

# Assessment of Awareness and Behavioural Patterns among Children Regarding COVID-19

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## ABSTRACT

**Introduction:** Coronavirus Disease 2019 (COVID-19) has spread like wildfire across the globe affecting all age-groups. Children usually present with mild symptoms or may even remain asymptomatic. Due to the asymptomatic presentation, they may act as silent carriers and aid in the spread of infection, hence prompting greater vigilance. Therefore, it's imperative to increase awareness among children and alter their habits in order to curb the pandemic.

**Aim:** To assess the level of awareness among children regarding coronavirus infection and the behavioural changes they wish to make post-COVID-19. Additionally, it also recorded the recommendations of children for their schools to curb the COVID-19 infection.

**Materials and Methods:** This cross-sectional study was conducted among 246 private school going children across India in the age group of 9-15 years. A questionnaire was circulated via online platform which assessed the level of awareness regarding COVID-19, its influence on their behavioural patterns and recommendations of children for their schools. The mean knowledge scores were recorded for first part and chi-square test was employed to evaluate the changes in behaviour before and after COVID-19 for the second part. For the third part, percentage

for each response was determined. Data was compiled in MS Office Excel sheet (version 2019, Microsoft Redmond Campus, Redmond, Washington, United States). Statistical analysis was performed on Statistical Package for the Social Sciences version 16.0 (SPSS) software.

**Results:** The average knowledge score was 85.50%. This increased awareness among children was reflected in the statistically significant difference in their behavioural patterns before and after COVID-19 (p-value <0.05) and also in the recommendations given by children to their schools.

**Conclusion:** To the best of our knowledge, this is a pioneer study assessing the awareness of COVID-19 in children and its impact on their behaviour pattern. Children showed good knowledge about COVID-19 with the average knowledge score of the entire sample being 85.50% and also wished to make changes in their behaviour post-COVID-19. Additionally, schools are also required to make numerous amendments in their functioning in order to provide a safe environment. This study will serve as a basis for future awareness programmes which could be directed towards children belonging to various socioeconomic status and educational backgrounds highlighting the aspects in which they lack knowledge.

**Keywords:** Coronavirus disease 2019, Cross-sectional studies, Knowledge, Pandemic, Practice

## INTRODUCTION

Emergence and spread of the novel COVID-19 captured the attention of the entire world and led to its declaration as a global pandemic by World Health Organisation (WHO) on March, 11, 2020 [1]. COVID-19 presents clinically with respiratory symptoms like fever, cough, sore throat and dyspnoea [2].

COVID-19 has been observed to affect all age groups ranging from paediatric to geriatric patients. The first confirmed paediatric case of COVID-19 was reported in Shenzhen on January 20, 2020 [3,4]. The epidemiological and clinical characteristics of COVID-19 are still being collated in children [2]. It has been reported that children usually present with milder symptoms or may even remain asymptomatic [5,6]. Literature reveals high secondary attack rate of COVID-19 which is responsible for its rapid transmission and spread [7]. Therefore, children without symptoms may act as silent carriers aiding in the spread of infection. This epidemiologic feature of COVID-19 makes it challenging to identify and quarantine these patients in time, resulting in an accumulation of SARS-CoV-2 in communities [8]. Hence, this prompts greater vigilance among children.

Adolescence is a crucial period of transition for developing a variety of health behaviours. Promoting healthy practices during adolescence is extremely critical for preventing health problems in adulthood and also in the forthcoming generations [9]. Research conducted globally have time and again proven the effectiveness of health education

programmes ranging from obesity, sex education and psychological changes among adolescents [10,11]. It also becomes necessary to integrate health promotion into the school curriculum. In view of the current pandemic, it is important to educate and raise awareness among children regarding COVID-19 and its prevention and alter their habits in order to curb the pandemic.

Various attempts have been made by government and educational institutions to raise awareness of the pandemic among general public which include news portals, posters and social media. Special methods were adopted for children as well, like publishing a comic titled "KIDS, VAYU and CORONA: Who wins the fight?" by Government of India and also conducting numerous webinars on the same.

Therefore, this study was planned with an objective to assess the awareness among children regarding coronavirus infection and their behavioural patterns before and after COVID-19 crisis. Additionally, it also aimed to record the recommendations of children for their schools after it reopens which would help schools to make proper guidelines to curb the spread of infection.

## MATERIALS AND METHODS

This cross-sectional study was conducted pan India in a span of one month (June 2020) among 246 private school going children in the age group of 9-15 years. Prior to commencement of study, approval was obtained from the Institutional Ethics Committee

(IEC/02/01). The main study sample comprised of 246 children which was calculated at 95% confidence interval using Open Epi version 3, open source calculator. The sample size was determined based on the study conducted by Selvan A and Devanesan P [12].

**Inclusion criteria:** Children in the age group of 9-15 years who agreed to participate in this study and were able to comprehend English were included in this study. This age group was mainly selected since they can comprehend instructions and are also aware of their surroundings and adapt accordingly, thus is a crucial phase of learning and development of habits.

**Exclusion criteria:** Specially-abled children and those who could not read and understand English were excluded from the study.

The questionnaire used in this study was self-designed and was pre validated after consulting with subject experts. A total of eight subject experts comprising of paediatric dentists, epidemiologists, and English literature experts were consulted.

Also, a pilot survey was conducted on 30 children to assess whether they could understand the questions but they were not part of the main study. Only minor change in the language of questions was done as suggested. Test-retest reliability showed Intraclass Correlation Coefficient (ICC) of 0.78.

The questionnaire in English was circulated via online platform on google forms to various school groups on whatsapp and students belonging to classes V<sup>th</sup>-X<sup>th</sup> were asked to fill the survey. Regular reminders were also sent on these school groups.

Prior to filling the questionnaire, the parents were instructed to educate the children about a list of words which were used in the questionnaire so that they do not take help of their parents while filling the questionnaire:

- Infection
- Contamination
- Cough
- Sneeze
- 1 foot means how much
- Triple layer mask
- Respiratory system, renal system, cardiovascular system, central nervous system
- Incubation period
- Pandemic

The questionnaire comprised of a total of 31 questions divided into four parts. The first four questions were pertaining to demographic details and the main questionnaire comprised of 27 questions. The demographic details of the child included name (optional), age, gender and class.

#### The main questionnaire was divided into three parts:

**Part 1: Awareness among children regarding COVID-19:** This part included six questions assessing the basic awareness of COVID-19 infection. The first question was regarding whether they had heard about coronavirus infection. Only if the answer was "Yes", they were allowed to proceed further to other questions.

Assessment of awareness was done by calculating the knowledge score based on study conducted by Vanaja K et al., [13]. It was determined based on the answers given for the remaining five questions in this section. Every correct answer yielded a score of one and every wrong answer corresponded to 0. Thereafter, the percentage of correct answers was calculated to determine knowledge score for each child. Lastly, mean knowledge score for the entire sample was determined.

The knowledge levels were categorised based on the marks obtained into poor knowledge (<50%), moderate knowledge (51-75%) and good knowledge (75-100%).

**Part 2: Assessment of influence of COVID-19 on behavioural patterns of children before and after COVID-19 pandemic:** This part assessed the basic habits of children before COVID-19 pandemic and the amendments they wish to make in their habits after the COVID-19 pandemic.

There were eight questions in each part thereby total number of questions being 16. For each question, the percentage of people choosing every option was calculated. After determining the percentages for each habit, the comparisons were made between pre and post-COVID-19 crisis.

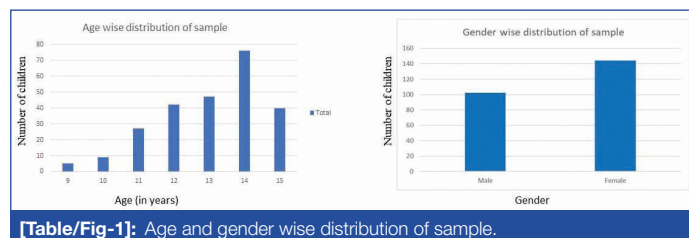
**Part 3: Recommendations for School:** This part comprised of five questions which recorded the suggestions of children for their school which would aid the schools in preparing guidelines after the COVID-19 pandemic.

## STATISTICAL ANALYSIS

Data was compiled in MS Office Excel sheet (version 2019, Microsoft Redmond Campus, Redmond, Washington, United States). Statistical analysis was performed on Statistical Package for the Social Sciences version 16.0 (SPSS) software. For the first part, the mean knowledge scores were determined. For the second part, percentage of people choosing each option were determined and comparisons were made for before and after COVID-19 pandemic using Chi-square test. The difference was considered to be statistically significant if p-value <0.05. For the third part, percentage of children giving each response was recorded.

## RESULTS

The mean age of the study population was 13.05 (1.49) years. The sample comprised of 102 (41.4%) males and 144 (58.5%) females [Table/Fig-1]. Since majority of children (205; 83.33%) were in the age range of 12-15 years, we did not perform a subgroup analysis for different ages.



[Table/Fig-1]: Age and gender wise distribution of sample.

The study comprised of three parts, hence the results are discussed separately for each part.

**Part 1: Awareness among children regarding COVID-19.**

It was observed that 100% children had heard about coronavirus infection and the average knowledge score of the entire sample was 85.50% [Table/Fig-2].

**Part 2: Assessment of influence of COVID-19 on behavioural patterns of children before and after COVID-19 pandemic.**

There was a statistically significant difference in behaviour patterns before and after COVID-19. Before the pandemic, 33.9% children travelled with more than 25 students but 40.2% would wish to travel alone postpandemic (p-value <0.001). Earlier, 50.6% children never wore masks in school and classroom but 80.5% will wear masks here on (p-value <0.001). At present, majority of children are aware of appropriate technique and duration of hand washing, developed habit of sanitising and washing hands and taking a bath immediately after returning from school after the pandemic. Furthermore, before the pandemic only 66.5% children were aware of the appropriate respiratory etiquette but after the pandemic, 93.8% have developed awareness on the same (p-value <0.0001). Only one habit did not show a significant difference that was pertaining to habit of washing hands prior to lunch in school which could be attributed to the fact that it was already a strictly inculcated habit even before the pandemic (p-value=0.1) [Table/Fig-3].

Questions	Options	Percentage of children for each response N (%)
Do you know about the coronavirus infection?	Yes	246 (100%)
	No	0
What are the symptoms of coronavirus infection?	Fever	3 (1.2%)
	Dry cough	2 (0.8%)
	Difficulty in breathing	4 (1.6%)
	All of the above	237 (96.4%)
How does the coronavirus infection spread?	When an infected person with coronavirus coughs/sneezes, via droplets the virus enters through the mouth, nose and eyes	11 (4.5%)
	When you touch the surface contaminated with virus and then touch your face (eyes, nose, mouth)	9 (3.7%)
	Both	226 (91.8%)
What is social distancing?	Maintaining a distance of 6 feet from other person	152 (61.9%)
	Don't know	4 (1.6%)
	Maintaining a distance of 2 feet from other person	90 (36.5%)
Can homemade mask, simple handkerchief, or triple layer mask reduce risk of community spread of coronavirus infection?	Yes	201 (81.7%)
	No	27 (10.9%)
	Don't know	18 (7.4%)
Which system is affected by coronavirus infection that can lead to death?	Respiratory system	226 (91.8%)
	Renal system	4 (1.6%)
	Cardiovascular system	8 (3.3%)
	Central nervous system	8 (3.3%)

**[Table/Fig-2]:** Awareness among children regarding novel Coronavirus disease (COVID-19): assessed the level of awareness among children and consisted of six questions.

Questions	Options	Before COVID-19 pandemic	After COVID-19 pandemic	Chi-square value	p-value
Number of students you wish to travel to school along with	Alone	48 (19.5%)	99 (40.2%)	41.86	<0.001*
	Less than 5	29 (11.7%)	73 (29.6%)		
	5-15	53 (21.5%)	38 (15.4%)		
	15-25	33 (13.4%)	18 (7.4%)		
	>25	83 (33.9%)	18 (7.4%)		
Wearing masks in school and classroom	Always	49 (19.8%)	198 (80.5%)	79.77	<0.001*
	Sometimes	73 (29.6%)	36 (14.8%)		
	Never	124 (50.6%)	12 (4.7%)		
Washing hands before lunch in school	Always	213 (86.4%)	233 (94.9%)	15.31	0.1
	Sometimes	30 (12.5%)	11 (4.3%)		
	Never	3 (1.2%)	2 (0.8%)		
Hand washing technique in school and home	Just place my hands under running tap water	52 (21.1%)	3 (1.2%)	53.6	<0.001*
	Wash my hands with soap and water and clean only my palms	31 (12.8%)	6 (2.3%)		
	Wash my hands with soap and water and clean thoroughly my palms, back of my hand, between fingers and nails	163 (66.1%)	237 (96.5%)		
Washing of hands and taking bath immediately after coming from school	Always	131 (53.3%)	212 (86%)	49.1	<0.001*
	Sometimes	93 (37.8%)	33 (13.6%)		
	Never	22 (8.9%)	1 (0.4%)		
Duration of washing hands	5 seconds	39 (15.9%)	6 (2.3%)	56.8	<0.0001*
	10 seconds	98 (39.7%)	19 (7.8%)		
	20 seconds	91 (37%)	159 (64.6%)		
	30 seconds	18 (7.4%)	62 (25.3%)		
Habit of sanitising hands in school	Always	88 (35.7%)	210 (85.2%)	61.32	<0.001*
	Sometimes	89 (36.2%)	14 (5.7%)		
	Never	38 (15.6%)	6 (2.3%)		
	Whenever I remembered	31 (12.5%)	16 (6.6%)		
Method of sneezing or coughing	I used to not cover my mouth and nose	7 (3.1%)	3 (1.3%)	68.25	<0.0001*
	I covered my mouth/nose with my hand	75 (30.4%)	12 (4.8%)		
	I covered my mouth/nose with shoulder or handkerchief or any other cloth	164 (66.5%)	231 (93.9%)		

**[Table/Fig-3]:** Assessment of influence of COVID-19 on behavioural patterns of children before and after COVID-19 pandemic: assessed the basic habits of children before COVID-19 pandemic and the amendments they wish to make in their habits and comprised of 16 questions (eight questions for each part).

\*p-value <0.05 -statistically significant

### Part 3: Recommendations for School

Among 246 children, 88.7% children suggested implementation of single seat single student pattern in classroom and school bus, 94.2% wished to have classes on maintenance of hygiene, 92.6% wanted teachers to wear masks, 90.3% wish to get permission to sanitise hands and 99.6% wanted classrooms to be disinfected every day [Table/Fig-4].

Questions	Options	Percentage of children for each response
Do you want schools to implement single seat single student seating pattern for classroom and school bus?	Yes	218 (88.7%)
	No	28 (11.3%)
Do you want teachers to conduct classes on how to maintain hygiene?	Yes	232 (94.2%)
	No	14 (5.8%)
Do you want your teachers to wear mask everyday?	Yes	228 (92.6%)
	No	18 (7.4%)
Would you wish to get permission to sanitise your hands in between class also?	Yes	222 (90.3%)
	No	24 (9.7%)
Would you want your classroom to be cleaned and disinfected everyday?	Yes	245 (99.6%)
	No	1 (0.4%)

**[Table/Fig-4]:** Recommendations for School: recorded the children's recommendations for their school and comprised of five questions.

## DISCUSSION

Children are considered to be powerful agents of change in the current as well as forthcoming generations. Global crises like the current pandemic presents them with an opportunity to learn and cultivate good habits and be instrumental in building a safer community. Furthermore, experts have also warned that deadlier pandemics may affect mankind in the future. Hence, it is imperative for children to inculcate healthy habits and instil them into their day-to-day life. Thus, the observations of the present study are not only applicable to the ongoing pandemic but will also find relevance in

the future. A study conducted by Aly M et al., pertaining to the swine influenza pandemic concluded that increased level of awareness would be reflected in higher tendency to adopt behavioural precautions thereby limiting the spread of disease [14].

Numerous studies have assessed the Knowledge, Attitude and Practices (KAP) of COVID-19 in adults [Table/Fig-5] [15-23]. To the best of our knowledge, this is the pioneer study assessing the awareness and practices exclusively among children. The results of this study showed that 100% children had heard about coronavirus infection and average knowledge score was 85.5% which showed good knowledge among children. This could be credited to the constant efforts by government and other organisations via news portal, social media platforms, posters and online portals of education offered by schools. Children were well aware of the symptoms, mode of spread and preventive strategies to be adopted for COVID-19. However, it was observed that certain level of confusion existed in the social distancing protocol wherein children were confused whether the ideal distance was 6 feet or 2 feet. Despite the confusion, 61.9% children answered it correctly as 6 feet. This could be attributed to the numerous alterations in the protocol for social distancing and varied protocols given by different health authorities.

The present study sample comprised of children studying in private schools who tend to belong to affluent families, have well-educated parents as well as easy access to television and social media. Hence, they were better equipped to have increased awareness about the pandemic. Various authors have highlighted the important role of education and socioeconomic status in awareness and compliance of precautionary measures in studies related to H5N1 pandemic [24-26]. However, children belonging to lower socioeconomic status do not have access to electronic media hence may lack awareness about the disease. Furthermore, they are also more likely to get infected considering the poor living conditions, crowded homes and poor sanitation [27]. It is imperative to adopt measures like

Author (Year)	Place of research	Observations and Conclusion
Singh AK et al., (2020) [15]	India	<ul style="list-style-type: none"> <li>Majority of respondents- 15-25 years</li> <li>Mostly literate urban people were aware of this pandemic</li> <li>68.3% trusted television, 61.8% trusted official government website for information</li> <li>85% extremely/ somewhat worried about pandemic</li> <li>Aware of preventive strategies</li> </ul>
Tripathi R et al., (2020) [16]	South west Saudi Arabia	<ul style="list-style-type: none"> <li>Age <math>\geq 12</math> years</li> <li>98.7% aware about COVID-19</li> <li>Health organisations- most reliable source of information</li> <li>Hand hygiene and social distancing- most common preventive strategies</li> <li>Healthcare workers and more educated participants showed considerable knowledge</li> </ul>
Zaid AA et al., (2020) [17]	Jordan	<ul style="list-style-type: none"> <li>Majority of respondents- 18-29 years</li> <li>Satisfactory knowledge of symptoms and mode of transmission</li> <li>Respondents were aware of high risk groups for COVID-19</li> <li>Had misconceptions on preventive strategies</li> </ul>
Kaushik M et al., (2020) [18]	India	<ul style="list-style-type: none"> <li>Age group- 18-80 years</li> <li>Level of public awareness- poor</li> <li>Elaborate Indian socio-cultural aspects to encourage appreciation of preventive strategies</li> </ul>
Garg R et al., (2020) [19]	India	<ul style="list-style-type: none"> <li>39% respondents gave correct answer to all questions; 61% had one or more misconceptions</li> <li>Wide misconception about transmission of disease from pets</li> <li>Continuous need for educational strategies to minimise misconceptions and myths</li> </ul>
Zhong BL et al., (2020) [20]	China	<ul style="list-style-type: none"> <li>Correct rate of knowledge questionnaire- 90%</li> <li>Knowledge score significantly associated with lower likelihood of negative attitudes and preventive practices towards COVID-19.</li> <li>Correlated the risky behaviours like not wearing masks, going to crowded places with male gender, late adolescents and those with poor knowledge score</li> </ul>
Azlan AA et al., (2020) [21]	Malaysia	<ul style="list-style-type: none"> <li>Overall knowledge score- 80.5%</li> <li>Most participants were following precautions- avoiding crowds (83.4%) and practising proper hand hygiene (87.8%)</li> <li>Wearing masks- less common (51.2%)</li> </ul>
Tomar BS et al., (2020) [22]	India	<ul style="list-style-type: none"> <li>Overall KAP score was 80.64%, 97.33% and 93.8% respectively</li> <li>Majority of Indian population demonstrated preceded good knowledge, positive attitude and good practice regarding COVID-19 pandemic</li> </ul>
Vijai C, and Suryalakshmi SM. (2020) [23]	India (Chennai)	<ul style="list-style-type: none"> <li>94.7% had awareness about COVID-19</li> <li>Majority of participants followed adequate precautions and felt lockdown was better</li> <li>Respondents feared the impact of pandemic on personal life, economy and society</li> </ul>
Present study (2020)	India	<ul style="list-style-type: none"> <li>9-15-year-old children</li> <li>100% children had heard about the coronavirus disease</li> <li>Average knowledge score- 85.5%</li> <li>Children wish to make amends in majority of their habits post-COVID-19.</li> </ul>

**[Table/Fig-5]:** Summary of studies assessing KAP of COVID-19.

awareness campaigns at their door step in order to educate and encourage them to adopt measures to protect themselves as well as their loved ones.

At present considering the lack of definitive therapy for COVID-19, nonpharmacologic interventions like social distancing, wearing masks and washing hands are necessary to prevent its transmission [28]. Hence, individual behaviour rather than government action is considered as a crucial means to flatten the curve of COVID-19. This research showed a statistically significant difference in majority of habits before and after the pandemic.

Furthermore, valuable recommendations were provided by children based on their good knowledge about the disease, its spread and preventive strategies. Majority of children would not prefer to travel by school buses after the pandemic. But parents may continue to opt for school buses keeping in mind the expense as well as security concerns. Hence, it is the school's responsibility to ensure safe travel by allowing only one child per seat, windows to be kept open, everyone should wear masks at all times, encourage hand sanitisation and regular disinfection [29]. Classrooms also must be well ventilated and attempt should be made to keep desks at least one meter apart. Schools must also stagger arrival and dismissal times to avoid crowding in the common area [30,31]. Children also wanted regular classes to be conducted on maintenance of hygiene which may be in the form of role plays, animated videos and value education classes at regular intervals such that healthy habits are followed even after the pandemic ends. Through this study, children expressed their wish that teachers should wear masks in classrooms and also wished to have permission to sanitise their hands in between classes. Lastly, children also recommended that classrooms should be cleaned and disinfected daily. Implementation of effective cleaning and disinfection protocols is the need of the hour and schools must recruit additional janitorial staff to cater to these needs. Disinfection of high touch surfaces such as light switches, door knobs, desks, stairway rails and washrooms should be done at least twice a day. Cleaning of surfaces is recommended with soap and water followed by disinfection with diluted bleach, 70% alcohol, sodium hypochlorite solution. Apart from these, newer technologies which have been implemented in healthcare settings like ultraviolet device, no-touch technologies for applying chemical disinfectant (e.g., vaporised hydrogen peroxide) such as fogging type applications could be adopted in schools as well [32,33].

The current pandemic has majorly hampered the mental health especially of adolescents due to the fear of losing loved ones, uncertainty of academics, lack of physical activity and excessive screen time. Hence, schools should emphasise on the importance of mental health and offer support and create awareness among students via online lectures and also appoint counsellors for the same [34].

### Limitation(s)

Use of a self-designed questionnaire, unequal samples in each age which could not have been avoided since it was a random sampling due to circulation of survey via online platform and Children belonging to only private schools who had access to smartphones and could understand English were considered, precluding generalisation of results. Children belonging to public schools could not be considered due to closure of schools and their lack of access to online platforms, making it difficult to send questionnaires for the study.

### CONCLUSION(S)

This research assessed the level of awareness among children and showed good knowledge of COVID-19 (85.50%). Significant difference was observed in the behavioural patterns before and after COVID-19 pandemic in terms of wearing masks, hand washing technique and duration, habit of sanitising hands, etc. Additionally, children also recommended schools to make numerous amendments

in their functioning in order to provide a safe environment. This study will serve as a basis for future awareness programmes which could be directed towards children belonging to various socioeconomic status and educational backgrounds highlighting the aspects in which they lack knowledge. Hence, future studies could be planned to compare the level of awareness among children belonging to various socio-economic status. COVID-19 is here to stay and in the future more deadlier pandemics may affect mankind, hence it is required to change individual behaviour and not rely solely on actions taken by authorities.

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