrition of adolescents

Data shows that in India, every third child suffers from one form of malnutrition that is; stunting, underweight, or wasting [9]. According to the Comprehensive National Nutrition Survey (2016-18), 23 % of children (5-9 years) and 24 % of adolescents (10-19 years) were thin for their age (BMI-for-age <-2 SD) [10].The current COVID-19 context could aggravate malnutrition among children and adolescents. The nutritional status of children is extremely susceptible to the smallest of shocks to bodyweight. A reduction in child's body weight between 0.5 and 1 % can substantially increase the prevalence of underweight and wasting. Estimates say there will be 410,413 and 392,886 additional cases of underweight and wasting, respectively, in India [11]. A Lancet article on the indirect effects of COVID-19 pandemic in low- and middle income countries estimated that an increase in wasting prevalence would account for 18–23% of additional child deaths per month [12].

Though there is lack of similar data for children and adolescents in India, a similar situation can be seen in this age group due to the disruption of programs like the Integrated Child Development Scheme (ICDS) and the Mid-Day Meal Program. The vulnerability would be higher in rural areas as more than half of children rely on these government programs [13] such disruption can only exacerbate food insecurity [14].

The Global Nutrition Report 2020 has taken cognizance of the grave economic crisis due to COVID-19 in developing countries like India. While highlighting the stark inequalities in accessing food and healthcare in India, the report emphasis on the underlying importance of maintaining food supply and healthcare systems for the poor while formulating policy responses to COVID-19 [15].

Objectives:

The objectives of the study were as follows:

1. To measure weight pre and post lockdown
2. To study the food intake pattern
3. To evaluate food habits
4. To evaluate nutritional status of students

Research design

It is a qualitative study. Purposive sampling technique was used for the selection of subject. Various schools were approached. Sample size of 50-100 adolescent from the various schools in Surat, Gujarat were targeted. The age of the population is 12 years to 14 years.

Selection of subjects

The subject selected for the study are adolescent school going children aging 12 to 14 years from the schools of Surat, Gujarat, India. The permission of student's participation will be taken from the higher authority or principal of the schools.

Instruments

A questionnaire in the form of google form will be circulated to the concerned group of people. The questionnaire will include the anthropometric measurements, general food habits and a food frequency questionnaire.

Procedure

The permission of student's participation will be taken from the higher authority or principal of the schools, then the questionnaire in the form of google form will be circulated to the concerned group of people after the permission is granted. After receiving require number of responses from the participants the data will be evaluated to fulfill the objective of the study.

Results and discussion

Anthropometric measurements

Table 1 shows the mean age of the male as well as female students was 13 years. All the participants were adolescent children studying in standards 7^{th} and 8^{th}. Mean age of both the sexes was found to be same.

Height and weight was not taken personally for all the participants, strictly following the lockdown protocol. The participants were asked to fill in their anthropometric measurements by themselves in the google form. The mean height was 156.3 cm for males and 147.85 cm for females. And in terms of weight average weight for males was found to be 46.3 kg and 41.01 kg for females during the post lockdown phase. Whereas during pre-lockdown the mean weight was 45.03 kg and 40.75kg for male and female children respectively. Therefore it was seen that there was a significance difference between the post-lockdown and pre-lockdown weight.

Table.1. Mean anthropometric measurements of participants

Characteristic	Male (N=55)	Female (N=25)
Age (years)	13	13
Weight (kg)(after lockdown)	46.3	41.04
Weight (kg)(before lockdown)	45.03	40.75
Height(cm)	156.3	147.85

BMI classification was done on the basis of Asia cut-off values and as shown in Figure 3 51.25% (n=41) of participants were underweight. Whereas 41.25% (n=33) were having normal weight and 5% (n=4) participants were overweight. 1.25% (n=1) participants were reported pre-obese, while 1.25% (n=1) participants were categorized as type II obese.

It was seen that large number of students suffers from underweight problem while there were participants who had BMI in the Range of Type II obesity which was a risk factor for many lifestyle diseases like hypertension, diabetes mellitus when the adolescent becomes an adult.

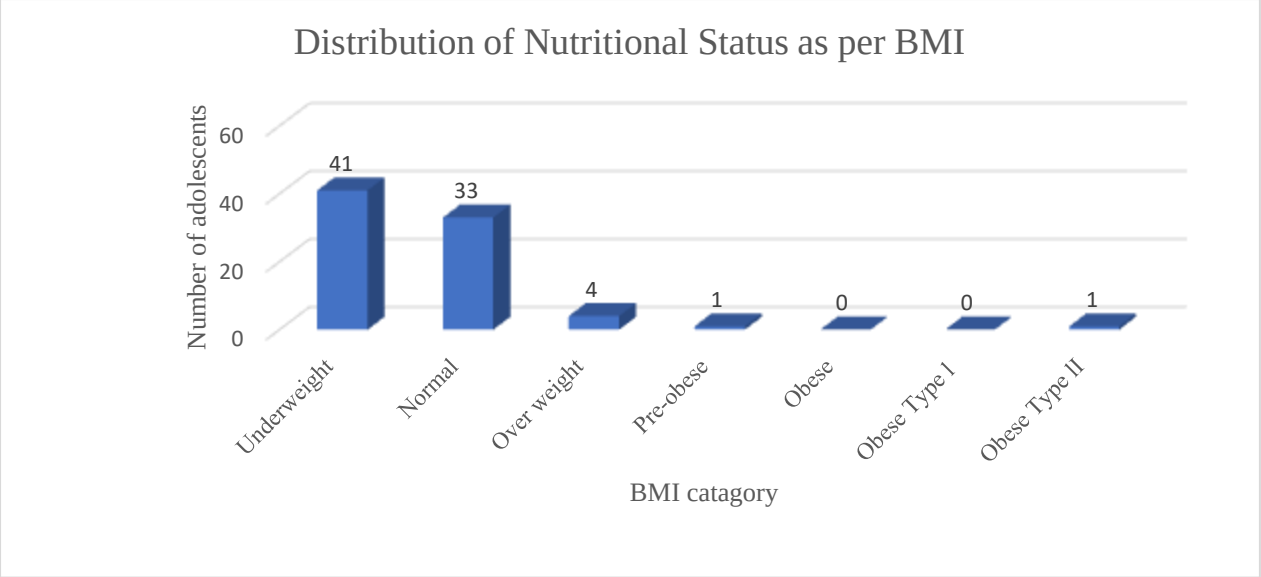

Figure 1. Distribution of Nutritional Status as per BMI

Dietary trends among adolescents

Figure 2 reports the dals and pulses during and before the COVID-19 lockdown period. The consumption of dals significantly increased on daily basis from 72.5% during lockdown to 82.5% after COVID-19 lockdown. In addition, the distribution intake frequencies show an increase in the number of adolescents who consume the recommended weekly servings of dals and legumes during lockdown i.e. 1,2, 3 times per week or fortnightly; from 45, 3.7, 6.3ad 1.2% during to 6.3, 1.2, 5 and 1.2% after COVID-19 lockdown (Figure 3.2). The findings also reveal that 78.8%and 75% of the participants consumed rice on a daily basis during and after lockdown respectively as shown in figure.3.

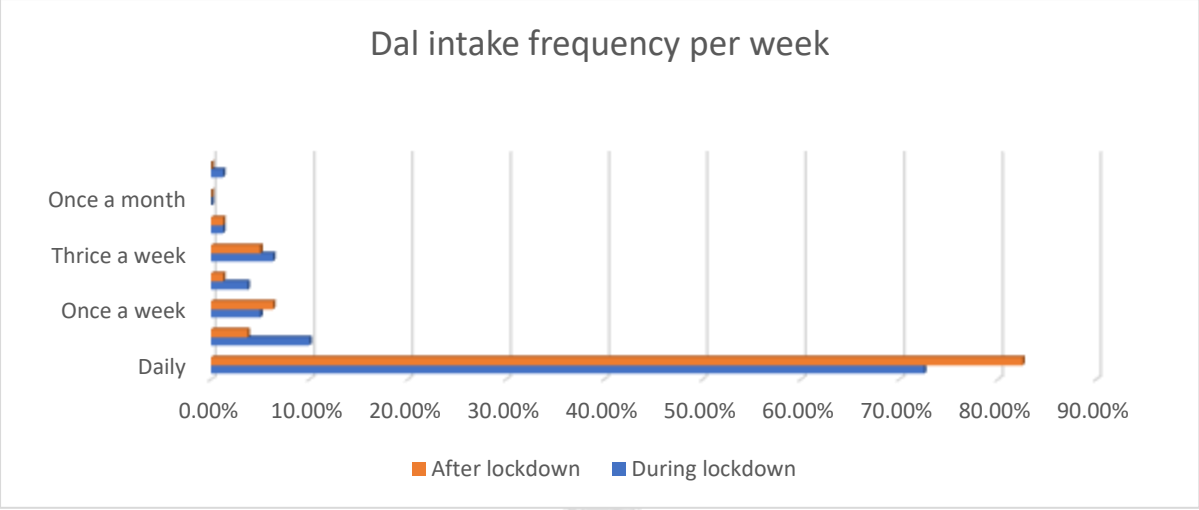

Figure 2. Dal intake frequency per week

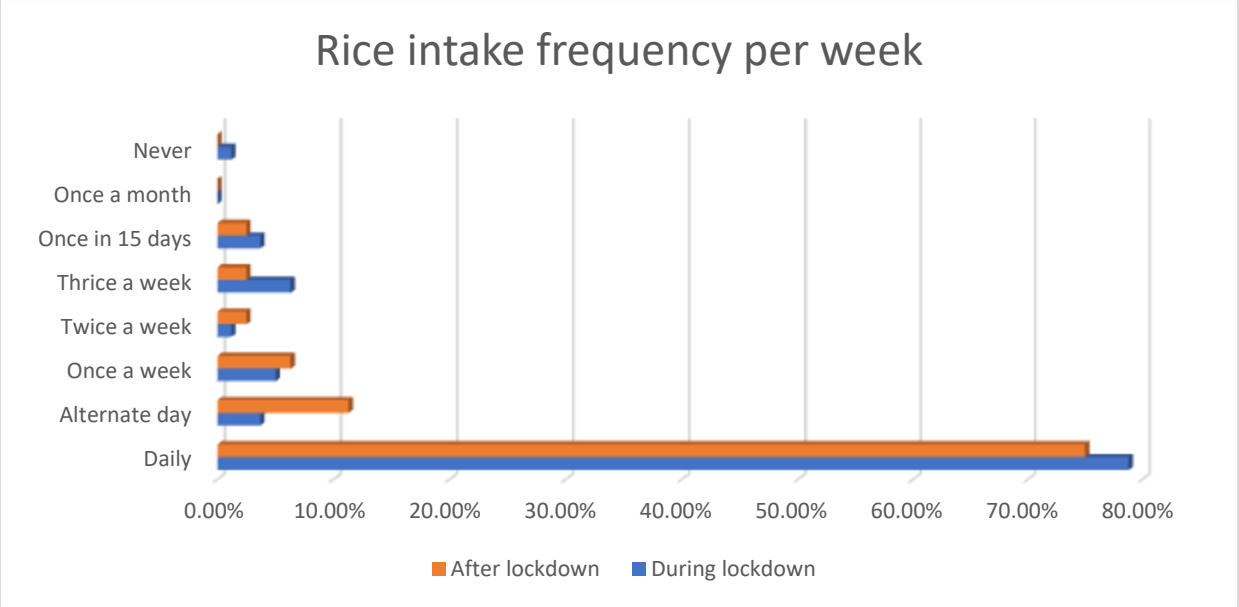

Figure 3. Rice intake frequency per week

It is also important to highlight the changes in the pattern of vegetable and fruit consumption of the adolescents of this survey. 37.5% of adolescents consumed vegetables every day during lockdown versus 78.8% who did it after (Figure 4). Similarly, only 21.3% of adolescents surveyed consumed fruits daily during lockdown versus 30% after lockdown. This can be justified by the matter of fact that there were limited available resources during complete lockdown and the visit to the market was limited. The WHO recommends legumes, fruits and vegetables as the best food items during self-quarantine or longer home stays.

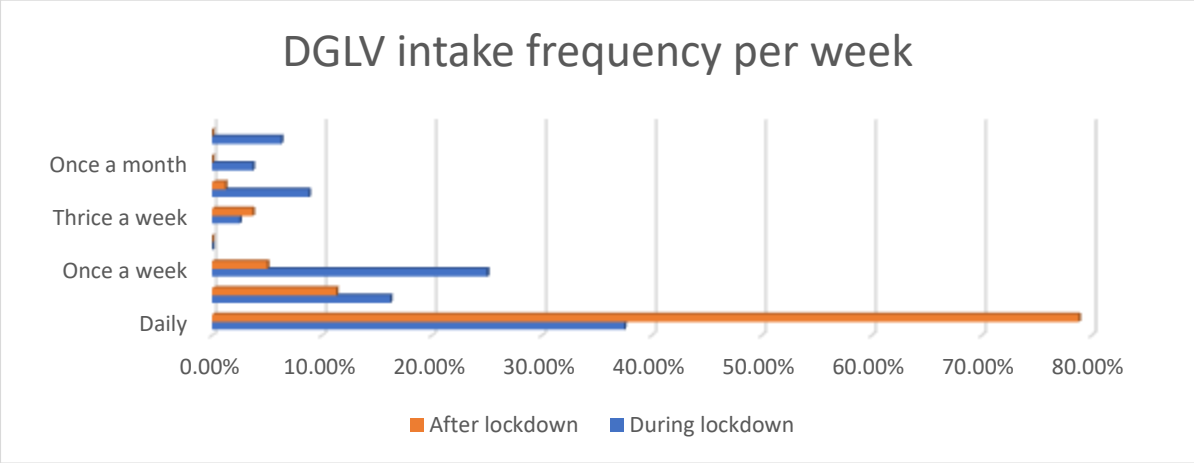

Figure 4. DGLV intake frequency per week

The results seen in figure 5 are not surprising because the sale of this type of food has increased since the beginning of lockdown. It was seen in this survey that there was no major difference in consumption of processed and packaged foods like Maggie and other noodles, potato chips, bakery items during and after lockdown.

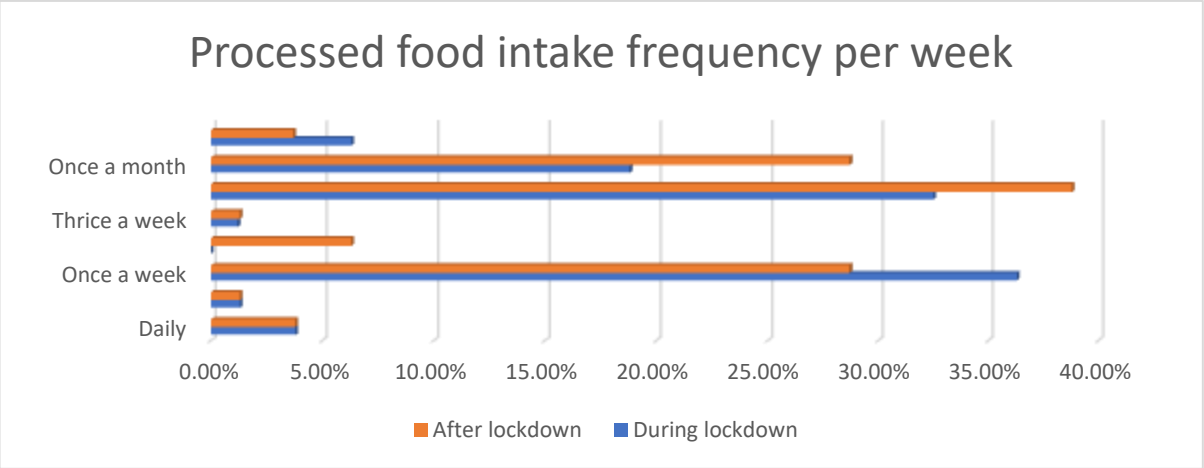

Figure 5. Processed food intake frequency per week

In contrast, fried food intakes increased significantly to 8.8% daily, during COVID-19 lockdown and 6.3% daily after. 12.5% of adolescents consumed sweet food every day before COVID-19 lockdown, which decreased to 6.3% during lockdown. These results confirm previous studies that suggested that the confinement could lead to irregular eating patterns and frequent snacking in adolescents due to boredom and stress. It is also important to highlight that these dietary habits are associated with a higher caloric intake and an increased risk of obesity.

In addition, we report that fast food intake was dramatically reduced in adolescents during lockdown. While after lockdown 16.3% of adolescents consumed fast food less than once a week, this figure decreased 8.4% during lockdown.

Figure 6 depicts the frequency of intake of milk and milk products. It was seen that milk was incorporated in the diet on daily basis both during and after lockdown, the percentage of participants being 80 and 81% respectively. Whereas the consumption of milk products accounted for 8.8% during and 12.5% of participants after lockdown on daily basis. Milk and milk products is a good source of macro as well as micro nutrients like energy, protein, fat, calcium, vitamin B12, all these nutrients are very important during the growth spurt.

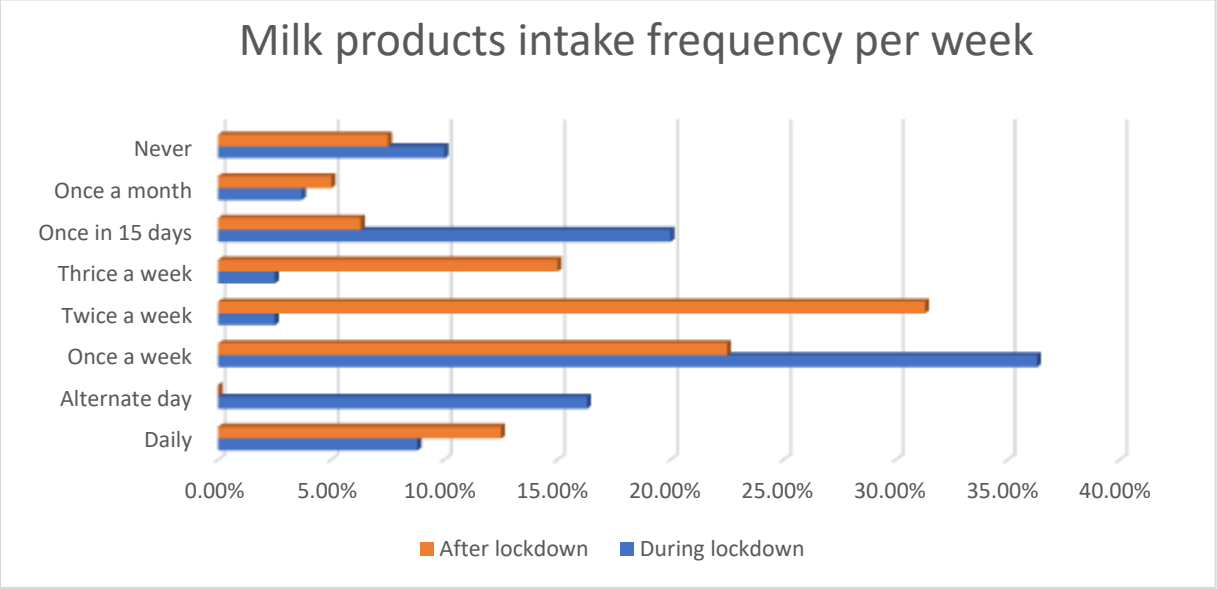

Figure 6. Milk products intake frequency per week

As seen in figure 7 the fortnightly consumption of non-veg items like chicken and mutton is 24.1% of total participants for both during and after lockdown. Whereas there were 45.5% during lockdown and 48.8% after lockdown who never consumed non-veg food.

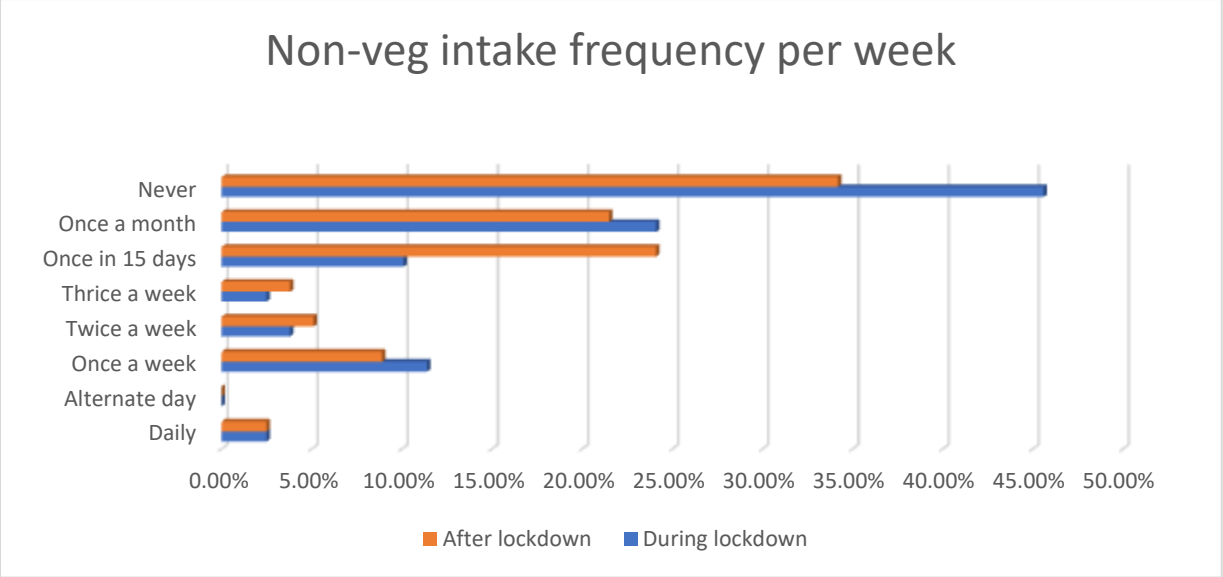

Figure 7: Non-veg intake frequency per week

Meal pattern

It was seen that 26.3% of participants skipped their meals during lockdown. Whereas 25% of adolescent skipped their breakfast during lockdown and 35% skipped it after lockdown. It can be seen that the meal pattern is disturbed the reasons for this can be online schooling, low physical activity, and home confinement. Also boredom can be a reason for this, as the children cannot go to the school, meet their friends, so they tend to miss upon meals. Usually food is associated with emotions, and when the child goes to the school the breakfast is done with their friends, they eat whatever they carry in their tiffin box. But due to COVID and online school children miss the happy time spent in school with their friends and do not feel like eating.

Conclusion

The present study was conducted to find nutritional status of adolescent of during COVID 19 pandemic. The subjects were students of various school of Surat, Gujarat. The subjects were between 12 to 14 years of age. Permission to collect data from the students was taken from the head person or from the principal.

Children between the age of 10-18 years are defined to be adolescence by WHO. After infancy this is the second stage of growth spurt. A sudden increase in the growth rate is referred to as growth spurt. The growth rate is not consistent for both gender, it occurs in spurt.

Data was collected using google forms. Due to COVID 19 lockdown the forms were circulated via digital media. Anthropometric measurement in the form of pre-lockdown and post lockdown weight and height of the participant was asked in the form.

Food frequency questionnaire was also included in the form. The mean age of 55 males was 13 years and mean age of 25 females was 13 years.

The results of the anthropometric measurements in the study are :

- The mean height of the males was 156.3 cm while for the females was 147.85cm.
- The mean weight before lockdown of males was 45.03 kg and for females it was 40.75kg.
- It was observed that 51.25% (n=41) of participants were underweight. Whereas 41.25% (n=33) were having normal weight and 5% (n=4) participants were overweight. 1.25% (n=1) participants were reported pre-obese, while 1.25% (n=1) participants were categorized as type II obese.

The consumption of dals significantly increased on daily basis from 72.5% during lockdown to 82.5% after COVID-19 lockdown. The findings also reveal that 78.8%and 75% of the participants consumed rice on a daily basis during and after lockdown respectively.

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It was seen that milk was incorporated in the diet on daily basis both during and after lockdown, the percentage of participants being 80 and 81% respectively. Whereas the consumption of milk products accounted for 8.8% during and 12.5% of participants after lockdown on daily basis.

The fortnightly consumption of non-veg items like chicken and mutton is 24.1% of total participants for both during and after lockdown. Whereas there were 45.5% during lockdown and 48.8% after lockdown who never consumed non-veg food.

It was seen that 26.3% of participants skipped their meals during lockdown. Whereas 25% of adolescent skipped their breakfast during lockdown and 35% skipped it after lockdown.

Strength of the Research:

• Different aspects were studied for correlation with nutritional status.
• Pre and pot lockdown meal patterns as studied

Weakness / Limitation of the research :

• It was restricted to Surat city only.
• All the schools were not included.
• Sample size was relatively small.

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