



Health Risks of Stress, Anxiety, and Depression and the Effectiveness of Yoga in Distress Reduction in Adolescents Studying in Schools Located in the Field Practice Area of a Tertiary Care Institution, Kanchipuram. a Randomized Control Trial.

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KEYWORDS

Adolescents, related factors, yoga, distress

ABSTRACT:

Background: The adolescent age group is more prone to depression anxiety stress and other mental health conditions due to the transitional effect of their age group. The present study aims to assess their distress and to determine the impact of yoga on distress reduction compared to lifestyle education.

Methods and materials: The present experimental study was conducted among school-going adolescents from two publicly funded schools of the panchayat in the Southern part of India. A cluster random sampling was done to select the estimated sample size of 300 adolescents. Data were collected by interview method using a self-designed questionnaire. The mental distress was assessed using the DASS-10 questionnaire. Univariate analyses and student t-test analyses were done by Stata 17.

Results: More than one-third of the study participants 110 (36.66%) had distress in baseline data. On univariate analysis, it was found that female gender ($p<0.05$); father's education below high school level ($p<0.001$); lower socioeconomic status ($p<0.001$); joint family ($p<0.001$); living in urban setup ($p<0.001$); underweight ($p<0.05$); addictive status of the father ($p<0.001$); stressful events in the family ($p<0.001$); more than one siblings ($p<0.001$); unsatisfied academic performance ($p<0.001$) and binge eating ($p<0.001$) were found to be significantly related to distress among adolescents. In the pretest, distress was seen in 61 (40.6%) adolescents which was reduced to 39 (26%) in the post-test after the yoga session in the intervention arm. Thus 35.97% decrease in



distress was noted in the intervention arm which was significant when compared to a 24.53% distress reduction in the control group.

Conclusion: As yoga intervention substantially reduced the prevalence of distress, it is recommended that yoga be made a compulsory weekly activity in the adolescent's education curriculum alongside conventional physical training classes

Introduction

WHO has defined adolescents as persons in the age group of 10-19 years and the corresponding age is known as adolescence [1]. Age 13 through 16 is considered early adolescence and 17 through 21 is late adolescence [2]. Adolescence is a transitional period of life between childhood and adulthood characterized by rapid physical, social, mental, and psychological development. It is an important stage of life for establishing healthy behaviors, desirable attitudes, and lifestyles that contribute to current and future health [3].

On the contrary, it is also a period of constant storms and emotions leading to more stress which is described as a negative concept that can have an impact on one's mental and physical well-being and make a person feel overwhelmed and/or unable to cope effectively with people or events in one's life. When stress becomes excessive, then the person experiences disrupted emotional, cognitive, and physiological functioning [4]. Other common mental health problems among adolescents are anxiety and depression which is experienced by 20% of adolescents [5,6].

The World Health Organization defines depression as a common mental disorder (CMD) that is characterized by emotions of melancholy, loss of pleasure or interest guilt or a sense of self-worth, interrupted sleep or appetites, and feelings of exhaustion and poor concentration [7]. Worldwide 10%–20% of children and adolescents experience mental health disorders, and half of all mental illnesses begin during adolescence [8]. In India, 21% of the population (253 million) are adolescents, which is the largest in the world [9]. An epidemiological study from India revealed that 14.5% of adolescents were found to be suffering from anxiety disorders [10].

To address the health and development-related needs of its adolescents the health risk behavior of adolescents is one of the indicators that serve as a basis for measuring adolescent health over a period of time as well as a target

for health policies and programs [11]. Of all the stressors, academic stress is the most prominent and affects a significant population of adolescents [12, 13]. Poor eating behaviors, inadequate physical activity, parental education, and addictive behavior also play indirect roles in adolescent distress [14,15]. Most of the studies on depression, anxiety, and stress have been conducted on adults. Hence, the present study was carried out to determine the prevalence of depression, anxiety, and stress among adolescent students [11,15]

Due to these observations, child psychologists and academicians have emphasized the importance of incorporating school programs to reduce psychosocial stress, and improve resilience and coping skills without changing the core academic curriculum for the betterment of the adolescents [13]. One such coping mechanism is yoga and the important research question in this present study relates to whether yoga offers any unique benefits for student's psychosocial well-being compared to standard school curricula such as physical education (PE) classes. Studies in adult populations have suggested that yoga is superior to exercise in its ability to improve psychological outcomes [16].

Yoga parse is an ancient holistic Indian traditional form of mind-body practice, that uses asana (techniques of posture), pranayama (breath control), dhyana (meditation), and preparation of moral and ethical observance has been recently investigated for its benefits in various health conditions [17]. It has been included in modern medicine during the past few decades because of the increasing incidence of noncommunicable diseases, which are rooted in faulty lifestyles and psychological stress [17]. Results of various studies suggest that school-based yoga programs may be appropriate for promoting healthy behaviors for adolescents to reduce distress [18].

With this as background, the present study is carried out on school-going adolescents who will experiment with yoga intervention and conventional didactic healthy lifestyle lectures. Baseline data and the final outcome of



mental distress were done by using suitable measures and the final difference was evaluated to determine the effect of the yoga on distress reduction.

METHODOLOGY

Study design & setting

The present prospective study was a cluster randomized controlled trial (cRCT). Participants in grades VIII-X were selected as representatives of the adolescent age group [19,20]. Two schools in Vembakkam town panchayat in Tiruvanamalai district were selected for the study. The two schools were publicly funded schools under the same trustee one being a boy's school and another being a girl's school. The 3 selected grades had 2 sections each which had 25 students per section, thus 300 students were present in both the schools under the selected grades.

Ethical statement-

Ethical approval was granted by the Institutional Ethics Committee of Meenakshi medical college and research institute, Kachipuram (ref no.42/IEC/MMCHRI/2017) on 31/10/2018. Informed consent was taken from study participants and the parents/ guardians in case of minors via Google Forms. Assent was also taken from study participants of age 16-17 years.

Sample size calculation

Based on a previous study [19], the allowable difference in stress scores between the yoga and education groups is considered as 5 % and assuming the power as 0.8, the significance level as 0.05, the ratio of experiment and control as 1, the standard deviation of 12 and margin as 1 the sample size is calculated as 140 in each group accounting for 280 samples which were rounded as 300 including all the students.

Study tools

The study tool used was a questionnaire containing DASS-10 (Depression Anxiety Stress Scale) [21], sociodemographic characteristics, and mental health risk factors. The Depression Anxiety Stress Scale (DASS-10) is a 10-item version of the full version of the Depression Anxiety Stress Scale (DASS-42). The DASS-10 can assess the overall level of distress and also provides subscale scores for two symptom clusters: Depression and Anxiety/Stress. The scale has 10 items taken from the

DASS-42. The total score for questions 1 to 10 represents overall distress (0 to 30), with higher scores suggesting a more severe or greater number of symptoms. Two subscales are presented. Items 1, 4, 6, 7, 8, and 9 correspond to Anxiety/ Stress while items 2, 3, 5, and 10 correspond to depression.

Overall scores can be classified into five groups –

Subclinical (raw score 0-4)

Mild (raw score 5-6)

Moderate (raw score 7-12)

Moderate (raw score 7-12)

Extremely severe (raw score 21-30)

Study population

The study was started after getting approval from the respective state government education office, the school management, and the principals of the school. All the school children who volunteered for the study were taken into the study after getting written consent from their parents during a parent-teacher meeting one week before the commencement of the study.

The inclusion criteria for the study consisted that the student was in the 8th to 10th grade not practicing any form of yoga or meditation, and devoid of any health issues during initiation of the study.

The exclusion criteria were the students who were suffering from any illness like dengue, malaria, fever, etc. (confirmed by asking the student and their class teacher) and those who were already practicing meditation or yoga.

Randomization

After getting informed consent from the volunteered parents, all participants of the selected grade in that school were cluster-randomized into the yoga or education group. Here the unit of cluster randomization is taken as one section of a grade in both boys' and girls' schools separately to reduce the cross-contamination and equal representation of gender and age groups. Finally, one section of each standard in both schools is randomized into a yoga group, the left-out section will be assigned as an education group. As the unit of cluster randomization is the section of a grade, a total of 12 sections were included and before randomization, the



sections were coded by a data operator and the code of the sections was given to the investigator who then randomized by online randomization grid thus ensuring blinding.

The baseline data of depression, stress, and anxiety were collected by using the DASS-10 scale [21]. Demographic factors like age, socio-demographic factors, and mental health risk factors were also assessed.

The yoga-based intervention contains the four key pillars of yoga:

- 1) Pranayama or deep breathing exercises (~10 mins)
- 2) Basic yoga postures (asanas) thought to alleviate and decrease stress, such as back bends, standing poses, and inversions (~15 mins)
- 3) Dhyana or meditation (~5 mins) and
- 4) Relaxation exercises (~5 mins) aimed at relaxing the mind and improving attention and concentration.

Yoga sessions were held once every week for 4 months and the final refresher session was held in the 5th month (total of 17 sessions) for the yoga intervention group. The sessions were held within the school premises for around 45 min (one period/class) and taught by a trained yoga teacher [19].

In the control, a healthy lifestyle lecture was delivered once every month for 5 months, in which the students, actively participated. The program was a 45-minute session on healthy living (which included 10 min on healthy eating, 10 min on increasing physical activity, 10 min on sleep, stress, & good habits, 5 min of simple stretching exercises, and the remaining time for questions and answers)

After completion of the sessions, the DASS-10 was again put forth to the students to know the effect of yoga on their mental health.

Table 1. Demographic details of the students involved in the study.

Variables	Frequency (%)	Control group (%)	Yoga group (%)	X ² test	P value
Age					
13	101 (33.6)	50 (33.3)	51 (34)	0.02	0.99
14	95 (31.6)	48 (32)	47 (31.3)		
15	102 (34)	51 (34)	51 (34)		
16	2 (0.6)	1 (0.6)	1 (0.6)		
gender					
Male	150 (50)	75 (50)	75 (50)	0.01	0.92
Female	150 (50)	75 (50)	75 (50)		
Religion					
Hindu	273 (91)	135 (90)	138 (92)	0.51	0.77
Christian	19 (6.3)	11 (7.3)	8 (5.3)		
Muslim	8 (2.6)	4 (2.6)	4 (2.6)		
other	0				
Socio economic class					
Upper class	0	0	0		



Upper middle class	17 (5.6)	11 (7.3)	6 (4)	0.227	4.34
Lower middle class	189 (63)	88 (58.6)	101 (67.3)		
Upper lower class	69 (23)	35 (23.3)	34 (22.6)		
Lower class	25 (8.3)	16 (10.6)	9 (6)		
Fathers education					
Professional degree	0	0	0		
Graduate and post graduate	0	0	0		
Intermediate / diploma	31 (10.3)	12 (8)	19 ()	3.86	0.42
High school	163 (54.3)	81 (54)	82 (54.6)		
Middle school	68 (22.6)	37 (24.6)	31 (20.6)		
Primary school	27 (9)	16 (10.6)	11 (7.3)		
Illiterate	11 (3.6)	4 (2.6)	7 (4.6)		
Mothers education					
Professional degree	0	0	0		
Graduate and post graduate	0	0	0		
Intermediate / diploma	9 (3)	6 (4)	3 (2)	1.72	0.78
High school	42 (14)	23 (15.3)	19 (12.6)		
Middle school	113 (37.6)	54 (36)	59 (39.3)		
Primary school	101 (33.6)	49 (32.6)	52 (34.6)		
Illiterate	35 (11.6)	18 (12)	17 (11.3)		
Fathers occupation					
Professional	0	0			
Semi professional	0	0			
Clerical, shop owner, farmer	16 (5.3)	7 (4.6)	9 (6)	1.89	0.75
Skilled worker	82 (27.3)	37 (24.6)	45 (30)		
Semi skilled worker	104 (34.6)	56 (37.3)	48 (32)		
Unskilled worker	91 (30.3)	47 (31.3)	44 (29.3)		
unemployed	7 (2.3)	3 (2)	4 (2.6)		
Type of family					



Joint	24 (8)	11 (7.3)	13 (8.6)	2.04	0.36
Nuclear	227 (75.6)	110 (73.3)	117 (78)		
Three generation	49 (16.3)	29 (1.93)	20 (1.3)		
Area of residence					
Urban	197 (65.7)	93 (62)	104 (69.3)	1.48	0.22
Rural	103 (34.3)	57 (38)	46 (30.6)		
BMI					
Underweight	115 (38.3)	54 (36)	61 (40.6)	0.7	0.7
Normal weight	149 (49.6)	77 (51.3)	72 (48)		
Over weight	36 (12)	19 (12.6)	17 (11.3)		
Drinking status of father					
Yes	47 (15.6)	26 (1.3)	21 (14)	0.4	0.52
No	253 (84.3)	124 (82.6)	129 (86)		
Smoking status of father					
Yes	33 (11)	16 (10.6)	17 (11.3)	0.1	1
No	267 (89)	134 (89.3)	133 (88.6)		
Academic performance					
Satisfied	121 (40.3)	65 (43.3)	56 (37.3)	0.89	0.34
Not satisfied	179 (59.6)	85 (56.6)	94 (62.6)		
Siblings					
>3	15 (5)	7 (4.6)	8 (5.3)	0.64	1.6
2	36 (12)	16 (10.6)	20 (13.3)		
1	157 (52.3)	84 (56)	73 (48.6)		
0	92 (30.6)	43 (28.6)	49 (32.6)		
Stressful event in the family <1yr					
Yes	9 (3)	4 (2.6)	5 (3.3)	0.9	1.1
no	291 (97)	146 (97.3)	145 (96.6)		



Chronic disease in family member					
Yes	136 (45.3)	67 (97.3)	69 (46)	0.01	0.92
no	164 (54.6)	83 (55.3)	81 (54)		
Binge eating					
Yes	142 (47.3)	73 (48.6)	69 (46)	0.12	0.72
no	158 (52.6)	77 (51.3)	81 (54)		

P values indicate level of significance for the difference in proportions between control group and yoga group

Table 2. Personal health risk factors and sociodemographic characteristics related to the total distress score among school students

Variables	Frequency (%)	Distress present (%)	Distress absent (%)	X ²	P
Gender					
Male	150 (50)	43 (28.6)	107 (71.3)	Reference variable	0.004
Female	150 (50)	67 (44.6)	83 (55.3)	8.26	
Fathers education					
High school and above	194 (64.6)	36 (18.5)	158 (81.4)	Reference variable	
Less than high school	106 (35.3)	74 (69.8)	32 (30.1)	77.54	0.0001
Mothers education					
Middle school and above	164 (54.6)	62 (37.8)	102 (62.1)	Reference variable	
Less than middle school	136 (45.3)	48 (35.2)	88 (64.7)	0.2	0.6
Fathers occupation					
Skilled work Skilled worker or clerical / shop owner/ farmer	98 (32.6)	39 (39.7)	59 (60.2)	Reference variable	
Semi skilled , unskilled or unemployed	202 (67.3)	71 (35.1)	131 (64.8)	0.61	0.4
Socio economic class					
Class 1 to 3	206 (68.6)	24 (11.6)	182 (88.3)	Reference variable	
Class 4 and 5	94 (31.3)	86 (91.4)	8 (8.5)	22.67	0.0001
Type of family					
Joint	73 (8)	53 (72.6)	20 (27.3)	53.65	0.0001
Nuclear	227 (75.6)	57 (25.1)	170 (74.8)	Reference variable	
Area of residence					
Urban	197 (65.7)	89 (45.1)	108 (54.8)	17.89	0.0001
Rural	103 (34.3)	21 (20.3)	82 (79.6)	Reference variable	



BMI					
Underweight	115 (38.3)	51 (44.3)	64 (55.6)	4.73	0.02
Normal weight and over weight	185 (61.6)	59 (31.8)	126 (68.1)	Reference variable	
Drinking status of father					
Yes	47 (15.6)	39 (82.9)	8 (17)	51.47	0.0001
No	253 (84.3)	71 (28)	182 (71.9)	Reference variable	
Smoking status of father					
Yes	33 (11)	31 (93.9)	2 (6)	52.37	0.0001
No	267 (89)	79 (29.5)	188 (70.4)	Reference variable	
Academic performance					
Satisfied	121 (40.3)	21 (17.3)	100 (82.6)	Reference variable	
Not satisfied	179 (59.6)	89 (49.7)	90 (50.2)	32.56	0.0001
Siblings					
>1	208 (69.3)	94 (45.1)	114 (54.8)	21.23	0.0001
≤1	92 (30.6)	16 (17.3)	76 (82.6)	Reference variable	
Stressful event in the family <1yr					
Yes	9 (3)	9 (100)	0	16.02	0.0001
no	291 (97)	101 (34.7)	190 (65.2)	Reference variable	
Chronic disease in family member					
Yes	136 (45.3)	53 (38.9)	83 (61)	0.56	0.4
no	164 (54.6)	57 (34.7)	107 (65.2)	Reference variable	
Binge eating					
Yes	142 (47.3)	67 (47.1)	75 (52.8)	12.84	0.0003
no	158 (52.6)	43 (27.2)	115 (72.7)	Reference variable	

Table 3. Comparison of the presence of distress according to the DASS-10 questionnaire between the two groups before and after the intervention

Groups	Presence of Distress	Time		X ²	P
		Pretest	Posttest		
Control	No	101 (67.3)	113 (75.3)	2.347 (0.40 – 1.11)	0.125
	Yes	49 (32.6)	37 (24.6)		
Yoga	No	89 (59.6)	111 (74)	7.2600 (1.19 – 3.18)	< 0.01
	Yes	61 (40.6)	39 (26)		

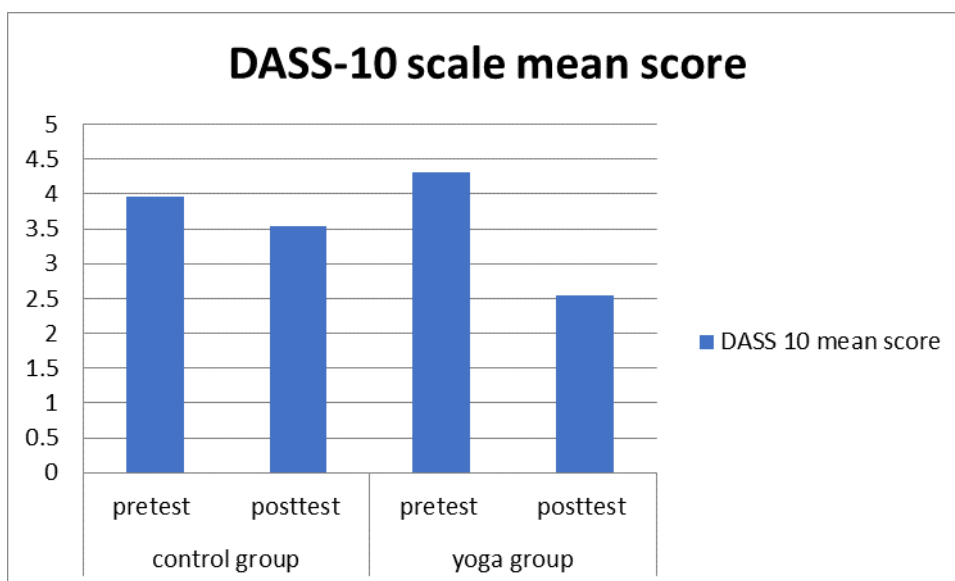


Figure 1. Comparison of DASS 10 mean scores between the two groups before and after the intervention

Table 4. Effect of yoga in the experimental study on reduction of distress among school students using DASS-10 questionnaire

S.No	Intervention Time	DASS-10 Scale Questions	Groups		Control Mean	Yoga mean	Mean Difference	95 % CI Interval	t	df	SE	P value (unpaired t test)
			Control	Yoga								
1	Pretest	I felt I was close to panic	0.32 ± 0.72	0.27 ± 0.67	0.01 ± 0.04	0.15 ± 0.22	0.14	0.104 – 0.17	7.6	298	0.018	0.0001
	Post test		0.31 ± 0.68	0.12 ± 0.45								
	P value *		0.158	0.05								
2	Pretest	I found it difficult to work up the initiative to do things	0.38 ± 0.61	0.35 ± 0.64	0.07 ± 0.04	0.20 ± 0.07	0.13	0.11 – 0.14	19.74	298	0.007	0.0001



	Post test		0.31 ± 0.57	0.15 ± 0.57									
	P value *		0.00 2	0.01									
3	Pretest	I felt down hearted and blue	0.41 ± 0.65	0.41 ± 0.66	0.07 ± 0.02	0.23 ± 0.12	0.16	0.14 – 0.1	16.1 0	29 8	0.01 0	0.0001	
	Post test		0.34 ± 0.58	0.18 ± 0.54									
	P value *		0.00 4	0.00									
4	Pretest	I was intoleran t of anything that kept me from getting on with what I was doing	0.4 ± 0.69	0.47 ± 0.75	0.06 ± 0.05	0.32 ± 0.23	0.26	0.22 – 0.29	13.5 2	29 8	0.01 9	0.0001	
	Post test		0.34 ± 0.64	0.15 ± 0.52									
	P value *		0.01 2	0.00									
5	Pretest	I felt that I had nothing to look forward to	0.45 ± 0.80	0.56 ± 0.89	0.05 ± 0.07	0.31 ± 0.75	0.26	0.13 – 0.38	4.22	29 8	0.06 2	0.0001	
	Post test		0.4 ± 0.73	0.25 ± 0.14									
	P value *		0.00 4	0.000									
6	Pretest	I felt scared without	0.45 ± 0.69	0.53 ± 0.86	0.06 ± 0.03	0.33 ± 0.29	0.27	0.22 – 0.31	11.3 4	29 8	0.02 4	0.0001	



		any good reason										
	Post test		0.39 ± 0.66	0.20 ± 0.57								
	P value *		0.002	0.001								
7	Pretest	I tended to over react to situations	0.47 ± 0.82	0.53 ± 0.86	0.06 ± 0.07	0.30 ± 0.21	0.24	0.20 – 0.27	13.27	298	0.018	0.0001
	Post test		0.41 ± 0.75	0.23 ± 0.65								
	P value *		0.001	0.000								
8	Pretest	I was worried about situations in which I might panic and make a fool of myself	0.45 ± 0.73	0.31 ± 0.66	0.02 ± 0.01	0.05 ± 0.01	0.03	0.02 – 0.03	25.98	298	0.001	0.0001
	Post test		0.43 ± 0.72	0.26 ± 0.67								
	P value *		0.158	0.001								
9	Pretest	I found it difficult to relax	0.36 ± 0.64	0.32 ± 0.59	0.03 ± 0.04	0.12 ± 0.01	0.09	0.08 – 0.09	26.73	298	0.003	0.001
	Post test		0.33 ± 0.60	0.2 ± 0.6								
	P value *		0.103	0.001								



10	Pretest	I couldn't seem to experience any positive feelings at all	0.27 ± 0.57	0.32 ± 0.59	0.02 ± 0.01	0.17 ± 0.08	0.15	0.13 – 0.16	22.78	298	0.007	0.0001
	Post test		0.29 ± 0.58	0.15 ± 0.67								
	P value *		0.416	0.002								
11	Pretest	Total score	3.97 ± 2.26	4.31 ± 4.33	0.44 ± 1.5	1.77 ± 1.7	1.33	0.96 – 1.69	7.18	298	0.185	0.0001
	Post test		3.53 ± 3.76	2.54 ± 2.63								
	P value *		0.00	0.00								

P value * indicated paired t test for significance within the same group

Results

In the present experimental study, 300 students were involved and all the students participated till the end of the study. Table 1 shows the socio-demographic characteristics of the study participants. The data revealed that the age groups and gender of the students were equally distributed between the groups. The majority of the students 273 (91%) were Hindu by religion and belonged to the lower middle class 189 (63%). Most participant's fathers have completed high school 163 (54.3%) and most of them were working as semi-skilled workers 104 (34.6%) as their primary occupation. Most of their mothers studied up to middle school 113 (37.6%). About three-fourths of their families were a nuclear type of family 227 (75.6%) and residing mostly in urban and suburban areas 197 (65.7%).

Table 2 shows the Personal health risk factors and sociodemographic characteristics related to the total distress score among the school students assigning subclinical grades as no distress and higher grades as having distress. Among gender, female students were significantly related to distress ($p=0.004$). Parental factors like the father's education lower than high school

($p<0.001$), the drinking status of the father ($p<0.001$), and the smoking status of the father ($p<0.001$) were found to be statistically significant. Familial factors like lower socioeconomic class ($p<0.001$), residence in an urban area ($p<0.001$), joint family ($p<0.001$), stressful events in the family ($p<0.001$), and having more than one sibling ($p<0.001$) were found to be contributing factors of distress among students. Individual factors like being underweight ($p<0.05$), unsatisfied academic performance ($p<0.001$), and binge eating were also found to be statistically significant.

Table 3 shows a Comparison of the presence of distress according to the DASS-10 questionnaire between the two groups before and after the intervention. The DASS-10 questions were significantly improved from 61 adolescents (40.6%) in the pretest to 39 (26%) adolescents in the post-test after giving yoga sessions to the students of the yoga group and the total students with the presence of distress decreased from 110 (36.6%) to 76 (25.3%). Meanwhile in the control group presence of distress was reduced from 49 (32.6%) to 37 (24.6%) adolescents. This shows that there was a 35.97% decrease in distress after yoga in the intervention arm



which was significant when compared to the control arm in which there was a 24.53 % distress reduction. Figure 1 shows the comparison of DASS 10 mean scores between the two groups before and after the intervention.

Table 4 shows the effect of yoga in the experimental study on the reduction of distress among school students using the DASS-10 questionnaire. Independent sample t-tests found statistical significance for all the questions in the DASS-10 questionnaire. The overall students' test for the total attained score was found to be statistically significant ($p=0.0001$) ($t=7.18, 0.96 - 1.69$) between the intervention group and the control group.

Discussion

The present experimental study was conducted among 300 students from 2 schools with cluster randomization having 150 students in each group. The baseline data revealed the overall prevalence of distress to be 36.6%, which was similar to the study done by Singh et al [15], but was lesser than the studies done by Siddik et al and Roy et al [14,22]. This may be because later studies are on late adolescent age groups, while the present study was based on the middle adolescent age group. In the present study, about two-thirds of the total distressed students were female students. This was concurrent with other similar studies [4,11,20 - 26]. This may be because women articulate depressive symptoms, even minor ones, more easily [27]. The salience of social relationships for females is a major factor in their mental health is well known [23]. It has also been stated that after reaching puberty, there is a sharp rise in psychological problems in girls [28]. Society expects different behaviors from boys and girls, which stereotypes girls to be submissive and docile leading to failure to express their emotions and contributing to emotional problems including stress, anger, depression, and anxiety [4].

Parental factors like the drinking and smoking status of the father were statistically found to be related to the student's distress, these findings were similar to the finding of the study done by Singh et al which may be due to the ill effects of the additives causing quarrel and financial strain in the family leading to distress in adolescents [15]. The present study showed that lower father's education was related significantly to adolescent's distress, these findings were similar to Roy et al in which parental education below higher secondary

was a significant factor for adolescent distress [14]. These findings were in contrast to the finding by Singhal et al [15] where graduate parents expected higher academic expectations from their peers whereas else the present study parents were mostly from sub-urban areas where the academic competition of the students was less likely a distressing factor than direct factors like parents education and occupation.

In the present study, familial factors like lower socioeconomic status were statistically related to distress in students. This finding is concurrent with other similar studies [15,23-25,29]. The present study also revealed distress among students of the joint family than nuclear family as in studies by Mishra et al [24]. Residence in urban areas was also a contributing factor to student's distress in the present study. These findings were similar to the studies done by other authors [4,6,14,23,24,30]. This may be due to higher academic expectations on their children to get good grades which in turn puts pressure and stress on the adolescents. Along with this, the competitive environment in the schools, peer pressure, the busy work schedule of parents, and the demand of teachers for good grades create more stressful situations for urban adolescents than rural [4]. In the present study, stressful events in the family like the death of a family member, financial emergencies, or natural disasters like flooding were found to be statistically significant for adolescent distress. This was also noted in a study done by Madasu et al [25]. Having more birth order was found to be a statistically significant factor for stress in a study done by Hasler et al [26], sharing a room with more siblings was also found to be stressing factor in a study done by Mohan et al [15]. These findings were also concurrent with the present study.

In this study, individual factors like being underweight, binge eating and unsatisfied academic performance were found to be statistically related to distress among study participants. This was similar to the study done by Hasler et al, Mishra et al and Roy et al [14,24,26].

In this study, yoga sessions were held once a week for 4 months, and the final refresher session was held in the 5th month (a total of 17 sessions). The study found that participants in the yoga group had a statistically significant reduction in total distress than students of the control group according to the DASS – 10 scale. This was concurrent with the study done by Ranjani H et al in



which Hath yoga reduced perceived stress in intervened participants. [19]. D Souza in their study revealed that adolescents who performed yoga had reduced stress levels. [31]. Markers of distress like metabolic syndrome markers i.e. blood pressure and random blood sugar level were also reduced by study participants who practiced yoga along with the control group who did not practice yoga. [32,33]

Thus the results of the present study reveal that the school children who performed regular yoga practices showed higher self-efficacy and improved performance compared with a control group who continued with their normal routine. [34] Experience from this study suggests the feasibility of implementing such a program with adolescents during school hours.

The strength of the study is that there were no dropouts in either the intervention or control groups as students actively participated in both arms. The limitation of the study is that data collection was restricted to one geographical area, that is, a panchayat in the Tiruvanmalai district of the Southern part of India, and the study design did not allow the determination of causal association of the related factors. Thus, further research to determine the risk factors of distress is recommended.

Conclusion

More than one-third of the school students had distress in them. Several demographic factors like female gender, father education below high school level, lower socioeconomic status, joint family living in an urban setup, the underweight, addictive status of the father, stressful events in the family, more than one sibling, unsatisfied academic performance and binge eating were found to be statistically significant for distress among adolescents.

As yoga intervention substantially reduced the prevalence of distress, it is recommended that yoga be made a compulsory weekly activity in the adolescent's education curriculum alongside conventional physical training classes.

List of abbreviations:

DASS: Depression, anxiety, and stress

BMI: Body mass index

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Conflicts of interest

There are no conflicts of interest

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