



Original Research Article

Effect of lockdown on children during COVID-19 pandemic–A cross-sectional study

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ABSTRACT

Background and Aim: COVID-19 infection and the pandemic have crippled the global life. Direct effects of infection and its severity among children were yet to define, but its indirect effects and associated consequences were significant but largely unknown. Aim of the current study was to address the impact of lockdown on food attitude, physical activity, sleep pattern, functionality and anxiety level among children of 6-18 years age.

Materials and Methods: Cross sectional study was conducted by the help of web based performa circulated to the parents as survey. It was a predesigned structured questionnaire based upon the published study in relation to sleep, food habit, anxiety, physical activity and overall wellbeing.

Result : Total 206 children were enrolled, with mean age of 11.54 ± 4.2 years. They grouped as those below 10yrs and 10 or above and the body weight as normal against overweight or obese. 70% of children were 10 or more and 20% being overweight or obese. The bad eating habits [AFHC, OR], poor physical activity [UKPAQ, OR] and severe anxiety [GAD-7, OR] is significantly affected among the overweight or obese group ($p < 0.01$). Children of ≥ 10 years group showed poor physical activity [OR, $p < 0.05$]. Parenteral concern was noted in.

Conclusion : Presumption of less vulnerability of children to COVID-19 needs a revision. During lockdown the poor physical activity, higher anxiety, and unhealthy diet pattern were significantly observed. Its emphasized to develop and adopt holistic approaches to guide our young generation during this uncertain COVID-19 pandemic or similar situations in future.

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1. Introduction

Corona virus disease - 2019 (COVID-19) pandemic has crippled the global life and has led to infection in more than 105 million and mortality up to 2.3 million till last revelation by WHO at the end of first week of February

2021.¹ Similar to adults, children are also affected by this SARS COV2 infection and related pandemic. The true magnitude of total children affected with SARS CoV2 and childhood mortality has been largely unknown. This was often due to low hospitalization, lack of testing and poor reporting. It is believed that children are less prone for the risk of contracting the infection and also had less severe

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disease.^{2,3} The direct impact of COVID-19 on the life of child was further compounded by the indirect effects and associated consequences. This is particularly important in the field of physical, mental, social health, dietary habit, lack of peer contact and above all being in isolation and in absence of school, sports or gatherings. The imposed lockdown also affected children badly, when social and family gatherings and outdoor activities were restricted. Over time, the lockdown was removed, but their situation still remains the same in absence of formal reopening of the schools and child care facilities. They are forced to adopt the virtual communication mode for the school without any peer interaction and teacher's guidance. The outdoor activities are restricted either by the parents or due to imposed laws of land. Family, public gathering and occasions for social activity also largely curtailed till date even in the absence of any restrictions.

Restriction in physical activities can have both physical and psychological impact. In the past such gap in physical activities was addressed in studies on summer holidays, when the physical activities reduced substantially. It was noted that, when children return to school after summer holidays, there was a significant weight gain and loss in cardio-respiratory fitness (CRF) than that during the school days. These negative health outcomes were more pronounced among those, who were already overweight or obese, ethnic minority and from low socio-economic-status (SES).⁴

Continued isolation and restriction, added stressors to psychological domain of a child like fears of infection, frustration and boredom. The mean posttraumatic stress scores were four times higher in children who had been quarantined than those who were not during the COVID-19 pandemic.⁵ Furthermore, a vicious circle happened with interaction between lifestyle changes and psychosocial stressed due to home confinement.

Significant efforts were made worldwide by schools and institutions to create online curriculum, which could be delivered through TV broadcasts and by online classes. The new virtual semester was started in many parts of the country and various courses were offered online in a well-organized manner. These actions partly helped the parental concerns about their children's educational attainment by ensuring the un-interrupted school learning. But when the children are out of school for a long time (eg, weekends and summer holidays), they are physically less active, have much longer screen time, irregular sleep patterns, and less favourable diets, resulting in weight gain and a loss of CRF).⁴ Such negative effects on health are likely to be much worse when they are confined to their homes without outdoor activities and interaction with peer groups.

India is not different from the global scenario, a lockdown of nearly 2 months, suspension of formal classes indefinitely and ongoing restrictions on various outdoor

activities, till this publication. There is limited literature from India as well as from other corners of globe, addressing the comprehensive living profile of school going children during the lockdown period. The present study was conducted through an online survey across the country about the parental concerns and the impact of corona virus pandemic on school going children. The Aim of current study is to evaluate the impact of lockdown on food attitude, physical activity, sleep pattern, functionality and anxiety level of children in 6 to 18 years age group during COVID-19 pandemic.

2. Materials and Methods

The study was carried out by the combine effort of the Department of Pediatrics, SGT Medical College and Research institute, Budhera, Haryana, India, and Department of Psychiatry, Institute of Liver and Billiary Sciences, Vasantkunj, Sector-D1, New Delhi India. A web-based survey was conducted to obtain the details about the children of age 6 to 18 years, about their eating habits, physical activity, sleep pattern, general functionality and anxiety level during the lockdown phase of COVID-19 pandemic. The survey was conducted from the 1st to the 14th of July 2020, by using an online platform, accessible through any device with internet connectivity. It facilitated the wide dissemination of the survey questionnaire during the period of lockdown, where there were many territorial restrictions. The study was conducted after all participants were fully informed about the study requirements and were required to accept the data sharing and privacy policy before participating in the study. Participants completed the questionnaire directly connected to the Google platform. Their personal information including names and mail id were anonymized to maintain and protect the confidentiality, before data analysis. Only the anonymous data file was utilized for data analysis.

The format of the data collection was agreed upon by all the authors. Institutional ethics committee approval was obtained. All authors had access to the study data, reviewed and approved the final manuscript.

Study questionnaires related to eating behavior, physical activity, sleep pattern, general functions and the level of anxiety were prepared using the standard guidelines which are freely available online and have no copyright issues associated with them as long as the authors are cited.^{6–10}

2.1. Questionnaire

The questionnaire was built on the "Google Form" platform. It included 25 questions divided into six different sections: (1) Consent with socio-demographic data, 9 questions; (2) Physical activity, 4 questions-based on UK Physical Activity Questionnaire (UKPAQ) for children and adolescents; (3) Sleep pattern, 5 questions- based on

SATED Insomnia score; (4) Dietary habit, 4 questions-based on Adolescent Food Habits Checklist (AFHC) and metabolic factors; (5) General functioning of the child, 2 questions- based on Clinical Global Impression(CGI) Scale; (6) Anxiety level assessment, 1 question- based on Generalized Anxiety Disorder 7-item:GAD-7 scale.

2.2. Statistical analysis

The present study is a cross sectional survey with data obtained in excel sheet from the google form. The data was tabulated and coded for analysis. In descriptive statistics, categorical variables were presented as proportions while continuous variables were either presented as mean with standard deviation (SD) or median with inter-quartile range (IQR). Comparison of continuous variables was done by Student's t-test and categorical variables were compared by Pearson's chi-square test or Mid-P exact test as per the requirement. The relative impact of the events i.e. food behaviours, sleep time, food intake and anxiety were calculated as Odds Ratio. Statistical significance was defined with a p value of <0.05. All statistical tests were performed using SPSS for Windows version 22 (Armonk IBM Corp).

3. Result

In the present study total 206 children of 6 to 18 years age group were enrolled. The study population was divided into groups basing on their age (<10 years and ≥10 years) and body weight (normal body weight and overweight/obese) and comparison and analysis were done. The mean age of the study population was 11.54 ± 4.2 years with 70% (144/206) being ≥ 10 years and 20% (41/206) being overweight or obese at the time of data collection. About one third of parents were also overweight or obese in the study population. Most of the parents i.e., 85.4% of fathers as well 86% of mothers were graduate or professionals with 70% of fathers and 56.3% of mothers were being employed either in government or private sectors (Table 1)

3.1. Food behaviour and eating attitude of children during lockdown

As per the AFHC score the mean food score of the study population was found 7.6 ± 3.04 and the score of ≤ 7.6 considered as the bad food habits. Overall, 45.5% (91/200) of children had bad eating habits (based on the scale) and there was no significant difference in food habits across the age groups. When analysed for body weight category, the bad eating habit was more marked among the children with overweight compare to those having normal body weight with odds of 8.87 and $p < 0.01$. (Tables 2 and 3)

3.2. Sleep pattern of children during lockdown

Using SATED Insomnia score the mean sleep score of study population was found 5.39 ± 1.58 and the score of < 5 indicated as poor sleep. Overall, the poor sleep pattern was observed in 26% (53/204) of children. It was more commonly observed in children of ≥ 10 years age group than those with less than 10 years age with odds of 3.67 and $p = 0.06$. A poor sleep pattern was often noted among overweight/obese children compared to children with normal body weight with odds of 1.48 and $p = 0.24$. Here both of the categories showed no statistically significant difference in the sleep pattern. (Tables 2 and 3) [Figure 1]

3.3. Physical activity pattern of children during lockdown

As per the UK Physical Activity Questionnaire for children the mean score was found 2.48 ± 0.79 and the score of <2.5 indicated as poor physical activity. Overall, 46.6 % (96/206) of children had poor physical activity ($p = 0.04$) which was significant. Children of ≥ 10 years had a poor physical activity compare to those of <10-year age with odds of 4.4, $p = 0.05$. Similar to other activities, physical activity was also badly affected among overweight or obese compare to normal weight children having odds of 7.84, $p = 0.01$ (Tables 2 and 3) [Figure 1]

3.4. Anxiety level of children during lockdown

GAD-7 score was used for the assessment of anxiety level. This was graded as no, mild, moderate and severe categories. However for simplicity we grouped them with GAD score of <10 as 'no to mild' level of anxiety and ≥10 as presence of moderate to severe anxiety. Mild anxiety was noted in 87% (27/31) of normal body weight children, where as severe anxiety cases exclusively seen among overweight/obese (5/5) with odds of 36.47 and p value of <0.01. Whereas 85% (130/153) of normal body weight against 15% (23/153) of overweight children were fine without any expression of anxiety throughout the period of lockdown. As per the age category anxiety was more marked among age group of ≥ 10 years vs less with Odds of 4.98 p value= 0.17. (table-2,3) [Figure 1]

3.5. General functionality of children

As per the parental perception using the CGI score (poor functionality indicated as a score of < 50) the overall functionality of their children was found to be 84.3 ± 19.5 before lockdown and 79.1 ± 19.5 during lockdown, showing (p values of 0.40 and 0.44 respectively) almost good functionality level throughout. Whereas poor functionality was observed in only 8.7% of children before lockdown and 10.4% during lockdown. There was no significant difference

observed among children with age groups ≥ 10 years vs. less ($p= 0.41$) and body weight category overweight or obese child vs normal($p=0.14$) so far as their poor functioning was concerned and overall functioning of children were good. (Tables 2 and 3) [Figure 2]

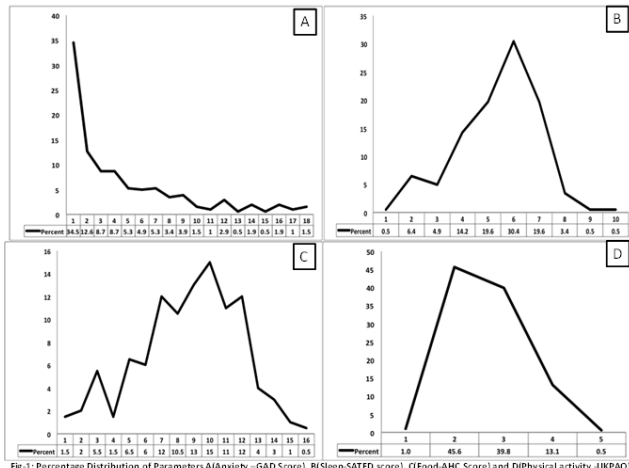


Fig. 1: Percentage Distribution of Parameters A(Anxiety – GAD Score), B(Sleep-SATED score), C(Food-AHC Score) and D(Physical activity-UKPAQ)

Fig. 1: Anxiety level of children during lockdown

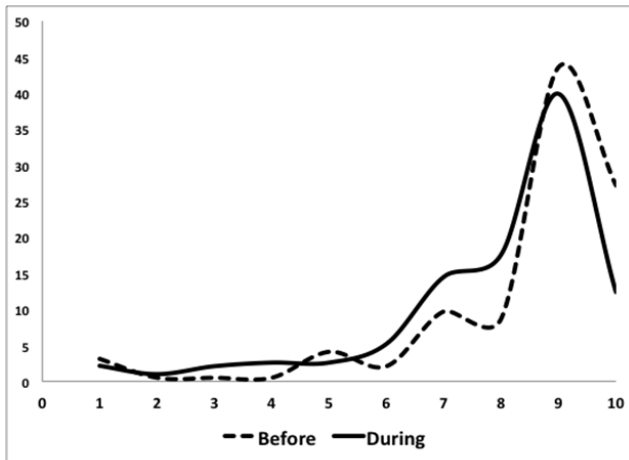


Fig-2: Percentage Distribution of over all general functioning before and during COVID

Fig. 2: General functionality of children

4. Discussion

The ongoing COVID-19 pandemic has impacted adversely in many spheres of life among all age groups. Paediatric age has been least explored about the impact of pandemic,

due to the common belief that its less severe and often less susceptible for the disease. However, the restrictions due to pandemic and period of lockdown impacted badly in the life of a kid. Lack of outdoor activities, exercises, lack of peer interaction, closure of school, absence of entertainment or travel could have added to the physical and mental development. School related activities i.e. physical education through organised sports, games, and dance; diet pattern during their school days through the teacher’s guidance as well as various nutritional and health awareness are also affected. Home confinement, sedentary lifestyle, less consistent sleep patterns, increased screen time or dependency on gadgets led to an unstructured daily routine. The present study is of the first kind to address the concern of the kid i.e. indirect consequences in form of dietary habit, physical activity, sleeping pattern, anxiety and general well being as per the published structured questionnaires. The study has given a maiden insight into the well being of a child and as a guide for remedial steps to improve the lifestyle in future days too, as the restriction and closure of school still prevalent.

Lockdown has mostly having unfavourable effect on the eating style of the children. The literature showed that the parental perception towards their children’s health and overall development was negatively affected by improper diet pattern during the lockdown period.¹¹ Previous studies highlighted the indirect association of eating pattern with stress level and was evident during the period lockdown.¹² Many children now have the tendency to consume less nutritious food which may results in increase rate of obesity over this period of home confinement. The tendency of having unhealthy eating pattern is more observed in overweight and obese children.¹³ Some study also described the increased BMI during the holiday time of school as a result of poor-quality food and is very much addressed during this indefinite school closure.¹⁴ The present study found the poor eating pattern was more commonly observed among overweight children compared to those with normal weight and age category had no significant difference. Also, this home confinement further adds on the future risks of vitamin D deficiency, mental health issues, and ocular conditions like myopia.¹⁵

In the present study, the impact of lockdown on children’s sleep quality was also investigated as the sleep has a major role in their physical, psychological and cognitive development.¹⁶ The poor sleep pattern was more commonly observed in children more than 10 years of age group and children of overweight/obese compared to the normal body weight. The contributory reasons for poor sleep quality were difficult situation of home restriction, radical change in daily activity, COVID-19 related stress and anxiety, decreased natural daylight and increased artificial blue light exposure due to excessive media handling, unhealthy dietary changes, and reduced

Table 1: Socio-demographic Parameters of study participants

Baseline parameters	Categories	Frequency	Percentage (%)
Age of study population	≥ 10 years	144	70
	< 10 years	62	30
	Mean age	11.54 ± 4.2 years	
Educational status of father	Professional	68	33
	Post graduate and graduation	108	52.4
	High school and intermediate	14	6.8
	Primary education or illiterate	16	7.8
Educational status of Mother	Professional	58	28.2
	Post graduate and graduation	119	57.8
	High school and intermediate	15	7.3
	Primary education or illiterate	14	6.7
Occupational status of father	Government	58	28.2
	Private and part time	86	41.8
	Self employed	52	25.2
	Unemployed	10	4.8
Occupational status of mother	Government	48	23.3
	Private and part time	68	33
	Self employed	35	17
	Unemployed	55	26.7
Parental overweight and Obesity	Yes	138	33.5
Study children over weight and Obesity	Yes	41	20
Sibling overweight and Obesity	Yes	13	6.3

Table 2: Daily Activities of all children during lockdown:

Daily routine activity	Good (n,%)	Poor (n,%)	p
Food habit	109(54.5)	91(45.5)	0.16
Sleep pattern	151(74)	53(26)	0.03
Physical activity	110(53.4)	96(46.6)	0.04
General functioning (During lockdown)	173(89.6)	20(10.4)	0.44
General functioning (Before lockdown)	178(91.3)	17(8.7)	0.40

Table 3: Impact of lockdown on daily routine activities of children depending on their age and body weight.

Parameters	Independent Variables	OR	p value
Bad food habit (>7.6)	Age ≥ 10 years Vs. less	2.27	0.61
	Overweight or obese child Vs Normal	8.87	<0.01*
Poor Sleep pattern (<5.0)	Age ≥ 10 years Vs. less	3.67	0.06
	Overweight or obese child Vs Normal	1.48	0.24
Inadequate Physical activity (<2.5)	Age ≥ 10 years Vs. less	4.40	0.05*
	Overweight or obese child Vs Normal	7.84	0.01*
More anxiety (>10.0)	Age ≥ 10 years Vs. less	4.98	0.17
	Overweight or obese child Vs Normal	36.47	<0.01*
Poor General functioning (<50.0)	Age ≥ 10 years Vs. less	1.30	0.41
	Overweight or obese child Vs Normal	3.02	0.14

*Statistically significant; Parenthesis contain scores cut off based on respective scales used for measuring the items

physical activity.¹⁷ It's very well known that the artificial light exposure from screen often hinder the sleep wake cycle by disrupting the melatonin mediated circadian rhythm.¹⁸ The present study only focused on sleep pattern and time rather than the screen exposure time, but it may be a confounder as during lockdown the average screen time was significantly increased. Poor sleep and insomnia can lead to various physical and psychological risks of chronic illnesses, poor mental health, decreased functionality, and cognitive impairment.¹⁹ So as per the need of the time the sleep hygiene and the importance of good sleep must be brought to parental as well as public health awareness via digital or web based mass communication to maintain their children's and own physical, mental and psychological dimensions of health during this COVID-19 pandemic and lockdown. Now WHO has also recommend maintaining a regular routine as interventions to promote family well-being for helping children to cope with COVID-19 related pandemic.²⁰ Some recent studies carried out on quality of sleep in various age groups showed varied observations i.e. negative;²¹ mixed impact on children's sleep quality.²² Some observed that during the initial period of lockdown sleep was disturbed but after few weeks it had no effect on kindergarten children.²³

The impact of lockdown on children's physical activity was noted more among children of ≥ 10 years age and those were overweight or obese. As per Steffen et al., during lockdown there was overall increase in regular physical activities among children and adolescents but a negative impact on the sports activity of children of 14- to 17-years compared to 4-5 year group in Germany.²⁴

The eating pattern, sleep quality, and physical activity all were found better in normal body weight children compared to overweight and obese children. In the same context the anxiety level was also very obvious among the overweight/obese group. As per Pietrobelli A et al. significant bad food habit pattern observed during the lockdown, more particularly among the obese children with reduced time for sports and increased time spent with screen or in bed.²⁵

As a safety measure the social distancing is important for the children during this pandemic. But lack of interaction, engaging the digitalized platform for schooling, socialization and other activities, which may impact the psychosocial well-being. To add to this, suboptimal mental health could be a result of unhealthy diet, poor sleep, and inadequate physical activity.²⁶ Present study showed a high anxiety level among the overweight children as compared to normal body weight children in relation to pandemic and lockdown. Few studies reported that the parents noticed agitation or anxious behavior and imposed significant stress and challenges on psychological aspect of children.²⁷ In another study from China showed that children of 3 to 6 years had more clinginess and

fearfulness about the pandemic, whereas inattentiveness and persistent inquiry were noticed often among children of 6 to 18 years.²⁸ The parental perception and their response to the quarantine induced stress, also reciprocated and reflected on their children's behaviors and emotions.²⁹ As shown by Staal M et al. narrowed consciousness; poor attention; impaired memory, thinking, and imagination; and a decreased learning ability occurred because of severe stress and anxiety. The poor cognitive ability led to poor attention hence the negative consequences about self and surrounding and poor self-care.³⁰

The study had strengthened the focus on kids during COVID and uncertainty about school reopening, socialization as well as physical activity. The food pattern, weight, sleep pattern and anxiety has been focused by a structured questionnaire. This study also focused the multi-prong approach first of kind during COVID in more than 200 cases.

The study limitation is due to its cross-sectional survey design. The survey tool only collected information from the parents/caregivers who have access to the internet or internet-enabled mobile devices due to lockdown. Since internet connectivity and literacy were pre-requisites to participation, it was not possible to get equal number of responses from all sections of the society. Secondly, the data was mostly based on the parental perception. But in pediatric context, the parental opinion has its own validity irrespective of their educational status, as far as their children's health, nutrition, sleep and functionality aspects are concerned. So, the study has carried out without much effect on data quality.

5. Conclusions

The presumption of less vulnerability of the paediatric population from COVID need a revision, because the indirect consequences in view of ongoing restriction, poor socialization and lack of recreation. The disturbed sleep, poor physical activity among all children especially in older kids (10 years more), higher anxiety and unhealthy diet pattern among overweight children is significant. The parental assessment is crucial for early detection and to guide intervention like learning of newer things, engaging on skill-based activities and reducing the screen time. So it is an unmet need to bring a holistic approach to address the diet, sleep, anxiety, emotion, physical activity to guide our young generation during this uncertain current COVID-19 or similar situations in near future.

6. Conflict of Interest

No conflict of interest.

7. Source of Funding

None.

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