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Stress among Teenagers is Underlying Psychometric Factor for Causing Onset of Anxiety at an Early Age

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Abstract: ***Background: Stress originated mental, behavioral and neurological disorders are breaking its age boundaries with recent reported cases among children and teenagers, yet a few studies have paid attention to this sensitive issue. The cases include traits of depression, panic attack, social isolation trends, fear of being negatively evaluated and humiliated or judged by others. This leads to poor academic performance, suicidal tendency, violent behavior etc. which affects the quality of life for the particular person as well as their family and society. The aim of this study was to assess prevalence of such undesirable traits among teenage population to address the root-cause towards providing remedial measures. Methods: DSM IV & V manual was used to develop a self-assessment questionnaire including three anxiety scales (GAD-7, PSS-10 & BFNE) and administered to 208 teenagers, between 13-19 years of age, including males and females. The response-data was evaluated to categorize respondents into healthy and pathological range of anxiety scales followed by data validation using SPSS statistical software. Results: This study has found that approximately 58% of the teenage population, under study, has shown the developing traits of generalized anxiety disorders, with females being more susceptible than males; and 99% were experiencing the fear of being negatively judged by others. The 86% of teenagers were found susceptible to perceived stress traits which eventually lead to development of GAD at an early age.***

Keywords: Anxiety, Teenage, GAD-7, PSS-10, BFNE

1. Introduction

Humans are blessed with cognitive abilities making them superior to most organisms on the Earth. These include logical thinking, reasoning, analytical thinking, learning from experience, problem solving, planning and many more complex abilities[8]. Moreover, an important ability of controlling all these in a well-co-ordinate fashion is of utmost importance as it helps a human to pave the path for achieving desired goal in life. These complex sets of cognitive abilities are a source of behavioral phenotypes among the human population. Anxiety, Depression, Obsessive Compulsive Disorder like behaviors are considered as impaired cognitive abilities if they persist with a particular person for a long time[5]. A complicated neural network processes various stimuli, its related neural signals and required behavioral outcomes, which are reflected as mental health of a person. Stress and anxiety have traditionally been associated with the adult population only with reference to socio-economic status as well as the nature of job and also as component of comorbidities like cancer, cardiac arrest; but in recent years, it has been recorded in the social domain that the teenage population, living under stress is registering an increase in anxiety traits as they are not left untouched with pressure of performance in their academic domain whether it is school or college. One in seven teenagers globally, experiences a mental health issues at an early age of 10-19-years[20]. Unsurprisingly, the issue has attracted attention of psychologists[12] and neuroscientists[13] to understand the genesis & etiology of mental disorders to address the problem as it relates to sensitive population of teenagers[5][12].

2. Literature Survey

The twentieth century has been called "The age of Anxiety"[2]. A study was conducted to analyze the level of state anxiety among board exam attending school students in Tamil Nadu, India. This study found that all board exam going students had increased level of anxiety, which was particularly higher among boys and 12th standard board exam going students. There are various factors affecting cognition state of adolescents including examination systems at multiple stages as the major factor due to poor study skills [1]; which undoubtedly leads to develop loosed coordination between cognitive abilities for some teenagers while others experience debilitating anxiety despite adequate preparation [6]. In the physiological or cognitive components of test anxiety girls gets higher anxiety score than boys[19]. A study reported that females are found to be more depressed than male participants & females with drug abuse and less physical activity are more anxious and have physical and emotional abuse history[16]. Students with good grades in previous exam represent more anxiety in the cognitive component, while those who scored lower grades have higher anxiety values in the behavioral component[7]. Also, the particular exam patterns like oral test and public presentations cause more anxiety in students. A study reported that internally oriented group of students on the Procrastination Scale, showed significantly lower test anxiety and higher academic achievement than externally oriented group[3].

Analysis of various demographic variables showed that students from nuclear or conjugal families have high anxiety levels compared to joint families [10]. English medium students

have less anxiety than Hindi medium students. Students belonging from upper and lower socio-economic group have less anxiety than middle socio-economic group[7].

2. Materials

Ethics: This cross-sectional study was part of a research project to find out the biochemical and neural basis of developing anxiety traits in heterogeneous human populations with focus on young ones. We followed the ethics of research. The purpose of this study was explained to the participants and their parents (for participants below age of 18 years) and a written consent was secured from participants/parents.

Participants: In the process of data collection, a self assessment questionnaire was administered on 326 subjects (teenagers) including males and females. 118 participants were excluded because of incomplete response in the self assessment questionnaire. The response of the remaining 208 subjects were found complete & suitable and subjected to further statistical analysis under this study. All the participants in the age group of 13-19 years were administered the same level of questionnaire as per DSM- IV and V.

Tools:

a) **DSM-V:** A self assessment questionnaire was prepared from combinations of different anxiety scales, GAD - 7(Generalized Anxiety Scale-7), PSS-10 (Perceived Stress Scale-10) & BFNE (Brief Fear of Negative Evaluation) as per DSM-IV and V to be used as tool to screen the subjects for level of anxiety[7]. The responses from each individual were given scores as per DSM-V manual. The resulting total score for all the three scales in the questionnaire was used to identify each participant's level of anxiety under two broad categories- non-anxious (constituting the Control group) and anxious range i.e. pathological range (constituting the Test group). DSM-V has been found to be valid to construct questionnaire for children and teenagers[13].

b) ***Statistical analysis tool*:** The statistical data analysis was performed on SPSS version 28.0 for Windows (IBM SPSS Statistic 28.0) software. The first output was Descriptive statistical data for all the variables under this study which typically included mean, standard deviation and number of participants who participated in this survey. The next output was Pearson's Correlation matrix, a table that showed correlation coefficients between variables in a dataset. To check the sample adequacy the Kaiser Meyer Olkin (KMO) and Bartlett's tests were performed. To check the variance for three scales Communalities test was performed (the communality value should be more than 0.5 to be considered for further analysis if not it needs to be removed from the following analytical procedure.

2.4 Measures

a) GAD-7: The GAD anxiety scale to measure its severity has used the easy scoring system applied on self-assessment questionnaire responses according to "DSM-IV-TR" [17]. Evaluation has been made on 7 questions. Each question is scored between 0 (not at all) and 3 (nearly every day), over the last 2 weeks from the date of survey for how often has the individual been bothered by these problems which were mentioned in 7 items of GAD. The total possible scores range from 0 to 21, with cut off scores ≥5, ≥10, and ≥15 correspond to a mild, moderate, and severe level of anxiety, respectively.

b) PSS-10: The Perceived Stress Scale is a 10-item questionnaire, developed to measure the self-reported amount of psychological stress in individuals aged 12 and above. Each item is scored from 0 (never) to 5 (very often) with a possible total score range between 0 and 40 [4]. Higher score signifies the increased amount of perceived stress. Cut off scores >0, ≥14, and ≥27 of PSS-10 corresponds to a mild, moderate, and severe level of perceived stress, respectively. Questions were related to their daily life, describing their thoughts and feelings about life [9,11]. It evaluates the levels of perceived life that an individual has faced as unpredictable, overloading as well as uncontrolled over the previous month from the date of survey.

c) Brief Fear of Negative Evaluation (BFNE): The Fear of Negative Evaluation Scale is widely used to assess various dimensions of social-evaluation that leads to development of anxiety traits for example, distress, avoidance, expectations [5]. BFNE is a brief version of FNE (FNEB; Leary, 1983) containing 12 items from the original 30 item-scale. In this questionnaire, respondents rate the degree of their experience/ response and each of 12 items is scored 1 (not at all characteristic of me) to 5 (extremely characteristic of me). The total score ranges from 12 to 60. Cut off scores ≤12, ≤20, and ≤60 of BFNE corresponds to a mild, moderate, and severe level of Fear of negative evaluation, respectively. It is a measure of an individual's tolerance towards the possibility that they might be judged disparagingly or hostile by others [18].

3. Methods

3.1 Administration of Questionnaire

The respondents were asked to reco
rd their answers in questionnaire independently, so the analytical approach was of self-assessment nature and not assessed by the researcher. Responses from unconcerned/ inattentive/ non-interested/below 13 years & over 19 years of age, were kept in exclusion criteria. The survey was conducted by approaching the test subjects through making personal level contacts with people (family, friends and acquaintances) as well as in local hospitals of Ayodhya and nearby districts in offline mode and also by sharing the online link of a self-assessment questionnaire.

3.2 Evaluation of Self Assessed Reports:

Table 3.1: Cut-off scores of the three Anxiety Scales to measure their level of severity

GAD-7		BFNE Scale		PSS-10	
None	0-4	-		-	
Mild	5 -9	Mild	0-12	Mild	0-13
Moderate	10-14	Moderate	13-20	Moderate	14-26
Severe	15-21	Severe	21-30	Severe	27-40

The self – assessed reports collected were analyzed and scores were allotted to each item in all three evaluation scales as detailed in material section above. The respondents were considered in the pathological range with the help of sum of scores under each category (GAD/PSS/BFNE) as mentioned with cut-off values. Data in pathological range was classified in three sub categories of anxiety level as Mild, Moderate and Severe levels of anxiety. Anxious range was identified with scores' distribution as in table 3.1.

4. Results

The target population of this study was the teenage population. Upon administration of the questionnaire on 326 subjects, 208 subjects (N) were selected including 95 males and 113 females, with a mean age of 14.27 ±1.505 years.

Inclusion criteria was screened - in those subjects who had completely filled the questionnaire, for data analysis towards further screening for biochemical analysis, after validating the three anxiety scales - GAD-7, PSS-10 and BFNE. The pathological range to determine the anxiety level was based on score cut off as given in DSM- IV & V and mentioned in the previous section of this research report (Table 3.1).

Table 4.1: SPSS measures for the three anxiety scales

SPSS Measures	GAD-7	PSS-10	BFNE
Pearson correlation Matrix	0.129 to 0.376	-0.288 to 0.496	-0.158 to 0.699
1- Tailed sigma analysis	0.004 - 0.032	0.000 – 0.419	0.000 – 0.498
KMO Test	0.807	0.811	0.760
Bartlett's Test	<0.001	<0.001	<0.001

Table4.2: Total variance explained and squared holding percentage for different anxiety scale

Anxiety Scales	Item Number	Total Variance Explained	Squared Holding %
GAD-7	item-1	2.549	36.421%
PSS-10	item-1	3.326	33.25%
	item-2	1.371	13.705%
BFNE	item-1	3.270	27.246%
	item-2	1.655	13.792%
	item-3	1.213	10.105%
	item-4	1.002	8.349%

Statistical analysis of GAD-7 using SPSS 28.0 software

The statistical analysis was performed using Microsoft Excel software and afterwards data was analyzed using the advanced statistical software IBM SPSS 28.0 Version by subject expert. All the subjects who were positively screened under inclusion criteria had participated in self assessment of anxiety using GAD-7 scale. The figure 4.1.2 shows that approximately ¾th of the teenage population has experienced a significant trait of anxiety. The data is not affected by ceiling and floor effect in GAD-7 scores as none of the subjects acquires the maximum score of 21. The descriptive statistics mean value and standard deviation have closely related values which validate the significant "no floor/ceiling effect". Under Pearson's correlation matrix, internal homogeneity, between item scores was 0.129-0.376 as indicated by "Pearson correlation coefficient" (table 4.1). The 1- tailed sigma analysis in correlation matrix ranged between 0.004-0.032 which reflects 'significant character' of the data. The KMO (Kaiser-Meyer-Olkin) analysis for sampling adequacy has value 0.807 (table 4.1) which find that the sample size of this study was adequate and acceptable. To reject the null hypothesis data analyzed by Bartlett's test has also significant value 0.000 which is potentially capable of rejecting the null hypothesis. This shows that relationship among variables is strength-full and correlation matrix is not an identity matrix. The next statistical result was obtained for communalities which is more than 0.5 for all the items in GAD-7 (Supplementary Table 4). Therefore, data is perfectly considerable for further analysis and no variable need to be removed from factor analysis.

The total variance explained has only 1 component – 'item no. 1' with value 2.549 >1 as initial Eigenvalue. Thus, the taken set of 7 variables in GAD-7 with 208 observations represent 1 component, also the extracted sum of squared holding % of variance depicts that the first factor accounts for 36.421% of the variance feature (table 4.2). Therefore, Eigenvalue interpretation of one component is considerable to be effective for representing all the seven variables. The scree plot also supports the result of total variance explained i.e., one factor was taken for determination for the number of factors to be retained. The component matrix was concluded with one component, extracted as only one factor that was retained through scree plot analysis (Figure 4.1.1).

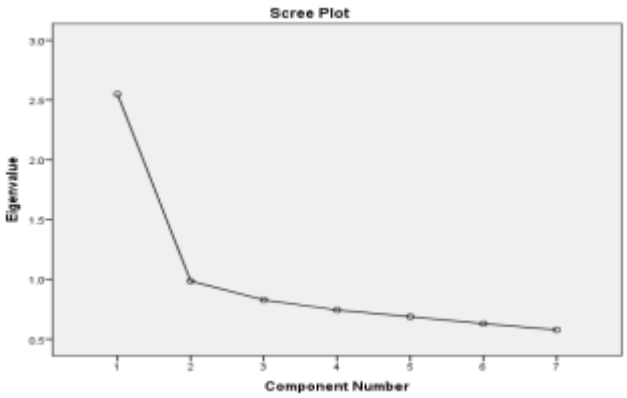

Figure 4.1.1: Scree plot analysis of GAD-7 Scale

As per DSM - IV &V, the cutoff values of 5, 10 & 15 were taken for mild, moderate and severe traits respectively for GAD-7 scale. In this study, 34% of the population was found not suffering from generalized anxiety disorders; they scored in range of 0-4 in self-assessment while 14% of sample size

have self assessed themselves as mildly affected by GAD. 40% subjects fell under moderate traits of GAD. 18% subjects were found severely affected (figure 4.1.2). Almost equal counts of males and females were found unaffected by GAD whereas in the mild range, 66% of male population were affected. Under moderate levels of GAD almost equal numbers of both the genders were found to have GAD traits. Major difference was observed in the severe range as 68% of females were sufferers of GAD.

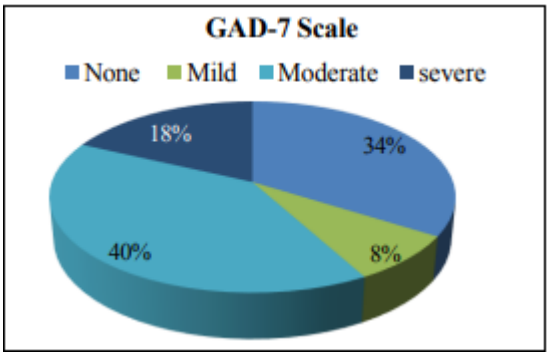

Figure 4.1.2: Percent distribution of severity of GAD

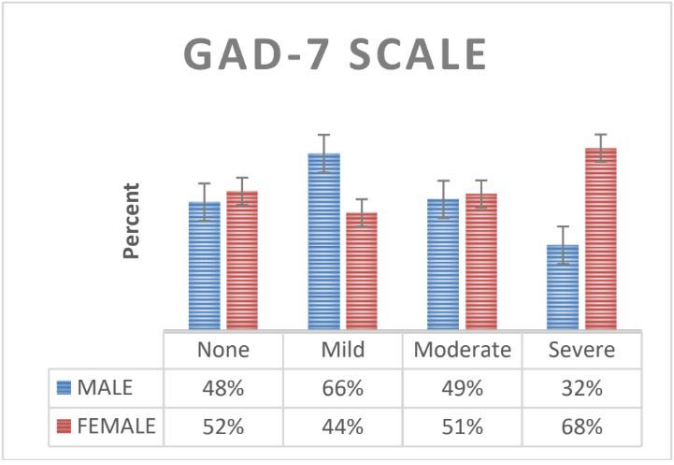

Figure 4.1.3: Severity and Gender wise comparison of GAD-7 score in total sample

Statistical analysis of PSS-10 using SPSS 28.0 software

The Statistical analysis of data set for PSS-10 found that 39% of the total population was experiencing a severe level of perceived stress (figure 4.2.2). The data collected for PSS-10 scale was unaffected by ceiling and floor effect as it shows none of the subjects acquired the minimum and the maximum score of 0 & 40 respectively. In Pearson's correlation matrix, internal homogeneity as indicated by "Pearson's correlation coefficient", between item scores was -0.288 to 0.496 (table 4.1). The 1- Tailed sigma analysis in correlation matrix ranged between 0.000-0.419 which reflects significant character of the data set. The KMO analysis for sampling adequacy has value 0.811 (table 4.1) which finds that the sample size for PSS-10 study was adequate and acceptable. The output of Bartlett's test has also significant value 0.000 which is potentially capable of rejecting the null hypothesis for PSS-10 scale too. This shows that relationship among variables is strength full and correlation matrix is not an identity matrix. The next statistical result was obtained for communalities which was more than 0.5 for all the items in PSS-10. Therefore, data is perfectly considerable for further analysis and no variable needs to be removed from factor analysis.

The total variance explained (table 4.2) has two components – item no. 1 with value 3.326 >1 and item no.2 with value 1.371 > 1 as initial Eigenvalue. Thus, the taken set of 10 variables in PSS-10 with 208 observations represent two components, also the extracted sum of squared holding % of variance depicts that the first factor accounts for 33.256% and the second 13.705% of the variance feature. Therefore, Eigenvalue interpretation of two components is considerable to be effective for representing all the ten variables.

Figure 4.2.2: Percent distribution of severity of PSS-perceived

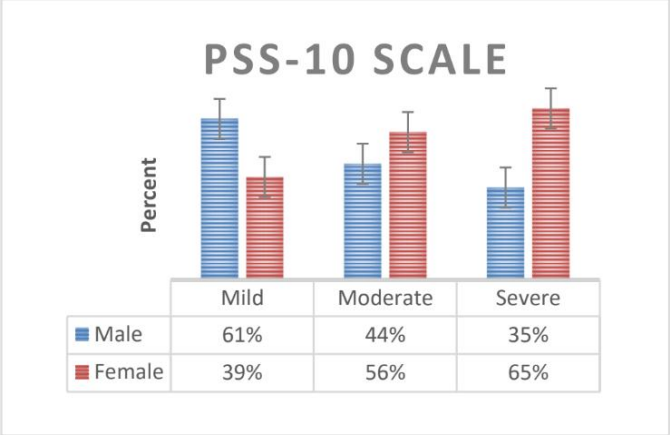

Figure 4.2.3: Severity and Gender wise comparison of 10 score in total sample

The scree plot also supports the result of total variance explained i.e. two factors were taken for determination for number of factors to be retained. The component matrix was

concluded with two components extracted, as two factors were retained through scree plot analysis (Figure 4.2.1).

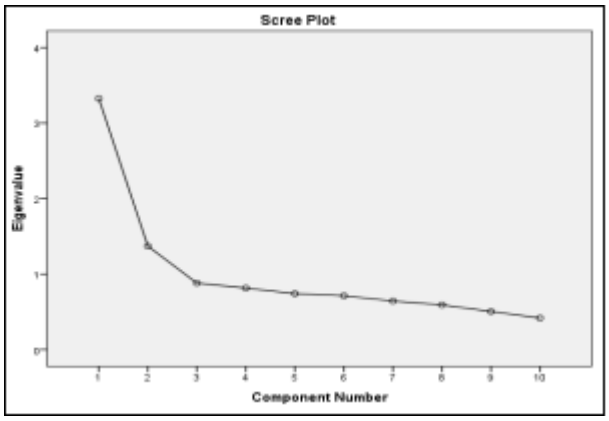

Figure 4.2.1: Scree plot analysis of PSS-10

The pathological range as per DSM IV &V has cutoff values of 0, 14 & 27 for mild, moderate and severe traits respectively for PSS-10. In this study 14% of sample size have self assessed themselves as mildly affected by perceived stress while approximately half the population (47%) has self assessed themselves to possess moderate traits of perceived stress. The important finding of the sample was under the severe range, as the affected population was 39% of sample size.

The gender wise analysis of the data shows that out of 14% mildly affected individuals, more male teenagers (61%) had mild level of perceived stress as compared with female teenagers (39%). It reflects that male population has better coping up ability with perceived stress while less females are able to avoid even mild level of perceived stress. The finding was consistent with the severe range of PSS-10 scale too, in which 30% of male population have had severe traits of perceived stress but approximately half the female population (47%) were affected with severe levels of perceived stress. For the moderate traits of the perceived stress among male and female teenagers, there was no significant difference on gender basis i.e., 45% of males and 48% of females self-reported themselves under moderately affected by perceived stress. Within male group again male population represents better ability (17%) of dealing with perceived stress but only 9% of the affected female population could show perceived stress under the mild range of PSS-10 scale. In other words, more females fall under severe and moderate category of PSS-10 scale.

Statistical analysis of BFNE using SPSS 28.0 software

The BFNE scale was used as the third parameter to assess the prevalence of anxiety in the studied population. All the included subjects were screened by self assessment for the fear of negative evaluation using BFNE scale. 83% of the total population under study has experienced a severe level of fear to be negatively judged by others. The characteristic data sample under BFNE scale was not affected by ceiling and floor effect, as none of the subjects acquired the 'maximum score of 30 and the minimum score of 0". Internal homogeneity between item scores was -0.158 to 0.639 as indicated by "Pearson correlation coefficient" in Pearson's correlation matrix, (table 4.1). The 1- Tailed sigma analysis in correlation matrix ranged between 0.000-0.498, which reflects significant character of the data. The sample size of this study was found adequate and acceptable by KMO analysis that has the value 0.760 (table 4.1). Bartlett's test has also shown significant value 0.000 which is potentially capable of rejecting the null hypothesis. The next statistical output was calculated for communalities which is more than 0.5 for all the items in BFNE. Therefore, data is perfectly considerable for further analysis and no variable needs to be removed from factor analysis.

The total variance explained (table 4.2) has four components – item no. 1 with value 3.270 >1, item no.2 with value 1.655 > 1, item no.3 with value 1.213 > 1, item no.4 with value 1.002 > 1 as initial Eigen value. Thus, the taken set of 12 variables in BFNE with 208 observations represent four components, also the extracted sum of squared holding % of variance depict that the first factor accounts for 27.246%, second

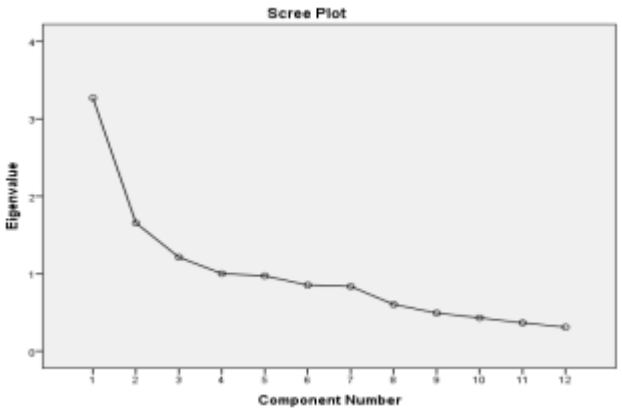

Figure 4.3.1: Scree plot analysis of BFNE Scale

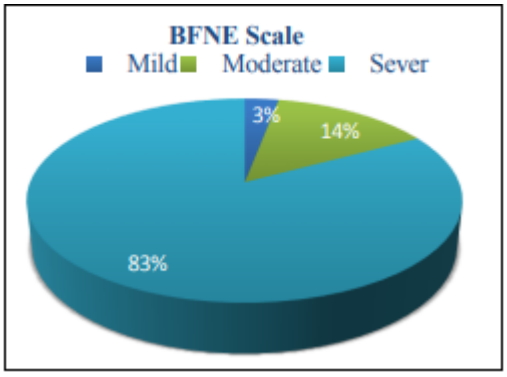

Figure 4.3.2: Percent distribution of severity of FNE

13.792%, third 10.105% and fourth 8.349% of the variance feature. Therefore, Eigenvalue interpretation of four components is considerable to be effective for representing all the ten variables. The same was validated by scree plot too which supports the result of total variance explained i.e. four factors were taken for determination for number of factors to be retained. The component matrix was concluded with four

components extracted, as four factors were retained through scree plot analysis (Figure 4.3.1).

BFNE scale represents a social anxiety trait that shows the sensitivity of a person towards his/her surroundings for being subject to humiliation, criticism, judgment and disgrace by others. Low BFNE scores reflect less sensitivity (mild to moderate) therefore less of an anxious trait too, on the other hand higher BFNE score reflects more sensitivity (severe) towards social anxiety. In this study almost negligible (3%) teenage population (Total 6, including 2 males and 4 females) were found to be little sensitive for fear of negative evaluation. The 83% of the total population were found to have severe sensitivity towards fear of negative evaluation, also it was consistent with GAD-7 and PSS-10 scores as females being more sensitive (62%) than males (38%). This also reflects that the present-day teenage population is significantly sensitive for fear of negative evaluation/social anxiety traits.

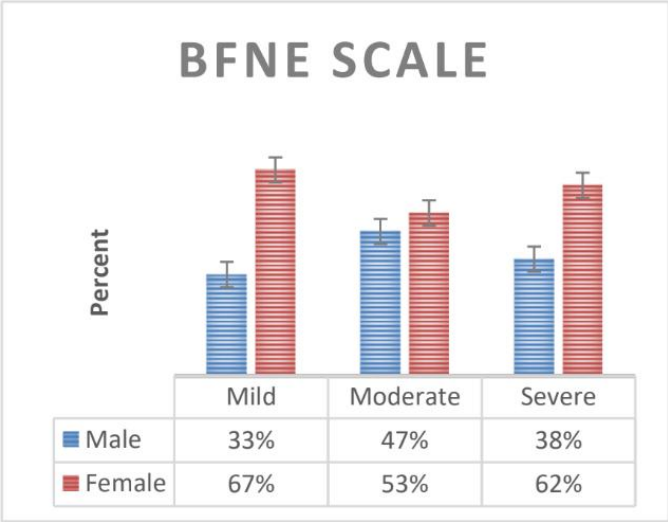

Figure 4.3.3: Percent distribution of FNE by severity and gender

5. Discussion

Stress in any form had been subject of discussion to affect the normalcy of living and reducing the performances in all aspects of life, but it was considered for adults only until recently. Increased cases of undesirable behavior in young populations across the world is being reported even extreme behavior like suicide and killing others. It has been crucial for scientific and social communities to address the causes of this negative development. Under this study, it was hypothesized that teenagers, at present, are facing more stress than ever, which is being reflected in their social behavior and academic performance in the form of undesirable anxiety traits. The result of this study presented debilitating perseverance among our teenage population with more females to male teenagers being on the edge of mental health. More than 70% teenagers have experienced GAD traits above the mild level. Approximately one-third did have severe GAD traits with much more females (68%) affected as compared to males (32%).

The study has concluded that the perceived stress traits were found to be collinear with that of GAD traits under moderate and severe pathological range. Comparing the two scales GAD-7 and PSS-10 for severity- 33% and 39% teenagers were found to be affected respectively. Comparing the moderate level for GAD -7 and PSS-10, perceived stress with 47% is more prevalent among them than GAD with 40% across the sample size. Perceived stress can't be ignored even if person reports self as not affected by GAD because long term persistence of former will eventually lead to development of later one.

The third trait under study i.e. BFNE has more concerning result outcome with 83% of total sample size to fall under severe level of fear of negative evaluation. It reflects that the young citizens are not living with peace of mind which is primary to a healthy mind hence, to a healthy life.

6. Conclusion

While considering the age factor, the severely stressed population percentage is of great concern. It reflects that our teenage population is facing a lot of expectations from family and society which in turn affects their normal mental development and this issue needs sincere attention from primarily by the social scientist followed by the scientific community. Our findings highlight the need for early intervention strategies to manage stress among teenagers and prevent the onset of anxiety disorders. Future research should explore the effectiveness of such strategies in reducing the prevalence of anxiety disorders among teenagers. These findings can be summed up as the increase in anxiety trait or development of GAD (Generalized Anxiety Disorder) among the teenage population is in its genesis phase by the mean of stress exerted upon our teenagers through negative evaluation by their social surroundings which is affecting their cognitive ability of perceiving the stress as normal course of life.

7. Future Scope

The abnormal behavioral outcomes are representation of underlying biological processes, not going as they should be. The broad aspect of this study is to explore the physiological pathways at its molecular level to understand the role of environmental factors in development of anxiety and related behavioral disorders under biochemical paradigm, and also to provide curated strategy to address the problem by social community, the family of affected person being in the center. The outcomes of this study would lead other researchers to make attentive involvement towards progress in these least explored scientific interests.

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