

# Effect of Covid-19 Lockdown on the Physical Activities and Nutrition Status of Children (10-12 Years)

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**ABSTRACT** **Background:** The COVID 19 lockdown has influence the physical activity of school going children due to closure of school. During the shutdown, there may be shifted towards unfavorable dietary habits, such as increased calorie intake, more frequent snacks, decreased fresh fruit, and vegetable consumption, and weight gain. **Aims:** The present study was conducted in 100 school going children of age group between 10-12 years from Kannur district, to find out the effect of covid-19 lockdown on the physical activities and nutrition status. **Materials and Method:** Purposive sampling method was used. The data regarding general profile and socio-economic status of the samples was collected. The nutritional profile of the samples was assessed by anthropometry and dietary methods using a structured Google form. To assess sleeping quality of school going children, Pittsburgh Sleep Quality Index (PSQI) was used. **Results:** Majority (82%) of samples has noticed significant change in their body weight; out of 82 samples, majority (98%) noticed an increase in their body weight. There was a significant ( $P<0.01$ ) change in dietary behavior between before lockdown and after lockdown. Lockdown introduced a significant ( $P<0.01$ ) change in physical activity before lockdown and after lockdown. Majority (99%) samples have good quality of sleep during lockdown. **Conclusion:** Physical activity of children negatively influenced by COVID 19 lockdown and improved their nutritional status during lockdown.

**Keywords:** COVID 19, Physical activity, Sleep quality

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## INTRODUCTION

COVID-19 has had a significant impact on people's lives all over the world, especially children and adolescents. Isolation and social distancing have been used all over the world to defend against the possibility of COVID-19 infection.<sup>[1]</sup> Global school and college closures have harmed approximately 91% of the world's student population and disturbances in their education, physical activity, and socialization opportunities, children and adolescents who are restricted to their homes experience confusion and distress.<sup>[2, 3]</sup>

WHO defined as a person between the ages of 10 and 19 is adolescent. Of the world's 1.2 billion teenagers, about 85% live in developing countries, and the rest of the developed world.<sup>[4]</sup> It is a key decade in the course of life that has

implications for the health of adults, the socio-economic wellbeing of a nation, and even the health of future children. Adolescents comprise 16% of the world's total population.<sup>[5]</sup> As per Census 2011, India has 13.59% (16.45 Cr) of its population with a population of 121.1 Cr, in the age group 0-6 years, and in the age group 0-14 years, 30.76% (37.24 Cr).<sup>[6]</sup>

A physical activity characterizes as anybody movement that requires energy expenditure provided by skeletal muscles.<sup>[7]</sup> The health advantages of a physically active lifestyle are well known during adolescence. They include enhanced

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cardiorespiratory and muscular fitness, metabolic health of the bone and cardio, and beneficial impacts on weight status. For children and adolescents, 60 minutes of everyday physical activity should range from mild to intense, and recreational screen time should be restricted. for a healthier lifestyle (ST).<sup>[8]</sup>

Nutritional status is an important index, especially in children, for measuring the quality of life. Knowing the nutritional condition of children in this regard has far-reaching consequences for enhancing the growth retardation of future generations, scholastic backwardness and decreased work ability growth and development of teenagers is closely related to the diet, they obtain during childhood and adolescence. Any individual's adequate nutrition is determined by two factors. The first is the sufficient availability of food regarding both quantity and quality, which is based on socio-economic status, food habits, cultural customs, and food allocation. The second aspect is the food can be digested, absorbed, and used. Infections and metabolic disorders can impede this capacity.<sup>[9]</sup>

Since many physiological, cognitive, and psychological processes mature sharply during adolescence and create an associated risk of morbidity, as well as many other significant maturation sleep changes and changes in many developmental functions, adolescence is characterized as a complex and especially vulnerable time.<sup>[10]</sup> For optimum functioning, it is recommended that adolescents require an average sleep time of 9 hours/night, i.e., 8.5-9.25 hours.<sup>[11]</sup> Lockdown in the aftermath of the COVID-19 pandemic appears to have drastically altered various aspects of students' lifestyles, especially by and screen time and even sleep duration and pattern.<sup>[12]</sup>

There is no uncertainty that food accessibility and availability can be impacted during periods of confinement, which in turn affects diet efficiency. Diet can affect many areas, but immune status can be affected most seriously. During the shutdown, there may be shifted towards unfavorable dietary habits, such as increased calorie intake, more frequent snacks, decreased fresh fruit, and vegetable consumption, and weight gain. During lockdown social infraction between children and surrounding were decline, which ultimately results in development of various psychological factors such as stress, anxiety, anger, etc. As a consequence, these adverse activities substantially worsen disrupted sleep patterns and insomnia, unhealthy eating habits, reduced physical activity levels and increased sedentary behaviors. Hence, this study attempts to assess the change in physical activity, nutritional status and sleeping pattern of school going children before and during the lockdown of covid-19 pandemic.

## SUBJECTS AND METHODS

### Selection of Samples

A total of 100 samples of school going children between the ages of 10-12 years were selected using purposive sampling method from Tholambra U P School in Kannur district, Kerala.

### Data Collection of Tool

The data was collected using the Google form tool. Google Forms is a survey administration tool that's included in Google's free, web-based Google Docs Editors package.

Google forms includes personal profile of the school going children (age, sex, educational status of parents, occupation of parents, monthly income of the family), socio-economic details, assessment of sleeping quality, assessment of physical activities, anthropometric measurements and dietary pattern.

### Anthropometric Assessment

"Anthropometry is the science of measuring the human body's proportions. It is one of the methods for determining nutritional status, including biological, clinical, and dietary evaluations.<sup>[13]</sup> The sample's height was determined using a stadiometer. The standing height was measured with the subject standing upright and feet together, without any shoes on. The head should be upright, the head board should be kept securely in place, and the final position should be taken as the reading. A weighing machine was used to determine body weight. The subject was asked to stand without shoes on the weighing machine and the weight was registered in kilograms. The samples were asked to monitor height and weight before and after lockdown. The samples have been following a frequent height and weight checkup from the school so it was easy to obtain their weight before lockdown. After 7 months of lockdown they were asked to monitor their height and weight for research purpose. BMI is a weight-to-height ratio-based anthropometric measure. It is used to categories malnutrition in adults who are not pregnant or postpartum. BMI is calculated by multiplying a person's weight in kilograms by the square of their height in meters. You'll need to convert the measurements from centimeters to meters (100 cm = 1 meter).<sup>[14]</sup> BMI before and after lockdown were calculated and classify according to BMI percentile range table (Developed by the NCHS collaborated with the National Center for Chronic Disease Prevention and Health Promotion, 2000) where BMI less than 5<sup>th</sup> percentile were considered as underweight and BMI between 5<sup>th</sup>-85<sup>th</sup> percentile were grouped as normal. BMI between 85<sup>th</sup>-95<sup>th</sup> percentile had grouped as overweight and BMI greater than >95<sup>th</sup> percentile were grouped as obese.

### 24 Hour Recall Method

The 24-hour recall method is a subjective, retrospective method that entails a direct face to face or phone interview and can be self-administered with the help of a computer programme.<sup>[15]</sup> Its aim is to collect comprehensive information about all foods and beverages (as well as potential dietary supplements) that the respondent had consumed in the previous 24 hours, normally from midnight to midnight the day before. The nutrient intake calculation was done by making subsamples of 50.

### Assessment of Food Frequency Pattern

“A food frequency questionnaire is designed to collect information on overall dietary quality, rather than nutrient composition and intake. The diet frequency questionnaire examines how much and how large people eat those foods.<sup>[14]</sup> The common food groups based on food practices were listed in the questionnaire wherein the samples were asked to mark their frequency of each food intake.”

### Assessment of Sleeping Quality

To assess sleeping quality of school going children, Pittsburgh Sleep Quality Index (PSQI) was used which was a one-month self-reported questionnaire that assessed sleep quality and disturbances. The PSQI includes a scoring key for calculating a subject’s seven sub-scores, which range from zero to three. The sub-scores are combined to yield a “total” score that ranges from zero to twenty-one. A score of five or more indicates poor sleep quality; the higher the score, the worse the quality.<sup>[16]</sup>

### Statistical Analysis and Interpretation

After the data collection, the information was reviewed, classified, tabulated and analyzed and subjected to statistical analysis using SPSS (Statistical Package for Social Sciences) version 26. Descriptive and inferential analysis was computed. The descriptive statistics included number, percentage, mean and standard deviation used to determine the change in frequency of food consumption before and during lockdown. Inferential statistics of Chi-square test and paired sample t-test were used to test the association

between Covid-19 lockdown with physical activity and weight, association of quality of food consumption before and during lockdown.

## RESULTS

### Basic Details

Out of 100 samples 51% were boys and 49% were girls. About 58% of samples family monthly income was between Rs. 10000 and 25000. Majority (91%) of samples family economic condition were affected by COVID 19 lockdown.

### Anthropometric Changes Before and During the COVID19 Lockdown

Majority (82%) of samples has noticed significant change in their body weight; out of 82 samples, majority (98%) noticed an increase in their body weight ( $36.58 \pm 12.31$  Kg) with calculated t-value- -12.190 and P-value < 0.05 it indicates a significant change in body weight before and after lockdown. The mean BMI before lockdown was  $16.707 \pm 5.527$  and mean value after lockdown  $17.38 \pm 5.343$  with calculated t-value- -6.142 and P-value < 0.05; a significant change in BMI before and after lockdown. The calculated Pearson Chi-square value is 132.312 with p-value less than 0.001 [Table 1]. So there is a significant association between BMI change and lockdown due to COVID-19. Behavioral and environmental determinants have been evaluated across all age groups, including infants, during the COVID-19 pandemic. Due to school closures, there was a decrease in structured physical activity, an increase in sedentary behaviors and screen time, and a greater probability of stress-induced indulgence of high calorie dense and sugary foods, all of which led to a higher risk of weight gain.<sup>[17]</sup>

### Change in Physical Activity Before and During the COVID19 Lockdown

COVID 19 lockdown downgraded the physical activity of school children. 46% of respondents are not engaged in physical activity in before the lockdown. During the lockdown there are 58% respondents are not doing any physical activity. The calculated Pearson Chi-square value of physical activity

**Table 1: Influence of Lockdown on Body Weight**

Variable	Before Lockdown		After Lockdown		Paired Mean Differences	T value	P value
	Mean	Standard Deviation	Mean	Standard Deviation			
Weight (Kg)	34.14	12.031	36.58	12.313	-2.44	-12.190**	0
BMI (Kg/m <sup>2</sup> )	16.707	5.527	17.378	5.343	-0.671	-6.142**	0

**Note:** Paired Samples Test, \*\*Significant at 0.01 level.

(minutes/day) was 175.204 with p-value less than 0.001. So there is a significant change in physical activity (minutes/day) before lockdown and during lockdown. The calculated Pearson Chi-square value of physical activity (Time/week) was 97.042 with p-value less than 0.001. So there is a significant difference in physical activity (Time/week) between before lockdown and during lockdown [Table 2]. Staying at home can lead to a reduction in leisure and athletic activities as well as a rise in time spent in front of screens (cell phones, televisions, laptops, and tablet computers), all of which can adversely affect PA and contribute to this population's sedentary lifestyle.<sup>[18]</sup>

### Change in Dietary Habit Before and During the COVID19 Lockdown

Out of 100 samples majority (71%) have good dietary habit during lockdown and before lockdown only 47% samples were with good dietary habit. The calculated Pearson Chi-square value is 35.387 with p-value less than 0.001. So there is

a significant change in dietary habit between before lockdown and during lockdown [Table 2].

### Food Frequency of Samples

All the samples (100%) were taking cereals daily before and during lockdown and daily intake of pulses where also remains same before and during lockdown. Majority (43%) of them were taking green leafy vegetables occasionally before lockdown and it reduced by 14% during lockdown. All the samples were included other vegetables daily in their diet before and during the lockdown. Majority of the samples included fruits weekly in their diet before and during lockdown. Most of the samples were consuming fish and egg weekly. There is slight increase (4%) in the daily intake of milk and milk product compare to before lockdown [Table 3].

### 24 Hour Nutrient Intake of Subsamples

On comparing the nutrient intake of study sample with the RDA (2020) it was seen that samples (both boys and girls)

**Table 2: Change in BMI, Physical Activity and Dietary Habit Before and During the COVID19 Lockdown**

Variables	Pearson Chi-Square	P value
BMI	132.312	0
Engaged physical activity (minutes/day)	175.204	0
Engaged physical activity (times/week)	97.042	0
Dietary habit	35.387	0

**Note:** Abbreviation: BMI - Body Mass Index.

**Table 3: Change in Food Frequency During Lockdown**

Food Items	Before Lockdown					During Lockdown				
	Daily	Weekly	Monthly	Occasionally	Never	Daily	Weekly	Monthly	Occasionally	Never
Cereals	100	0	0	0	0	100	0	0	0	0
Pulses	51	45	2	2	0	51	47	2	1	0
Vegetables	100	0	0	0	0	100	0	0	0	0
Green Leafy Vegetables	7	26	24	43	0	11	29	31	29	0
Fruits	10	57	30	3	0	4	47	42	7	0
Meat	1	16	35	41	7	1	11	37	42	9
Chicken	1	30	57	10	2	0	27	59	11	3
Egg	7	74	12	5	2	3	74	15	5	3
Fish	31	59	5	1	4	24	58	11	3	4
Milk and Milk Products	76	13	3	4	4	80	11	2	5	2

**Table 4: 24 Hour Nutrient Intake of Samples**

Nutrients	Mean Intake ( $\pm$ SD) (Boys)	RDA (Boys)	Mean Intake ( $\pm$ SD) (Girls)	RDA (Girls)
Energy (Kcal)	1783.9 $\pm$ 176.0	2220	1697.5 $\pm$ 153.9	2060
Protein (g)	51.7 $\pm$ 12.0	32	48.5 $\pm$ 12.0	33
Fat (g)	31.1 $\pm$ 6.4	35	30.8 $\pm$ 7.8	45
Calcium (mg)	628.7 $\pm$ 238.1	850	740.1 $\pm$ 383.4	850
Vitamin A ( $\mu$ g)	539.1 $\pm$ 103.2	770	528.9 $\pm$ 100.5	790
Vitamin C (mg)	47.9 $\pm$ 11.2	54	46.2 $\pm$ 8.5	52
Iron (mg)	18.5 $\pm$ 2.1	16	19.3 $\pm$ 2.7	28

**Note:** Abbreviation: SD – Standard Deviation.

RDA Source: ICMR 2020

were not meeting the calorie (boys (2220  $\pm$  176.0), girls (2060  $\pm$  153.9), fat (boys (35  $\pm$  6.4), girls (45  $\pm$  7.8), micronutrient such as calcium (boys (628.7  $\pm$  238.1), girls (740.1  $\pm$  383.4), vitamin A (boys (539.1  $\pm$  103.2), girls (528.9  $\pm$  100.5), vitamin C (boys (47.9  $\pm$  11.2), girls (19.3  $\pm$  2.7). Boys were meeting the recommended RDA of iron but the mean intake value of iron seen to be deficient in girls [Table 4].

### Sleep Quality of Samples During Lockdown

Majority (99%) of samples have PSQI Score between 0-5 that shows healthier sleep quality. Majority (55%) of samples have 7-9 hour sleep duration during lockdown [Figure1]. All children need sleep for their health and well-being. Sleep deficiency in children has long been known to cause functional and cognitive disability. Inadequate sleep has been linked to

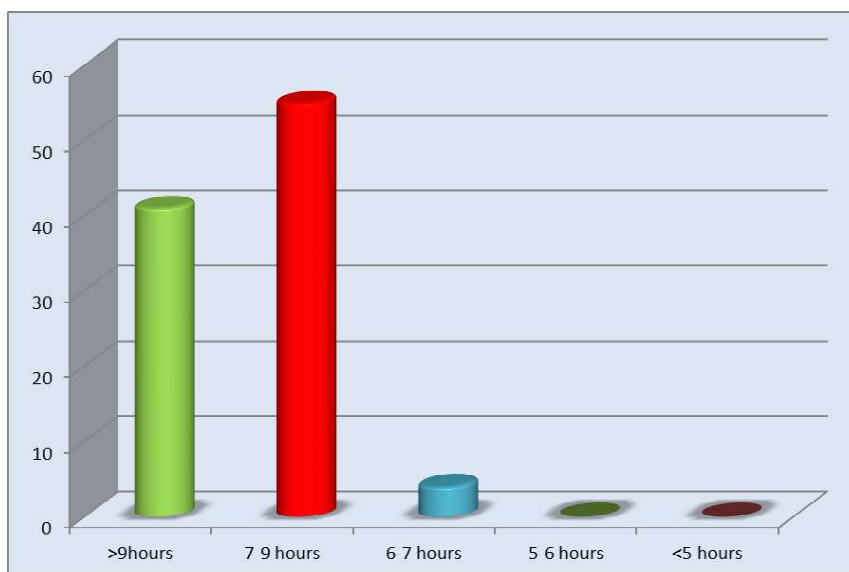
an increased risk of chronic illnesses, behavioral issues, and impaired memory and executive function.<sup>[19]</sup>

### DISCUSSION

After getting prior consent from school management Google form method was used to collect information from 100 sample of school going children age between 10-12 years. The Google form included personal profile of the school going children (age, sex, educational status of parents, occupation of parents, and monthly income of the family), socio-economic details, assessment of sleeping quality, and assessment of physical activities, anthropometric measurements and dietary pattern.

Out of 100 samples 51% were boys and 49% were girls. About 58% of samples family monthly income was between Rs. 10000 and 25000. Majority (91%) of samples family

**Figure 1: Distribution of Samples Based on Sleep Duration During Lockdown**





economic condition were affected by COVID 19 lockdown. Majority (82%) of samples has noticed significant change in their body weight; out of 82 samples, majority (98%) noticed an increase in their body weight ( $36.58 \pm 12.31$  Kg). The mean BMI before lockdown was  $16.707 \pm 5.527$  and mean value after lockdown it slightly increased to  $17.38 \pm 5.343$ . Lockdown downgraded the physical activity of school children. 46% of respondents are not engaged in physical activity in before the lockdown. During the lockdown there are 58% respondents are not doing any physical activity. it was seen that samples (both boys and girls) were not meeting the calorie (boys ( $2220 \pm 176.0$ ), girls ( $2060 \pm 153.9$ ), fat (boys ( $35 \pm 6.4$ ), girls ( $45 \pm 7.8$ ), micronutrient such as calcium (boys ( $628.7 \pm 238.1$ ), girls ( $740.1 \pm 383.4$ ), vitamin A (boys ( $539.1 \pm 103.2$ ), girls ( $528.9 \pm 100.5$ ), vitamin C(boys ( $47.9 \pm 11.2$ ), girls ( $19.3 \pm 2.7$ )). Majority (99%) of samples have PSQI Score between 0-5 that shows healthier sleep quality. Majority (55%) of samples have 7-9 hour sleep duration during lockdown

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