Stress Among College Students is Linked to Headache, PCOS, Hypertension, and Depression: A Cross-Sectional Study

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Abstract

Objective: In the present study, we aimed to find out the prevalence of stress among college students.

Methods: In this descriptive cross-sectional study, a simple random sampling approach was chosen for data collection from different colleges of Jammu & Kashmir (UT). Data analysis was done by using the chi-square test, and the t-test was utilized for discrete and continuous variables respectively. The logistic regression model using odds ratio was utilized to find out the association between the risk variable and the dependent variable.

Results: A total of 1405 college students were included in which stress was found in 60.49% of students with males representing 34% and females 65.88%. Educational stress was found to be the major contributor of stress-type faced by the students with 46.35%. Different disorders were also observed in students including hypertension 2.70%, PCOS (Poly-cystic ovarian syndrome) 2.34%, and depression 2.84%. Stress was found associated with the PCOS with OR: 3.62 [95% CI: 1.4850-8.84, p-value: 0.0047], headache OR: 3.67, hypertension OR: 5.31 [95% CI: 2.06-13.70, p-value: 0.0006] and depression OR: 7.24 [95% CI: 2.56-20.48, p-value: 0.0002].

Conclusion: Educational stress is found to be very common among college students which may alter the prosperous life of students. Female students were seen to be more stressed than male students. Stress has a strong detrimental impact on students' health because it is considerably linked to conditions including hypertension, PCOS, and depression. Therefore, the educational system must need a better strategy that will ensure a better education system.

Keywords: Stress; Educational stress; Hypertension; PCOS; College students

Abbreviations: PCOS: Poly-cystic ovarian syndrome; SAA): Salivary Amylase Activity; FGD: Functional Gastrointestinal Disorders; IBD: Inflammatory Bowel Disease; PU: Peptic Ulcer; UC: Ulcerative Colitis; CRH: Corticotrophin Releasing Hormone; ACTH: Adrenocorticotropic hormone; OR: Odds Ratio; OECD: Organization for Economic Co-operation and Development

Introduction

In today's world, many shortcomings need to be eliminated and education is the one that is often seen as a solution to many social problems. Education is an important instrument that has the power to make a person interactive, self-reliant, social, and disciplined. Education broadens the scope of learning by facilitating knowledge absorption and dissemination among people in order to advance society [1]. Every individual is

bombarded with a multitude of perceptual information in their day-to-day life activities. Apart from such advantageous features of education, the ability to process information is limited and varies from person to person. These cognitive characteristics have the potential to disrupt students' lives periodically, which might result in circumstances that resemble stress and anxiety-like condition. According to physiological definition, stress may be described as "any form of change that results in bodily, emotional, or psychological strain or pressure".

It could result from a traumatic, disappointment, or uneasy encounter or sensation [2]. It is not that stress is bad, "Eustress" describes stress as a "positive, motivating, and enhances functioning feature which leads to the excellent performance" while "distress" refers to bad and overwhelming stress full condition which leads to tiredness, despair, and a variety of other illnesses and thus impairs functioning [3]. Albeit intense or transient pressure can be helpful but ongoing pressure, which goes and remains for a more extended period, is very unfavorable to the body and causes hypertension, weight gain, sadness, and even coronary diseases [4]. The effects of anxiety on students' academic performance were detrimental [5] and besides anxiety, another emotionally uncomfortable disorder that could interfere with a student's life is depression.

Stress affects students' life in a variety of ways, including how they perform academically, socially, physically, and emotionally [6]. Exam stress, a lack of interest in attending lectures, full schedules &responsibilities, lack of sleep, an inability to understand the topic, and academic pressure (pressure to achieve high marks and concerns about receiving poor grades) are some examples of stresses faced by students [7]. The cognitive system becomes overburdened under stressful settings, reducing the student's attention and ability to process the perceived information [8]. Biologically, stress can lead to long-term health complications, chronic illness, and psychiatric conditions such as migraine, PCOS (poly Cystic Ovarian Syndrome), depression, and suicide [9-11].

The Organization for Economic Co-operation and Development (OECD) recently conducted a survey that included 540,000 students aged 15-16 years old from 72 nations which showed that education and academic achievement are major sources of stress for students [5]. Therefore, in the present study, we aim to find out the stress frequency among college students of Jammu division. To our knowledge, this is the first study that included 10 district colleges from our region. The remainder of the paper is laid out as follows: methods utilized in this study are depicted in Section 2, section 3 includes the result of the study, section 4 represents the discussion and the conclusion of the study is present in section 5.

Method

In this present descriptive cross-sectional study, a random sampling approach was chosen for data collection from different colleges in the Jammu division of Jammu & Kashmir (UT). The sample collection was done in two phases i.e., Phase-I (Face-face interview) and Phase-II (E-based sampling).

Sample Collection

A targeted survey was taken in the colleges of the Jammu division to gather data from the different college students. The information was gathered using two different phases, including face-to-face interviews (Phase-I) conducted by an experienced interviewer/ trained interviewer and online sampling/ E-Sampling using a google form (Phase-II). The questionnaire/ Google form was disseminated through emails and social networking sites. The present study design was duly approved by Animal and Human Experimentation Ethical Committee (AHEEC), University of Jammu vide notification number EC: DRS/22/4969.

Filtering and Data Cleaning

A large data set was obtained using the E-based sampling approach, and the data was cleaned and filtered using a variety of exclusion criteria to decrease redundancy and bias. Exclusion criteria include "students that did not belong from the district of Jammu division", "non-college students", "who don't permit for use of their data (incomplete consent)", and also the exclusion of subject data "who gave the partial information".

Data analysis and statistics

For the descriptive data analysis, mean with Standard deviation and frequency distribution were used for the continuous and discrete variables respectively. The chi-square test and the t-test were utilized for the discrete and continuous variables, respectively, in the inferential statistics. The logistic regression model utilizing the odds ratio (OR) was used to determine whether the risk variable and the dependent variable i.e., diseases were associated or not. Online free statistical tools/calculators such as MedCalc's Odds ratio calculator for calculation of Odds ratio, t-test were calculated by graph-pad Home-GraphPad and for chi-square statistics Social Science Statistics (socscistatistics.com) were used to draw out the inference.

Result

A total of 1405 college students were included with a mean age of 19.64 ± 1.32, including 498 males (19.46 ± 1.32) and 907 females (19.74 ± 1.31). We found a highly statistical difference between the age of male and female students among college students (t-test: 3.8220: p-value: 0.0001). The majority of students were belonging to the Hindu community (n=964) in contrast to Muslims (n=412) and with minorities including Sikhs and Buddhists n=27 and n=2 respectively (Table 1) (Figure 2A). Regarding the martial estimates, the frequency of married students was not quite high (0.49%) (Table 1). Lifestyle activity of students has been also observed where it is found the lower frequency of alcohol usage 1.35% (n=19/1405) in which the male participants represent the dominancy 72.68% (n=14/19) over the female 26.31% (n=5/19).
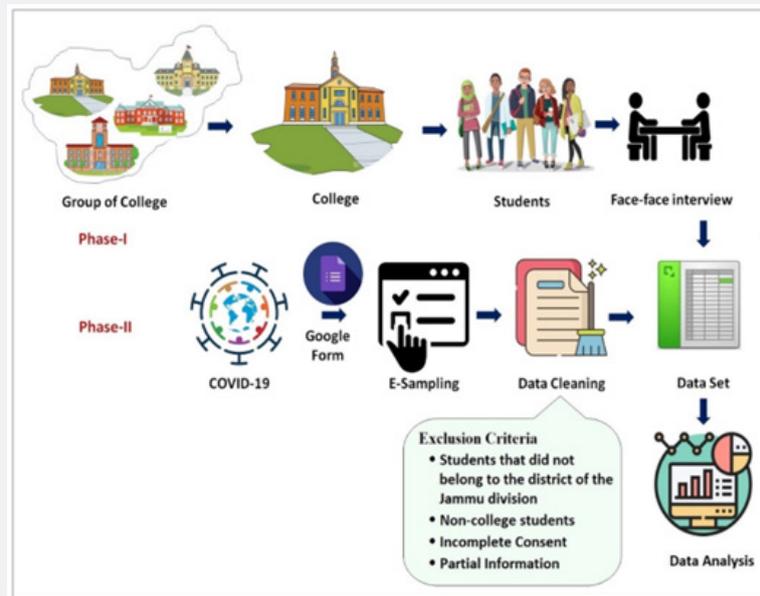
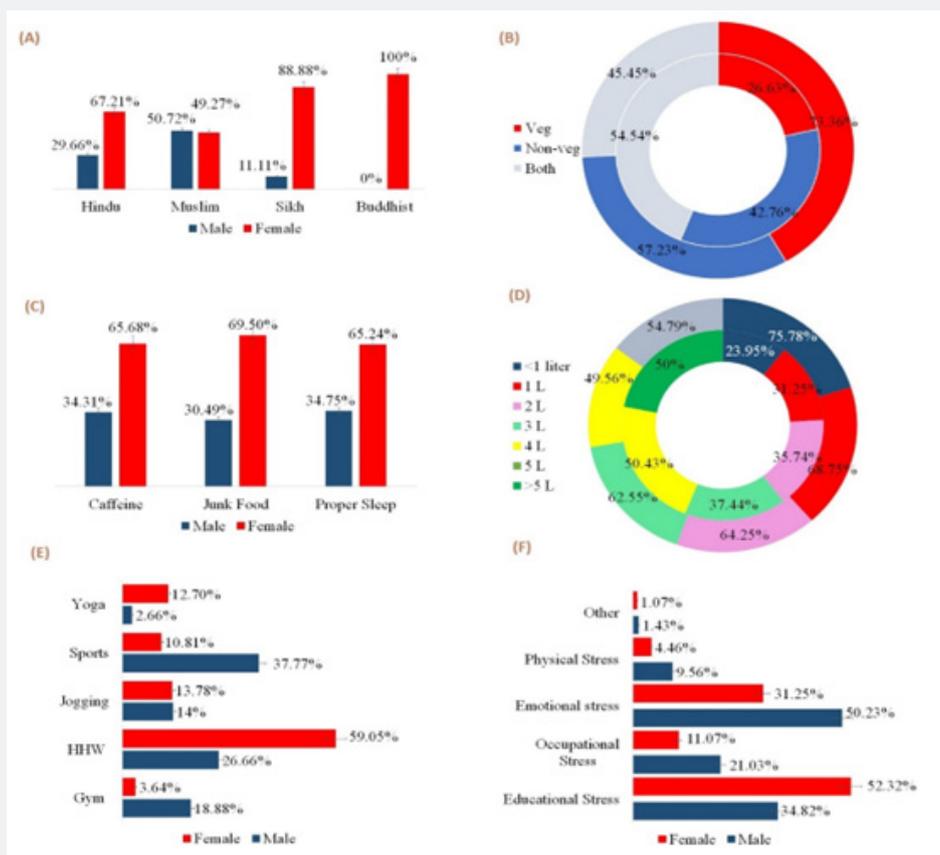**Figure 1:** Schetimetically pictorial representation of the method used in the present study.

Figure 2: (A): Community; (B): Dietry Pattern; (C): (D): Water Intake; (E): Physical activity; (F): Column graph depicts the number of students suffering from the different kind of stress. Female students show the maximum of educational stress and emotional stress as compared to the male students.

Table 1: Demographic data distribution.

Variable	Grouping	Total (n) (%)	Male (n) (%)	Female (n) (%)
Sample size	N/A	1405	498 (35.44%)	907 (64.55%)
Marital status	Married	7 (0.49%)	6 (85.71%)	1 (14.28%)
	Unmarried	1398 (99.50%)	492 (35.19%)	906 (64.80%)
Community	Hindu	964 (68.61%)	286 (29.66%)	678 (67.21%)
	Muslim	412 (29.32%)	209 (50.72%)	203 (49.27%)
	Sikh	27 (1.92%)	3 (11.11%)	24 (88.88%)
	Buddhist	2 (0.14%)	0 (0%)	2 (100%)
Water intake	<1liter	190 (13.52%)	46 (23.95%)	144 (75.78%)
	1 L	336 (23.91%)	105 (31.25%)	231 (68.75%)
	2 L	428 (30.46%)	153 (35.74%)	275 (64.25%)
	3 L	227 (16.15%)	85 (37.44%)	142 (62.55%)
	4 L	115 (8.18%)	58 (50.43%)	57 (49.56)
	5 L	73 (5.19%)	33 (45.20%)	40 (54.79%)
	>5 L	36 (2.56%)	18 (50%)	18 (50%)
Diet	Veg	766 (54.51%)	204 (26.63%)	562 (73.36%)
	Non-veg	463 (32.95%)	198 (42.76%)	265 (57.23%)
	Both	176 (12.52)	96 (54.54%)	80 (45.45%)
Caffeine	N/A	982 (69.89%)	337 (34.31%)	645 (65.68%)
Junk Food	N/A	564 (40.14%)	172 (30.49%)	392 (69.50%)
Proper Sleep	N/A	1102 (78.43%)	383 (34.75%)	719 (65.24%)
Physical activity		1405 (100%)	450 (32.02%)	740 (52.66%)
	Gym	112 (7.97%)	85 (18.88%)	27 (3.64%)
	HHW	557 (39.64%)	120 (26.66%)	437 (59.05%)
	Jogging	165 (11.74%)	63 (14%)	102 (13.78%)
	Sports	250 (17.79%)	170 (37.77%)	80 (10.81%)
	Yoga	106 (7.54%)	12 (2.66%)	94 (12.70%)

Also, the increased smoking habit was observed in males 71.42% (n=15/21) in contrast to female students 28.57% (n=6/21). Around 1190 students (84.69%) were observed to do physical activities including n=450 males (37.81%) and n=740 female (62.18%) (Figure 2E) (Table 1). Regarding the dietary pattern, it was observed that 32.95% (n=463) were non-vegetarian (n=766) were vegetarian and 12.52% (n=176) take both (veg % and non veg.) and with respect to the caffeine 69.89% (n=982) were taken caffeine out of which32.29% (n=327) were occasional (Figure 2B) (Table 1). Stress was found in 60.49% students (n=850/1405) with the male representing 34% (n=290/850) and female 65.88% (n=560/850). We observed statistically significant difference (t-test = 3.3926, p-value: 0.0007) between the age

difference between stressed males (19.46±1.33) and females (19.78±1.29).

The frequency of the different types of stress was observed (Table 2) and the educational stress was at the top representing 46.35% including 34.82% (n=101/290) and females 52.32% (n=293/560) (Figure 2F). Different disorders were observed in students which include hypertension 2.70% (n=38/1405), PCOS (Poly-cystic ovarian syndrome) 2.34% (n=33/1405), and depression 2.84% (n=40/1045). To find out the risk attribute associated the condition Odds ratio (OR) were utilized. Stress was found associated with the headache OR: 3.67,95% CI: 2.92-4.60, (p value: <0.0001), PCOS with OR: 3.62 [95% CI: 1.4850-8.84,

p-value: 0.0047], hypertension OR: 5.31 [95% CI: 2.06-13.70, p-value: 0.0006] and depression OR: 7.24 [95% CI: 2.56-20.48, p-value: 0.0002]. Also, caffeine risk on hypertension and PCOS were also observed including OR: 5.24 [95% CI: 1.60-17.17, p-value: 0.0061] and OR: 3.12 [95% CI: 1.13-9.34, p-value: 0.027] respectively.

Table 2: Different form of stress among students.

Type of stress/ Sex	Male (290) (%)	Female (560)	Total (805)
Educational Stress	101 (34.82%)	293 (52.32%)	394 (46.35%)
Occupational Stress	61 (21.03%)	62 (11.07%)	123 (14.47%)
Emotional stress	105 (50.23%)	174 (31.25%)	279 (32.82%)
Physical Stress	20 (9.56%)	25 (4.46%)	45 (5.29%)
Other	3 (1.43%)	6 (1.07%)	9 (1.05%)

We also observed the bidirectional association of headache and hypertension and found a significant increase of risk i.e., headache to hypertension OR: 14.65, 95% CI: [6.59-32.57], (p-value: 0.0001) and hypertension to headache OR: 3.61, 95% CI: [1.64-7.94] (p-value: 0.0014). Stress was also found significantly (p value <0.0001) associated with the risk of anxiety (OR: 2.66, 95% CI: [2.07-3.43] and risk of stomachache (OR: 2.26, 95% CI: [1.17-2.85]) (Table 3). Educational stress was found significant (p value: <0.0001) responsible for increasing the likely hood of headache by 3.8-fold (OR:3.84, 95% CI: 2.92-5.05). Emotional stress was found to be a high-risk variable associated with hypertension with an OR: 2.74 [95% CI: 1.35-5.54, p-value: 0.0050]. Also, the association between emotional stress and PCOS was observed with an OR: 1.14 [95% CI: 0.50-2.58] but did not reach at statistical significance (p-value: 0.74).

Table 3: Stress associated with different disorders in students.

Disorder	Odds Ratio (OR)	95% Confidence Interval (CI)	P-value
Hypertension	5.31	2.06-13.70	0.0006
Headache	3.67	2.92-4.60	<0.0001
Depression	7.24	2.56-20.48	0.0002
Anxiety	2.66	2.07-3.43	<0.0001
Stomach	2.26	1.17-2.85	<0.0001

Discussion

Education has a crucial role in society since it may influence people's attitudes, ways of thinking, and behaviors [12]. But stress which is an inevitable part of life has a detrimental effect on student's physical and emotional health as well as their academic performance. In the present study, we observed that college female students were more stressed than the male participants, with the female group showing higher levels of educational stress (Figure 3F). Also, emotional stress was found to be more frequent in the female group as compared to the male students (Figure 3F). College students experience stress due to increased workload, new responsibilities, poor time management, and interpersonal relationships [13].

In comparison to our study, many research studies have provided significant data on stress and students and their relationship. According to Waghachavare and colleagues, 25.1% of medical students, 28.7% of dentistry students, and 19.7% of engineering students reported feeling stressed out. In comparison to the gender disparity, female students were found to be more stressed than the male participants [14-16]. According to published data, secondary school students had a medium degree of tension, with females being shown to be more stressed [17]. In the college institution, more than one-fifth of college students suffer from mental problems [18] and the academic domain was the most common source of stress, followed by the social activity area, and group activity domain [19]. Regarding the academic domains, science, and commerce domains students were shown to be more academically stressed than the students in the arts, management stream, and humanities [20]. The fact is that most of the female respondents feel stress in their college life because of fear of failure [21,22].

Reasons for the stress among the students were found the lack of appropriate support, a variety of personal and social issues, academic pressure, extracurricular activities, assignments overburden, and most importantly parents want their children to

participate in the rat race and outperform their peers to improve their social status, the attitude of faculty members [16,23,24]. Rana and colleagues reviewed that stress can be either bad or positive for a person, depending on the severity and duration of the stress, the person's personality, cognitive assessment of the stress, and social support. They must be raised in a positive environment and more attention is paid to the child's growth as they enter adolescence [7]. Extreme stress can make it difficult to work effectively, as well as cause poor academic achievement and reported poor health and a lower quality of life [13] and there was no association between high-stress levels and students' age [15].
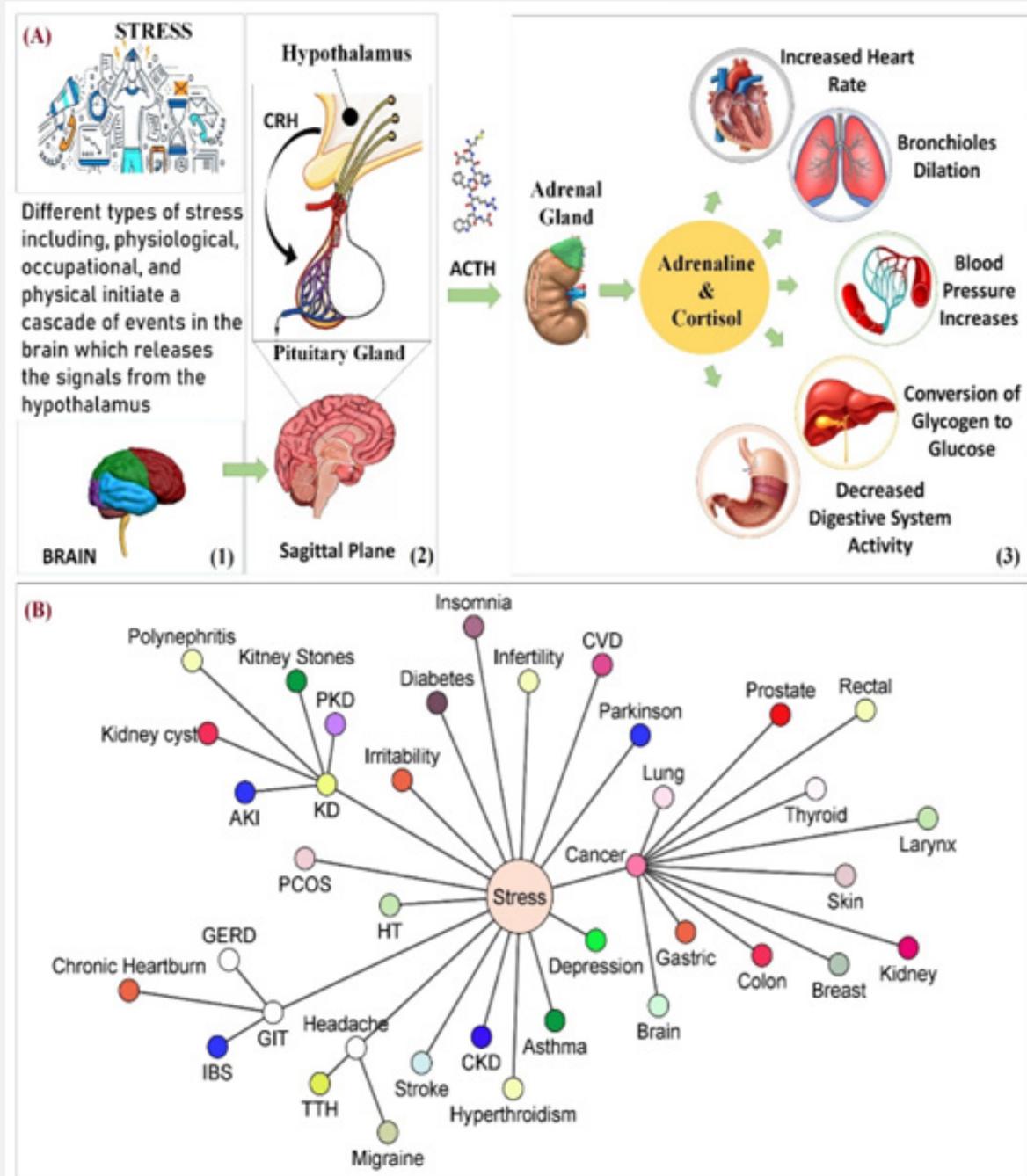

Figure 2: (A): Community; (B): Dietry Pattern; (C): (D): Water Intake; (E): Physical activity; (F): Column graph depicts the number of students suffering from the different kind of stress. Female students show the maximum of educational stress and emotional stress as compared to the male students.

The biological aspect of stress is complicated where stress has much negative feedback. One such example is the stress-induced stimulation of the hypothalamus to secrete CRH (Corticotrophin releasing hormone) which then further stimulates the anterior part of the pituitary gland to release ACTH (Adrenocorticotropic hormone) [25]. ACTH flows down from the brain to the kidney through the bloodstream (endocrine signaling) and binds to the specific receptor on the Adrenal gland (located on the kidney) and stimulus to secrete the adrenaline and cortisol. Adrenaline and cortisol alter the homeostatic mechanism of the different systems including heart rate, dilation of bronchioles, increasing blood pressure, increasing blood glucose level by converting glycogen, and decreasing digestive activity (Figure 4). Long-term and continuous stimulus results in a dysregulated mechanism which leads to different diseases such as heart diseases [26], asthma [27], Obesity, Diabetes [28], headaches including migraine [11], depression [29] and anxiety [30], gastrointestinal problems [31], Alzheimer's disease [32] etc. (Figure 5).

In the present study, we have observed that stress negatively impacted the reproductive health of females where it significantly increases the chance of PCOS (Poly-cystic Ovarian Syndrome) OR: 3.62 [95% CI: 1.4850-8.84, p-value: 0.0047]. Also, structural changes in blood vessels i.e., hypertension found to be significantly associated with stress with OR: 5.31 [95% CI: 2.06-13.70, p-value: 0.0006]. Mental status among students is the seed for progress but stress has created a distressing environment for the brain and alters its normal activity. We have also observed that stress increases 7 times more chance of depression among students with OR: 7.24 [95% CI: 2.56-20.48, p-value: 0.0002]. Emotional stress was found to be a high-risk variable associated with hypertension with an OR: 2.74 [95% CI: 1.35-5.54, p-value: 0.0050]. Also, the association between emotional stress and PCOS was observed with an OR: 1.14 [95% CI: 0.50-2.58] but was not reached statistical significance (p-value: 0.74). Students have a lot of stress related to their academics, where we found that educational stress is significantly associated with the increased likelihood of headache (OR:3.84).

PCOS results in low self-esteem which causes the majority of psychiatric conditions, such as depression and suicide [9]. Stress-related factors such as Salivary Amylase Activity (SAA) and salivary cortisol levels were found to be higher in PCOS patients than in age-matched controls, implying an exaggerated response of the central stress stations in the affected women [33,34]. Early life stress such as abuse, and school bullying play a significant effect on the susceptibility to develop FGD (Functional Gastrointestinal Disorders) and IBD (Inflammatory Bowel Disease) later in life [35], gastrointestinal conditions like peptic ulcer disease (PU) and ulcerative colitis (UC). Psychological stress has been found to negatively impact the immune system which worsens the number of skin and hair conditions like psoriasis, alopecia areata, and atopic dermatitis [36].

Humensky and group have shown that self-reported depressive symptoms were associated with concentration difficulties and difficulty completing school tasks between 14 to 21 aged students in the United States were at risk for major depression [37]. One-fifth of college students had mental problems, indicating that mental health is a serious problem that increases with the children's grade level [18]. These findings imply that there is a strong link between stress or stress-related factors and altered body composition. Also headache and hypertension has been found to be linked with each other (comorbid conditions) [38,39] and this might be due to the presence of diverse risk attributes such as environmental including stress and genetic factors [40].

To this end, the future of any nation lies in its students, who are blessed with incredible abilities; we simply need to discover them. Despite of advanced learning and teaching approach, enhancement of students is not at its peak. Stress is a major reason for the decreased development of students which negatively impacted their health, social status, future goals, their academic life, and many other important life aspects. Therefore, emphasizing the value of research, improving pupils' growth may be accomplished by suggesting some coping mechanisms like college students should pay attention to their health and nutrition, take proper sleep, manage their time effectively, practice self-care, make connections with others, maintain healthy relations, focus on physical activities, use relaxation techniques like meditation, live organized life, practice positive thinking etc. All of these will help college students to increase their overall health and can reduce stress. Avoiding stress decreases and increases the likelihood of disease occurrence and happy and healthy existence respectively.

Conclusion

If a healthy solution cannot be found, stress can have a negative influence on academic performance and mental health. Therefore, there must be needed a system that will ensure a better education system. Colleges must develop coping strategies to reduce stress triggers and improve student experiences by identifying the causes of stress (financial struggles, academic pressure, student-teacher relationship, conflict with a roommate, family issues, relationship issues, career problems, post-graduation plans etc.) which disrupts student's daily activities and how to manage it.

Acknowledgment

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