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Impact of online education on mental health of matriculating adolescents during COVID-19 pandemic in Western India

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***Abstract*---**Background: School closures during COVID-19-Pandemic introduced online teaching- learning in low-&middle-income-countries (LMIC). We aimed to assess its impact on mental health (MH) of adolescents in India studying for matriculation. Material & Methods: A cross sectional study was carried out in Maharashtra, India in 2021. MH of matriculating adolescents was assessed by presence of symptoms of depression, anxiety, stress (DAS) using DASS-42 and emotional intelligence (EI) by Schutte's self-report EI test (SET) with collection of socio-demographic information maintaining confidentiality. Higher are the DAS scores, greater is the severity of symptoms and higher the score better is EI. They were categorized as per convention by their inventors. Data were analyzed by SPSS-20 software. Impact of online teaching was assessed by comparing results of present study with pre- pandemic pilot and other studies. Results: Total 1103 adolescents participated, 42.9% were boys & 57.1% were girls. Mean age was 14.7 (+0.75) years, majority from middle socio-economic- status. Median DAS, EI scores showed no evidence of symptoms of DAS with EI in normal category. DAS scores were significantly lower and EI score was significantly higher than reported in pre-pandemic pilot and other studies. Conclusion: MH derangement of matriculating adolescents was more in pre-pandemic times with in-class education than during COVID-19- Pandemic with online education. Recommendations: MH support at schools needs to be strengthened. Online school education may be continued giving voluntary option in LMIC in post-COVID-19 period.

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***Keywords*---**DAS (depression, anxiety, stress), emotional intelligence, adolescents.

Introduction

COVID-19-Pandemic affected lives in an unprecedented manner.[1] Drastic changes in lifestyles, fear and anxiety about COVID-19, led to deranged mental health (MH).[2] It was more in low-&-middle-income-countries (LMIC).[3] Adolescents make 19.6% of Indian population[5] with highest rate of suicide in 16 to 18 years age group. One in twenty individuals suffered consequences of depression with roots being in adolescence.[4] It is crucial to restrict derangement in adolescents' MH and intervene for their sound mental health. COVID-19 Lockdowns caused closures of schools and playgrounds. Education was continued by adopting online teaching-learning modes. They were never utilized by majority of students in LMIC.

In India, secondary school (SS) education is completed in mid-to-late adolescence by matriculation.[2] It is considered as crucial academic milestone wherein natural stresses of adolescence are superadded with considerable academic stress, societal pressure and now with COVID-related stressors which can affect their MH.[5,6] It is needed to be studied for decision making related to online education. With this background, present study was planned to assess impact of online education on MH of adolescents undergoing matriculation during COVID-19-Pandemic.

Methodology

A cross sectional study was carried out in one of the Municipal Corporations in Maharashtra state of India during COVID-19-Pandemic from March to NOV 2021 with IEC approval, all due permissions, consents and assents. Adolescents studying for matriculation to appear for Secondary School Certificate examination (SSC) served as study population. Twenty-four out of 424 SS in study area following State Board Syllabus pattern were randomly selected. At 95% confidence level, 5% allowable error, 10% non-response rate and 54% expected proportion of symptoms of depression, calculated sample size was 1363.[7] Study was preceded by pilot study in Feb 2020, just before declaration of COVID-19- Pandemic. Relevant socio-demographic information was collected maintaining the confidentiality. Students not attending online teaching were excluded.

MH status of study subjects

MH was assessed by presence of symptoms of depression, anxiety, stress (DAS) and emotional intelligence (EI)[8] using DASS-42 and Schutte's self-report EI test (SET) respectively to be answered on self-reported Likert scales. Their summative scores were interpreted as per the conventions laid by their inventors, as in Table1.[9,10]

Data Collection

After pre-testing & validation, Google forms of research instruments (RI) with study information & a statement of implied assent in local language were sent to the students by respective class teachers.

Statistical Analysis

Data were recovered in MS-Excel and analyzed with SPSS 20.00 (IBM) software. Enlisting frequencies & proportions, associations were assessed by Pearson's Chi-squared test, independent sample Mann Whitney U test as scores did not follow normal distribution. Correlations were assessed by Pearson's correlation-coefficient. For all, significance level (p) was assigned at < 0.05.

Table 1: Categorization of Scores of DAS & EI

	No Evidence	Mild	Moderate	Severe	Extremely severe
Depression	0–9	10–13	14–20	21–27	≥ 28
Anxiety	0–7	8–9	10–14	15–19	≥ 20
Stress	0–14	15–18	19–25	26–33	≥ 34
EI	Low	Normal	High		
	<110	111-137	>137		

Table 2: DAS & EI Scores Present study (PS) during Pandemic & Pre-pandemic pilot (PP) study

Score for	Present study during Pandemic (N=1103)		Pre-pandemic pilot (PP) study (N=45)		*P (Two tailed)
	Median	IQR	Median	IQR	
Depression	5 (No evidence)	8	18 (Moderate)	16	<0.0001
Anxiety	6 (No evidence)	10	16 (Severe)	14	<0.0001
Stress	10 (No evidence)	10	15 (Mild)	12	<0.0001
Emotional Intelligence	125 (Normal)	19	108 (Low)	31	<0.0001

*p by Mann Whitney U test.

Table 3: Categories of DAS in Present study (PS) during Pandemic & Pre-pandemic pilot (PP) study

Categories		No Evidence	Mild	Moderate	Severe	Extremely severe	Total
Depression n (%)	PS	808 (73.3)	115(10.4)	111 (10.1)	52 (4.7)	17 (1.5)	1103 (100)

	PP	15 (33.3)	4 (8.9)	9 (20.0)	13(28.9)	4 (8.9)	45 (100)
	p < 0.00001						
Anxiety n (%)	PS	595 (53.9)	125 (11.3)	178 (16.1)	127 (11.5)	78 (7.1)	1103 (100)
	PP	7 (15.6)	4 (8.9)	8 (17.8)	10 (22.2)	16 (35.6)	45 (100)
	p < 0.00001						
Stress n (%)	PS	772 (70.0)	151(13.7)	147 (13.3)	29 (2.6)	4 (.4)	1103(100)
	PP	19 (42.2)	5 (11.1)	15 (33.3)	5 (11.1)	1 (2.2)	45 (100)
	p < 0.00001						

Results

Characteristics of study participants

Total 1103 students participated; boys & girls were 42.9% (473/1103) & 57.1% (630/1103) respectively. Mean age was 14.7 (+0.75) years. And 23.1% (255/1103), 62.2% (686/1103) & 14.7% (162/1103) were from low, middle & upper socio-economic status (SES) respectively. In pre-pandemic pilot study with in-class school education, 45 adolescents participated with 69.6% boys & 30.4% girls. Mean age was 14.42(+0.64) years.

MH of study participants in the present study with online school education

Median DAS & EI scores & their categorization is shown in Table 2. As in Table 3, majority, had no evidence of symptoms of DAS. Proportion of students with symptoms of anxiety was relatively more. It was 46.1% as compared to 26.7% & 30% with depression & stress respectively. Majority, 62.6% (664/1060) had Normal EI, while 9.8% participants had low EI & 17.5% of the participants had high EI.

Comparison with Findings from Pre-pandemic pilot study with in-class school education

Median DAS scores had higher severity in pre-pandemic pilot study (Table 2) with significantly higher proportion of adolescents with severe to extremely severe DAS (Table 3). Proportions of adolescents without any symptoms of DAS were significantly high ($p<0.0001$) in present study than in pre-pandemic pilot study (Table 3). EI score was significantly lower in pre-pandemic pilot study with significantly higher proportion of adolescents with low EI as compared to present study (Table 2).

Secondary findings

DAS scores had strong positive correlation with each other in present as well as pre-pandemic pilot study with correlation coefficients, $r >0.7$, at $p<0.0001$. DAS scores were on higher side for girls than boys without significant statistical difference ($p=0.880$, 0.696, 0.923 respectively).

Discussion

Present study investigated potential impact of online teaching-learning modes on MH status of adolescents studying for matriculation. We found that their MH was more sound during the period of online school education than in-class school education. It was denoted by their lower DAS & higher EI scores in the present study than pre-pandemic pilot and previous studies in the same study area. [3,7,11] Pre-pandemic pilot study showed much deranged MH when in-class teaching-learning was the routine. Shaikh MB et al, in 2018, well before Pandemic, reported quiet higher proportion of adolescents in the same study area with DAS symptoms as 54%, 60% and 44% respectively as compared to what we observed as 26.7%, 46.1%, 30.0% respectively.[7] Similarly, it was much lower than our pre-pandemic pilot study wherein they were 66.70%, 84.4%, 57.8% respectively. EI is associated with overall MH and improves adolescents' resilience which protects against school burnout and anxiety.[12] It also predicts adaptation to newer life circumstances like lifestyle changes during COVID-19-Pandemic.[13] Pre-pandemic pilot study showed lower EI with higher DAS while present study with online education showed higher EI with lower DAS scores. Increased time spent with family in COVID-19-Pandemic scenario may also had influenced positively on EI.[14]

Our findings signify positive effect of online teaching on MH of matriculating adolescents under study who were going through crucial stage of academic development during COVID- 19-Pandemic. Though our findings are not coherent with some studies during COVID-19- pandemic [15-16] , they are somewhat coherent with reports by Yu-Hsiu Chu who found no significant changes in psychological distress and life stress due to online educational modes among 181 Taiwanese University students.[17] Contradictory to report by Shepherd et al[14], some students in our study reported that they were more comfortable with online teaching activities than attending schools.

But online education may prove to be a risk factor for early obesity and need simultaneous health promotional measures to prevent it. Yu-Hsiu Chu et al also observed drastic ($p < 0.05$) reduction in physical activity during online learning period specially among male students.[17] We found strong correlation between DAS scores. Minimizing stress and anxiety may help to decrease incidence of depression & consequent MH disorders including suicidal tendencies. In consistency with previous studies, DAS scores were more among girls than boys.[18,8]

Generalizability of the results is restricted to matriculating adolescent population in study area. Comparison group of pre-pandemic pilot study had smaller sample size (n=45). But it provided directly comparable pre-COVID-19 baseline for same parameters of MH as under present study and such comparisons are not reported before. Studies with larger sample size in both groups are recommended. As data is self-reported, response bias may exist. We could not reach adolescents who did not have access to online teaching. It will need different study designs. There is hardly any study based on in depth analysis of DAS & EI scores as well as their categorization from India. It may be the first study on its own in LMIC to investigate the MH of only matriculating adolescents for impact of online

education in COVID-19-Pandemic with large sample size which enhanced power of the study.

We recommend online education for matriculation to be continued partially and with voluntary option in LMIC in post-COVID-19 period also. While in-class learning, school environments should facilitate mental & emotional well-being of the students. School MH program and support needs to be strengthened to limit DAS and improve EI among adolescents studying for matriculation.

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Conflict of interest: Nil

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