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Lifestyle and food habits of school-based children during the COVID-19 pandemic era: A cross-sectional study among a South Indian urban population

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ABSTRACT

Objectives: The present study was carried out to understand the lifestyle changes such as physical activity, diet and sleep pattern among children 8 to 15 years of age during this extended period of stay indoors as a result of the SARS COV-2 pandemic and also to examine the effect of lifestyle changes, if any on the nutritional status of the children.

Methods: This was a cross-sectional study conducted among school-going children in pre- and early adolescence (8 to 15 years). Survey conducted among parents of children in the study age group to understand the lifestyle changes like family cooking practices, food preference of the child, physical activity, screen time and sleep pattern. Data were entered and analyzed using SPSS version24.

Results: The total numbers of study participants were 330. Around 33% of the parents of our study participants resorted to preparing healthy food during the pandemic. Around 70% of the study participants had access to outdoor games. More than 50% of the study participants were involved in recreational screen time for > two hours. Weight gain of more than 3kg during the ten-month period was significantly associated with overweight/obesity and age (8-12 years) and increased screen time was associated with overweight/obesity among girls.

Conclusion: Positive and negative changes in lifestyle were observed among our study participants and their households. Providing clear guidelines and proper health education by the state and the schools may be important to prevent adverse health outcomes in children during their prolonged stay indoors due to the pandemic.

Key word: COVID-19 pandemic, lifestyle changes, children, adolescents

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INTRODUCTION:

The COVID-19 pandemic has caused unprecedented effects globally across all age groups. There is accelerated rise in the number of cases in many regions, following a short period of decline, possibly due to spread of more transmissible variants, relaxation of public health and social measures (PHSM), mass gatherings and fatigue leading to low

adherence to PHSM. This situation had created an uncertainty on getting back to normalcy.^[1]

The pandemic has an impact on all individuals irrespective of age and school going children aged 5-18 years may be the worst affected.^[2] Children have little or no interaction with peers, friends, and are deprived of sports and other activities. While children need at least 60 minutes of moderate to high intensity

physical activity, they are forced to stay indoors for prolonged periods which may have adverse effects on their physical and mental health. [3, 4, 5] The negative effects are greater so in developing countries such as India where 41% of the population are below 18 years of age. [6] Around 321 million children in India are forced to stay away from school due to the lockdown causing a huge setback not only to their learning but also to their social interaction, physical health, and well-being. [6, 7]

In low- and middle-income countries like India, schools may be the only source of safe neighbourhood to engage children. The pandemic has caused a threat to this access leaving them with no option but to stay indoors. [3] Xiang et al.'s study amongst children revealed that physical inactivity had increased from 21.3% pre-pandemic to 65.6% during the early phase of the pandemic.[5] Adverse effects have also been found on food habits, sleep pattern and mental health like increased consumption of junk food, decreased quality of sleep and stress. [8, 9, 10]

These adverse lifestyle changes may be silently growing as the next pandemic. The World Health Organisation (WHO) has estimated the prevalence of physical inactivity amongst individuals more than 15 years to be 31%. Approximately 3.2 million estimated deaths are attributed to unhealthy lifestyle. With no proper measures for improving physical activity even prior to the pandemic, the scenario is likely to worsen in the light of the current pandemic.[11] cardiovascular disease has emerged as a major public health problem in India contributing significantly to mortality and morbidity.[12] The underlying risk factors and risk behaviours that accelerate atherosclerosis begin right from childhood. With expert recommendations for promoting healthy lifestyle right from childhood to prevent cardiovascular disease in adulthood, the

current pandemic is a major threat to implementing healthy behaviours in children. [3, 13]

While some attempts have been made to understand the lifestyle changes among children during the pandemic in countries like China, Italy, and few others, less is known about the status of children in India. [5, 8] The present study was carried out with the hypothesis that prolonged stay indoors due to the COVID-19 pandemic would have adversely affected the lifestyle and food habits among children. Hence it was sought to understand the lifestyle changes such as physical activity, diet and sleep pattern among children 8 to 15 years of age during this extended period of stay indoors as a result of the SARS COV-2 pandemic. The study also examines the effect of lifestyle changes, if any on the nutritional status of the children.

METHODS

Design. This was a cross-sectional study conducted among school-going children who were in pre- and early adolescence (8 to 15 years) from a private school in an urban locality.

Sample. Considering a 65.3% physical inactivity from a recent Chinese study, [5] it was estimated that a sample size of 347 was required for 5% absolute precision.

Data Collection. After obtaining clearance from the institutional human ethics committee, data collection was conducted using a self-administered questionnaire (completed by parents of children between 8-15 years), adapted and modified to local context from studies done in China and Italy. [3, 7] After validation process the final questionnaire was administered to all the parents of children belonging to the study age group. Considering the impossibility of contacting children or their parents in person, an online survey

was conducted in English language using Google forms. Prior orientation and support was sought from the respective class teachers to improve the response rate of the parents. Weekly reminders were sent through social groups for two months. At the end of two months, 330 parents responded and completed the survey form. We obtained a response rate of 95%.

Measures. The questionnaire captured the following information regarding the sample demographic information like age, sex, and type of housing (independent or apartment)

- a. Height and weight of the child before the pandemic (March 2020) and current height and weight (January 2021) were measured to calculate body mass index (BMI).
- b. Accessibility to outdoor games, number of hours spent in active games/sports, number of hours spent in active sports/games, number of hours of virtual formal school sessions, measures taken by the school to promote physical activity and compliance of children to school expectations of activity, and number of hours of screen time.
- c. Change in cooking pattern in the family during the lockdown period, child's preference for healthy or junk food, frequency of snacking in a day, snacking during screen time. For the purpose of the study, pre-packaged, processed, preserved, fried food and sugary drinks were considered as junk. [14, 15]
- d. Change in sleep pattern during the lock down and average duration of sleep.
- e. Analytic approach. Data entry and analyses were done using SPSS version 24, IBM Corporation. The categorical variables were presented as percentages. The continuous variables were presented with mean and

standard deviation or median and interquartile range where appropriate. Body mass index (BMI) was calculated from weight and height. The BMI values were converted to percentiles based on the World Health Organisation (WHO) guidelines and children were categorized as being underweight, normal, overweight or obese with the cut-offs being <5th, 5 - <85th, 85-<95th and 95th percentile or greater respectively. (16) Chi square test of association was done to compare categorical variables Statistical significance was declared if 'p' value was less than 0.05.

RESULTS

Table.1. Profile of study participants (N=330)

Variables	Percentage
Age in years	
08-10	14.2
08-11	57
14-15	28.8
Gender	
Male	45.8
Female	54.2
Type of house	
Individual	73.3
Apartments	26.7
Household cooking practices during pandemic	
No changes	63.9
Preference for health food	33
Preference for junk food	1.8
Both	1.2
Access to outdoor games	
Yes	70.9
No	29.1
Average sleep duration of children	
<9 hours	58.8
9-11 hours	40
>11 hours	1.2

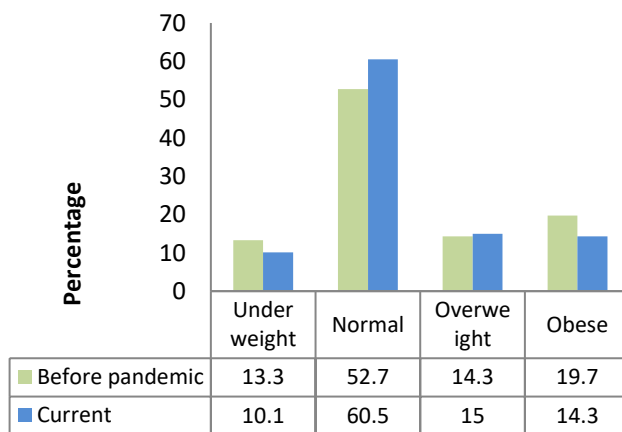
This cross-sectional study was conducted with school going children aged 8 to 15 years. Of the 330 children who participated in the study, the majority (83.1%)

were in the age group of 11-14 years. More than half the participants (54%) were females. Majority of them (73.3%) were residing in individual houses. Table.1 displays the profile of the study participants.

Anthropometric profile

The parents of 286 (N=330) of the sample were able to measure their present weight and height and 300 of them were aware of their anthropometry before the pandemic. The distribution of BMI of the study participants with a comparison of the BMI data before and after lockdown (one year period) is presented in figure.1.

Figure.1. Before pandemic and current distribution of Body Mass Index (BMI) of study sample (n=286)



There was no statistically significant gender difference in the prevalence of obesity. However, children between 8 to 12 years of age had a significantly ($p < 0.02$) higher level of obesity (36.2%) compared to children between 13-15 years of age (24.07%). The median weight gain between before pandemic and current times among the children was around 3 kg (IQR 2-5). Around 45.7% children had gained more than 3 kg in the ten-month period.

Figure2 displays the change in category of nutritional status based on BMI of the children during the one-year period (n=257). Around 2.9% had become overweight /obese during the ten-month period.

Figure 2. Changes in BMI during the 10 month period

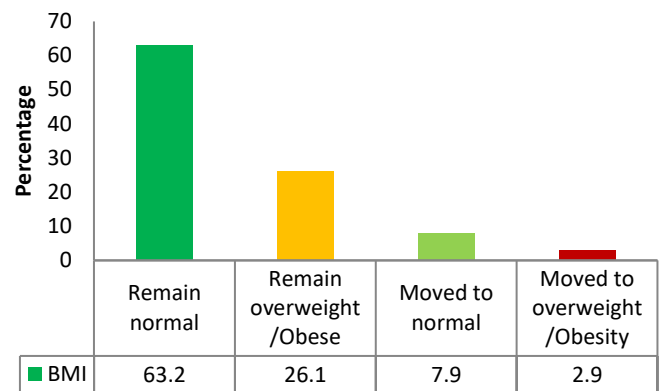


Table 2. Summary of food preferences and snacking pattern of the children during the pandemic (N=330).

Variables	%
Preference for junk food (n= 279)	34.7
Preference for unhealthy snacks or both(n=330)	44.8
Habit of frequent consumption of snacks (4 or more times a day) (n= 115)	27.8
Habit of snacking while watching television or using gadgets (n=330)	56.4

Dietary habits

All 330 participants responded to the questions on dietary habits during the lockdown. Around 35.5% of parents have responded that they had changed cooking patterns during the lockdown period. Among those who have changed their cooking pattern, the vast majority (91.5%) have reported that they had tried to cook healthy food by including more vegetables, fruits, whole grains, sprouts, vegetable soups and green leafy vegetables in the family diet. Around 96% of the participants had access to fresh fruits and vegetables during the lockdown period.

Table. 3. Physical activity, barriers to physical activity & screen time for leisure among children

Physical Activities reported by parents (N=286)	%
Outdoor games and sports	51.9
Indoor activities- yoga, home workout and dance	39.3
Household chores	8.8
Factors hindering physical activity among children (n=44)	
Fear of Covid-19	48.3
Non-co-operation from child	27.5
Limited access for play	17.3
Lack of time for parents	6.9
Leisure time screen time > 2 hours (n=300)	53

Physical activity and screen time

Of the study participants, 70.9% had access to outdoor activities in and around the house. Around 15% of the children did not spend time in any form of outdoor activities. Among the rest of the children, 45% spent less than one hour in outdoor activities. The median time involved in outdoor activities was 1 hour with interquartile range of 0.5 to 2 hours.

Around 87% percent of parents took measures to engage the kids in outdoor and indoor physical activities. The rest of the parents quoted different factors hindering them from engaging their children in physical activities (table.3).

The median time spent by the children in online classes was 2.5 hours (IQR 2.5-3). The maximum time on online classes extended to 6 hours a day based on the educational level of the child. More than 50% of the children spent more than 2 hours on screen either watching television, playing games or on social media other than formal online sessions. The median screen time of the children was 3 hours (IQR 2 to 4).

Sleep

Sleep routine has been affected in nearly 46% of the children with 14.8% parents reporting that it is completely altered. Of these parents, 46.7% reported

increased sleep time and 11.8% reported decreased sleep time.

Factors influencing obesity

Univariate and where relevant multivariate logistic regression analyses were run to find out the influence of age, weight gain, physical activity pattern, screen time, and food preference on BMI. For the analysis, children falling in under underweight and normal weight category were grouped together and those in overweight and obese category were grouped together. Weight gain (>3kg) during the ten-month period had a significant influence on overweight/obesity among boys. Age distribution (8-12 years) and leisure time screen time were found to be independently associated with overweight/obesity among girls. The results are depicted in Table 4.

Discussion

Studies done in different countries during the beginning of the pandemic revealed that food habits, sleep patterns and physical activity have been adversely affected in children. [3, 7] This study was undertaken in a subset of children from an urban school to understand the lifestyle changes of children in India after prolonged stay indoors because of the ongoing SARS CoV-2 pandemic.

The study participants had nearly equal number of boys and girls, with most of the children in the age group of 11-14 years. From the self-reported data on height and weight, the study found that there was decrease in the proportion of children who were overweight/obese currently (29.3%) compared to the pre lock down period (34%). This finding is quite contrary to the assumptions from other studies which predicted that confinement within homes for a long time would have adverse impact on weight. [3, 7] This could be probably because our study was conducted 10 months into the pandemic by which time various

Table.4. Association of age, weight gain, food preference, physical activity and screen time with overweight/obesity (N=330).

Variables	BOYS (n=128)			GIRLS (n=158)		
	%	Unadjusted OR (95%CI)	%	Unadjusted OR (95%CI)	Adjusted OR (95%CI)	OR
Age						
8-12 years	29.4	1.2(0.8-1.6) ns	42	1.5 (1.04-2.9)*	2.6 (1.3-5.8)*	
13- 15 years	19.7		27.9			
Weight gain during 10 months (n=282)						
< 3 kg	20.6	2.85 (1.3-6.3)*	21.2	1.01(0.48-2.1)	-	
>3 kg	42.6		25.8			
Snack preference (n=286)						
Healthy snacks	33.3	1.03 (0.7-1.7)	26.7	1.01(0.7-1.5)	-	
Junk	32		26.3			
Physical activity (n=286)						
< one hour of outdoor activity	29.4	1.2(0.5-2.9)	34.1	1.2 (0.9-1.5)	-	
> one hour of outdoor activity	34.1		23.6			
Screen time (n= 286)						
< 2 hours	35.1	1.08(0.7-1.5)	16.6	2.7 (1.3-6.0)*	3.1 (1.4-6.6)*	
>2 hours	31.9		36.2			

OR- Odds ratio, *p <0.05

influential factors would have played a role in altering the lifestyle of the children.

Around 45% of children in our study had weight gain of more than 3kg. There was a significant association between increased weight gain (>3kg) and obesity among males (OR-2.85, 95% CI-1.3-6.3). For females, other factors like age (8-12 years) (OR-2.6, 95% CI-1.3-5.8) and increased screen time (OR-3.1, 95% CI-1.4-6.6) were associated with obesity. The gender difference in factors influencing overweight/obesity is unsurprising considering the volume of evidence available that indicate early growth spurt in females which may explain age as a risk factor for obesity and decreased physical activity during adolescence leading to increased screen time being a risk factor. [17, 18, 19]

At least 35% of the parents had tried changing their cooking pattern by trying to add to more fruits, vegetables, sprouts and soups in their diet. Nearly one third of the children in our study preferred junk food and unhealthy snacks and around 27.8% had the habit of frequent (>four times a day) of snacking. This finding is not surprising because prolonged stay at home may cause boredom and provide more accessibility to food which has an influence on frequent food consumption. [20, 21]

We did not find a significant association between consumption of unhealthy snacks and obesity. However, Sidor and Rzymiski, in their study among Polish adult residents observed that a significant association between obese individuals and preference for snacking on unhealthy foods during the pandemic. [21] The study also revealed that 50% of the participants

had the habit of snacking while watching television. A significant influence of television watching and food consumption on obesity has been observed by Vik et al in a multinational cross-sectional study among adolescents.^[22]

Around 70.9% of the study participants had access to outdoor games/sports activities. Of them, only around 50% of the children were engaged in outdoor activities. Around 39% of the children were engaged in indoor activities like yoga and home workouts. However, 11% of the parents reported not taking any measures to promote physical activity among children quoting fear of Covid-19, lack of time and inaccessibility to outdoor play as reasons. This may reflect disaster situations that bring about a change in lifestyle including decreased physical activity, the evidence for which are available from the studies done during the Japanese tsunami, SARS-1 and those conducted earlier in the current pandemic.^[5, 10, 23]

“Playing with friends” was the most favourite activity next to television watching for children 9-12 years of age in many countries.^[24] But when opportunities to interact with friends become impossible, children resorted to sedentary activities like television watching, playing videogames and accessing social media. More than 50% of children in the study had leisure time screen time of more than two hours. Increased screen time which is evidence of sedentary behaviour is rapidly increasing among adolescents.^[24] This problem is compounded by the pandemic situation where school activities are also virtual. In the study, children spent 2- 6 hours in virtual classes. Combined, the duration of screen time of children is quite alarming when compared with the recommendation of 2 hours or less.^[3] The pandemic may be temporary but its lasting effects on the health of the children due to decreased physical activity and

increased sedentary behaviour may emerge as the next pandemic.^[11]

The recommended duration of good quality sleep for children and adolescents is 9-11 hours.^[3] Studies done prior to the pandemic among school going children (8-17 years) observed that majority of them followed sleep routine in weekdays and disruption was observed only in weekends among few children^[25]. But only 40% of our study children reported having the recommended duration of sleep during the pandemic period. Around 58% of them have decreased sleep, with 14.8% reporting that the sleep pattern has been completely altered. Sama et al. in their study among adolescents of two districts in Punjab have reported that the sleep pattern along with eating patterns and physical activity has been adversely affected within three weeks of national lockdown in India.^[10]

Our study relied on self-reported anthropometric measures for nutritional assessment. Other variables like physical activity, screen time and sleep pattern were also assessed using self-reported data. Though this might introduce some bias in the study, the findings from the study may provide insight on the status of the children and the areas which require focus for further research.

Though the lifestyle changes did not have a significant negative impact on the nutritional status of target population in the study, there was a significant change in lifestyle like increased screen time, altered sleep patterns, decreased physical activity, and increased frequency of snacking. The study has also unveiled the positive changes that have taken place like better cooking and nutritional practices and increased efforts of parents to improve children’s physical activity. While schools have made some efforts such as conducting daily yoga session on a virtual platform to improve physical activity in children, more stringent measures are required by schools and the state to bring

about more awareness among children and their families, given the uncertainty that is prevailing due to the SARS COV-2 pandemic. Future research needs to focus on the long-term repercussions of the continuing pandemic on the children and specifically of low income and below poverty line urban, peri-urban (slum) and rural areas.

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