



## Assessment of impact of structured education regarding COVID – 19 among higher secondary school children among selected schools of Kalaburagi City

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### Abstract

Tablets are currently the most widely used dosage form due to their ease of self-administration, compactness, and simple production. In many situations, rapid action is necessary rather than conventional therapy. Immediate release dosage forms have become an alternative to traditional oral dose forms in order to address these shortcomings. Immediately after administration, immediate medication release dose forms dissolve more quickly. Super disintegrants such carboxymethylcellulose (Croscarmellose), sodium starch glycolate (Primogel, Explotab), cross-linked polyvinylpyrrolidone (Polyplasdone), and others are employed as the fundamental method in the manufacture of tablets. After being administered to the stomach, these powerful disintegrants instantly dissolve tablets. In this area, parenteral dosage forms and instant release liquid dosage forms have both been introduced for the treatment of patients. It is possible to administer suspensions in liquid dose form using common dispersion agents as hydroxypropyl methylcellulose, AOT (dioctyl sulfosuccinate), etc. Many medications, including neuroleptics, cardiovascular medications, analgesics, antihistamines, and other medications, can be thought of as candidates for this dose form as a result of the advent of immediate release therapy. Pharmaceutical companies frequently create a certain medication entity in a new and improved dosage form as the drug entity's patent life is about to expire. While providing its patient group with a more practical dosage form or dosing schedule, a new dosage form enables a producer to extend market exclusivity.

Keywords: - Immediate release, polymers, super disintegrant.

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### Introductions

According to WHO, Corona viruses (CoV) are a large family of viruses that cause illness ranging from the common cold to more severe diseases [1]. Several cases of pneumonia of unknown etiology and origin were reported on December 31, 2019, in Wuhan City, Hubei province in China [2]. This disease was named as COVID-19 by the WHO, and the causative virus was named as SARS-CoV-2 by the International Committee on taxonomy of Viruses. This

Problem started as a single animal-to-human transmission in Wuhan, and was followed by continued human to- human spread [3]. The International Health Regulations (2005) Emergency Committee of the World Health Organization (WHO) declared the novel corona virus disease (COVID-19) (initially termed novel corona virus (2019-nCoV) a public health emergency of international concern, on 30 January 2020; the same day as India had reported its first confirmed case of the condition [4]. WHO officially declared the outbreak a pandemic on march 11, 2020 [5]. Unlike previous corona outbreaks, this highly contagious zoonotic virus from an as-yet- unconfirmed animal origin evolved from a local flu-related severe acute respiratory syndrome to a pandemic threatening the lives of millions within a few weeks [6].

## Aim & Objectives

### Aim

The study aimed to evaluate the impact of education regarding COVID-19 on knowledge, attitude and practices among higher secondary school children in selected schools of Kalaburagi city in the initial stage of Coronavirus pandemic (COVID-19) outbreak.

### Objectives

- To Assess the Knowledge, Attitude and Practices regarding of COVID -19.
- To Improve the Knowledge, Attitude and Practices regarding COVID-19.
- To compare the knowledge of school children of different schools regarding COVID-19.

## Methodology

**Study Design:** Community based Prospective Educational study.

**Study Site:** The study has been carried out in selected higher secondary schools in Kalaburagi city.

**Study Duration:** The study was conducted for a period of six months. (January 2021 to August 2021)

### Inclusion Criteria

- Higher secondary school children of both the genders.
- School children who were the residents of Kalaburagi city.

### Exclusion Criteria

- School children who were absent on the day of pre-test.

**Source of Data:** Data collection form.

**Study Procedure:** This study is carried out for a period of six months after getting the approval from Institution Ethics Committee. Each participant was given with informed assent and consent form which were duly filled by them and their parents. After getting their assent and consent, study is carried out in selected higher secondary school children of Kalaburagi city. They were provided with 20 self-prepared objective type questions after a comprehensive literature search and most available information. A self-administered questionnaire was composed of four parts:

**Part 1:** Demographic data included age, sex and school level and residence.

**Part 2:** To assess knowledge regarding COVID-19 consists of (08) items.

**Part 3:** To assess attitude regarding COVID-19 consists of (06) items.

**Part 4:** To assess practical knowledge (Practice) regarding COVID-19 consists of (06) items.

Correct answers are awarded with 1 mark and wrong with 0 marks. After pre-test the participants were provided with a

thorough structural education regarding COVID -19 by means of audio-video representations, leaflets and direct interactions. After 2 weeks of education, post-test was taken with same questionnaire. All the data entered into Microsoft Excel 2007 for further analysis. For knowledge assessment we applied student paired T-test and for attitude and practice we have presented in descriptive statistics.

## Results

In the present study, we have enrolled 233 higher secondary school students and 13 students were excluded from the study due to their absence in post-test. In the current study we enrolled a final total of 220 students from the following schools; Chimalgi P U College (62), Disha PU College (59), Al Sharay (56), Sarvjana P U College (43).

Table 01. Depicting the school wise distribution of students.

Schools	Number of students	Percentage
ALS	56	25.5
CMG	62	28.2
DIS	59	26.8
SVJ	43	19.5
Total	220	100.0

The above table and the following graph illustrate the school-wise enrollment of students from different schools. Study observes that, out of 220 total study subjects (students) 56 (25.5%) of students were from ALS school, 62 (28.2%) of students were belongs to the CMG school, 59 (26.8%) of students were belongs to the DIS school and 43 (19.5%) of students were belongs to the SVJ - school.

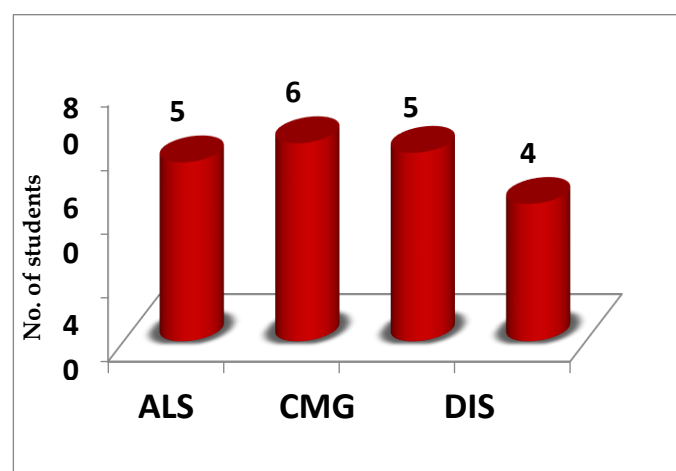
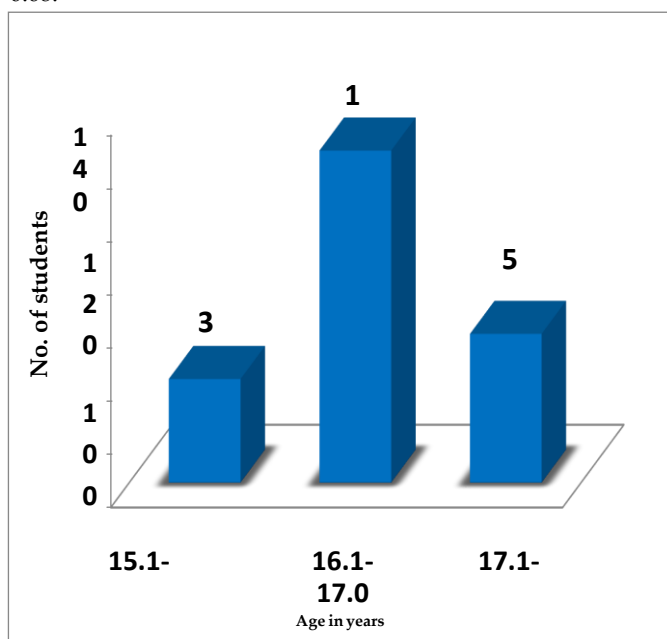


Figure 01. Representing the school wise distribution of students.

**Table 02. Depicting the age wise distribution of students.**

Age in years	Number of students	Percentage
15.1–16.0	39	17.8
16.1–17.0	125	56.8
17.1–18.0	56	25.4
<b>Total</b>	<b>220</b>	<b>100.0</b>
<b>Mean ± SD</b>	<b>16.06 ± 0.68</b>	

The above table and the following graph illustrate the age-wise enrollment of students from different schools. Study observes that, Maximum number of students 125 (56.8%) were belongs to the age group of 16.1–17.0 years followed by 56 (25.4%) were belongs to the age group of 17.1–18.0 years and 39 (17.8%) of the subjects were belongs to the age group of 15.1–16.0 years. The mean age of students was 16.06 ± 0.68.

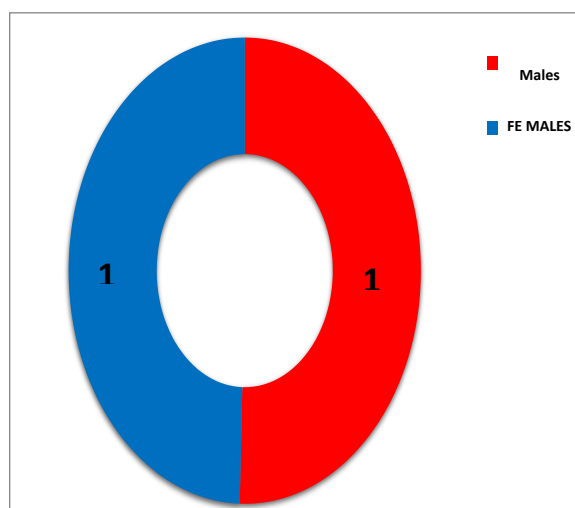


**Figure 02. Representing the age wise distribution of students.**

**Table 03. Depicting the gender wise distribution of students.**

Gender	Number of students	Percentage
Males	111	50.5
Females	109	49.5
<b>Total</b>	<b>220</b>	<b>100.0</b>

The above table and the following graph illustrate the gender-wise enrollment of students from different schools.



**Figure 03. Representing gender wise distribution of students.**

**Table 03. Depicting the assessment of the knowledge, attitude and practices scores of students on COVID -19 in pre and post intervention. (Structured Health Education)**

Variables	Assessment (Pre-test scores)	Percentage	Improved (Post-test scores)	Percentage
Knowledge	4.94 ± 1.50	61.75	7.66 ± 0.61	95.75
Attitude	3.56 ± 1.24	59.33	5.65 ± 0.58	94.17
Practice	4.02 ± 1.23	67.0	5.55 ± 0.56	92.5

The above table and the following graph illustrate the assessment of the knowledge, attitude and practices scores of students on COVID -19 in pre and post intervention of students from different schools. Study reveals that the knowledge score in the pre-test (assessed knowledge) was 61.75%, in the post-test after structured health education the knowledge score was 95.75%. The attitude score in the pre-test (assessed attitude scores) was 59.33%, in the post-test after structured health education the attitude score was 94.17%. The Practice score in the pre-test (assessed practiced score) was 67.0%, in the post-test after structured health education the practice score was 92.5%.

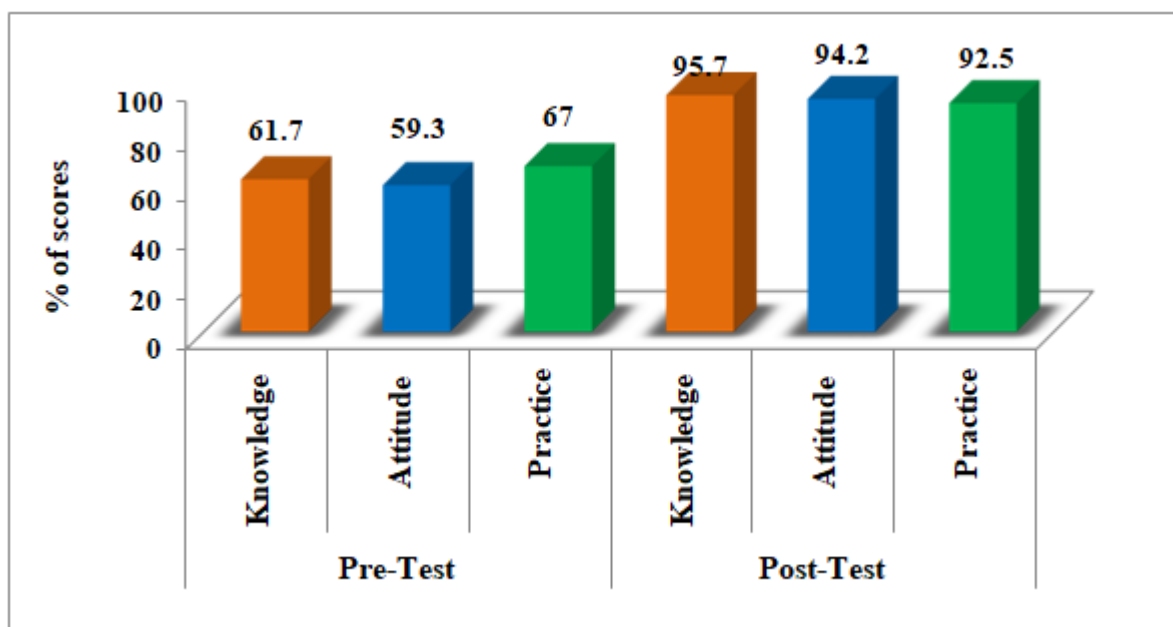


Figure 04. Representing the knowledge, attitude and practice scores in the pre and postintervention.

Table 04. Depicting the comparison of knowledge, attitude and practice scores of students on COVID -19 in pre- and post- test intervention (STRUCTURED HEALTH EDUCATION)

Variables	Pre-test scores	Post- test scores	Difference score (%)	t –test value	P-value & significance
	Mean ± SD	Mean ± SD			
Knowledge	4.94 ± 1.50	7.66 ± 0.61	2.72 (35.5%)	t = 26.88	P = 0.000, VHS
Attitude	3.56 ± 1.24	5.65 ± 0.58	2.09 (37.0%)	t = 28.25	P = 0.000, VHS
Practice	4.02 ± 1.23	5.55 ± 0.56	1.53 (27.6%)	t = 19.39	P = 0.000, VHS

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant.

The above table and the following graph illustrate the comparison of knowledge, attitude and practice scores of students on COVID -19 in pre- and post- test intervention. Study reveals that, there was statistically very highly significant difference of mean knowledge scores of students on COVID-19 between pre and post-test ( $P < 0.001$ ). The mean knowledge score of post-tests was significantly more as compare to pre- test mean knowledge score, the post-test knowledge score was increased 34%. There was statistically very highly significant difference of mean attitude score of students on COVID-19 between pre and post-test ( $P < 0.001$ ). The mean attitude score of post-tests was significantly more as compare to pre- test mean attitude score, the post-test attitude score of students on COVID-19 was increased 34.84%. There was statistically very highly significant difference of mean practice scores of students on COVID-19 between pre and post-test ( $P < 0.001$ ). The mean practice score of post-tests was significantly more as compare to pre- test mean practice score, the post-test practice score of students on COVID-19 was increased 27.6%. The intervention that was the structured health education regarding COVID-19 was given to the higher secondary school children was significantly effective.

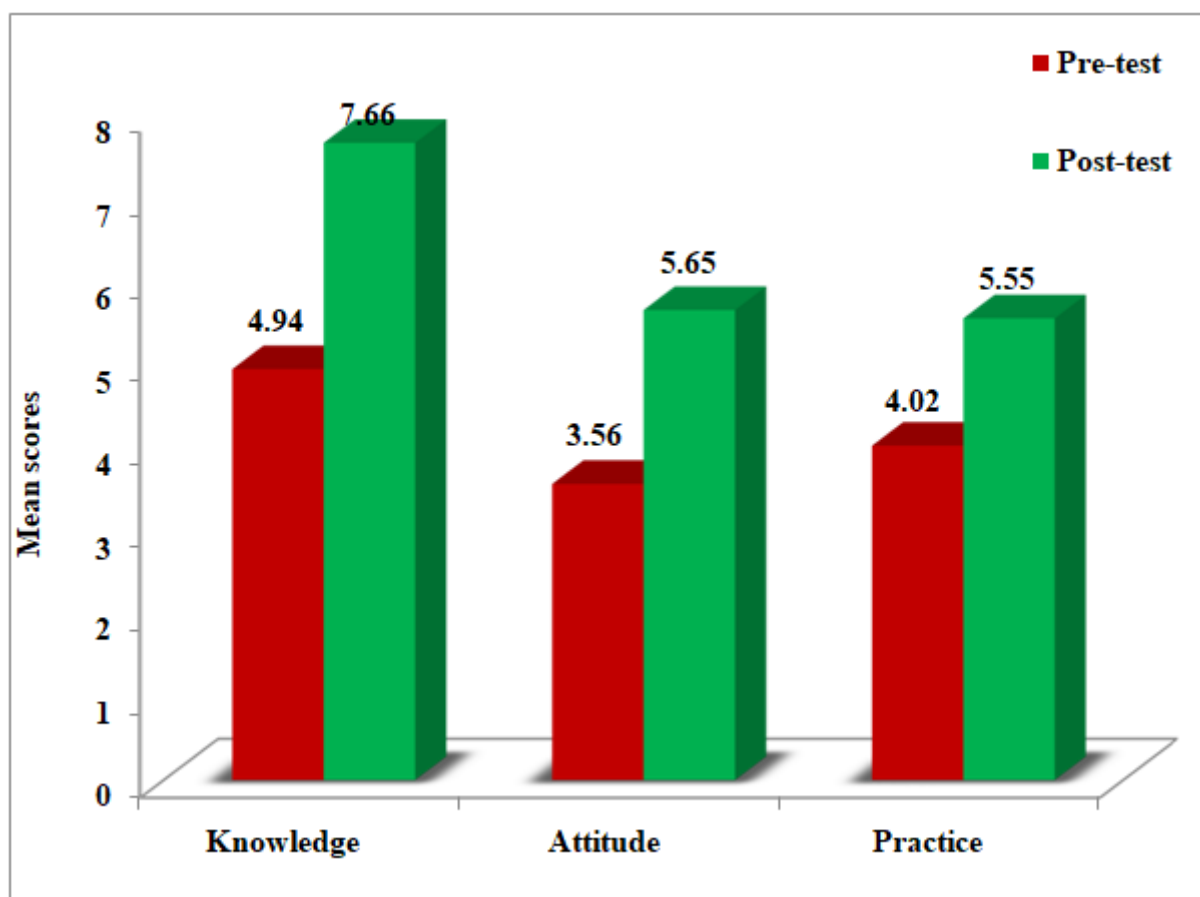


Figure 05. Representing the comparison knowledge, attitude and practice scores of students on COVID-19 in pre and post-test intervention (STRUCTURED HEALTH EDUCATION)

Table 05. Depicting the comparison of knowledge, scores of students on COVID-19 in pre and post-test intervention (STRUCTURED HEALTH EDUCATION) with different schools.

Schools	Pre-test scores	Post- test scores	Differencescore (%)	t-testvalue	P-value & significance
	Mean ± SD	Mean ± SD			
ALS	4.80 ± 1.39	7.84 ± 0.41	2.61 (35.2%)	t = 23.71	P = 0.000, VHS
CMG	4.95 ± 1.63	7.41 ± 0.77	2.46 (33.2%)	t = 21.54	P = 0.000, VHS
DIS	4.55 ± 1.33	7.64 ± 0.63	3.09 (40.4%)	t = 27.93	P = 0.000, VHS
SVJ	5.65 ± 1.41	7.81 ± 0.39	2.16 (27.6%)	t = 19.03	P = 0.000, VHS
ANOVA test value & significance	F = 4.984 P = 0.002HS	F = 6.029 P = 0.001VHS	--	--	--

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant

The above table and the following graph illustrate the comparison of knowledge, scores of students on COVID-19 in pre and post-test intervention (STRUCTURED HEALTH EDUCATION) with different schools.

Study reveals that, there was statistically very highly significant difference of mean knowledge scores of students on COVID-19 between pre and post-test ( $P < 0.001$ ) in all school students. There was statistically highly significant difference of mean knowledge scores of covid-19 in both pre and post-tests with different schools ( $P < 0.01$ ). The ALS and SVJ school students had significantly better knowledge of COVID-19 in pre and post-tests as compare to CMG and DIS schools.

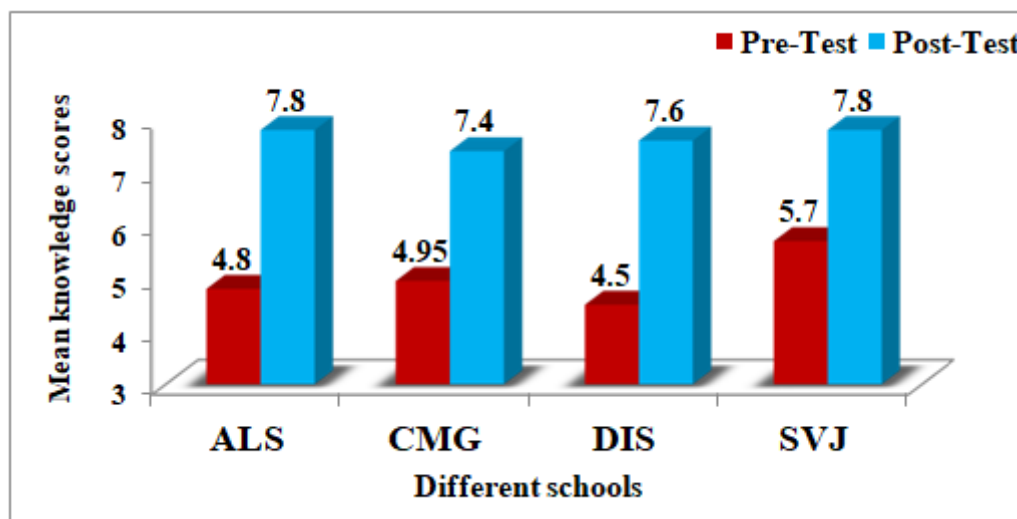


Figure 06. Representing the comparison of knowledge scores with different schoolstudents.

Table 06. Depicting the comparison of attitude scores of students on COVID-19 in pre and post-test intervention (STRUCTURED HEALTH EDUCATION).

Variables	Pre-test scores	Post- test scores	Difference Score (%)	t-testvalue	P-value & significance
	Mean ± SD	Mean ± SD			
ALS	3.32 ± 1.33	5.51 ± 0.65	2.19 (39.7%)	t = 22.87	P = 0.000, VHS
CMG	3.02 ± 1.23	5.54 ± 0.68	2.52 (45.4%)	t = 24.51	P = 0.000, VHS
DIS	2.98 ± 1.02	5.81 ± 0.18	2.83 (48.7%)	t = 28.43	P = 0.000, VHS
SVJ	3.04 ± 1.31	5.48 ± 0.54	2.44 (44.5%)	t = 20.73	P = 0.000, VHS
ANOVA test value & significance	F = 1.178 P = 0.319NS	F = 2.02 P = 0.107NS	--	--	--

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant

The above table and the following graph illustrate the comparison of attitude scores of students on COVID-19 in pre and post-test intervention (STRUCTURED HEALTH EDUCATION).

Study reveals that, there was statistically very highly significant difference of mean attitude scores of students on COVID-19 between pre and post-test ( $P < 0.001$ ) in all school students. There was no statistically significant difference of mean attitude scores of COVID-19 in both pre and post-tests with different schools ( $P > 0.05$ ). All school students have significantly same attitude regarding covid-19 in both pre and post-tests.

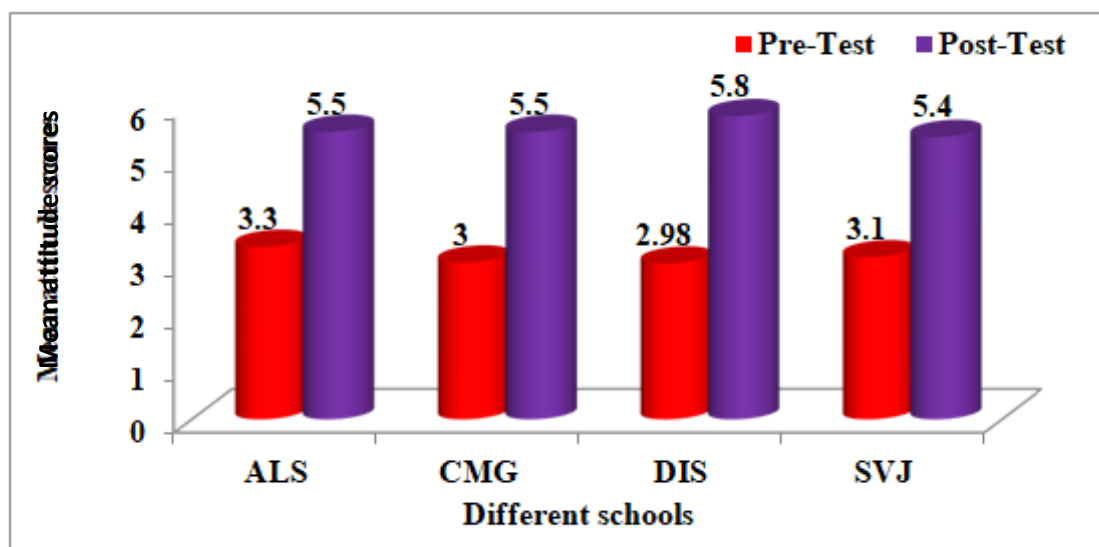


Figure 07. Representing the comparison of attitude scores with different school students.

Table 10. Depicting the comparison of practice scores of students on COVID-19 in pre and post-test intervention (STRUCTURED HEALTH EDUCATION)

Variables	Pre-test scores	Post- test scores	Difference score (%)	t –test value	P-value & significance
	Mean ± SD	Mean ± SD			
ALS	4.12 ± 1.15	5.69 ± 0.45	1.57 (27.6%)	t = 17.43	P = 0.000, VHS
CMG	4.04 ± 1.32	5.51 ± 0.67	1.47 (26.7%)	t = 17.15	P = 0.000, VHS
DIS	3.84 ± 1.21	5.61 ± 0.48	1.77 (31.5%)	t = 18.79	P = 0.000, VHS
SVJ	4.11 ± 1.14	5.46 ± 0.58	1.35 (24.7%)	t = 16.47	P = 0.000, VHS
ANOVA test value & significance	F = 0.619 P = 0.603 NS	F = 2.19 P = 0.095NS	--	--	--

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant

The above table and the following graph illustrate comparison of practice scores of students on COVID-19 in pre and post-test intervention (STRUCTURED HEALTH EDUCATION).

Study reveals that, there was statistically very highly significant difference of mean practice scores of students on COVID-19 between pre and post-test ( $P < 0.001$ ) in all school students.

There was no statistically significant difference of mean practice scores of COVID-19 in both pre and post-tests with different schools ( $P > 0.05$ ). All school students have significantly same practice regarding COVID-19 in both pre and post-tests.

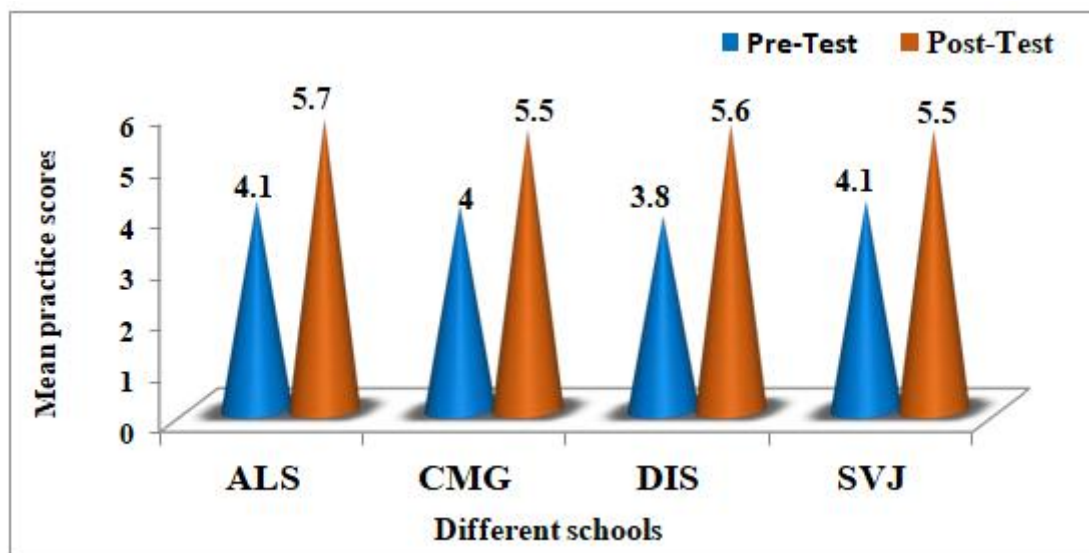


Figure 08. Representing the comparison of practice scores with different school students.

### Statistical Data Analysis

Statistical data was analyzed by IBM SPSS 20.0 version software. Collected data were spread on excel sheet and prepared master chart. Through the master chart tables and graphs were constructed. For quantitative data analysis paired t test and ANOVA test was applied for statistical significance. If P-value was less than 0.05 considered as significant.

### Discussions

The world is now facing a Coronavirus pandemic which is considered highly infectious. Several preventive measures have been mentioned to prevent its spread among all age groups. However, for these preventive measures to be effective, the students require appropriate and sufficient information. Knowledge, attitude, and practices, which are crucial to prevent and control the disease. Our study provides a useful baseline for future research. Our study was conducted in the initial stage of the COVID-19 outbreak in Kalaburagi, Karnataka province.

Here we present the result of our study evaluating the impact of educational intervention on higher secondary school children's knowledge, attitude and practices regarding COVID-19;

### Regarding Socio-Demographics

The present study observed that out of the total 220 school children, 62 (28.2%) belonged to CMG, 59 (26.8%) were from

DIS, 56(25.5%) children from ALS and 43(19.5%) were belonged to SVJ-School.

Our study revealed that, maximum number of students that is; 125(56.8%) were belonged to the age group 15.1-16.0 years followed by 56(25.4%) were belonged to the age group 16.1-17.0 years and 39 (17.8%) of the subjects were of the age group 14.1-15.0 years. The mean age score of the school children is found to be 16.06 which is slightly supported by the study conducted by Souli D, Dilucca M *et al.*,<sup>50</sup> in Italy.

The current study put forward that, out of 220 higher secondary school children, 111(50.5%) were males and 109 (49.5%) females. These results were nearly supported by the study conducted by Subedi D *et al.*,<sup>2</sup> in Nepal were the number of males were more than half of the participants.

Our study revealed that there is an association between different school styles and is of a greater significance. This is supported by the study conducted by Padmanaban S *et al.*,<sup>51</sup> in India.

### Regarding Knowledge.

Knowledge is prerequisite for forming positive attitude and promotes positive behaviors. In our study we found a high level of basic knowledge on COVID-19 and control measures among the higher secondary school children.

Our current study indicates that there was an improvement in higher secondary school children's knowledge compared to pre-educational - knowledge (61.75%) and there was a highly statistically significant difference between pre/post

and after two week of educational – interventional implementation to the higher secondary school children's Knowledge regarding COVID-19 (95.75%) with a ( $P < 0.001$ ), which is similar to the study conducted by **Ayed M M A et al.**,<sup>52</sup> in Egypt. There was statistically highly significant difference of mean knowledge scores of COVID-19 in both pre and post-tests with different schools ( $P < 0.01$ ). This may be related to the teaching programs and the leaflet which covered the information's regarding COVID-19. The mean score of post-tests was significantly more as compared to pre-test mean knowledge score, which was increased by (34 %). Present study revealed that, there was a statistically highly significant difference of mean knowledge scores of COVID-19 in both pre and post-tests with different schools ( $P < 0.01$ ). ALS Shown a (4.80) in pre-test and (7.84) in post-test with a difference of (35.2%), CMG revealed (4.95) in pre-test and (7.41) in post-test with a difference of (33.2%). Similarly, DIS – layout (4.55) in pre-test and (7.81) in post-test with difference of (40.4%) and SVJ shown (5.65) in pre-test and (7.81) in post-test with a difference score of (27.6%) which evaluates that the students of ALS and SVJ had significantly better knowledge of COVID-19 in pre/post-tests as compared to DIS and CMG.

#### Regarding Attitude

Present study revealed that, there was an improvement (94.17%) in higher secondary school children's attitudes compared to pre-educational intervention (59.33%) and there was a statistically very highly significant difference of mean attitude ( $P < 0.001$ ) and there was no statistical significant difference of mean attitude scores of covid-19 in both pre and post-tests with different schools ( $P > 0.05$ ), which is supported by the study conducted by **Tadesse A W et al.**, [53] in Ethiopia where, the findings of attitude of the participants are very low (56.4%). In our study the mean attitude score of post-tests was significantly more as compared to pre-test mean attitude score, which was increased by (34.84%). Comparing the attitude scores, children in ALS had a mean score of (3.32) in pre-test, (5.51) in post-test with a difference of (39.7%), whereas CMG had (3.02) in pre-test, (5.54) in post-test with a difference of 45.4%. Similarly DIS and SVJ revealed a mean score of (2.98) in pre-test (5.81) in post-test with a difference of (48.7%) and (3.04) in pre-test and (5.48) in post-test with a difference of (44.5%) respectively. In overall, all school students had significantly same attitude regarding COVID-19 in both pre and post-tests.

#### Regarding Practice

Our current study revealed the practice score in the pre-test (assessed practiced score) was 67.0%, in the post-test after structured health education the practice score was 92.5%.

There was statistically very highly significant difference of mean practice scores of students on COVID-19 between pre and post-test ( $P < 0.001$ ) and there was no statistically significant difference of mean practice scores of COVID-19 in both pre and post-tests with different schools ( $P > 0.05$ ). This observation is similar to study conducted by **Maheshwari S et al.**,<sup>54</sup> in Uttarakhand. The mean practice score of post-tests was significantly more as compared to pre-test mean practice score, the post-test practice score of students on COVID-19 was increased 27.6%. Comparing the different schools, our present study put forward that; ALS had a mean score of (34.12) in pre-test, (5.69) in post-test with a difference score of (27.6%), CMG showed (4.04) in pre-test, (5.51) in post-test with (26.7%) as difference. Whereas, DIS showed (3.84) in pre-test, (5.61) in post-test and (31.5%) as difference. SVJ showed a (4.11) in pre-test and in post-test, (5.46) with a difference of (24.7%). Our study summarized that, All school students have significantly same practice regarding covid-19 in both pre and post-tests.

Hence, the intervention; that was, the structured health education regarding COVID-19 was given to the higher secondary school children was significantly effective, all of which is slightly similar to the study conducted by, **Thenmozhi et al.**, [55] in Saudi among undergraduate students, where the study revealed that the college students had a moderate level of knowledge, possess a positive attitude, and performed a good practice and active behaviors of preventive measures towards COVID-19.

Receiving a very high percentage of correct responses in our study was very encouraging. This study provides a valuable insight into health education and preventive measures in the school children during the COVID-19 pandemic. Our result indicates that the majority of the higher secondary school children have acquired the basic understandings of knowledge, attitude, practices regarding COVID-19, but their performance may vary by school. Taken together, our study results revealed that the school styles potentially affect student's responses to education, which should be drawn awareness to education and health authorities. These factors should also be accounted to formulate contingency plans or trainings for the students against similar public health emergencies in future.

#### Conclusion

In light of the study the following conclusion has been drawn it was concluded that secondary school student's knowledge, attitude, and practice improved after exposure to the educational intervention. Our findings suggested that the majority of the higher secondary school children understood the basic information, possessed positive attitude and presented proactive practice towards the outbreak of COVID-19, indicating the efficacy and success of

present public health campaigns. However, results also revealed the school styles should also be taken into consideration when health and education authorities tailor public health trainings and improve their preventive measures against the epidemic. Implementing periodic educational interventions, training programs and conducting webinars on infection control practices for COVID-19 for all students as well the teaching staffs can be very useful in improving the awareness. With the COVID-19 well controlled in Kalaburagi city, students are back to school step by step. Improving the level of KAP of the COVID-19 is essential to the prevention of the rebounding of the COVID-19 epidemic for resurgence in contagion. Based on the findings of the present study, the following recommendations are proposed; Training programs for teachers to be well prepared to provide instructions about prevention and control about COVID-19 for students. Training programs for nurses to be well prepared to provide secondary school students with appropriate knowledge and practice about COVID-19 through verbal and written instructions. It is important to encourage corporation between educational institutions, medical care providers and health personnel to educate school students about COVID-19 that will help in increasing awareness, decreasing the spread of disease, prevention and control.

#### Future recommendations

Continuous education should be incorporated on periodic basis. School children should be given accurate and updated knowledge about COVID-19. Research can be undertaken to examine the impact of COVID-19 KAP educational programs in changing the perspectives. If students were provided with information on COVID-19, they can in turn pass this knowledge to other individuals and make the society even safer. Students should be included in COVID -19 prevention programs and research studies.

#### Limitations

This study has certain limitations;

- First and foremost, since this was a study conducted in school children, it is hence, difficult to assure that the respondents gave honest replies and furthermore selection of one option over the other could merely be a matter of chance.
- This study mainly targeted participants with a higher secondary level education and so the findings cannot represent the KAP of Karnataka general public.
- There is a risk of inequality may exist as disadvantaged general population cannot participate in the study.
- Further, due to time limit, lack of field survey due to effective lockdown rules, the KAP analysis could not be repeated and tested with other samples.

#### Funding

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#### Conflict of interest

Authors are declared no Conflict of interest

#### Author contribution

All authors are contributed equally

#### Informed Consent

Taken from the Participants

#### Ethical Statement

Not Applicable

#### References

1. [https://www.who.int/westernpacific/healthtopics/detail/coronavirus#:~:text=Coronaviruses%20\(CoV\)%20are%20a%20large,been%20previously%20identified%20in%20humans](https://www.who.int/westernpacific/healthtopics/detail/coronavirus#:~:text=Coronaviruses%20(CoV)%20are%20a%20large,been%20previously%20identified%20in%20humans)
2. Subedi D, Bhandari S, Gaire A. Knowledge, Attitude, and Practices Associated with COVID- 19 Among School Students in Bharatpur, Chitwan District Nepal. IJMS 2020;8(3):231-237.
3. Kasemy A Z, Bahbah W A, Zewain S K. Knowledge, Attitude and Practice toward COVID- 19 among Egyptians' JEGH 2020;10(4):378-385.
4. Taneja D, Khurana A. An Online cross-sectional survey on knowledge, attitudes, practices and perspectives of homeopathic practitioners towards COVID-19. IJRH 2020;14(2):145-194.
5. Koyama T, Platt D, Parida L. Variant analysis of SARS-CoV-2 genomes. BWHO 2020;98:495-504.
6. Paul A, Sikdar S, Hossain M M. Knowledge, attitudes, and practices toward the novel coronaviruses among Bangladeshis: Implications for mitigations measures. IJP 2020;1-18.
7. Image drawn from CDC news room.
8. Gahlot A, Singh S P, Verma V. A Study Of knowledge, attitude and practices regarding SARS COV-2 infection and its control amongst medical students of Rama Medical College Kanpur. IJFCM 2020;7(3):134-139.
9. Asraf H, Garima T, Singh B M. Knowledge, attitudes, and practices towards COVID -19 among Nepalese Residents: A quick online cross-sectional survey. AJMS 2020;11(3).
10. Image drawn from WHO, CDC.
11. Image drawn from TIME Magazine front cover May 10/May 17 2021 double issue.
12. <https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19---29-june-2021>.
13. <https://covid19.karnataka.gov.in/english>

14. <https://kalaburagi.nic.in/en/covid-19-eng/>
15. Watsala, Awasthi A, Taneja N, Janardhanan R. Knowledge Attitude and Practice towards COVID-19 Pandemic among residents of Bihar, India. *IJRSR* 2020;11(06):38990-38995.
16. Teferi S C.A Review on Knowledge, Attitude, Practice during the COVID -19 Pandemic in Ethiopia. *IJVID* 2020;5(2):040-044.
17. Khodor S, Kumar M. Pathophysiology and treatment strategies for COVID-19. *J transl Med*;(2020) 18:353.
18. Image drawn from Frontiers.<https://apps.who.int/iris/handle/10665/331329>.2021.
19. Image drawn from knowable magazine.
20. Fehr R A, Perlman S. Coronaviruses: An Overview of Their Replication and Pathogenesis. Helena Jane Maier et al. (eds.), *Coronaviruses: Methods and Protocols, Methods in Molecular Biology*,2015 ;1282: 978-4939.
21. Licastro D, Rajashekharan S. Isolation and Full-Length Genome Characterization of SARS-CoV-2 from COVID-19 Cases in Northern Italy. *Jvi* 2020; 94 (11) e00543-20.
22. Wu A, Peng Y. Genome Composition and Divergence of the Novel Coronavirus (2019- nCoV) Originating in China.*CHM* 2020;325-328.
23. Hoffman M, Weber H K, Shroeder S. SARS-CoV-2 Cell Entry Depends on ACE2 and TMPRSS2 and Is Blocked by a Clinically Proven Protease Inhibitor. *CP* 2020; 181:271-280. 25.Jaimes J A, Millet J K, Whittaker G R. Proteolytic Cleavage of the SARS-CoV-2 Spike Protein and the Role of the Novel S1/S2 Site. *iScience* 2020; 23:101212.
24. Image drawn from Journal of translational medicine.
25. Schoeman D, Fielding B C. Coronavirus envelope protein: current knowledge. *VJ* 2019; 16(69) 1-22.
26. OVID -19 Antiviral and pharmacotherapy information *Nebraska medicine* /4/12/2021.
27. Smith T, BCPS; Bushek J; PharmD. COVID -19 Drug therapy. *CDI/CS* 2020.
28. Sanayolu A, Okorie C, Marinkovic A. Comorbidity and its Impact on Patients with COVID- 19.*SN* 2020; <https://doi.org/10.1007/s42399-020-00363-4>.
29. Guan W-j, Liang W-h, Zhao Y, et al. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. *Eur Respir J* 2020; 55: 2000547 [https://doi.org/10.1183/13993003.00547-2020].
30. Abhilasha, Mitra P. Association of Comorbidities with Coronavirus Disease 2019: A Review. *Ann Natl Acad Med Sci (India)*:2020; 2:102–111.
31. CDC. National Diabetes Statistics Report | Data & Statistics | Diabetes | CDC. Available at: <https://www.cdc.gov/diabetes/data/statistics/statistics-report.html>. Accessed May 17, 2020.
32. Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA* 2020. Doi: 10.1001/jama.2020.4683
33. Ferguson N, Laydon D, Nedjati Gilani G, et al. Report 9: Impact of non-pharmaceutical interventions (NPIs) to reduce COVID19 mortality and healthcare demand. Available at: <https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19NPI-modelling-16-03-2020.pdf>. Accessed June 22,2020.
34. CDC COVID-19 Response Team. Severe outcomes among patients with Coronavirus Disease 2019 (COVID-19) - United States, February 12-March 16, 2020. *Morb Mortal Wkly Rep* 2020;69(12):343–346.
35. Epidemiology Working Group for NCIP Epidemic Response, Chinese Center for Disease Control and Prevention. [The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]. *Zhonghua Liu Xing Bing Xue Za Zhi* 2020;41(2):145–151.
36. Kreutz R, Algharably EA, Azizi M, et al. Hypertension, the renin-angiotensin system, and the risk of lower respiratory tract infections and lung injury: implications for COVID-19. *Cardiovasc Res* 2020. Doi:10.1093/cvr/cvaa097.
37. Xu Z, Shi L, Wang Y, et al. Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *Lancet Respir Med* 2020;8(4):420–422.
38. Klok FA, Kruip MJHA, van der Meer NJM, et al. Incidence of thrombotic complications in critically ill ICU patients with COVID-19. *Thromb Res* 2020. 191:145–147.
39. Arleevskaya MI, Shafigullina AZ, Filina YV, Lemerle J, Renaudineau Y. Associations between viral infection history symptoms, granulocyte reactive oxygen species activity, and active rheumatoid arthritis disease in untreated women at onset: results from a longitudinal cohort study of Tatarstan women. *Front Immunol* 2017; 8:1725.
40. Listing J, Gerhold K, Zink A. The risk of infections associated with rheumatoid arthritis, with its comorbidity and treatment. *Rheumatology (Oxford)* 2013;52(1):53–61.

41. Galloway JB, Hyrich KL, Mercer LK, et al; BSRBR Control Centre Consortium; British Society for Rheumatology Biologics Register. Anti-TNF therapy is associated with an increased risk of serious infections in patients with rheumatoid arthritis especially in the first 6 months of treatment: updated results from the British Society for Rheumatology Biologics Register with special emphasis on risks in the elderly. *Rheumatology (Oxford)* 2011;50(1):124–131.
42. Bernal J P, Andrews N, Gower C et al. Effectiveness of COVID-19 vaccines against
43. B.1.617.2 (Delta) Variant. *N ENGL J MED* 2021;1-10.
44. Image drawn from [www.immunology.org](http://www.immunology.org).
45. <https://www.webmd.com/vacines/covid-19-vaccine/default.htm>.
46. Pathak H. India's COVID-19 Vaccination Campaign: A Marathon, Not a Sprint/ORF Special report no.143/June 2021.
47. Galvin C J, Li U C (Jack), Malwade S. COVID-19 preventive measures showing an unintended decline in infectious diseases in Taiwan. *IJID* 98 2020; 18-20.
48. Image drawn from [Tiger encounter.com](http://Tiger encounter.com).
49. Souli D, Dilucca M. Knowledge, attitude and practice of secondary school students toward COVID-19 epidemic in Italy: a cross sectional study.
50. Padamanaban S, Rajendran P, Davis P et al. Knowledge, attitude and practices towards COVID-19 among higher education students in India: a cross sectional study. *JPB* 2021.
51. Ayed M M A, Mohamed A E, Mahmoud TM et al., Impact of Educational Intervention on Secondary School Students' Knowledge, Practices and Attitudes Regarding to COVID- 19.2020.
52. Tadesse A W, Melese N et al., Knowledge, attitude and practice and associated factors towards COVID-19 among college students in Ambara region, Ethiopia; A cross sectional study.
53. Maheshwari S, Gupta P K, Sinha R et al., Knowledge, attitude, and practice towards Coronavirus disease 2019 (COVID-19) among medical students: A cross-sectional study. *JAD* 2020;9(3):100-104.
54. Thenmozhi, Bhuvaneshwari. Knowledge, Attitude and Practices towards COVID-19 among Undergraduate Students: Web-Based Cross-Sectional Study. *SJNHC* 2021;4(7):164-169.