

# **Evaluation of Stress and Its Correlation with Anthropometric Parameters among Software Industry Professionals**

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**Abstract:** The present study aimed to assess the level of stress perceived by software professionals by correlation stress, anthropometric parameters and blood pressure. This cross sectional study included 155 participants working in software companies across Karnataka. Data about stress was collected using perceived stress scale. Body mass index was calculated from the recorded Height & weight of the participants. Their resting blood pressure was recorded. Analysis was done using descriptive one way analysis of variance and Pearson's correlation coefficient. Among the obese employees, 16.2% participants had severe stress level and 62% showed moderate level stress and 85% of underweight employees showed moderate amount of stress. The mean value of systolic and diastolic blood pressure of highly stressed individuals was significantly ( $p < 0.05$ ) higher when compared to the less stressed group. In conclusion, this study showed a definite association of psychological stress with obesity and blood pressure.

**Keywords :** Body mass index, Blood pressure, Obesity, Perceived stress scale, Software professional.

## **I. INTRODUCTION**

In the 21st century, stress is a well known factor affecting health of an individual. Stress is one factor which may influence behaviors and health especially when an individual faces challenges that surpass his or her coping skills[1]. Stress reactions vary from person to person. Many of life's demands such as work, relationships, financial problems, health problems could cause stress. Stress can affect how one feels, thinks, behaves. Psychological stress may show up as headache, muscular ache, sleeping difficulties, eating disorders, loss of appetite, lack of concentration, memory impairment, fatigue, restlessness, agitation or depression[2] Hans Seyle[3], defined stress as body's non-specific response to any demand placed upon it whether it is caused by, or results in pleasant or unpleasant conditions. Richard Lazarus in 1974 published a model dividing stress into eustress and distress[4]. He stated that where stress (whether physical or mental) enhances function it is considered eustress, whereas persistent stress which is not resolved by coping or adaptation may lead to anxiety or depression which is distress. In our institute we conducted a study on Medical students, which revealed mild stress among them during examination enhancing their performance, which we interpreted as eustress[5]. Obesity is one of the risk factor that precipitates many cardiovascular diseases[6] Obesity is determined by body mass index[7] Association between stress and BMI involve diet and physical activity[8]. Occupational stress occurs when there is discrepancy between the demands of work place and an individual's ability to carry out the work and complete the demands[9]. Any kind of stress is known to increase the blood pressure up to a certain extent[10,11]. The increase in blood pressure occurs due to increase in sympathetic activity [12-13]. High work stress has a definite association with cardiovascular diseases[14-16]. This association could be derived from detrimental effects on blood pressure by recurrent autonomic system reactivity to work related stressors[17-

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19]. Software industry is one of the highest employer of young people in India. We in this study aim to explore the association between work place stress and obesity and the effect of stress on blood pressure in software professionals.

## II. MATERIAL AND METHODS

Study population comprised of all software professionals working in different software companies across Karnataka. This included programmers, developers, project managers etc. A total of 155 employees were included in the study.

Inclusion criteria : 1. Healthy subjects working in software professional for atleast 3 months.

2. Daily working of minimum 6hrs

Exclusion criteria: 1. History of major illness in the recent past

2. History of family distress in the recent past

At the outset, all the participants were explained the purpose, procedure and the confidentiality prior to their written informed consent. Institutional ethical committee clearance was obtained before commencement of the study. A standardized questionnaire perceived stress scale 20 used to assess stress levels were handed over to each participant. Each of the question was explained to the participant and the response was noted. Along with it demographic data was collected. Height (in meters) and weight (in kilograms) of each participant was recorded and body mass index was calculated. Resting Blood pressure was measured manually using sphygmomanometer in supine position.

Employees were grouped based on age, gender, marital status, work experience and type of work.

Age wise grouping : 20-25 years , 26-30 years , >30 years

Gender wise : Male, Females

Work experience : 1-5 years, 6-10 years, >11 years.

Type of work : Group A – desk job, HR recruitment,

Group B – consulting, project manager, domain lead.

Group C- programmer, developer, data analysis, data administration.

Group D- IT support, production support, application support.

### Experimental results

The data collected was entered in SPSS software and analyzed by Pearson’s chi square test, correlation coefficient & descriptive analysis. P value less than 0.05 was considered significant. The PSS scores among the underweight, Normal, Overweight and Obese were analyzed separately and compared.

**Table 1: PSS score among the study group, Under-weight, Normal, Overweight and Obese subjects (Total n= 155), Values = Mean ± SD**

BMI	PSS score Group Mean±SD	PERCEIVED STRESS SCALE		
		MILD	MODERATE	HIGH
UNDERWEIGHT (n=7)	21± 3.92	(0)	19.67±1.86 (6)	29 (1)
NORMAL (n=111)	16.01±4.70	10.73±2.61 (30)	17.55±3.10** (78)	28.67±0.58***†† (3)
OVERWEIGHT (n=24)	19.58±5.01*	11.50±1.73 (4)	20.55±3.26 (18)	27±0 (2)
OBESE (n=13)	16.77±9.30	6.5±0.58 (4)	15.2±0.45 (5)	29±1.16 (4)

PSS score: \* Normal vs Overweight: p<0.05; mild v/s mod- p<0.001

The group mean PSS scores among them were significantly varied (Table 1). Among these groups, underweight subjects showed highest PSS Score, however this value is unreliable because their number was very low (n=7). Group PSS scores from those with Normal BMI was lower than those in overweight category (p<0.05). In the present study, involving 156 subjects, 111 subjects were of normal BMI range. Among them 78 showed moderately elevated stress levels (PSS 17.55±3.10), and only 3 subjects showed high PSS (Table 1).

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**Table 2: PSS score among the study group in different age groups and gender. Values Mean ± SD.**

STRESS SCORE	AGE			GENDER	
	20-25	26-30	More 30	MALE	FEMALE
PSS (mean )	16.721±5.70 (n=43)	15.63±4.1 (n=68)	18.86±5.91** (n=44)	16.9±5.58 (n=110)	16.6±5.04 (n=45)
P VALUE	** 0.01			0.737	

PSS score: \* 20-25 yrv/s More than 30 p<0.01

In overweight category, (n=24) 18 subjects had moderately increased stress score. Only two of them showed high PSS score. A comparison of PSS scores among the three age groups revealed an increases score among the age group of more than 30 years (p<0.01) There was no significant variation among the 20-25 years and 26-30 years groups. There was no significant difference in PSS scores of males and female subjects (Table 2).

**Table 3: PSS score among the study group in different years of experience and type of Job. Values Mean ± SD.**

STRESS SCORE	WORK EXPERIENCE(yrs)			TYPE OF JOB			
	0-5	6-10	More 11	A	B	C	D
MEAN VALUE	16.42±5.33 (n=79)	15.69±4.58 (n=48)	20±5.91 (n=28)	19.56±6.23 (n=9)	15.64±5.47 (n=42)	17.32±5.37 (n=78)	16.46±4.92 (n=26)
P-VALUE	0.001 (VHS) **			0.17			

PSS score: 0-5 years v/s more than 11 years: p<0.01

Stress levels were found to be high in the group who had more than 10 years of experience, when compared to those with less than 10 years of experience (p<0.01) (Table 3). Positive correlation has been observed between the systolic Blood Pressure and the PSS score (Table 4) where the high stress group had elevated systolic pressure compared to low stress group (p<0.01). Diastolic blood pressure was also elevated in the high stress group. However, none of the participants had high enough blood pressure, which can be considered as hypertension clinically.

**Table 4: Blood pressure in mild, moderate and high stress category of subjects.Values Mean ± SD.**

PERCEIVED STRESS	BLOOD PRESSURE	
	SYSTOLIC mm Hg	DIASTOLIC mmHg
MILD (n=38)	128±8.22	80±7.52
MODERATE(n=107)	130±7.61	82±7.410
HIGH(n=10)	140±6.72**	88±4.50**

Systolic & Diastolic pressure in mild vs high (p<0.01)

### III.DISCUSSION

Stress is considered as a ubiquitous issue and it is essential for the normal growth and development[2,5]. However elevated stress induces several physiological responses which eventually may be too detrimental. Software industry is one of the highest employer in India, where young professionals are engaged in rigorous mental work. We in the present study evaluated the stress levels among a group of professionals from software industry. Due to worldwide recession of last few years, the software industry employees are subjected to uncertainties and fear of job loss, which may induce stress. In the present study we correlated PSS scores with their anthropometric parameter, BMI. In overweight subjects, the PSS score was high. This suggested that the there was a correlation between the stress score and obesity. It is also evident among Obese subject, where about 70 % of them were either moderately stressed or highly stressed .Our study also confirms the earlier reports that stress had been associated with obesity-related

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behaviors among adults[21-23].The high prevalence of obesity is a major public health problem because of the association of obesity with chronic health conditions such as coronary heart disease, type 2 diabetes [24]. The increase in prevalence during the last several decades more likely stems from environmental factors at multiple levels than genetic changes[25].Sedentary office workers in stressful job will have altered eating behavior, may have high BMI and are obese as reported by Kivimaki et al[26,27]. Blood pressure was well correlated with the stress was known to be affected by the psychological disturbances and fluctuations in the autonomic functions[28,29]. Stress increases sympathetic activity and decreases parasympathetic activity[30]. In our study, a correlation could be seen in the PSS scale and Systolic blood pressure. This finding is in line with the recent articles published [31,32].

## IV. CONCLUSION

Occupational stress has a strong association with obesity and hypertension. We conclude that work place stress appears to rise on an alarming rate in the Indian scenario. Promoting healthy eating habits and adapting an exercise regime may help control obesity. Practicing relaxation techniques like yoga, meditation are useful ways to de-stress at the individual level. Counseling sessions could be provided to overcome stress. Since this study was conducted during worldwide recession, the stress level could be high among the midlevel employees. Therefore the work place should offer happiness, peace of mind, certainty and flexibility rather than compromise on one's health and personal life.

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