Impact of Multi-Component Intervention On Selected Behavioural Problems Among School Going Adolescents

Shija K[*1], Shanthi Nambi[2], Sreeja Indira[3], R. Vijayaraghavan[4]

[*1]Ph.D scholar, Saveetha College of Nursing, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, Tamilnadu, India.

Email ID: vtrshija.k@gmail.com

[2]Professor, Department of Psychiatry Saveetha Medical College, Chennai, Tamilnadu, India.

[3]Professor, Department of Mental health Nursing, Ananthapuri College of Nursing,

Ananthapuri Hospitals and Research Institute, Thiruvananthapuram, Kerala, India.

[4]Former Director, Department of Research and Development, SIMATS, Chennai, Tamilnadu, India.

ABSTRACT

Introduction: Adolescence is a pivotal period of development in one's life. There is a need of adaptation in emotional and social behaviour and adoption of healthy patterns in sleep, exercise, coping, problem solving and interpersonal skills. Behavioural disorders in younger adolescents like hyperactivity and conduct problems can affect the studies and add a risk of criminal and anti- social behaviour. These behavioural problems along with smartphone addiction in this age group may become a challenge to the society, if not addressed properly. This study aims to evaluate the impact of a multi-component intervention (MCI) on emotional-behavioural problems (EBP) like hyperactivity, conduct disorder, peer relationship problems and smartphone addiction among the adolescents of 13-16 years.

Methods: A quasi- experimental design was used to find the impact of multi-component intervention (MCI) on behavioural problems of adolescents. After obtaining a voluntarily signed informed consent, and ensuring confidentiality, Strengths and Difficulties Questionnaire (SDQ11-17) was administered to 804 school going adolescents from different schools of Thiruvananthapuram District of Kerala (South India) to identify those with behavioural problems, based on the specified tool. Socio- demographic data sheet was used to collect the adolescent's characteristics; with the second section of, Smartphone Addiction Scale – Shortened version (SAS-SV). Data in this phase was analyzed using SPSS version 20.

Among the 804 adolescents, 214 who met the criteria for EBP were chosen and were assigned to control and experimental groups (108 and 106 respectively). Then MCI consisted of online psycho education, pranayama and aerobic exercise with dancing steps was given to the experimental group for 10weeks and post test was done for both the groups. Data were analysed by two way repeated measures analysis of variance (RM-ANOVA) with Boneferoni 't' test for multiple comparisons and one-way Kruskal Wallis ANOVA on ranks with Dunn's multiple comparison test.

Results: The results showed that there was a significant impact of multi-component intervention in reducing the behavioural problems like hyper activity, conduct problems and peer problems among experimental group in comparison to the control (p< 0.001).

Conclusion: The study shows the positive effect of multi component intervention to manage behavioural problems, if regularly practised.

Keywords: *Emotional behavioural problems, hyper activity, conduct problems, peer problems, smart phone addiction, adolescents, psycho education, pranayama, aerobic exercise.*

1. INTRODUCTION

India has the highest number of adolescents in the world, and every fifth person is in the age group of 10-19 years. A country's progressive development depends upon this age group and hence should be supported by focusing their safety, education, physical and mental health. (UNICEF 2019).[1]

One out of seven (14%) adolescents in the world experiences mental health problems. To great extent, meanwhile to a great extent, they are not recognized and treated. Considering EBP, behavioural problems during adolescence affect their education, and add the risk of anti-social and criminal behaviour due to impulsivity. Emotional problems like anxiety and depressive disorders can significantly affect school attendance and academic performance.[2] Anxiety and depression contribute 40 per cent of mental disorders among adolescents aged 10–19, and followed by conduct disorders (20.1%) Attention-deficit hyperactivity disorder (ADHD)(19.5%).[1] Younger adolescents show more prevalence of behavioural problems like ADHD (2.9%) and it is 2.2% in 15-19 years group. Conduct disorder with features of destructive and problematic behaviour manifest among 3.5% of younger and 1.9% of elder adolescents.[3]

A study among school going teenagers in Kohima, India, behavioural problems reported were hyperactivity (16%) and conduct problems (15%) as per the strengths and difficulties questionnaire (SDQ).[4]A prevalence study in Kancheepuram district of South India, showed the prevalence of ADHD among primary school children as 8.8% .[5] Kerala based study on self-reported ADHD symptoms among 12-19 years age group of school going adolescents was 4.3%. A notable result of this study is that ; while comparing with the Non- ADHD group, students with ADHD had poor academic performance, and significantly higher psychological distress, substance use , suicidal tendency and sexual abuse.[6] A South Indian study conducted in Thiruvananthapuram district of Kerala, over a period of five years from 2007-2012 revealed that the most common mental disorder diagnosed among high school students was conduct disorder (36.4%).[7]

A Bangladesh based study on prevalence of smartphone addiction among young adults was reported as 61.4%, with more addiction among males. Mental health issues like anxiety and depression among smartphone addicted group was 40.7% and 40.0% respectively and it was much higher while comparing with the non-addicted group. The study highlighted the need to find solution to address the impact of smartphone addiction. [8] A systematic review on smartphone addiction among Indian adolescents revealed that the magnitude ranged from 39-44% and also pointed out the negative health risks and harmful psychological effects.[9]

Mental health promotion and preventive interventions should focus on strengthening the capacity of adolescents in regulating emotions, selection of alternatives to manage negative behaviours, build resilience in dealing difficult situations and adversity, and improve supportive social environments and social connectedness. Multi- level approach like online platforms, health care settings, school or community- based interventions that apply various strategies to outreach the vulnerable groups like adolescents is mandatory.[2]

Though literature reveals single interventions on one to one basis for each of the emotional- behavioural problems like anxiety, depression, ADHD and conduct problems, a single intervention that suits for all these could not be identified

Behavioral problems secondary to ADHD and conduct problems have many negative impacts that can persist in adulthood. Most of these problems occur along with smartphone addiction and emotional symptoms like anxiety and depression, a school based multi- component intervention combining online psycho education, pranayama and aerobic exercise with dancing steps was conducted in this study.

2. MATERIALS AND METHODS

2.1. Participants of the study: The study was conducted in two stages. In the first stage, adolescents from various schools of Thiruvananthapuram district (Kerala, India), were assessed for EBP. The research proposal was presented to Institutional Human Ethics Committee of Saveetha Medical College and Hospital and approval was taken. (No. 005/05/2022/IEC/SMCH dtd 05 Jan 2022). All the adolescents' parents were given informed consent and signatures were taken for voluntary participation. Assents to participate voluntarily in this study was also taken from the adolescents. Permission was also taken from the school authority for this study and confidentiality was ensured. For the first phase, 804 adolescents were taken. Sample size was calculated based on a prevalence study conducted in Kollam District of Kerala, which showed as 24.5%.[10]

Data collection for the first phase was done in a comfortable setting in the schools. Along with the socio demographic data, mobile phone/ internet addition was assessed by using SAS-SV . All the participants were screened for EBP, by using validated Malayalam version of the SDQ (11-17) along with the English version. Among the 244 borderline and abnormal adolescents, 30 numbers were excluded as per exclusion criteria and the 214 adolescents were selected for second phase. Second phase of the study consisted of the intervention. For this the 214 adolescents were assigned to control (n= 108) and experimental (n=106) groups by purposive selection of school based clusters from Government, Government aided and unaided schools in both the groups. The schools for the control and experimental groups were nominated from distant areas to avoid information contamination. The study was carried from November 2022 to February 2023.

2.2 Inclusion and exclusion criteria: The study included adolescents studying in 8,9 and 10 standards with the age of 13-16, both male and female and willing to participate. Differently abled, adolescents with mental sub normality, chronic illness and those receiving medical or psychological treatment for psychological problems were excluded from the study. Additionally for the intervention study, adolescents regularly involved in yoga, gymnastics or sports activities were also excluded.

2.3 Methodology

Two questionnaire were used in the first phase with the first one being the socio- personal data sheet, and the second one was the Strengths and Difficulties Questionnaire (SDQ11-17).

2.3.1. Socio- personal data sheet : The socio- personal data sheet consisted of two sections. The first one was socio-demographic data including personal details like age, gender, area of residence, family type and educational qualification of the parents. The second section consisted of the shortened version of Smartphone Addiction Scale (SAS-SV) to assess the over usage of mobile phones or internet among the adolescents. SAS-SV created by Kwon et al [11] was employed to evaluate internet addiction behaviour on a 6-point likert scale (Strongly disagree(1), Disagree(2), Weakly disagree (3), Weakly agree(4), Agree (5), Strongly agree(6). With 10 items, the total score was 1 to 60. The higher score indicated problematic usage of a smartphone. Cut off scores of more than 31 in males and more than 33 in females indicated smartphone addiction.

2.3.2. Strengths and Difficulties Questionnaire (SDQs)

SDQs11-17 developed by Goodman et.al[12] is a standard tool to evaluate EBP among adolescents. It is a brief behavioural screening questionnaire containing 25 questions categorized under 5 domains with 5 questions each. The scoring is like zero for 'not true', 1 for 'somewhat true' and 2 for Certainly true'. For certain questions, the scoring is reversed. There are three versions of the report including self-report, parents' report, and teachers' report, and three bands of score viz., normal (clinically significant problems are unlikely), borderline (Reflect clinically significant problems), and abnormal (Substantial risk of clinically significant problems). Total difficulties score (TDS) was created via adding the scores of four sub-scales of difficulties namely the conduct problem scale, emotional symptom scale, peer problem scale, and hyperactivity scale. The TDS ranges from 0 to 40 with 0-15 taken as normal, 16 to 19 as borderline, and 20 to 40 as abnormal. The pro-social behaviour scale score indicate strength and range from 0 to 10 with 0 to 4 considered abnormal, 5 as borderline, and 6 to 10 as normal. All subscales were with specific grading score and behavioural problems like hyperactivity, conduct problems and peer related problems. A validated Malayalam version

(regional language) of SDQ 11-17 YR1 (Youth self- report- Base line version) was employed along with the English version in this study.[13]

Data was collected in person as a self- report using the Pen and Paper method in both phases of the investigation.

2.3.3. Multi- component Intervention: The multi-component intervention has three components as described below

2.3.3.1 Online psycho-education: The online psycho- education on emotional and behavioural problems among adolescents and management were conducted in two sessions. The first session of 45 minutes focused on EBP among adolescents including internet addiction for conducted through Web Meet. The second session was of 90 minutes; focusing on Management of EBP including anger management, managing distorted thinking , assertive behaviour and means to control the use of internet.[14,15,16]

The batch strength was restricted to 25-27 and all participants were educated within the first 8 days between 7.30pm- 9pm (as per their convenience). They were asked to implement the acquired knowledge in daily life, depending on their situation. They were also asked to maintain a bi-monthly self- report behaviour check list from the third week onwards, so that they can identify their changes or improvements if any.

2.3.3.2. Pranayama: An introduction about pranayama was given to the experimental group, by the investigator and through a trained Yoga master, pranayama was demonstrated for the breathing manipulation involving a combination of Kapalbhati, Nadishodhana, and Bhramari for 15 minutes.[17] The training on pranayama was given 3 hr after food in the school setting for five days and made them do it independently and correctly. The participants were asked to do at least 10 rounds of Kapalbhati, and 12 rounds of Nadishodhana daily with Bhramari pranayama for 2-3 minutes per day.

2.3.3.3. Aerobic exercise:

The aerobics training was given to the participants after pranayama and were strictly instructed not to do pranayama after aerobics. The participants were instructed to do the exercise with dancing steps, based on specific background music, after listening to the instructions.[18]

A session of 25 minutes was encouraged while playing the background music. The pattern of aerobics included a 2-minute warm-up followed by 3-minute brisk walking in a place. Then a 30-second slow walking with deep breathing was done. The next 15 minutes were for exercise with dancing involving all joints; and had three segments of 5 minutes each followed by a one-minute slow walking with deep breathing. Though no specific steps for dance movements were instructed; the students were monitored to ensure involvement of all joints in the dancing movement. The last 3 minutes were for walking from moderate to slow form for cooling down to a normal state.

After direct monitoring for correct practice, the participants were instructed to continue these for 10 weeks at home; early in the morning on an empty stomach. The first 15 minutes for pranayama followed by 5 minutes of rest and then aerobics for

25 minutes. The regularity was monitored through telephone calls to parents on every alternate day. Participants who developed short-term health issues like fever or diarrhea were allowed to take a break for 3 to 4 days if needed. Skipping practice for more than 7 days was considered as a dropout but no dropout was found in the study. The participants were followed up once in a fortnight in school to ensure the regularity and quality of intervention.

The control group was allowed to do their regular activities. Every effort was taken not to inform the control group about the experimental group activities.

Both the groups were reassessed after 10 weeks for changes in behavioural problems including internet addiction by using the same tools like SDQs and SAS-SV. The obtained data were analyzed to determine the outcome of the intervention on EBP. After completion of the experimental study, the control group also given all details with information about related books and interventions were explained and motivated to practice it.

2.4 Statistical analysis

The screening phase data was evaluated with SPSS software (IBM Corp, New York USA) to identify the presence of EBP among the teenagers.

All data were represented as mean $\pm$ standard error (SE) and evaluated by two-way RM-ANOVA, and Bonferroni 't' test. The group comparison between the experimental and control group was taken as factor A and the tests within groups were taken as factor B and the interaction between the groups and tests were analyzed. All the statistical analysis and graph generation were done by Sigma Plot version 14.5 (Systat Software Inc., San Jose, USA) with a significant probability value of 0.05 or less.

The effectiveness of the interventions for one-factor repetition was evaluated by two-way RM-ANOVA and Bonferroni 't' test for post-hoc multiple assessments for normally distributed data. For those data that were not distributed normally, Kruskal Walli's one-way ANOVA with Dunn's post-hoc multiple comparisons test was employed for analyzing the medians. The group comparison between the experimental and control group was taken as factor A and the tests within groups were taken as factor B and the interaction between the groups and tests were analyzed. All the statistical analysis and graph generation were done by Sigma Plot version 14.5 (Systat Software Inc., San Jose, USA) with a significant probability value of 0.05 or less.

3. RESULTS

3.1. Assessment of prevalence of Emotional-Behavioural Problems (EBP) among adolescents.

Prevalence of EBP among adolescents (n=804) was assessed using SDQ (11-17), during the first phase. Based on TDS of SDQ, abnormal score (20-40) was identified among 10.4% , borderline score (16-19) in 19.9% . In total, 30.3% were at risk of clinically significant problems. Those with normal score (0-15) were 69.7%, and were unlikely to have any significant problem.

3.1.1. The prevalence of EBP based on the sub-scales score and grading was provided in Table 1.
n= 804

Sl. No	Emotional-behavioural problems (EBP)	Grading of EBP based on TDS	Frequency	Percentage
1.	Emotional symptom scale	0 to 5 (Normal)	700	87.1
		6 (Borderline)	47	5.8
		7 to 10 (Abnormal)	57	7.1
2.	Hyperactivity scale	0 to 5 (Normal)	671	83.4
		6 (Borderline)	69	8.6
		7 to 10 (Abnormal)	64	8.0
3.	Conduct problems scale	0 to 3 (Normal)	554	68.9
		4 (Borderline)	110	13.7
		5 to 10 (Abnormal)	140	17.4
4.	Peer problems scale	0 to 3 (Normal)	282	35.1

		4 to 5 (Borderline)	431	53.6
		6 to 10 (Abnormal)	91	11.3
5.	Prosocial behaviour score scale	6 to 10 (Normal)	660	82.1
		5 (Borderline)	78	9.7
		0 to 4 (Abnormal)	66	8.2

Table. 1 shows the prevalence of different EBP among adolescents based on subscales in SDQ. Prevalence of difficulties identified were: Emotional symptoms (12.6%), hyperactivity (16.6%), conduct problems (31.1%), and peer relationship problems (64.9%), when taken the borderline and abnormal scores together. Prosocial behaviour that indicates strength was normal in 82.1% of adolescents.

In this study, 20.4% of adolescents had smartphone addiction; based on the Smartphone Addiction Scale- Shortened version.

Since behavioural problems like hyper activity, conduct problems, peer problems and smart phone addiction were identified as the major problems among adolescents, the investigator was interested to assess the impact of MCI on these behavioural problems.

3.1.2. The socio-demographic data of the adolescents with EBP selected for intervention phase was given in Table 2.
From the 244 adolescents with EBP, 214 only met the selection criteria for the intervention phase.

S. No.	Variable	Category of variable	Frequency	Percentage
1	Gender	Male	98	45.8
		Female	116	54.2
2	Area of Residence	Urban	114	53.3
		Rural	100	46.7
3.	Type of family	Nuclear	159	74.3
		Joint	55	25.7
4.	Father's education	School level	133	62.1
		Collegiate level	81	37.9
5	Mother's education	School level	104	48.6
		Collegiate level	110	51.4
	n=214			

Table. 2 shows that among the 214 adolescents with EBP, selected for intervention phase; 54.2% were females. Majority of the participants (53.3%) were from urban area and 74.3% were from nuclear family. Parental education of adolescents showed that 51.4% of their mothers were with collegiate education and 62.1% of adolescents' father were with school level education.

Shija K, Shanthi Nambi, Sreeja Indira, R. Vijayaraghavan

3.1.3. The impact of multi-component intervention on behavioural problems like hyper activity, conduct problems, peer problems, based on SDQ(11-17) are shown in Table 3, 4, and 5 respectively.

The various domains of TDS, which indicate behavioural problems were expressed as median and percentiles (25 and 75). Since the data was not normally distributed, the medians were analysed by Kruskal Wallis one way analysis of variance on ranks with Dunn's post-hoc multiple comparisons test. A probability of 0.05 and less was considered statistically significant. Sigma Plot 14.5 version (Systat Software Inc., San Jose, USA) was used for the statistical analysis and graph plotting.

Table 3 – Comparison of control and experimental groups based on Score of Hyper activity in SDQ.

Table 3: Comparison of control and experimental groups on hyperactivity score of adolescents.					
S.No.	Groups	Tests	Median	Percentiles	Statistics
1	Control	Pre-test	5	4 – 6.75	H = 93.407 P < 0.001
	Experimental	Pre-test	5	4 – 6	
	Control	Post-test	5	4 – 6	
	Experimental	Post-test	3	2.75 – 4	
2	One-way ANOVA on ranks				
3	Comparison between Pre-test (Control and Experimental)				q = 0.625 P = 1.0
	Comparison between Post-test (Control and Experimental)				q = 7.009 P < 0.001
4	Comparison within Control (Pre-test and Post-test)				q = 0.727 P = 1.0
	Comparison within Experimental (Pre-test and Post-test)				q = 8.318 P < 0.001
n – Control = 108; Experimental = 106. The percentiles are 25 and 75. The 'H', 'q' and 'P' values are by Kruskal Wallis one-way ANOVA on ranks with Dunn's multiple comparison test.					

Table 3 shows the effect of MCI on hyper activity among adolescents. The median and percentile of hyperactivity score is given in Table 3. The median of Control Pre-test, Experimental Pre-test, Control Post-test and Experimental Post-test were 5, 5, 5 and 3 respectively. It was found to be statistically significant (P < 0.001). Between group comparison of Pre-test of Control and Experimental did not show significance (P = 1.0). Between group comparison of Post-test of Control and Experimental showed significance (P < 0.001). Within group comparison of Control Pre-test and Post-Test did not show significance (P = 1.0). Within group comparison of Experimental Pre-test and Post-test showed significance (P <0.001). This shows that the intervention has an impact in decreasing the hyperactivity score.

Table 4– Comparison of control and experimental groups based on Score of Conduct problems in SDQ

Table 4: Comparison of control and experimental groups on conduct problems score of adolescents.					
S.No.	Groups	Tests	Median	Percentiles	Statistics
1	Control	Pre-test	4	3 – 5	H = 48.194 P < 0.001
	Experimental	Pre-test	4	3 – 5	
	Control	Post-test	4	3 – 5	
	Experimental	Post-test	3	2 – 4	

2	One-way ANOVA on ranks	
3	Comparison between Pre-test (Control and Experimental)	q = 0.960 P = 1.0
	Comparison between Post-test (Control and Experimental)	q = 4.050 P < 0.001
4	Comparison within Control (Pre-test and Post-test)	q = 2.291 P = 0.132
	Comparison within Experimental (Pre-test and Post-test)	q = 5.345 P < 0.001
n – Control = 108; Experimental = 106. The percentiles are 25 and 75. The 'H', 'q' and 'P' values are by Kruskal Wallis one-way ANOVA on ranks with Dunn's multiple comparison test.		

Table 4 illustrates the effect of MCI on conduct problems among adolescents.

The median of Control Pre-test, Experimental Pre-test, Control Post-test and Experimental Post-test were 4,4,4 and 3 respectively. It was found to be statistically significant (P < 0.001). Between group comparison of Pre-test of Control and Experimental did not show significance (P = 1.0). Between group comparison of Post-test of Control and experimental showed significance (P < 0.001). Within group comparison of Control Pre-test and Post-Test did not show significance (P = 0.132). Within group comparison of Experimental Pre-test and Post-test showed significance (P <0.001). Hence intervention was effective in making significant reduction in the conduct problem score.

Table 5– Comparison of control and experimental groups based on Score of Peer problems in SDQ

Table 5: Comparison of control and experimental groups on peer problems score of adolescents.					
S.No.	Groups	Tests	Median	Percentiles	Statistics
1	Control	Pre-test	5	4 – 5	
	Experimental	Pre-test	4	3 – 5	
	Control	Post-test	5	4 – 6	H = 29.611 P < 0.001
	Experimental	Post-test	4	3 – 5	
2	One-way ANOVA on ranks				
3	Comparison between Pre-test (Control and Experimental)				q = 2.166 P = 0.182
	Comparison between Post-test (Control and Experimental)				q = 4.589 P < 0.001
4	Comparison within Control (Pre-test and Post-test)				q = 2.279 P = 0.136
	Comparison within Experimental (Pre-test and Post-test)				q = 0.154 P =1.0
n – Control = 108; Experimental = 106. The percentiles are 25 and 75. The 'H', 'q' and 'P' values are by Kruskal Wallis one-way ANOVA on ranks with Dunn's multiple comparison test.					

The median and percentile of peer problem score is given in Table 5.

The median of Control Pre-test, Experimental Pre-test, Control Post-test and Experimental Post-test were 5,4,5 and 4 respectively and was found to be statistically significant (P < 0.001). Between group comparison of Pre-test of Control and Experimental did not show significance (P =0.182). Between group comparison of Post-test of Control and experimental showed significance (P < 0.001). Within group comparison of Control Pre-test and Post-Test did not show significance (P = 0.136). Within group comparison of Experimental Pre-test and Post-test did not show significance (P =1).

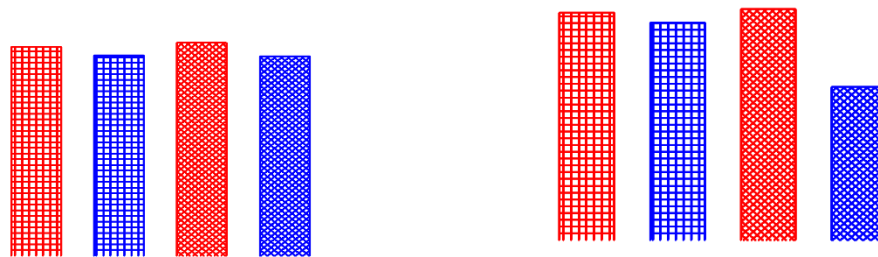This indicate that the impact of intervention was not effective to make significant reduction in peer problem score.

Figure 1A   **Figure 1 B**

Figure 1

Comparison of Experimental and Control group based on TDS in SDQ and SAS Score in SAS-SV

Figure 1:

Comparison of control and experimental groups on total difficulty score (TDS) and smart phone addiction scale-shortened version (SAS-SV) of adolescents.

The values are mean ± SE (n – Control = 108; Experimental = 106).

The data was analysed by two-way RM ANOVA with Bonferroni 't' test for multiple comparison. (between group comparison).

[a]Significantly different from the respective Control (between group comparison).

[b]Significantly different from the respective Pre-test (within group comparison)

The effect of the MCI on smartphone addiction based on the SAS-SV score is shown in (Figure 1A) and effect of MCI on EBP, based on TDS of SDQ (11-17) in (Figure 1B).

There weren't any significant differences in the two-way RM-ANOVA as a whole amongst the groups and also between the groups and within the groups in Figure 1 A. This implied that the multi-component intervention was not effective in making a significant difference in the usage of smartphones. But there is 1.8% increase in smart phone use among the Control group 0.4% decrease in phone usage in the Experimental group.

In Figure 1B, Two-way RM ANOVA revealed significant differences as a whole among the groups and the test and the group-cross-test interactions also exposed momentous differences at P < 0.001. The evaluation of the pre-test and post-test amid the Control and the Experimental group and the evaluation of the pre-test and post-test within the Experimental group was noteworthy, whereas the comparison of the pre-test and post-test within the control cluster was not significant (P=0.353) as there won't be any impact in the control group. There was a

1.6 % increase in TDS in the Control cluster, while in the Experimental cluster, there was a 29.5 % decrease in TDS indicating that the multi-component intervention has a great impact in reducing the TDS.

4. Discussion

The present study conducted in selected schools of the Thiruvananthapuram District, (South India) identified the prevalence

of EBP including smartphone addiction among adolescents and MCI was given to those who met the sampling criteria for intervention phase (n=214 ; Control group of 108 and Experimental group of 106)

Global burden of disease shows that one in seven adolescents in age of 10-19years experience mental disorder and it accounts for 14% of disease in this group. Present study also showed that 10.4% of the participants have clinically significant problems and supports the same since the rate does not show much difference.[2]

Prevalence of EBP among school going adolescents in this study was 30.3% (by combining the abnormal and borderline score), which is similar to the prevalence in Chandigarh based study, with 30%. [19]

Prevalence of different EBP among adolescents were assessed by subscales in SDQ

(Table 1). Prevalence of emotional symptoms (12.6%) was almost similar to the findings among school going adolescents of Ernakulam district of Kerala (14.19%).[20]

A systematic review was conducted on studies during 2009-2019 for estimation of prevalence of ADHD among children and adolescents in various parts of India and pooled prevalence of ADHD was 7.1%.[21] Prevalence of hyperactivity in this study also support it (8.0%).

A study conducted in Kohima city of Nagaland–to assess the mental health status of 702 school going adolescents(13-19years), reported emotional problems in 17%, hyperactivity in 16% and conduct problems in 15%.[4] These are supportive of present study findings; except in case of conduct problems; which is 31.1% in this study. A study conducted in Thiruvananthapuram, Kerala shows that Conduct problems are the most prevalent mental health problem among adolescents (36.4%).[7] and this study supports the same (31.1%).

A systematic review on assessment of smart phone addiction in Indian adolescents, shows that smart phone addiction magnitude ranged from 39% - 44%. Smart phone addiction among Indian adolescents damage their interpersonal skills; add negative health risks and may lead to harmful psychological effects.[9] In this Thiruvananthapuram based study, smartphone addiction among adolescents was 20.4%.

Intervention studies that focused on one or two emotional or behavioural problems are available on literature, but multi-component intervention with psycho education, pranayama and aerobic exercise with dancing steps as the components was not available on review. A longitudinal study on effectiveness of life skill education and psycho education on emotional and behavioral problems among adolescents in institutional care in Kenya shows that a combination of life skills education and psycho education is effective in reducing emotional and behavioural problems in this group.[22] In this study also psycho education on common EBP and their management was given through online mode, as a component of MCI.

Impulsivity is a problem in many neuropsychiatric problems like ADHD. A study on effectiveness of Bhramari pranayama on response inhibition test to stop signal task was conducted in healthy individuals- 31 male students of residential yoga university, Bangaluru. Participants were randomly divided into two different experimental conditions (Bhramari pranayama and deep breathing (DB). Results showed a significant decrease in SSRT (Stop Signal Reaction Time) after bhramari pranayama session, while deep breathing group did not show any significant change.[23]

In this study Pranayama (Kapalabhati, Nadi shodhana and Bhramari pranayama) was used in MCI and this combined intervention was found to be effective in reducing the TDS in general and also in decreasing the scores of hyperactivity, emotional and conduct problems . Results of a meta analysis, to find out the effectiveness of exercise intervention on symptoms of ADHD; like inattention, impulsivity/hyperactivity, anxiety and cognitive functions in children and adolescents showed that aerobic exercise had a moderate to large effect on major symptoms such as inattention (SMD = 0.84), hyperactivity (SMD = 0.56) and impulsivity (SMD = 0.56) and symptoms such as anxiety (SMD = 0.66).[24] In this study also aerobic exercise as a component of MCI also was found to be effective decreasing the hyperactivity score. *(Kruskal Wallis one- way ANOVA, showed p= <0.001))*

In Swedish city, as the part of school health program, adolescent girls in the age of 13-18 years were screened for somatic symptoms and emotional distress and dance intervention was given twice -weekly for 8 months, for enjoyment and socialization; and results showed significantly greater reduction in somatic symptoms and emotional distress, than the controlled group.[25] The MCI of this study also had aerobic exercise with dancing steps as a component, and this was found to be effective in reducing TDS that indicate EBP in general and, in decreasing the hyperactivity, emotional and conduct problem scores, when observed on the basis of subscales of SDQ.

A meta- analysis that included 37 meta -analyses based on 106 study findings, between January 2015- November 2022; focused the effects of exercise on ADHD symptoms in children and adolescents. Results showed improvement in attention and inhibitory control but not significant for hyperactivity and behavioural functioning.[26]

In the current study, a multi component intervention was provided to the adolescents who are likely to have risk of development of mental health issues and those with clinically significant problems. Though single interventions on specific behavioural or emotional problems were done previously and found effective in managing that problem, the cluster of

problems that may coexist or accompany this particular problem may remain unaddressed and may recur in another form. So combination of more than one interventions which were found to have positive effect should be tried to manage these complex problems which are related each other. As most of the behavioural problem have overlapping clinical symptoms, a 'one size fits all' approach may not be effective. The new intervention with multiple components (online psycho- education, pranayama and aerobic exercise with dancing steps) which was opted on the basis of expert opinion, and literature review, was found to be effective in reducing the behavioural problems among adolescents.

4. CONCLUSION

Early detection of mental health conditions among adolescents would be possible through school-based screening programs and combined interventions are more effective because psychological problem do not occur as a single entity. As many of the mental health issues coexist with overlapping features, a combined intervention to tackle them would be more beneficial. This study also recommends educating teachers about the common emotional and behavioural problems of adolescents, and training them about Yoga practice and physical education or aerobic exercise and similar extra- curricular activities in school settings.

This study is registered prospectively under Clinical Trial Registry of India (CTRI) with No. CTRI/2022/11/047017 [Registered on 03/11/2022]

REFERENCES

[1] UNICEF annual report 2019

[2] Geneva: World Health Organization; 2021. Adolescent mental health fact sheet

[3] Geneva: World Health Organization; 2024. Adolescent mental health fact sheet

[4] Keyho K, Gujar NM, Ali A. Prevalence of mental health status in adolescent school children of Kohima district, Nagaland. Ann Indian Psychiatry 2019;3:39-42.

[5] Catherine TG, Robert NG, Mala KK, Kanniammal C, Arullapan J. Assessment of prevalence of attention deficit hyperactivity disorder among schoolchildren in selected schools. Indian journal of psychiatry. 2019;61(3):232.

[6] Jaisoorya TS, Beena KV, Beena M, Ellangovan K, George S, Thennarasu K, Srinath S. Prevalence and correlates of self-reported ADHD symptoms in children attending school in India. Journal of attention disorders. 2020;24(12):1711-5.

[7] Jayaprakash R, Sharija S. UNARV: A district model for adolescent school mental health programme in Kerala, India. Indian Journal of Social Psychiatry. 2017;33(3):233.

[8] Ratan ZA, Parrish AM, Alotaibi MS, Hosseinzadeh H. Prevalence of smartphone addiction and its association with sociodemographic, physical and mental well-being: a cross-sectional study among the young adults of Bangladesh. International journal of environmental research and public health. 2022;19(24):16583.

[9] Davey S, Davey A. Assessment of smartphone addiction in Indian adolescents: a mixed method study by systematic-review and meta-analysis approach. International journal of preventive medicine. 2014;5(12):1500.

[10] Harikrishnan U, Sailo GL. Prevalence of Emotional and Behavioral Problems among School-Going Adolescents: A Cross-Sectional Study. Indian J Community Med. 2021 ;46(2):232-235. doi: 10.4103/ijcm.IJCM_451_20. Epub 2021 May 29. PMID: 34321732; PMCID: PMC8281858.

[11] Kwon M, Kim DJ, Cho H, Yang S. The smartphone addiction scale: development and validation of a short version for adolescents. PloS one. 2013;8(12):e83558.

[12] Goodman R, Ford T, Simmons H, Gatward R, Meltzer H. Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. The British journal of psychiatry. 2000;177(6):534-9.

[13] Owen JA, Mirza KA, Goodman R. Validating screening tool in Malayalam for mental disorders. The Indian Journal of Paediatrics. 2015;82(7):595-600.

[14] World Health Organization, mhGAPintervention guide for mental, neurological and substance use disorders in non-specialized health settings: mental health Gap Action Programme (mhGAP). World Health Organization; 2016).

[15] Vyas, Ghimire. Textbook of Postgraduate Psychiatry (2 Vols.).3 RD Edition JAYPEE BROTHERS PUBLISHERS, 2016.

[16] Townsend MC. Essentials of psychiatric mental health nursing: Concepts of care in evidence-based practice.

FA Davis; 2013.

[17] Sivananda SS. The science of pranayama. David De Angelis; 2019.

[18] Fong Yan A, Nicholson LL, Ward RE, Hiller CE, Dovey K, Parker HM, Low LF, Moyle G, Chan C. The Effectiveness of Dance Interventions on Psychological and Cognitive Health Outcomes Compared with Other Forms of Physical Activity: A Systematic Review with Meta-analysis. Sports Medicine. 2024; 25:1-27.

[19] Pathak R, Sharma RC, Parvan UC, Gupta BP, Ojha RK, Goel NK. Behavioural and emotional problems in school going adolescents. The Australasian medical journal. 2011;4(1):15.

[20] Paul B, Usha VK. Prevalence and Predictors of Depression Among Adolescents. The Indian Journal of Paediatrics. 2020 Oct 3:1-4

[21] Joseph JK, Devu BK. Prevalence of attention-deficit hyperactivity disorder in India: A systematic review and meta-analysis. Indian Journal of Psychiatric Nursing. 2019;16(2):118-25.

[22] Mutiso V, Tele A, Musyimi C, Gitonga I, Musau A, Ndetei D. Effectiveness of life skills education and psychoeducation on emotional and behavioral problems among adolescents in institutional care in Kenya: a longitudinal study. Child and Adolescent Mental Health. 2018 ;23(4):351-8.

[23] Rajesh SK, Ilavarasu JV, Srinivasan TM. Effect of Bhramari Pranayama on response inhibition: Evidence from the stop signal task. International journal of yoga. 2014 ;7(2):138.

[24] Cerrillo-Urbina AJ, García-Hermoso A, Sánchez-López M, Pardo-Guijarro MJ, Santos Gómez JL, Martínez-Vizcaíno V. The effects of physical exercise in children with attention deficit hyperactivity disorder: A systematic review and meta-analysis of randomized control trials. Child: care, health and development. 2015;41(6):779-88.)

[25] Duberg A, Jutengren G, Hagberg L, Möller M. The effects of a dance intervention on somatic symptoms and emotional distress in adolescent girls: A randomized controlled trial. Journal of international medical research. 2020;48(2):0300060520902610.

[26] Dastamooz S, Sadeghi-Bahmani D, Farahani MH, Wong SH, Yam JC, Tham CC, Sit CH. The efficacy of physical exercise interventions on mental health, cognitive function, and ADHD symptoms in children and adolescents with ADHD: an umbrella review. E Clinical Medicine. 2023;1;62.