

Association of Autosuggestion and Academic Performance & Stress Marker in Secondary School Students during Exams: A Pilot Study

Kathyayani P¹, Tirthal Rai^{2*}, Usha Adiga³, Desy TM⁴

^{1,3} *Principal, Tejaswini Institute of Allied Health Sciences, Mangalore*

² *Additional Professor, Department of Biochemistry, KS Hegde Medical Academy, Nitte-DU, Mangalore, India*

³ *Professor, Dept of Biochemistry, KS Hegde Medical Academy, Nitte-DU, Mangalore, India*

⁴ *Research Scholar, Dept of Biochemistry, KS Hegde Medical Academy, Nitte-DU, Mangalore, India*

Abstract

Introduction: Auto suggestions are a set of specific techniques which are self-administered for improving state of mind, self-confidence and the ability to cope with problems. Objective of the study was to assess the autosuggestion will improve academic performance and reduces stress in Secondary school students during exams.

Methods: This interventional study was conducted on 58 secondary school students for a period of one year. Their perception of stress during examination were analyzed six months before the exam using a validated questionnaire, Perceived stress score (PSS). Saliva was collected just before the exam for estimating cortisol levels, which was measured using ELISA. Statistical analysis was carried out using graph pad instat version 3. Comparison of marks and stress perception scores was done using Wilcoxon rank signed test, association of stress perception scores and cortisol levels with students' academic performance was by Chi square test, correlations by Spearman correlation test.

Results: The PSS in students before and after autosuggestion was found to be statistically significant ($p = 0.0002$). The grades obtained before and after autosuggestion was extremely significant ($p < 0.0001$). There was no statistically significant association between cortisol levels and marks ($p = 0.4477$), chi square statistics was 0.5766.

Conclusion: In our study the stress scores reduced and the academic grades improved after autosuggestion. Higher cortisol levels showed 50% less chance of getting good grades suggesting the association of academic performance and the stress marker. Effective practice of autosuggestion showed 85% higher chance of lowering the stress scale.

Keywords: Academics, Stress, Autosuggestion, performance, positive reinforcement

I. INTRODUCTION

Background

Examinations in school or college are a part of academic life. It has been said sometimes that “Student exam stress is creating mental health time bombs” (1). It is perfectly normal to feel some stress, but too much of it will reduce effectiveness. The need to appear for examination in schools, colleges or competitive examination burdens the students mind and causes tremendous amount of stress and strain.

They either develop examination phobia or depression. The Family Doctor Association and the British Association for Counseling and Psychotherapy has also reported an alarming rise in exam related stress and are seeking help for such services. The incidence of exam anxiety has been rising. Stressors for examination include social pressure for best result and future growth, emotional immaturity, poor self-esteem, negative thoughts and anxiety stimulating agents like tea, coffee, cola, etc.

taken before the exams. Student suicidal attempts are more common during the time of examinations or declaration of results and therefore in such cases they may need counseling, antidepressant drugs or more family support (2).

Stress produces definable mental and physiological reactions in the body. Mild stress is beneficial in cognitive tasks and performance but persistent compounded stress may lead to neuropsychiatric illnesses like anxiety and depression. Therefore, they are the two sides of the same coin. Examinations act as stressor and activate the hypothalamic-pituitary adrenal axis causing an increase in cortisol level, which is reflected in saliva (3). Stress alters the emotional and cognitive functions of the students via epinephrine and glucocorticoids thus hampering their performance (4). They are depicted in various ways and vary from individual to individual. Early signs show tense muscles, palpitations, dry mouth, headache, loss of appetite and sleep deprivation whereas exam stress in students can cause drug and alcohol abuse, trembling hands and suicidal tendencies. Therefore, proper counseling of the students should be initiated at the earliest to decrease their stress level. Examination stress is better prevented than treated. In parallel to a systematic, persistent, organized, planned and regular effort from the beginning of the academic session, some motivation to enhance self-confidence is the best method for any adolescent to prevent anxiety related to examination. Auto suggestion might play a significant role in building students' self-confidence and improving their academic performance.

Auto suggestions are a set of specific techniques which are self-administered for improving state of mind, self-confidence and the ability to cope with problems. They are of two types positive and negative. Clinical utilization of auto suggestions generally involves repeating the same set of suggestions to a participant in a series of sessions. This

form of self-induced suggestion guides individuals' own thoughts, emotions and behavior. It embeds positive attitude by nurturing good thoughts and thus auto suggestions can make an impact on conditioning a person, affects moral judgments and behavior, creates a healthy lifestyle and causes job enrichment. It also helps in getting rid of various phobias thus an overall sense of well-being in everyday life will automatically improve their holistic development. (5)

There are several techniques which can relieve stress in students during exams like breathing techniques, complementary therapies like yoga, meditation etc. Since they lack motivation, students do not practice it regularly thus a simple technique like positive autosuggestion may not only help in boosting their confidence but also relieves stress thus improving their performance in exams. This is not experimented so far to the best of our knowledge; hence it is justifiable to carry out the study, exploring the effect of autosuggestion on students' stress status and their performance.

II. METHODOLOGY:

This interventional Study was conducted on 58 secondary school students (Class X) of Pandith Government higher secondary school, Mangalore for a period of one year. Institutional ethics committee approval was sought before starting the study.

Only those students participated in this study, who were ready to practice autosuggestion throughout the experiment. Students/Parents' consent was obtained and prior written permission from the principal of this school was also taken. Those participants who did not give consent were excluded.

All the students included in the study, belonged to the same socio-economic background. Their perception of stress during examination was analyzed six months before exam using a validated questionnaire, Perceived stress scale (PSS)(table 1).

Table 1: Components of perceived stress scale questionnaire

1	In the last month, how often have you been upset because of something that happened unexpectedly?
2	In the last month, how often have you felt that you were unable to control the important things in your life?
3	In the last month, how often have you felt nervous and stressed?
4	In the last month, how often have you felt confident about your ability to handle your personal problems?
5	In the last month, how often have you felt that things were going your way?
6	In the last month, how often have you found that you could not cope with all the things that you had to do?
7	In the last month, how often have you been able to control irritations in your life?
8	In the last month, how often have you felt that you were on top of things?
9	In the last month, how often have you been angered because of things that happened that were outside of your control?
10	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

This questionnaire was designed for use with community samples with at least a junior high school education. This questionnaire assesses the degree to which students perceive their life as stressful.

In the training session, autosuggestion was designed to be thoroughly performed through ten steps (Table 2). Students were asked to practice autosuggestion daily for 15 minutes, followed by regular studies of 15 minutes for six months. At the end of six months, the same perception of stress scale questionnaire was administered. This questionnaire consists of ten 4-choice questions. 2ml of saliva sample was collected to check for cortisol levels.

To determine each individual's total stress score, following rules are followed; Reverse scores on four positive items (4,5,7,8) as follows- 0=4,1=3,2=2,1=4.

Salivary cortisol levels were estimated using ELISA.

The marks scored by the students in examinations before and after auto suggestion were noted.

Students' adherence to autosuggestion was noted on daily basis with a checklist and total score was noted as practice scores.

Stress levels of the participants were assessed subjectively with the same questionnaire and salivary cortisol levels were estimated just before the exams.

Table 2: Steps of auto suggestion (Positive reinforcement)

- 1. I am sitting in a comfortable position.**
- 2. I am a point of energy in the middle of brain.**
- 3. I start visualizing my body.**

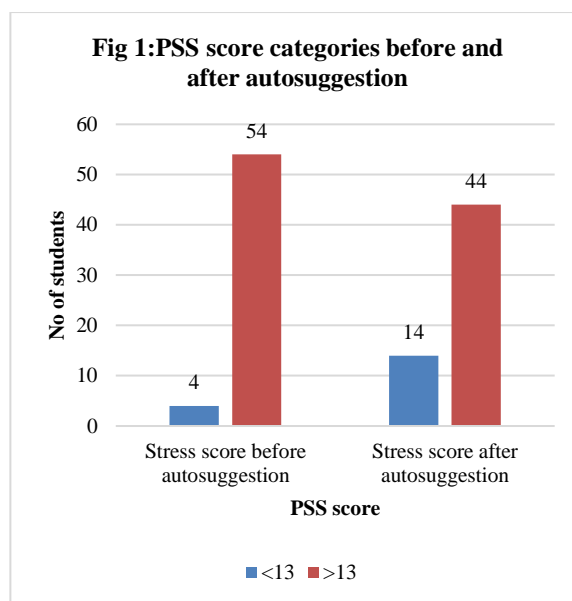
4. I find myself relaxed.
5. Slowly I start visualizing my forthcoming examination days
6. I visualize the examination hall.
7. Slowly I imagine myself sitting and receiving my question paper.
8. I realize that almost all the questions are according to my expectations and I thank my luck and preparation
9. Now I take my attention to another day of exam where the questions are not according to my expectation. Still, I am calm and relaxed and I am facing it as I have regularly studied those topics earlier.
10. I am able recall all the answers and I still thank my luck and by always.

III. STATISTICAL ANALYSIS

Statistical analysis was carried out using graph pad instat version 3. Comparison of percentage marks and stress perception scores before and after autosuggestion was done among students, separately among boys and girls were carried out using Wilcoxon rank signed test. Association of stress perception scores and cortisol levels with students' academic performance was done using Chi square test. Correlations was studied using Spearman correlation test. Mann Whitney U test was done for comparison of stress scores, salivary cortisol levels and grades between males and females. The same test was applied for the comparison of the question-wise PSS scores.

IV. RESULTS

These study participants were 58 class X students of Pandith Government higher secondary school, Mangalore, of which 41 were boys and 17 were girls. The mean age of boys was 15.2 ± 1.3 and that of girls was 14.8 ± 1.7 years. The number of students in low and moderate stress is as shown in Figure 1.



The perceived stress score in students before autosuggestion and after autosuggestion was 19.29 ± 3.73 & 16.26 ± 5.31 respectively with (p-value 0.0002) which was statistically significant. Similarly grades before autosuggestion was 56.60 ± 18.07 and after autosuggestion was 62.17 ± 19.98 respectively with p value < 0.0001 which was extremely significant (table 3).

Before autosuggestion the perceived stress score in boys was 19.46 ± 4.25 and that in girls was 18.93 ± 2.46 which was not statistically significant. The perceived stress scale in males and females after autosuggestion was 15.42 ± 5.04 & 18.18 ± 5.58 respectively which was also not statistically significant (p=0.11). Grades showed no significant difference in males and females before and after autosuggestion, before autosuggestion the grades in males were 53.61 ± 16.37 and females 63.81 ± 20.37 whereas after autosuggestion grades in males became 60.20 ± 19.02 and females scored 66.91 ± 21.99 . So no significant gender difference was noted either in PSS or in academic performance.

Table 3: Comparison of stress scores and marks before and after autosuggestion

Parameter	Before autosuggestion Mean \pm SD	After autosuggestion Mean \pm SD	P value
PSS	19.29 ± 3.73	16.26 ± 5.31	0.0002 *

Marks in percentage	56.60±18.07	62.17± 19.98	< 0.0001*
PSS in Boys	19.46±4.25	15.42±5.04	<0.05*
PSS in girls	18.93±2.46	18.18±5.58	0.86
Grades in % in boys	53.61±16.37	60.20±19.02	<0.05*
Grades in % in girls	63.81±20.37	66.91±21.99	<0.05*

* $p < 0.05$ statistically significant

However there was a significant reduction in PSS as well as an improvement in grades in boys ($p < 0.05$). No significant reduction in stress scores among girls before and after autosuggestion (table 3). But there was significant improvement in their grades ($p < 0.05$).

Correlation studies were done between perceived stress scale and marks after autosuggestion ($r = -0.04$ & p value = 0.77) which was not statistically significant. There was a positive correlation observed with no statistical difference between cortisol levels and perceived stress scale after autosuggestion that showed $r = 0.1681$ & p value = 0.26 and a negative correlation was seen between marks and cortisol level which again was not statistically significant ($r = -0.1170$ & p value = 0.424).

There was no statistically significant association between cortisol levels and marks

chi-square statistics was 0.5766 ($p = 0.4477$). However, odds ratio for the association of cortisol and marks was 0.5789. Association between perceived stress scale and cortisol was not statistically significant $p = 0.7722$ with the chi-square value being 0.08378 and odds ratio for their association was 1.2. Similarly, the association between the practice score and perceived stress scale was also not statistically significant ($p = 0.2671$), chi square statistics was 1.231. However, the odds ratio for their association was 0.1579.

Cortisol levels in boys were 1.23 ± 0.16 and in girls 1.53 ± 0.46 , not statistically significant ($p = 0.7042$). Correlation of perceived stress score with grades in males ($r = -0.2727$, $p = 0.4181$) and females ($r = -0.08000$, $p = 0.7684$) was not statistically significant. The association of cortisol with marks also showed no statistical significance in both the genders, males showed ($r = -0.1597$, $p = 0.3670$) and females ($r = -0.0679$, $p = 0.8101$).

On comparing PSS scores question wise before and after autosuggestion, significant improvements were observed in the perception of stress for the second and 10th question (table 4). However improvements seen for the other questions, even though statistically insignificant, they contributed for overall improvement in the PSS scores and hence in the better academic performance.

Table 4: Comparison of Question wise PSS Scores before and after autosuggestion

Questions	Before / Mean ± SEM	After / Mean ± SEM	p value
Question 1	1.57 ± 0.1879	1.82 ± 0.1568	0.3435
Question 2	2.023 ± 0.1609	1.36 ± 0.1493	0.0019*
Question 3	1.86 ± 1.194	1.57 ± 0.2041	0.2451
Question 4	1.43 ± 0.1822	1.73 ± 0.2214	0.2219
Question 5	1.82 ± 0.1464	1.47 ± 0.1937	0.1716
Question 6	2.20 ± 0.1827	1.45 ± 0.1575	0.0025
Question 7	1.82 ± 0.1698	1.82 ± 0.1875	0.9160
Question 8	1.68 ± 0.1207	1.45 ± 0.1990	0.3414
Question 9	2.43 ± 0.1763	2 ± 0.2056	0.0949
Question 10	2.29 ± 0.1738	1.48 ± 0.1705	0.0024*

* p value < 0.05 is significant

V. DISCUSSION

Landmark examinations like the tenth board exams that determines a child's future, his/her career and the rat race related to meet the expectations in order to excel in examinations can impose tremendous amount of stress on a young lad's mind. Hence our study was done on class tenth students (Class X) of Pandith Government higher secondary school, Mangalore where 54 of the students were having moderate perceived stress scale and only 4 had mild stress before autosuggestion which was supported by Subramani *et al* who asserted that government school children had moderate stress as compared to private schools due to the excess homework, projects and other academic related assignments(6). This result changed with practice of autosuggestion where the number of students having mild stress increased. In our study it was observed that the perceived stress score decreased significantly with autosuggestion and the students' academic performance also improved with the administration of positive autosuggestion(table 3) implying that repeated autosuggestion has the power to subconsciously create an affirmative statement or a trained thought process with repeated enchantment causing a psychological feedback wherein the negative thoughts are converted to positive thoughts and a conscious mind starts believing in them truly thereby causing a behavioral change in order to face any challenge successfully. Emile Coue a French psychologist, pioneer of autosuggestions trained conscious autosuggestions with the following statement, "Every day, in every way, I am getting better and better" and these optimistic statements were repeated multiple times with complete faith and focused mind. With this the subjects could feel they could achieve any possible goal (7). Autosuggestion and meditation together have relatively decreased HR, SBP and DBP in people who practiced both as compared to people who only meditated. However, this study did not emphasize the sole role of autosuggestion on these parameters (8). Seconding the facts that autosuggestion has a great impact on the body's response to medical ailments, positive

suggestion techniques were supplemented with medical procedures that led to drastic reduction in pain and faster healing process in a cost-effective manner (9). Therefore, the saying "fake it till you make it" goes well with autosuggestions, whereby the mind gets tricked by these repeated mantras and our body starts responding accordingly. Reddy *et al* concluded that tools such as mindfulness, feedback, psychotherapy and meditation rendered useful in coping with stress (10). Ikematsu *et al* proposed autosuggestion or autogenic training as a designed tool to enable college students in Japan to learn a foreign language English. Students had to train their subconscious mind by repeatedly imposing positive autosuggestions regarding learning the language." Electroencephalography (EEG) was recorded to check their state of mind. Positive results therefore concluded that AT or autosuggestion is better than hypnosis and could carve its way as an important tool in teaching and learning (11).

Academic stress among secondary and higher education school students is rampantly spreading. Michaela C *et al* reported that organisation for Economic Co-operation and Development (OECD) conducted a survey involving 72 countries with students aged 15–16 years, of which 66% of students stressed about poor results and 55% worried even after being well prepared (12). In our study the number of the students falling under low stress scale increased and moderate stress scale descended after autosuggestion. There was no significant association between perceived stress scale and students' academic performance after autosuggestion, however a negative correlation was observed indicating more stress caused low academic score in students and the same finding was observed between cortisol levels and students' academic performance. A positive correlation was observed between stress and cortisol levels (stress hormone) suggesting release of high stress hormone with increased stress. Our study also showed students having higher cortisol levels had only 50% chance of

getting high academic score as compared to those students who had less cortisol levels. Overproduction of cortisol from adrenal cortex during stress causes decrement in memory retrieval and cognitive functions of hippocampus, amygdala and prefrontal cortex due to complete blockage of glucocorticoids. It also impairs the ability of the hippocampus to update and retrieve memory. They could alter the manner in which the information is stored in the hippocampus and thus performing poorly in exams (13). Similar findings are seen in many studies which concluded the same results that stated stress has detrimental effects on academic performance (14). Lesser the stress in students better is the academic grades. The autosuggestion practice score in our study was analyzed and students who practiced at least 50% of autosuggestion daily showed 85% higher chance of getting low stress score than those practicing less than 50% of autosuggestion daily. Limited literature is available on effect of autosuggestion on reducing examination stress and improvement in grades.

The first question of PSS in our study is to assess how the students perceived unexpected happiness? The scores showed 16% improvement in their perception after autosuggestion. In question 2 there was significant improvement in the PSS score ($p=0.0019$) with the improvement being 45% of the ability to control the important things in their life. The improvement in other questions was statistically insignificant. However, the percentage of improvement was 16%, 21%, 22%, 36%, 0%, 23.8%, 16% and 36% respectively for questions from 3 to 10. These findings suggest that students were less nervous and more confident; they were able to accept situation as it comes. They were able to cope up with the things that they had to do. However, autosuggestion did not help them to control their irritation (question 7). They were able to control their anger as well as overcome the difficulties they faced. All these findings suggest that autosuggestion is beneficial in

overcoming the stress and managing their emotions. (Table 4)

Studies show variability in coping with examination stress among males and females. However, in our study there was no statistical difference in the perceived stress scale between males and females before autosuggestion and after autosuggestion, however the stress scale decreased by 21% in males after autosuggestion. Similarly, cortisol levels between males and females did not exhibit statistical difference. Prabu et al who researched on higher secondary school students propounded that the male students had higher academic stress than female students (15). Another finding in our study was that the academic grades in male and female students did not exhibit statistical difference but the results improved by 13% in males after autosuggestion. Our study also showed no statistical correlation between marks and stress in males as well as in females whereas Kaur et al asserted that female students were more prone to academic stress and poor mental health as compared to male students (16). Deb et al concluded that 35% male students from 10th and 12th grade had stress related to examinations and 37% had high anxiety levels (17). Self-esteem and academic performance have a positive correlation yet, it was refuted by a psychologists in Pakistan whereby males were observed to have more self-confidence but females performed academically well as compared to males. Self-esteem in this scenario was higher in males due to cultural beliefs and more freedom given to males in their population (18). On the contrary gender differences in stress and coping style was studied by Matud et al who concluded that women showed more psychological distress, lesser coping mechanisms than men (19). Study by Montiel et al reported a higher perceived stress, lower psychological well-being and less compliance behaviour in females compared to males (20), as stress is very subjective and can be overcome by various methods of which, one of them is autosuggestion.

VI. LIMITATIONS

The sample size was less and the cortisol levels before autosuggestion were not analyzed. The drawback of this study was that the cause for academic stress was not extracted.

VII. CONCLUSION

In our study there was significant effect of autosuggestion on stress scale and grades among the students, the stress reduced and the academic grades improved. Even though there was no statistical significance between stress score in males after autosuggestion there was a 21% dip in their stress levels clinically and 13% improvement in their grades. Higher cortisol levels showed 50% less chance of getting good grades. Effective practice of autosuggestion showed 85% higher chance of lowering the stress scale. Autosuggestions thus may help students in reducing stress during examination, escalates their self-esteem and therefore improves academic performance. However, to follow autosuggestion students need to concentrate, focus and believe in the statements and this needs an adequate amount of maturity in understanding the importance of autosuggestion in day-to-day life which some students may lack. Hence, they should be incorporated in higher secondary school curriculum so that it is practiced daily, as mental health is equally important as physical health.

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