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Original Research Paper

CONCEALED BURDEN OF UNDERNUTRITION AND OVERNUTRITION AMONG SCHOOL GOING CHILDREN DURING COVID 19 PANDEMIC IN KANYAKUMARI DISTRICT

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ABSTRACT:

Objectives: COVID- 19 pandemic has caused significant disruptions in children's lifestyles leading to increased burden of undernutrition and overnutrition. This study was designed to document lifestyle behaviour changes in school-going children aged 6 to 12 years of Kanyakumari district during COVID -19 pandemic and to analyze the burden of overnutrition and undernutrition. **Methodology:** This is a Cross-sectional observational study was conducted in Paediatric OPD of Kanyakumari Government Medical college hospital, India. 200 school-going children between the ages of 6 – 12 were selected using a consecutive sampling technique. A detailed questionnaire about dietary habits and physical activity was formatted. In addition, height and weight measurements were performed, and BMI was calculated. **Results:** The cohort comprised 200 children, of which 111 were females (55.5%) and 89 (44.5%) were males. The cohorts were divided based on age into three groups: 6-8 years (n=92), 9-10 years (n=52), 11-12 years (n=56). 43 children (21.5%) gave a history of consuming fast foods. 64 children (32%) of them engaged in some form of physical activity, while 136 children (68%) gave a history of sedentary lifestyle. One child (0.5%) was underweight, 33 were borderline (16.5%), 153 were normal (76.5%), 8 were overweight (4%), and 5 (2.5%) were obese. A statistical significance relation (P=0.001) was found between fast food and BMI. **Conclusion:** Poor eating habits and sedentary lifestyles established during the COVID-19 pandemic can be difficult for both parents and children to reverse. Childhood is an important time to learn and inculcate healthy eating habits that continue into adulthood. Most notably, malnutrition at a young age can have long-term consequences. The study was able to demonstrate a definite correlation between eating habits and health outcomes in children.

Keywords: COVID-19, BMI, Children, nutritional status

INTRODUCTION:

COVID – 19 pandemic led to unprecedented upheavals around the world. Many countries closed schools and imposed domiciliary confinement to gain control over the pandemic. While countries continued to fight the pandemic, physical and mental health of children and adolescents was given less attention which severely impacted lifestyle behaviours, such as physical activity and sedentary behaviour, with increased consumption of unhealthy fast foods. Low intake of natural or less processed foods and high intake of ultra-processed foods have been associated with negative health consequences, like weight gain, increased body fat, nutritional insufficiency, worsening insulin and lipid profile in people of various ages, including schoolchildren. [1,2,3] The medical community was concerned about the potential health consequences of the COVID-19 on children and adolescents. A study on the indirect impact of the COVID-19 pandemic in low- and middle-income countries noted an increase in the prevalence of undernutrition that would account for 18–23% of new child fatalities occurring each month.[2] It was still unclear how much this epidemic affected children's nutritional status thus raising the risk of malnutrition, namely obesity and under-nutrition.[4] There was a lack of data regarding the nutritional impact of COVID-19 on children. In this context, this study was designed to document lifestyle behaviour

changes in India's school-going children in the age group of 6 to 12 years during COVID -19 and investigate the burden of overnutrition and undernutrition in Kanyakumari district.

MATERIAL AND METHODS:

This was a Cross-sectional observational study that was conducted in Paediatric OPD of Kanyakumari medical college hospital, India. Institutional ethical board clearance and informed consent was obtained from parents before commencement of study. The study group consisted of all school-going children between 6 to 12 years of age in the Kanyakumari district. 200 school going children based on consecutive sampling techniques were included in this study. The inclusion criteria were all school-going children between the age group of 6 to 12 years who consented to participate in the study. Children of parents who did not consent, genetic disorders were excluded from the study. The study was conducted from June 2021 to November 2021. The study included two hundred school-going children based on consecutive sampling techniques. A detailed questionnaire of dietary habits and physical activity (PA) was included in the study. Demographic characters of age and gender were noted. Also, the children's height (centimetre) and weight (kilogram) were measured. Body Mass Index (BMI) was calculated as weight in kilograms divided by the square of the person's height in metres (kg/m2). Weight status was categorized as underweight for BMI values <5th percentile (BMI-SDS < -1.645), normal for BMI between the 5th and 84th percentiles ($-1.645 \leq$ BMI-SDS ≤ 1.036), overweight for BMI between the 85th and 95th percentiles ($1.036 <$ BMI-SDS ≤ 1.645), and obese for BMI equal to or higher than the 95th percentile (BMI-SDS > 1.645). All data were analysed using the Pearson chi-square test in SPSS v21.

RESULTS:

In this study, 200 children were included, 111 were females (55.5%) and 89 (44.5%) were males. Out of 200 children, 46% were in age between 6 to 8 years, 26% were in 9 to 10 years, 28% were in 11 to 12 years. In 200 children, 0.5% were underweight, 4% were overweight and 2.5% obese. 21.5% were taking fast food in their diet. 32% of them engaged in some form of physical activity, while 68% gave a history of a sedentary lifestyle. A statistically significant association was found between fast food and BMI (p=0.001). Among the children who did not eat fast food, 82.8% were had normal weight, and for those who consumed fast food, 16.3% were had increased weight (Table 2). There was no statistically significant association between physical activity and BMI (p=0.093), age group and BMI (p=0.588), age group and fast-food diet (p=0.997), age group and physical activity (p=0.804).

Table 1 Characteristics of Participants:

Participant's characteristics		Frequency	Percent
AGE GROUP	6-8	92	46.0%
	9-10	52	26.0%
	11-12	56	28.0%
GENDER	FCH	111	55.5%
	MCH	89	44.5%
BMI	Underweight	1	0.5%
	Borderline	33	16.5%
	Normal	153	76.5%
	Overweight	8	4.0%
	Obesity	5	2.5%
FAST FOOD	No	157	78.5%
	Yes	43	21.5%
PHYSICAL ACTIVITY	No	136	68.0%
	Yes	64	32.0%

Table 2 Association between fast food and BMI

			BMI					Total	P-value
			Underweight	Normal	Borderline	Overweight	Obesity		
FAST FOOD	No	Count	1	130	20	3	3	157	0.001
		% within FAST FOOD	0.6%	82.8%	12.7%	1.9%	1.9%	100.0%	
	Yes	Count	0	23	13	5	2	43	
		% within FAST FOOD	0.0%	53.5%	30.2%	11.6%	4.7%	100.0%	
Total		Count	1	153	33	8	5	200	
		% within FAST FOOD	0.5%	76.5%	16.5%	4.0%	2.5%	100.0%	

Table 3 Association between physical activity and BMI

			BMI					Total	P-value
			Underweight	Borderline	Normal	Overweight	Obesity		
PHYSICAL ACTIVITY	No	Count	1	17	111	5	2	136	0.093
		% within PHYSICAL ACTIVITY	0.7%	12.5%	81.6%	3.7%	1.5%	100.0%	
	Yes	Count	0	16	42	3	3	64	
		% within PHYSICAL ACTIVITY	0.0%	25.0%	65.6%	4.7%	4.7%	100.0%	
Total		Count	1	33	153	8	5	200	
		% within PHYSICAL ACTIVITY	0.5%	16.5%	76.5%	4.0%	2.5%	100.0%	

Table 4 Association between age group and BMI

			BMI					Total	P-value
			Underweight	Borderline	Normal	Overweight	Obesity		
AGE GROUP	6-8	Count	0	16	71	3	2	92	0.588
		% within AGE GROUP	0.0%	17.4%	77.2%	3.3%	2.2%	100.0%	
	9-10	Count	0	8	42	2	0	52	
		% within AGE GROUP	0.0%	15.4%	80.8%	3.8%	0.0%	100.0%	
	11-12	Count	1	9	40	3	3	56	
		% within AGE GROUP	1.8%	16.1%	71.4%	5.4%	5.4%	100.0%	
Total		Count	1	33	153	8	5	200	
		% within AGE GROUP	0.5%	16.5%	76.5%	4.0%	2.5%	100.0%	

Table 5 Association between age group and fast food

			FAST FOOD		Total	P-value
			No	Yes		
AGE GROUP	6-8	Count	72	20	92	0.997
		% within AGE GROUP	78.3%	21.7%	100.0%	
	9-10	Count	41	11	52	
		% within AGE GROUP	78.8%	21.2%	100.0%	
	11-12	Count	44	12	56	
		% within AGE GROUP	78.6%	21.4%	100.0%	
Total		Count	157	43	200	
		% within AGE GROUP	78.5%	21.5%	100.0%	

Table 6 Association between age group and physical activity

			PHYSICAL ACTIVITY		Total	P-value
			No	Yes		
AGE GROUP	6-8	Count	61	31	92	0.804
		% within AGE GROUP	66.3%	33.7%	100.0%	
	9-10	Count	35	17	52	
		% within AGE GROUP	67.3%	32.7%	100.0%	
	11-12	Count	40	16	56	
		% within AGE GROUP	71.4%	28.6%	100.0%	
Total		Count	136	64	200	
		% within AGE GROUP	68.0%	32.0%	100.0%	

DISCUSSION:

COVID-19 was anticipated to worsen all forms of malnutrition around the world, putting the Sustainable Development Goals (SDG) of ending all forms of malnutrition by 2030 in jeopardy. Physical inactivity, sedentariness, and poor diet can all contribute to weight gain. Physical inactivity, sedentary lifestyle patterns, and eating choices are the major factors that determine BMI maintenance and causative of obesity in adolescents and young adults. Alterations in body weight, whether obese or underweight, are significant health-related risk factors for various diseases, including COVID-19.[5,6] This research aimed to examine the relation between lifestyle behaviours in children during COVID-19 their impact on BMI. The results revealed a statistically significant correlation between fast food and BMI, signifying an increase in BMI with fast food consumption. All the other parameters examined were not significant. Different studies on malnutrition during the COVID19 pandemic was analysed. A prospective cohort study in Saudi Arabia evaluated 628 students between 18 and 30 years of age to ascertain if BMI, physical activity, and lifestyle, including diet, sleep, and mental health, changed significantly before and during COVID-19 lockdown. BMI of the students exhibited that 32% had increased, 22% had reduced, and 46% had maintained the same weight during COVID-19 lockdown. The physical activity significantly decreased, and sedentary time increased. The results of the present study were in concurrence with the present study.[6] An Israel study of 220 paediatric subjects aged between 5 to 18 years measured height, body mass index (BMI) and muscle-to-fat ratio (MFR) z scores and scrutinized how children and adolescents' body composition differed during the pandemic. The results revealed that subjects' weight and body composition were relatively stable. In contrast to the present study, this research found a significant relation between PA and improved body composition.[7] During the COVID-19 school closures, variations in BMI, weight, and height among 19,066 Chinese preschool children were noted in an observational retrospective study. Akin to our study, the results of the present study observed no noteworthy variance in the children's weight change and PA. Childhood obesity rates increased during the COVID-19-related school closures, while preschool children's BMI reduced the least during the closures compared to pre-COVID-19 periods.[8] COVID-19 Impact on Lifestyle Change Survey (COINLCS) conducted in China assessed 10,082 participants from high schools, colleges, and graduate schools, aged 19.8 ± 2.3 years, before and after COVID-19 lockdown. Dissimilarity of results could be observed between our and COINLICS cohorts where youths' average BMI significantly increased, with the prevalence of overweight/obesity and obesity also increasing, with decreased PA.[9] Stavridou et al. conducted a literature review of 15 articles to evaluate obesity in children, adolescents and young adults in the course of the COVID-19 pandemic. The researchers noticed increased intake of fried food and sweets, potato, meat and sugary drinks among adolescents and younger age, and higher BMI. Also noted was decreased PA and increased sedentary activity, with weight changes which were linked to limited physical activity. Increased obesity was also noted. A similar significance of BMI and fast food was noted in the present study.[10] The dortmund nutritional and anthropometric longitudinally designed (DONALD) study, Germany, investigated repeated 3-day weighed dietary records from 108 participants (3–18 years) to see how the pandemic affected nutrients

and food intake of children and adolescents. A significantly lower total energy was noted among children and adolescents during the pandemic. BMI and overweight status were comparable before and after the pandemic. Contrarily we found a statistically significant relationship between BMI and fast food.[11] Another study was designed to compare and contrast the amount of time Saudi and non-Saudi teenage pupils aged 12 to 18 years spent watching TV, using computers, participating in physical activity, and their food preferences. The connections between these lifestyle behaviours and BMI were investigated. Saudi boys who stated PA 2-5/week, the most time spent watching television and computer, and the highest frequency of consuming fast food and soft drinks had a significantly higher mean BMI than the non-Saudi boys. Similar food habit and BMI association was found in the present study also. [12] An online questionnaire-based survey involving 1065 individuals in the age group of 13years to 25year evaluated the effect of the COVID 19 pandemic on lifestyle. The results revealed an increase in mean sleeping duration and average screen time, with 38.6% subjects suggesting decreased physical activity levels. 51.9% experienced increased stress levels while 76.4% indicated increased food intake. [13] A retrospective cohort study measured body mass index (BMI) from the pre-pandemic and compared with the COVID-19 pandemic period among 36,837 Jewish and Arabic ethnicity in Israel, aged between 2 to 20 years. In line with our results, the Israeli study also found that BMI-standard deviation scores increased significantly in children and adolescents during the pandemic, with an overall increase in the prevalence of obesity by 1.8%. In the pre-pandemic period, 11.2 percent of individuals with normal weight had overweight or obesity; and obesity was present in 21.4 percent of those with overweight in the pre-pandemic period.[14] A COV-EAT cross-sectional online survey study among 397 children/adolescents aged 2–18 years in Greece documented changes in their families' lifestyle habits, body weight, and sociodemographic data. During the lockdown, sleep duration, as well as screen time, increased, with decreased PA. Bodyweight increased in 35% of subjects and was significantly associated with increased consumption of breakfast, salty snacks, total snacks and decreased physical activity. A similar association was noted in the present study also. [15]

CONCLUSION:

The poor nutrition quality and sedentary lifestyle established during the epidemic may be difficult to reverse for parents and children. Childhood is a crucial time for learning and inculcating healthy eating habits, which will continue into adulthood. In addition, poor nutrition at a young age could have long-term consequences. The immune system and disease predisposition are inextricably connected to nutrition. Notwithstanding the constraints, this study was able to demonstrate a definite correlation between eating habits and health outcomes in children. A long-term follow-up study with a larger sample size will definitely contribute to a better understanding of the nutritional fallouts of the pandemic and help devise suitable mitigation strategies.

LIMITATION OF THE STUDY:

A limited and consecutive sample that may not completely represent the population. Further, the socio-economic conditions, parental influence on the child's lifestyle, and diet chart were not a part of the research data. Interpolation of these data may contribute more to a better understanding of the study's outcome.

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REFERENCES:

1. Teixeira MT, Vitorino RS, da Silva JH, Raposo LM, Aquino LA, Ribas SA. Eating habits of children and adolescents during the COVID-19 pandemic: The impact of social isolation. Journal of Human Nutrition and Dietetics. 2021 Aug;34(4):670-8.
2. Deepika, B., Shalini, B., & Monika, A. "The Impact of COVID-19 on Children and Adolescents: Early Evidence in India," 2021. ORF Issue Brief No. 448, Observer Research Foundation
3. Xiang M, Zhang Z, Kuwahara K. Impact of COVID-19 pandemic on children and adolescents' lifestyle behavior larger than expected. Prog Cardiovasc Dis. 2020;63(4):531-532. doi:10.1016/j.pcad.2020.04.013
4. Zemrani B, Gehri M, Masserey E, Knob C, Pellaton R. A hidden side of the COVID-19 pandemic in children: the double burden of undernutrition and overnutrition. Int J Equity Health. 2021;20(1):44.
5. Littlejohn P, Finlay BB. When a pandemic and an epidemic collide: COVID-19, gut microbiota, and the

double burden of malnutrition. BMC Med. 2021;19(1):31.

6. Jalal SM, Beth MRM, Al-Hassan HJM, Alshealah NMJ. Body Mass Index, Practice of Physical Activity and Lifestyle of Students During COVID-19 Lockdown. J Multidiscip Healthc. 2021;14:1901-1910
7. Azoulay E, Yackobovitch-Gavan M, Yaacov H, et al. Weight Status and Body Composition Dynamics in Children and Adolescents During the COVID-19 Pandemic. Front Pediatr. 2021;9:707773.
8. Wen J, Zhu L, Ji C. Changes in weight and height among Chinese preschool children during COVID-19 school closures. Int J Obes (Lond). 2021;45(10):2269-2273.
9. Jia P, Zhang L, Yu W, et al. Impact of COVID-19 lockdown on activity patterns and weight status among youths in China: the COVID-19 Impact on Lifestyle Change Survey (COINLICS) [published correction appears in Int J Obes (Lond). 2021 Feb 12;:]. Int J Obes (Lond). 2021;45(3):695-699.
10. Stavridou A, Kapsali E, Panagouli E, et al. Obesity in Children and Adolescents during COVID-19 pandemic. Children (Basel). 2021;8(2):135. Published 2021 Feb 12.
11. Perrar I, Alexy U, Jankovic N. Changes in Total Energy, Nutrients and Food Group Intake among Children and Adolescents during the COVID-19 Pandemic-Results of the DONALD Study. Nutrients. 2022;14(2):297.
12. Alghadir AH, Iqbal ZA, A Gabr S. The Relationships of Watching Television, Computer Use, Physical Activity, and Food Preferences to Body Mass Index: Gender and Nativity Differences among Adolescents in Saudi Arabia. Int J Environ Res Public Health. 2021;18(18):9915.
13. Roy S, Tiwari S, Kanchan S, Bajpai P. Impact of COVID-19 pandemic led lockdown on the lifestyle of adolescents and young adults. Indian Journal of Youth and Adolescent Health (E-ISSN: 2349-2880). 2020 Dec 11;7(2):12-5.
14. Shalitin S, Phillip M, Yackobovitch-Gavan M. Changes in body mass index in children and adolescents in Israel during the COVID-19 pandemic [published online ahead of print, 2022 Feb 16]. Int J Obes (Lond). 2022;1-8.
15. Androutsos O, Perperidi M, Georgiou C, Chouliaras G. Lifestyle Changes and Determinants of Children's and Adolescents' Body Weight Increase during the First COVID-19 Lockdown in Greece: The COV-EAT Study. Nutrients. 2021;13(3):930.