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Original Research Article

Post COVID shift in BMI with special reference to dietary and behavioural pattern among adolescents: a school based study

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ABSTRACT

Background: Covid-19 was a life altering pandemic leading to children getting restricted indoors with online education. This led to a change in dietary and socio-behavioral pattern. Aim were to assess change in post-Covid BMI in comparison to pre-Covid BMI among adolescents and to determine post-Covid dietary and sleeping habits, screen time, physical activity, psycho-behavioral pattern using a structured questionnaire.
Methods: This study was conducted among 108 adolescent and mother dyads studying in a higher secondary school, during November 2022 to March 2023 using a pre-structured questionnaire. Anthropometry measurements were taken and compared with pre-Covid data available in the medical records. Using SPSS 21, analysis was done and association determined using Chi square test ($p<0.05$ significant).
Results: M:F ratio was 1:0.9. Among dietary pattern compared to pre-Covid 54.6% had increase quantity of food intake, of which 83.05% had increase consumption of JUNCS. 68.5% reported disturbances in sleep pattern. Increase in screen time for non-academic is 74% and 51.9% for academic purposes. 49% preferred leisure activity, 25% preferred moderate and 25.9% preferred vigorous physical activity. 60.1% experienced signs of anxiety. On comparison of pre and post-Covid BMI showed that there was an increase in overweight from 22.2% to 37.9% and obesity from 2.8% to 6.5% and was statistically significant.
Conclusions: There were significant changes in the lifestyle pattern with a double fold increase in overweight and obesity in the post-Covid assessment. This is an eyeopener regarding future burden of non-communicable disease and a warning to impart healthy lifestyle.

Keywords: Habit, Obesity, Overweight, Post covid-19

INTRODUCTION

Covid-19 was a life-altering pandemic. In March 2020 to decrease the widespread Covid-19 transmission, schools were shut down. Because of this, children were restricted inside four walls leading to lack of outdoor activities and was dependent on online sources for both entertainment and education.[1] This led to an increase in screen time during the pandemic period compared to pre-pandemic era. There was also alteration in the sleep pattern due to the disturbance in the circadian rhythm because of lack of proper exposure to daytime light. Thus, causing inadequate sleep which further disrupted the normal body function. As the covid-19 pandemic was controlled, the consequences it had on physical and mental health could not be altered.[2] It had a residual change in the lifestyle among humans even post pandemic. Overall Obesity was a preventable issue, in spite of that it still increased threefold all over the world irrespective of age and gender because of the lack of proper knowledge regarding the future complications, healthy diet, promotion of sedentary

lifestyle and lack of physical activity. Thus, obesity has become a global pandemic even before the Covid-19 Pandemic.[3] Now there has been an alarming increase in non-communicable disease especially diabetes mellitus at a younger period itself secondary to obesity. Several measures have been taken by various organization worldwide to curb obesity by promoting preventive measures in term of guidelines for diet, screen time and physical activity.[4] Mental health disturbance ad mist this Covid-19 era led to psychosocial problems like anxiety and depression among adolescents. Most of the cases remain undiagnosed and further decreasing the quality of life.[5] Thus because of the changes in dietary habits, lifestyle and socio-behavioral pattern in the post Covid era further caused increase in number of overweight and obesity especially among adolescents. However detailed data regarding these aspects among Indian adolescents are scanty. Hence this school-based study was planned to assess post-Covid shift in BMI and associated lifestyle changes. Aim of study were to assess change in post-Covid BMI in comparison to pre Covid BMI as per school medical records among 10-17-year old adolescents and to determine post Covid dietary habits, sleeping habits, screen time, physical activity, psycho-behavioral pattern among the above participants using a structured questionnaire.

METHODS

An observational longitudinal school-based study was conducted using a pre-structured questionnaire (Table 1) among 108 adolescent and mother dyad studying in a private higher secondary school from Kanyakumari district, Tamil Nadu. Based on the index study, the sample size was calculated.[6] Random sampling method was employed. Inclusion criteria: Children aged 10-17 years. Exclusion criteria: Children with any history of developmental delay or chronic illness and not willing to participate. Data was collected from November 2022 to March 2023. IEC approved. Informed consent obtained from parents.

Data collection tool

A pre-structured questionnaire containing preface, informed consent, demographic details and multiple-choice questions comprising of dietary habits, sleeping habits, physical activity, leisure activity, screen time and anxiety symptoms. Sleeping habits as to if there was any change in duration or disturbance or same as before. Anxiety pattern was assessed using 6 questions adapted from Spielberger's test anxiety inventory.[7] Semi open questions regarding dietary habits was based on quantity and quality of (JUNCS/healthy) foods. JUNCS meaning J- Junk foods (high in fats, sugars and salts, and lacks in micronutrients and minerals), U-Ultra processed foods, N - Nutritionally inappropriate foods, C and S meaning - Caffeinated/carbonated and Sugar sweetened beverages respectively.[8] Physical and leisure activity was assessed using 6 questions derived from Madras Diabetes Research Foundation - Physical Activity Questionnaire for Children and Adolescents-MPAQ.[9] It was made in English and translated to local language (Tamil and Malayalam). Initially a pilot study was conducted among 10 parents with children between the age of 10-17 years to access whether there was any difficulty in comprehension. It was acceptable and the study was carried on.

Data collection was done in a private school by approaching the parents during a PTA meeting. The procedure was explained as to how the questionnaire could be filled. Children were given enough time and proper environment to help fill out the anxiety questionnaire section. Anthropometry measurements were taken using standardized procedure and compared with pre-Covid data available in the medical records. BMI of the children was calculated. They were categorized as normal, overweight (corresponding to 23rd adult equivalent) and obese (27th adult equivalent) after plotting in the IAP boys/girls BMI chart.[10]

Statistical analysis

Data was analyzed using SPSS version 21. Descriptive statistics was expressed as frequency and percentages. Chi square test was used to assess the relationship between dependent and independent variables. P value<0.05 was considered to be statistically significant.

RESULTS

Among the 108 adolescents in the age group of 10-17 years, the male to female ratio was 1: 0.9. They all belonged to upper middle class according to Modified Kuppuswamy scale 2021. In this study out of 108, 59 (54.6%) children consumed more amount of food comparing to pre-lockdown period. Of which, 49 (83.05%) children consumed increased amount of JUNCS. Concerning sleep pattern, 74 (68.5%) of children had disturbed sleep pattern. Parents were finding it challenging to normalize the sleep pattern as these children had developed a habit of increase screen time at night time. Following covid-19 lockdown children became dependent on internet for both entertainment and educational purpose.

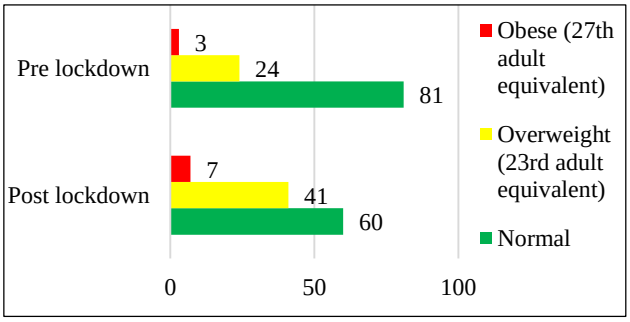

Figure 1: Pre-lockdown and post-lockdown BMI of children under overweight and obese category.

In this study, almost 80 (74%) developed a habit of increase screen time >2 hours for non-academic purposes and 56 (51.9%) for academic purpose. In the category of physical activity, 53 children (49%) preferred leisure indoor physical activities like drawing, 27 children (25%) preferred moderate physical activity like jogging and 28 children (25.9%) preferred vigorous physical activity like football. Anxiety signs like restlessness, nervousness, hand trembling, excessive sweating and frightening was experienced by 65 children (60.1%). On calculating the pre and post lockdown BMI, there was an increase in overweight from 22.2% to 37.9% and obesity from 2.8% to 6.5% and was statistically significant (p 0.01).

Table 1: Detailed pre-structured- questionnaire.

Dietary habits					N (%)
1. Whether there was change in dietary behavior after lockdown					
More					59 (54.6)
Less					20 (18.5)
Same					29(26.9)
2. Increase consumption of JUNCS					
Yes					49 (83.05)
No					10 (16.9)
3. If there was any change in duration or disturbance or same as before in sleep pattern					
Yes					74 (68.5)
No					34 (31.4)
4. More than two hours of watching television/playing mobile games					
Yes					80 (74)
No					28 (25.9)
5. More than two hours of online education					
Yes					56 (51.9)
No					52 (48.1)
6. More than one hour of leisure physical activity (slow walking/ playing musical instrument/ drawing etc) every day?					
Yes					53 (49)
No					55 (50.9)
7. More than one hour of moderate physical activity (brisk walking/jogging/cricket/dancing/swimming etc.) every day?					
Yes					27 (25)
No					81 (75)
8. More than one hour of vigorous physical activity (exercise/football/basketball etc.) every day?					
Yes					28 (25.9)
No					83 (76.9)
9.	**Anxiety and symptoms**	**Nothing 0 It did not bother at all**	**Weak 1 Bothered a little**	**Moderate 2 Bothered me a lot but I could stand it**	**Strong 3 I almost could not stand it**
	Restless, nervous, hand trembling, frightened sweating (not due to heat)	43	60	1	4

DISCUSSION

In this study there was change in dietary habits following Covid19 lockdown similar to the study observed by Segre G in which 57.3% children consumed more than their usual dietary pattern pointing towards more of sedentary lifestyle leading to increase weight gain.[6] Study by Bustos showed that only 23.4% children had healthy feeding behaviours and 23.7% had healthy lifestyle.[11] Similar to our study findings by Datta et al stress upon the point that adolescents sleep pattern is disturbed more pointing towards difficulty in falling asleep as they spent more screen time which affects the circadian rhythm and even impairing proper melatonin secretion.[12] Study by Moitra et al showed the positive association between increase screen time, decrease physical activity and increase disturbed sleep patterns.[13] Segre et al study showed that almost 78% children had anxiety symptoms following covid19 lockdown as to our study showed 60.1% suffered from it.[6] This stresses upon the fact that even when children were tried to be shielded from the outside world in the form of cocooning inside the house had a significant effect on their psychological state.

In this study, children showed more interest towards leisure physical activity than when compared to moderate and vigorous physical activity. While the study done by Pietrobelli A showed that there is decrease in physical activity of almost 2.30 hr/week.[14] Jha et al study findings were that the prevalence of obesity increased from 23.8% during pre-pandemic to 25.5% post-pandemic which supports our findings as to there was increase in overweight and obese children compared to pre-pandemic period.

CONCLUSION

There were significant changes in the dietary and lifestyle pattern of adolescent children in the post Covid assessment. There was increase in quantity of food intake especially of JUNCS, disturbances in sleep pattern, increase in screen time for both academic & non-academic and anxiety signs. There was a double fold increase in overweight and 3-fold increase in obesity. This is an eyeopener regarding future burden of non-communicable disease and a warning to start proactive steps towards healthy eating and healthy lifestyle.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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