Original Research Article

To Study the Effect of Peer Assisted Learning on Academic Performance and Perceived Stress Scores Among First MBBS Students in a College of West Bengal

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ABSTRACT

Background: Peer Assisted learning (PAL) is primarily founded upon the theories of social constructivism and cognitive congruence. Cognitive congruence focuses on the relative gap in knowledge between a student and an instructor and states that the relatively smaller gap between student teachers and student learners allows for the enhancement of communication of facts and understanding.

Aims: To study the effect of peer assisted learning on academic performance and perceived stress scores among first MBBS students in a college of West Bengal.

Materials and methods: This pilot study was conducted after taking institutional ethical clearance and informed consent of the subjects. Only eighty-four students agreed to participate in the study. Perceived stress scores in these subjects were calculated using Perceived stress scale of Shelden Cohen. Pulse, blood pressure, BMI were recorded, lipid profile was analyzed. Resting pulse rate (measured after 15 mins of rest with subject in supine posture) and blood pressure (measured by mercury manometer). An internal assessment examination was conducted and results recorded. The students attended lecture classes as usual and attended PAL classes arranged by the Department of Physiology. PAL was conducted daily for 6 days in a week for 3 months and time span for each class was one and half hour. Each student could attend 2 such sessions every week. All faculty members and residents were involved in PAL. During the first semester examination all the subjects participating in the study were asked to fill up the PSS sheet. Pulse, blood pressure, BMI were recorded, lipid profile was analyzed.

Results of first semester examination were assessed.

The computer software Statistical Package for the Social Sciences (SPSS) version was used to analyze the data, and paired t-test was used. Correlation coefficient was calculated to study correlation of PSS with academic performance.

Results: Learner satisfaction was high with an overall score of 4.7 on a 5-point Likert scale. After 3 months of PAL in these students there was significant decrease in stress scores (14.5± 3.39 vs. 23.8± 2.89; P value <0.001) and significant improvement in academic performance (65.23 ±12.61 vs.58.69 ±10.45; P value 0.045). But no significant change was observed in respect of other parameters. PSS was negatively correlated with academic performance with a r value of -0.6247. Conclusions: PAL may alleviate stress levels among new medical students and improve their academic performance and

may be considered as a preventive mental health services, which could be made an integral part of routine clinical services for medical students, especially in the initial academic years.

Keywords: Peer assisted learning, academic performance, Perceived stress.

INTRODUCTION

The present learning experience at in MBBS curriculum in West Bengal involves didactic lecture-based formats, which are often supplemented with short, intensive, summary tutorials. This may result in a teaching learning gap in medical education. Medical education is inherently stressful and emotionally demanding training. A high level of stress may have a negative effect on cognitive functioning and learning of students in a medical school. There is a negative impact of stress on health and education among MBBS students. [1-3]

A cross-sectional study was conducted by AlKanhal AA et al in 2011 to determine the prevalence of stress among medical students and to observe association between the levels of stress and academic performance, and the sources of their stress. All the medical students from year one to year five levels from the College of Medicine, King Saud University, were enrolled. The study was conducted using Kessler10 psychological distress (K10) inventory. The prevalence of stress was measured and compared with the five study variables: gender, academic year, academic grades, regularity to course attendance, and perceived physical problems. The total prevalence of stress was 63%, and the prevalence of severe stress was 25%. The prevalence of stress was higher ($p<0.5$) among females (75.7%) than among males (57%) (odds ratio=2.3, $\chi2$=27.2, $p<0.0001$). The stress significantly decreased as the year of study increased, excluding the final year. Physical problems were found to be associated with high stress levels. [4]

In three British universities, the prevalence of stress was 31.2%, [5] and 41.9% in a Malaysian medical school [6] and 61.4% in a Thai medical school. [7] Stress in medical school is likely to predict later mental health problems and students seldom seek help for their problems [8] (15). In a Swedish study, the prevalence of depressive symptoms among medical students was 12.9%, and 2.7% of students had made suicidal attempts. [9] It is important for medical educators to know the prevalence, causes, and levels of stress among students, which not only affect their health but also their academic achievements. Researchers from two studies conducted in Egypt and Saudi Arabia have observed high rates of anxiety and depression among medical students. [10-11]

Studies on medical education suggest that Peer Assisted Learning (PAL) could be an acceptable and beneficial educational strategy. Peer-assisted learning (PAL) is the development of new knowledge and skills through active learning support from peers. A study was conducted in Birjand University of Medical Sciences to examine and compare the effects of two educational methods: Peer Assisted Learning and lecture on medical students. The findings supported the notion that PAL is more effective than lecture on student's learning and retention, specifically in comprehension and application levels. PAL may be considered as an effective mean to encourage students and improve their knowledge and performance in basic sciences. [12]

PAL is primarily founded upon the theories of social constructivism and cognitive congruence. Social constructivism is characterized by the process of learning in a group setting towards the development of shared meaning created by the collaborative interaction. The more commonly cited theory underpinning peer-assisted learning initiatives is cognitive congruence. Cognitive congruence focuses on the relative gap in knowledge between a student and an instructor and states that the relatively smaller gap between student

teachers and student learners may result in enhancement of communication of facts and understanding. [13-17]

Students are arguably more in touch with the precise learning requirements of their peers. Senior students are also more likely to advise on useful revision strategies that are relatable to their student peers, as compared to lecturers. Tutees may feel more comfortable communicating their worries in the relaxed environment PAL creates, and tutors may be able to explain content at an appropriate, understandable level for the tutees. Peer teachers, because of their proximity to the learner, are more likely to understand which aspects of a topic learners may find conceptually difficult and to explain it in ways that are easily understood. The social proximity of peer teacher and learner is thought to allow students to express difficulties more comfortably, to feel relaxed and build confidence through observation of a peer in a teaching role. Development of organizational skills, communication/presentation skills, confidence, leadership and improved assessment performance are amongst some of the benefits to peer teachers. [18-19]

PAL has many benefits for tutors too. It has been demonstrated that teaching a topic creates intrinsic motivation to learn the material more thoroughly. The benefits of PAL are not just limited to students but extend to teaching institutions. Teaching institutions are often limited by the availability of their teaching staff, many of whom may struggle to balance teaching with patient care. As such, senior students are often in a greater position to teach, being less constrained by the professional workload and time limitations. [20] So their involvement may be beneficial in PAL.

The present study was conducted to observe the effects of PAL among 1st MBBS students in respect of academic performance and cardiovascular profile and correlation of stress with the above factors in newly admitted MBBS students in a rural Medical college of West Bengal.

MATERIALS AND METHODS

This pilot study was conducted in the Department of Physiology of Burdwan Medical College and Hospital, during a time span of one year after taking institutional ethical clearance and informed consent of the subjects.

Inclusion criteria: MBBS students of the first professional batch of Burdwan Medical College.

Exclusion criteria: All students of MBBS first professional batch not willing to participate in the study, or are absent during the study period due to some personal problems were excluded.

Methods: One fifty medical students are admitted yearly in MBBS course in Burdwan Medical College. On the first occasion which was one and a half month after admission to MBBS course history of the subjects was carefully recorded. Informed consent was taken. Only eighty-four students agreed to participate in the study. Perceived stress scores in these subjects were calculated using Perceived stress scale of Shelden Cohen. Body mass index (BMI) were recorded, lipid profile analyzed. Resting pulse rate (measured after 15 mins of rest with subject in supine posture) and blood pressure (measured by mercury manometer) were measured. The subjects were made to rest for 15 minutes in supine position. The resting time given to subjects in between two tests was 5 to 10 minutes. An internal assessment examination was conducted on the same day of physical and stress level assessment of the students. Syllabus included the topics taught in lecture classes and the examination was scheduled after giving a time of 1 week to the students for preparation and results recorded.

The Perceived Stress Scale (PSS) of Sheldon Cohen, the most widely used psychological instrument for measuring the perception of stress, was used. It is a measure of the degree to which situations in one's life are appraised to be stressful. The questions in the PSS ask about feelings and thoughts during the last month. It comprises

of 10 items, four of which are reverse-scored, measured on a 5-point scale from 0 to 4. PSS scores are obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 and 4 = 0) to the four positively stated items (items 4, 5, 7 and 8) and then summing across all scale items. Total score ranges from 0 to 40[1-3].

After conduction of the internal assessment the students attended lecture classes as usual and in addition attended PAL classes arranged by the Department of Physiology. Prior to commencement of this PAL programme, students were introduced to the objectives and benefits of PAL and given specific instruction regarding the process they were to undertake. Students were trained in giving and receiving feedback and on presentation skills. Documents outlining learning objectives and guidance on how to run the sessions were provided through our Virtual Learning Environment and PAL sessions were supported at the site by residents and faculty members.PAL was conducted daily for 6 days in a week for 3 months and time span for each class was one and half hour. Each student could attend 2 such sessions every week. All faculty members and residents were involved in PAL. By incorporating the identification of learning objectives we aimed to support greater self- direction amongst our students. Students were allocated to groups of 4 or 5 peers for PAL sessions. We found that for a 90-minute educational session, it worked best to allocate groups of four students with 20 minutes for each. We also found that a single faculty or resident supervisor could easily monitor and assist three groups. Students rotated the role of peer teacher weekly. The peer teacher presented the topic. The group provided feedback to the peer teacher on their presentation. The peer teacher then taught on a topic. Students selected the topic for the session themselves, as an important learning objective. They were also guided in their choice of topic by curricular documents. Students had already received teaching in core topics and therefore, review and application of prior learning was the focus of the PAL sessions. Participation in the program did not contribute to student evaluation. All the important and difficult topics of the first semester were covered in details and difficulties the students faced were regularly attended. During the first semester examination all the subjects participating in the study were asked to fill up the PSS sheet. Pulse, blood pressure, BMI were recorded, lipid profile was analyzed. Results of first semester examination were assessed.

The computer software "Statistical Package for the Social Sciences (SPSS) version 16 (SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.)" was used to analyze the data. And paired t-test was used. Correlation coefficient was calculated to study correlation of PSS with other parameters. The data was considered significant and highly significant if the analyzed probability values (P values) were < 0.05* and P <0.01** respectively.

RESULTS

This study was conducted in a time span of one year on eighty-four students, among them 32 mere female and rest male. Mean and SD value of age was 18.65 ± 1.24 years. Learner satisfaction was high with an overall score of 4.7 on a 5-point Likert scale. In written comments, students reported that small groups with minimal faculty involvement provided a safe learning environment. They felt that PAL was more effective than traditional methods of learning. Faculty reported that students remained engaged and required minimal oversight.

Females had higher PSS scores as compared to males but the difference was not significant. PSS scores, BMI, Pulse, BP were recorded during first internal examination and this period consisted only of lecture classes. Lipid profile was also analysed. After 3 months of PAL in these students there was significant decrease in stress scores (14.5 ± 3.39 vs. 23.8 ± 2.89; P

value <0.001) and significant improvement in academic performance (65.23 $\pm$12.61 vs.58.69 $\pm$10.45; P value 0.045). But no significant change was observed in respect of other parameters (Table1, Figure1-2), (BMI:24.3$\pm$4 vs.22.74 $\pm$3.40; P value 0.088; Pulse.80.46 $\pm$ 12.82 vs. 80.8 $\pm$ 13.60; P value 0.924; Systolic blood pressure SBP: 119$\pm$11.19 vs. 116.45 $\pm$10.48; P value 0.516; Diastolic blood pressure DBP: 77.48 $\pm$ 7.41 vs. 75 $\pm$4.96; P value 0.092; 196.75 + 21.47; Total Cholesterol: 197.41$\pm$26.28 vs.196.75 $\pm$ 21.47; P value 0.911;

Triglyceride:127.59 $\pm$ 47.85 vs. 114.05$\pm$ 32.68,P value0.158;LDL:123.23 $\pm$ 24.16 vs. 123.2 $\pm$ 17.27,Pvalue 0.588; HDL: 48.75 $\pm$ 4.26 vs.49.4 $\pm$ 4.75, P value0.994; VLDL:25.65 $\pm$ 8.56 vs.22.65 $\pm$ 5.84, P value 0.56). There was decrease in BMI, Pulse, blood pressure, Total Cholesterol, Triglyceride, LDL, VLDL and increase in HDL values during the second recording as compared to the first but the difference was not significant.PSS was negatively correlated with academic performance with a r value of -0.6247.

Table 1: The average values of PSS scores, BMI, Pulse, SBP, DBP, Academic Performance (Marks%) and Serum Lipid Profile of the subjects before and after PAL are shown in the following table:

PARAMETERS	Mean $\pm$ SD		P Value
	AFTER PAL (N=84)	BEFORE PAL (N=84)	
PSS score	14.5$\pm$ 3.39	23.8$\pm$ 2.89	<0.001**
BMI (Kg/m^2)	22.74 $\pm$ 3.40	24.34 $\pm$ 4.10	0.088
PULSE(beats/min)	80.8 $\pm$ 13.60	80.46 $\pm$ 12.82	0.924
SBP(mm of Hg)	116.45 $\pm$ 10.48	119 $\pm$ 11.19	0.516
DBP(mm of Hg)	75 $\pm$ 4.96	77.48 $\pm$ 7.41	0.092
ACADEMIC PERFORMANCE (MARKS%)	65.23 $\pm$ 12.61	58.69 $\pm$ 10.45	0.045*
TOTAL CHOLESTEROL (mg/dl)	196.75 $\pm$ 21.47	197.41 $\pm$ 26.28	0.911
Triglyceride (mg/dl)	114.05 $\pm$ 32.68	127.59 $\pm$ 47.85	0.158
HDL (mg/dl)	49.4 $\pm$ 4.75	48.75 $\pm$ 4.26	0.588
LDL (mg/dl)	123.2 $\pm$ 17.27	123.23 $\pm$ 24.16	0.994
VLDL (mg/dl)	22.65 $\pm$ 5.84	25.65 $\pm$ 8.56	0.056

Results show significant difference in marks and PSS before and after PAL but no significant difference was found in case of other parameters.
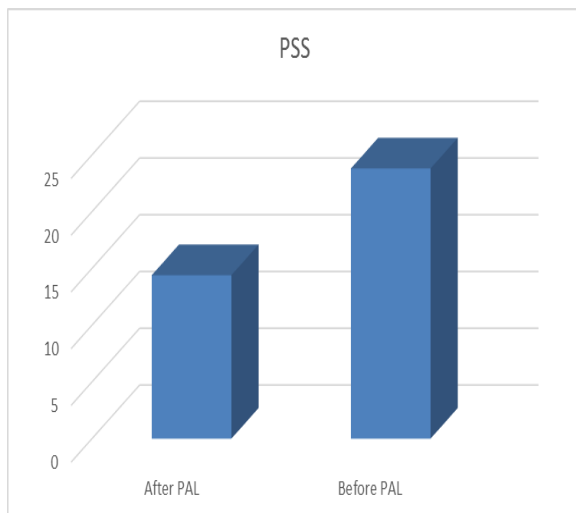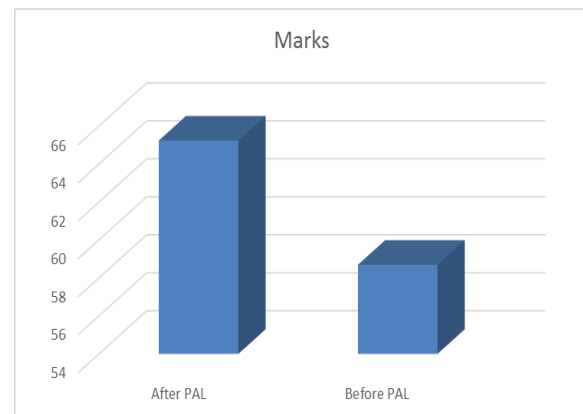

Figure 1: Comparison of PSS

Figure 2: Comparison of academic performance.
P Value < 0.05 (significant)
P Value <0.01 (highly significant)

DISCUSSION

Many studies have shown that stress levels of medical students are genuinely high. Academic reasons and emotional factors are greater during the first year while reasons related to patient care and physical factors are more important in subsequent years. Long working hours, lack of peer support, competitive environment, rigid authoritative non-encouraging faculty, an

imbalance between professional and personal lives, lack of recreational activities, staying away from home, financial problems, residency queries, an uncertain future, emergency situations, speedy decisions, life and death issues, cultural and minority issues, mismatch between capability and expectation are some reasons of stress. [21] So the present study was conducted to study the effect of PAL on PSS scores, academic performance and health profile. PAL was significantly associated with decrease in PSS and improvement in academic performance.

Improvement in post activity score of peer-assisted symposium showed that PAL may be implemented under the guidance of a teacher in studies by Gupta RR. [22] Jauregui J et al [20] developed five clinical cases in the style of EM oral boards in their study. Fourth-year medical students were each assigned a unique case one week in advance. Students also received an instructional document and a video example detailing how to lead a case. During the 90-minute session, students were placed in small groups of 3–5 students and rotated between facilitating their assigned cases and participating as a team for the cases presented by their fellow students. Cases were supplemented with a half-mannequin that can be intubated, airway supplies, and a tablet-based app (SimMon, $22.99) to remotely display and update vital signs. One faculty member rotated among groups to provide additional assistance and clarification. Three EM faculty members iteratively developed a survey, based on the literature and pilot tested it with fourth-year medical students, to evaluate the course.

135 medical students completed the course and course evaluation survey. Learner satisfaction was high with an overall score of 4.6 on a 5-point Likert scale. In written comments, students reported that small groups with minimal faculty involvement provided a safe learning environment and a unique opportunity to lead a group of peers. They felt that PAL was more effective than traditional simulations for learning. Faculty reported that students remained engaged and required minimal oversight. Unlike other simulations, their combination of brief, student-assisted cases using low-fidelity simulation provides a cost-, resource- and time-effective way to implement a medical student clerkship educational experience.

To review systematically clinical studies providing empirical data on stress-management programs in medical training Shapiro, Shauna L et al in 2000 searched Medline and PSYCHINFO from 1966 to 1999. Studies were included if they evaluated stress-management programs for medical trainees (medical students, interns, or residents); reported empirical data; and had been conducted at allopathic medical schools. 24 studies reported intervention programs, and only six of those used rigorous scientific method. Results revealed that medical trainees participating in stress-management programs demonstrated (1) improved immunologic functioning, (2) decreases in depression and anxiety, (3) increased spirituality and empathy, (4) enhanced knowledge of alternative therapies for future referrals, (5) improved knowledge of the effects of stress, (6) greater use of positive coping skills, and (7) the ability to resolve role conflicts. [23]

Peer-assisted learning (PAL) is increasing in popularity in medical education. While PAL has been used informally for generations, more formal use of it as a tool to teach and consolidate information and practical skills has been shown to be beneficial to both tutors and those being taught. [24-25] The study present was aimed to garnish a clearer understanding of the concept of PAL in undergraduate medical education and its benefits to students.

Overall outcomes for the students are favorable in many studies with PAL. Students "perceived the peer tutoring program as affording opportunities not otherwise available within the curriculum," while also offering a valuable learning experience which was noted as being unique

from the more traditional faculty-led teaching and studies have reported that the quality of teaching in joint sessions was similar, or better, than sessions taught by faculty members alone. [25-26] Similar findings have also been observed in the present study.

Student learners are often more engaged in active learning and at ease to ask questions and clarify understanding with fellow students, while student teachers may deepen their understanding and improved retention in a topic they prepared for and delivered. PAL allows students to participate in teaching in a safe learning environment in anticipation of becoming teachers themselves when they graduate to residency. Also, PAL inherently encourages students to take responsibility for their own learning and develop critical lifelong learning skills. [27-29]

All these factors may be the cause of decreased PSS scores and academic performance in the present study.

We had conducted three studies on effect of stress om medical students. In the first study one hundred and fifty MBBS students in the age group of 18–20 years under stress were chosen for the study. Stress level was assessed according to the Presumptive Life Event Stress Scale (PSLES) and categorized into two groups: 41–200: less/moderate stress; more than 200: severe stress. The Perceived Stress Scale (PSS) of Sheldon Cohen was also used. Scores around 13 were considered as average. Scores of 20 or higher were considered high stress. Baseline anthropometric measurements were done; body mass index and waist to hip ratio (WHR) were calculated. Resting pulse rate and blood pressure were measured. The results of internal assessment examinations conducted in this time period were recorded. A total of 30 subjects had moderate PSLES scores (167.25 ± 26.67); 120 had high scores (373.86 ± 149.21; $P < 0.000$). We found statistically significant higher heart rate, diastolic blood pressure, WHR, and PSS scores (22.05 ± 5.02 vs. 19.25 ± 4.21; P

0.003) in subjects having high PSLES scores. No significant effect of stress scores was observed on systolic blood pressure. Examination results were significantly worse in the highly stressed group (64.3 ± 10.8 vs. 69.1 ± 9.6; P 0.019) as compared to subjects having moderate stress. These results indicated a negative impact of stress on health and education among MBBS students. [2]

In the second study 465 subjects with scores above 200 were chosen for the study. Blood groups of the subjects were assessed (blood group O 185; A 95; B 150: AB 35 [total 465]). Lipid profiles of subjects with blood group O and A were analyzed following exposure to stress. The perceived stress scale (PSS) of Sheldon Cohen was used to measure perceived stress. There was no significant difference in PSLES scores, body mass index, total cholesterol, triglyceride, high-density lipoprotein, very low-density lipoprotein between subjects of blood group O and A. PSS score was significantly higher in group O as compared to group A (22.4 ± 4.6 vs. 19.36 ± 4.9; P value 0.036*). Low-density lipoprotein-cholesterol (LDL-C) was significantly higher in group O (132.63 ± 19.43 vs. 115.59 ± 18.7; P value 0.004**). PSS scores were positively correlated with LDL with r value of 0.03 [P < 0.01]). The results of our study indicated that subjects with blood group perceived more stress as compared to subjects of blood group A and perceived stress significantly worsened LDL-C levels. [1]

In the third study one hundred and twenty young adults from the health-care sector with the presumptive life event stress scale of more than 200 were selected for the study. Anthropometric measurements were carried out. Pulse and blood pressure were recorded. Perceived Stress Scale (PSS) scores were calculated, lipid profile analyzed, and isometric hand grip test, orthostatic tolerance test, and breath-holding test were done. Study subjects were divided into two groups G1 and G2. Group G1 was asked to practice PMR and Group G2 was

advised to walk in the morning for 3 months. All parameters were re-evaluated after 3 months. The primary outcome measures from baseline to final follow-up were measured by blinded observers. PSS, cardiovascular profile was significantly improved in both groups after the training session. PSS and cardiovascular profile improved equally in both groups. PMR and walking were equally effective in reducing stress and improving cardiovascular profile in young adults and may be used as a cost-effective way to improve health and quality of life. [3]

In the present study we observed that PAL may decrease perceived stress among medical students and help in improvement of academic performances

Limitations: The study was carried out on pre-taught topics, as a revision class, and not on a fresh topic. PAL sessions may be conducted on a fresh topic with a faculty as a guide

CONCLUSIONS

PAL may alleviate stress levels among new medical students and improve their academic performance and may be considered as a preventive mental health services, which could be made an integral part of routine clinical services for medical students, especially in the initial academic years.

Conflict of interest: Declared none.

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