A Comprehensive Survey-based Study on Pre and Post COVID-19 Impact Using Statistical Design on School Students in Urban Areas of Chennai

V. Nishanthini¹; Nibedita Dey²*

¹Research Scholar, Department of Biomedical Engineering, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India.

²*Assistant Professor, Project Guide, Department of Biotechnology, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Science, Saveetha University, Chennai, Tamil Nadu, India.

Abstract

Aim: The aim of our study was to assay pre and post covid-19 impact on school students in Chennai and their psychological impact of online learning on them. Material and methods: 500 school students were surveyed for their Post COVID and Pre COVID experience in their academic life. We calculated samples by using statistical packages for social science (SPSS). Result: The study highlights students performed and enjoyed organized learning experience in the pre COVID-19 time to post COVID lockdown. Conclusion: Although the most data were statistically insignificant (P>0.05), based on the number of responses for given conditions in the survey, we were able to infer that post COVID-19 was more stressful and had a greater impact on school students (Chi square, Correlation).

Key-words: Novel Survey Study, Psychological Stress, Pre and Post COVID-19 Experience, School Students, Medical Informatics.

1. Introduction

The year 2020 was declared as a global pandemic after nearly 100 years. It has impacted students and educational organizations throughout the world. The COVID-19 pandemic impacted schools, colleges and universities to lock down their campuses in order to follow distance learning (Kuhfeld et al., 2020); (Malboeuf-Hurtubise et al., 2021); (Adnan & Boz, 2015); (Kampe et al., 2020); (Malboeuf-Hurtubise et al., 2021). The lockdown has been impacted on psychological stress
for school during the covid-19 pandemic. (Radwan et al., 2020; Radwan & Radwan, 2020) b; (Reimer et al., 2021) . The survey is based on school students in urban areas of Chennai and also has better awareness on the effect of online learning for school students (Chennai).

Igor and team in 2021 have reported that 16% of the high school students in Ecuador felt depressed during the learning process in the lockdown (Igor Asanov, Francisco Flores, David McKenzie, Mona Mensmann, Mathis Schulte, 2021) (Zhang et al., 2021) (Igor Asanov, Francisco Flores, David McKenzie, Mona Mensmann, Mathis Schulte, 2021)). Pursuing distance education and virtual education did not arise overnight (Chaturvedi et al., 2021); (Radwan et al., 2020); (Zhang et al., 2021). Digital learning technology has become an important learning part in this pandemic (Grubic et al., 2020); (Camacho-Zuñiga et al., 2021); (Jiao et al., 2020); (Yang et al., 2020). The heightened effect of social media simultaneously also led to increase in mental disturbances in primary school students by 81% in netherlands (Radwan et al., 2020; Radwan & Radwan, 2020) b).

This was the best literature we were exposed to frame our study. Previously our team has a rich experience in working on various research projects across multiple disciplines (Gheena & Ezhilarasan, 2019; Jose et al., 2020; Ke et al., 2019; Krishnaswamy et al., 2020; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Muthukrishnan et al., 2020; M. S. Samuel et al., 2019; S. R. Samuel et al., 2020; Sathish & Karthick, 2020; Sharma et al., 2019; Varghese et al., 2019; Venu, Raju, et al., 2019; Venu, Subramani, et al., 2019; Vignesh et al., 2019; Vijayakumar Jain et al., 2019). Now the growing trend in this area motivated us to pursue this project.

We found that no Chennai area based study was done for school student’s experiences in the lockdown. The survey data addresses gaps or falls in online learning. The main aim of our study is based on surveys impacted on psychological stress on school students during COVID-19 pandemics. The comparison was done between survey output using statistical tools (Pearson chi square test and correlation) and IBM version 22 from SPSS was used for analysis.

2. Materials and Methods

An online questionnaire was designed and was shared with different groups in various social media platforms. School students were asked to answer the questionnaire for our project. Sample size was calculated to be 500 students each for posts and 500 per COVID-19 responses. Sample size was calculated using Clinical.com using the Radu and teams published article (Radu et al., 2020). The Power value was G-power 80%, Alpha- 0.05.
In group 1- Online survey questionnaire on pre COVID-19 experiences were used to collect responses from 500 school students. The number of responses were collected using excel scores. Similarly for group 2- Online survey questionnaires on post COVID-19 experiences of school students were collected in the same way. The comparison was done between survey output using statistical tools (Pearson chi square test and correlation) and IBM version 22 from SPSS was used for analysis. We conducted a cross-sectional survey with a sample of 1000 random school students from different schools located in different zones of Chennai. Data were analyzed in two major group categories as mentioned above.

**Statistical Analysis**

Analysis done by SPSS using chi square and correlation platforms. We didn't have any independent variables in our studies and dependent variables were responses given by the school students (chi square and correlation).

### 3. Results

Table 1 represents the age of school students and those who participate in our current study. Maximum number of students participating were in the age group of 17-18 for Pre COVID responses (32.8%) and 13-14 for post COVID responses (31%). The least number of responses were given by students between the ages of 11-12 (14.4%) in pre COVID survey and 10% in post COVID survey.

| AGE  | Pre COVID responses | Pre COVID (%) | Post COVID Responses | Post COVID (%) |
|------|---------------------|---------------|----------------------|----------------|
| 11-12| 72                  | 14.4%         | 50                   | 10%            |
| 13-14| 115                 | 23%           | 155                  | 31%            |
| 15-16| 149                 | 29.8%         | 153                  | 30.6%          |
| 17-18| 169                 | 32.8%         | 142                  | 28.4%          |
| Total=500 (for each group) | | | | |

Table 2- Represents the Gender of School Students who Participated in Pre and Post COVID-19 Data Survey

| Gender | Responses | Percentage |
|--------|-----------|------------|
| MALE   | 225       | 45%        |
| FEMALE | 275       | 55%        |

Table 2- Represents the Gender of School Students who Participated in Pre and Post COVID-19 Data Survey
Table 2 represents the male and female of school students, those who participate in COVID-19 data collection relate to our study. In this female responses dominated more when compared to male (55%). This pattern of gender responses was seen in both the surveys. Table 3 depicts the four zones of Chennai that harboured schools that were used to collect responses for this survey. The maximum number of students responded from east Chennai 155 (31%). The least number of responses were from schools that were located in south Chennai (16.8%). Table 4 represents the sample size of our study. 500 school students were surveyed for their Post COVID and Pre COVID experience in their academic life. Hence, the total size was found to be around 1000 responses. This was analysed in SPSS.

Table 3- Represents the School Student’s Location who Participated in Pre and Post COVID-19 Data Survey

| School location   | Responses | Percentage |
|-------------------|-----------|------------|
| West Chennai      | 114       | 22.8%      |
| East Chennai      | 155       | 31%        |
| North Chennai     | 147       | 29.4%      |
| South Chennai     | 84        | 16.8%      |
| Total=500         |           |            |

Table 4- Represents the overall Sample Size of the Responses Collected in Pre and Post COVID-19 Data Survey

| Cases                      | Valid | Missing | Total | Percent |
|----------------------------|-------|---------|-------|---------|
| pre_post_school_students* Group | 1000  | 0       | 1000  | 100.0%  |

Fig. 1- Represents the Pre and Post COVID Abroad Study Plans among School Students in Chennai. X Axis: Pre COVID and Post COVID Study Abroad Plans. Y Axis: Mean Value of Pre COVID and Post COVID Study Abroad Plans +/- 1 SD
Table 5a represents the comparison of changes in abroad study plans in school students during the Pre and Post COVID times. Many students opted for postponing their abroad plans (508 responses). There was a statistical insignificance between the data (P>0.05 Chi square analysis with Correlation). A negative correlation was seen between the responses which is depicted in Table 5b and 5c. The bar chart shown in Fig. 1 represents the comparison between the changes in abroad study plans in school students during the Pre and Post COVID times. There was a statistical insignificance between the data. (P>0.05 Chi square analysis with Correlation). The deviation was seen to be more for post COVID-19 study abroad plans when compared to pre COVID times among school students.

Table 5a- Represents the Comparison of Responses Regarding Changes in Abroad Study Plans in School Students during the Pre and Post COVID Times. (1 Represents Continuing their Studies, 0.5 Represents Postponing their Studies, 0 Represents Cancelling their Studies)

| Group                        | pre_abroad_study_plans | post_abroad_study_plans | Total |
|------------------------------|------------------------|-------------------------|-------|
| pre_and_post_abroad_study_plans | 39                     | 42                      | 81    |
| .5                           | 248                    | 260                     | 508   |
| 1.0                          | 213                    | 198                     | 411   |
| Total                        | 500                    | 500                     | 1000  |

Table 5b- Represents the Comparison of Responses Regarding Changes in Abroad Study Plans in School Students during the Pre and Post COVID Times using Chi-Square Tests and Correlation Analysis

|                            | Value  | df  | Asymp. Sig. (2-sided) |
|---------------------------|--------|-----|-----------------------|
| Pearson Chi-Square        | .942^a | 2   | .624                  |
| Likelihood Ratio          | .942   | 2   | .624                  |
| Linear-by-Linear Association | .845  | 1   | .358                  |
| N of Valid Cases          | 1000   |     |                       |

Table 5c- Correlation Regarding Changes in Abroad Study Plans in School Students during the Pre and Post COVID Times using Chi-Square Tests and Correlation Analysis

|                          | Value   | Asymp. Std. Error^a | Approx. T^b | Approx. Sig. |
|--------------------------|---------|---------------------|-------------|--------------|
| Interval by Interval     | Pearson's R | -.029               | -.919       | .358^c       |
| Ordinal by Ordinal       | Spearman Correlation | -.030               | -.952       | .341^c       |
| N of Valid Cases         | 1000    |                     |             |              |
The comparison of changes in distance study convenience in school students during the Pre and Post COVID times is tabulated in Table 6a. There was a statistical significance between the data (P<0.05 Chi square analysis with Correlation). There was a negative correlation between the data which is shown in Fig. 6b and 6c. Here, 1 represents study through laptops and desktop, 0.5 represents study through smart phone, 0 represents study through tablets. Most of the students studied on smartphones (459 responses). Bar chart shown in Fig. 2 represents the comparison between the changes in distance learning in school students during the Pre and Post COVID times. There was a statistical significance between the data (P<0.05 Chi square analysis with Correlation). School students felt that distance education was much better and efficient during Pre COVID times as the deviation and inconsistency was very much predominant in post COVID lockdown.

| Group               | Group total | pre_distance_learning | post_distance_learning | Total |
|---------------------|-------------|-----------------------|------------------------|-------|
| pre_post_distance_learning | .0          | 94                    | 153                    | 247   |
|                     | .5          | 254                   | 205                    | 459   |
|                     | 1.0         | 152                   | 142                    | 294   |
| Total               |             | 500                   | 500                    | 1000  |
Table 6b- Comparison of Responses for Changes in Distance Study convenience in School Students during the Pre and Post COVID Times using Chi-Square Tests and Correlation Analysis

|                        | Value  | df | Asymp. Sig. (2-sided) |
|------------------------|--------|----|-----------------------|
| Pearson Chi-Square     | 19.664 | 2  | .000                  |
| Likelihood Ratio       | 19.811 | 2  | .000                  |
| Linear-by-Linear Assoc | 8.828  | 1  | .003                  |
| N of Valid Cases       | 1000   |    |                       |

Table 6c- Correlation for Changes in Distance Study Convenience in School Students during the Pre and Post COVID Times

|                          | Value | Asymp. Std. Error | Approx. T | Approx. Sig. |
|--------------------------|-------|-------------------|-----------|--------------|
| Interval by Interval     |       |                   |           |              |
| Pearson's R              | -.094 | .031              | -2.983    | .003         |
| Ordinal by Ordinal       | -.092 | .032              | -2.910    | .004         |
| N of Valid Cases         | 1000  |                   |           |              |

Comparative responses for one and one discussion in school students with their teachers during the Pre and Post COVID times is represented in Fig. 7a. There was a statistical insignificance between the data (P>0.05 Chi square analysis with Correlation). There was a negative correlation between the data which is shown in Fig. 7b and 7c. Here, 1 represents discussion with teachers 20 and more, 0.5 represents discussion with teachers 10-20 minutes, 0 represents discussion with teachers 15 minutes. Most of the students have one and one discussion within 10-20 Minutes (271 responses). Figure 3 represents a bar chart comparing the changes in one and one discussion in school students and their teachers during the Pre and Post COVID times. There was a statistical insignificance between the data (P<0.05 Chi square analysis with Correlation). One and one discussion with the teacher increase in post COVID-19 times with higher standard deviation.

Table 7a- Comparison of Responses for One and One Discussion in School Students with their Teachers during the Pre and Post COVID Times. (1 Represents Discussion with Teachers 20 and more, 0.5 represents Discussion with Teachers 10-20 Minutes, 0 Represents Discussion with Teachers 15 Minutes)

|                        | Group                  | pre_one_one_discussion | post_one_one_discussion | Total |
|------------------------|------------------------|------------------------|-------------------------|-------|
|                        | pre_post_one_one_discussion | 0                      | 298                     | 577   |
|                        |                        | .5                     | 131                     | 271   |
|                        |                        | 1.0                    | 71                      | 152   |
|                        | Total                  |                        | 500                     | 1000  |

Table 7b- Comparison of Responses for One and One Discussion in School Students with their Teachers during the Pre and Post COVID Times Using Chi-Square Tests and Correlation Analysis

|                        | Value  | df | Asymp. Sig. (2-sided) |
|------------------------|--------|----|-----------------------|
| Pearson Chi-Square     | 1.582  | 2  | .453                  |
| Likelihood Ratio       | 1.583  | 2  | .453                  |
| Linear-by-Linear Assoc | 1.532  | 1  | .216                  |
| N of Valid Cases       | 1000   |    |                       |
Table 7c- Correlation for One and One Discussion in School Students with their Teachers during the Pre and Post COVID Times

|                  | Value | Asymp. Std. Error | Approx. T | Approx. Sig. |
|------------------|-------|-------------------|-----------|--------------|
| Interval by Interval | Pearson's R | .039 | .032 | 1.238 | .216c |
| Ordinal by Ordinal | Spearman Correlation | .040 | .032 | 1.258 | .209c |
| N of Valid Cases  |       | 1000              |           |              |

Fig. 3- Represents the Pre and Post COVID-19 for One and One Discussion among School Students in Chennai. X Axis: Pre COVID and Post COVID Distance Learning Plans. Y Axis: Mean value of Pre COVID and Post COVID Distance Learning Plans +/− 1 SD

Table 8a represents the comparison of changes in the schedule of school students during the Pre and Post COVID times. There was a statistical insignificance between the data (P>0.05 Chi square analysis with Correlation). There was a negative correlation seen between the data as shown in Fig. 8b and 8c. In this study, 1 represents schedule time strongly agrees, 0.5 represents schedule time is neutral, 0 represents schedule time and strongly disagrees. Bar chart shown in Fig. 4 represents the comparison between changes that occurred in the schedule of school students during Pre and Post COVID times. There was a statistical insignificance between the data (P>0.05 Chi square analysis with Correlation). They felt the schedule was much more organized during pre-C0VID-19 time.
Table 8a- Comparison of Response Regarding Schedule for School Students during the Pre and Post COVID times. (1 Represents Schedule Time is Strongly Agree, 0.5 Represents Schedule Time is Neutral, 0 Represents Schedule Time is Strongly Disagree)

| Group               | pre_School_Schedule | post_School_Schedule | Total |
|---------------------|----------------------|-----------------------|-------|
| pre_post_School_Schedule | .00 | 144 | 168 | 312 |
| .50 | 164 | 192 | 356 |
| 1.00 | 191 | 139 | 330 |
| Total | 499 | 499 | 998 |

Table 8b- Comparison of Response Regarding Schedule for School Students during the Pre and Post COVID Times Using Chi-Square Tests and Correlation Analysis

| Test                              | Value       | df | Asymp. Sig. (2-sided) |
|-----------------------------------|-------------|----|-----------------------|
| Pearson Chi-Square                | 12.242*     | 2  | .002                  |
| Likelihood Ratio                  | 12.281      | 2  | .002                  |
| Linear-by-Linear Association      | 8.992       | 1  | .003                  |
| N of Valid Cases                  | 998         |    |                       |

Table 8c- Correlation for Schedule in School Students with their Teachers during the Pre and Post COVID Times

| Interval by Interval | Pearson's R | Value | Asymp. Std. Errora | Approx. Tb | Approx. Sig. |
|----------------------|-------------|-------|--------------------|------------|--------------|
| Interval by Interval | Pearson's R | -.095 | .031               | -3.011     | .003*        |
| Ordinal by Ordinal   | Spearman Correlation | -.095 | .031               | -3.025     | .003*        |
| N of Valid Cases      |             | 998   |                    |            |              |

Table 9 represents the mental health condition of school students during lockdown. Most of the students felt lockdown-based work was very stressful (31.2%). 141 students found the online learning manageable (28.2%). The student feedback on workload during lockdown is tabulated in table 10. Most of the student’s felt lockdown based work was comparative more when compared to pre COVID times (182 responses).

Table 9- Represents the Mental Health Condition for School Students

| Response for mental health in lockdown | Responses | Percentage |
|----------------------------------------|-----------|------------|
| Very stressful                         | 156       | 31.2%      |
| stressful                              | 111       | 22.4%      |
| Manageable                             | 141       | 28.2%      |
| No difference                          | 92        | 18.4%      |
| Total =500                             |           |            |

Table 10- Represents the Workload during Lockdown for School Students in Chennai Region

| Amount of work changes in pandemics | Responses | Percentage |
|-------------------------------------|-----------|------------|
| Increase in work                    | 182       | 36.4%      |
| Decrease in work                    | 114       | 22.3%      |
| Neither increase or decrease        | 155       | 31%        |
| None of these                        | 49        | 9.8%       |
| Total =500                           |           |            |
4. Discussion

Our survey suggested that post COVID-19 online studies were less effective, non-interactive, depressing and disorganized among school students in Chennai. The response analysis was found to be statistically insignificant (P>0.005). Majority of the respondents were females (55%) hailing from East Chennai. In the lockdown students had to postpone their study abroad plan (260 respondents) which might be due to sealing of the borders. Majority of the students used smartphones (205 respondents) while studying with a maximum of 20 minutes of one on one discussion (140 respondents) with the teacher in the pandemic. There seemed to be a drastic increase in workload among the students. The negative correlation between each data set signifies the inverse relation between the post and pre COVID learning experiences in Chennai.

Previous literature states that the lockdown has higher psychological impact on school students up to 100% (depression) which is contractually to our stress percentage (31%) (Igor Asanov, Francisco Flores, David McKenzie, Mona Mensmann, Mathis Schulte, 2021)). School students all around the world felt a large deviation from their study abroad plans, less organised learning schedule and more work load in the lockdown (Kuhfeld et al., 2020); (Grubic et al., 2020)2020). Hence we would like to infer that Chennai based school students might not be well aware of their own mental health state. This decreased stress level might be independent to the demographic country, family structure, education system and their curriculum (Chennai) (Camacho-Zuñiga et al., 2021); (Jiao et al., 2020). A survey of this kind exclusive for the school students of Chennai is the novelty in this paper.

Our institution is passionate about high quality evidence based research and has excelled in various fields ((Ezhilarasan et al., 2019; Mathew et al., 2020; Pc et al., 2018; Ramadurai et al., 2019; Ramesh et al., 2018; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019). We hope this study adds to this rich legacy.

The prospective limitation in or study would be that the data given in online mode by school students might not be given very seriously. Data in person would be much more authentic.

To frame a better online learning platform curriculum for school students in the Chennai region. To have an understanding of the mental health and study preference specific for school students in the Chennai region.
5. Conclusion

Our study inferred that school students in Chennai performed and enjoyed organized learning experience in the pre COVID-19 times when compared to post COVID lockdown. Although most of the data were statistically insignificant, based on the number of responses for a given condition in the survey, we were able to infer that post COVID-19 lockdown was more stressful and had a greater impact on school students (Chi square, Correlation).

Declarations

Conflict of interests

No conflict of interest in this manuscript.

Authors Contributions

Author NV was involved in data collection, data analysis and manuscript writing. Author ND was involved in conceptualization, data validation and critical review of the manuscript.

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