Research Article

OBESITY, SMOKING AND STRESS: EXPLORING CORRELATES OF STRESS

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Abstract

The objective of the study was to explore the potential correlates of stress. The stress was measured on some common symptoms like feeling tension, headache, abnormal appetite, blood pressure, physical energy, feeling tired. The data was collected from Faisalabad district using a planned questionnaire covering information concerning different stress indicators and life habits. Marital status, Gender, habit of late hours working, educational level, smoking and BMI were considered to be potential contributory factors. Using cross tabulation and chi-square test of association, marital status (p-value=0.0398), late working habits (p-value=0.0005), education (p-value=0.0133) were found to be associated with stress. In addition, smoking habit (p-value <0.0001) and BMI (p-value <0.0001) were highly associated with stress. It was found that gender is not significantly associated with stress (p-value=0.2815).

Keywords: BMI, Obesity, Quartile analysis, Smoking, Stress, Stress indicators

INTRODUCTION

Stress is a common and growing phenomenon in societies of the present age. According to the World Health Organization the “Stress” is entitled as the “Health Epidemic of 21st Century”. Anything that seriously threatens the “homeostasis” (that is the state of internal, physical and chemical conditions maintained by the body) is termed as Stress. The external factors for stress can be anger, frustration, anxiety (1-3). Therefore, stress can be defined as a process in which chemical, physical or psychological factors lead towards mental tension and subsequently towards disease that may range from memory impairment (4) to psychological problems like child abuse (5). The stress problem can be acute or chronic. Acute stress can be least damaging that can begin shortly after an accident or a trauma or any unpleasant incident, whereas chronic stress is a prolonged and constant sense of feeling pressurized and stressed that can negatively affect the health if left untreated. To differentiate between exposures to the stress factors and events and responses to those events is a significant distinctive study. The present study focuses on acute stress by measuring the stress levels of different genders at different statuses, which can be due to over work, meeting time limit pressure, minor accidents, or increased extra physical activity. Symptoms of this type of stress are headaches, back pain, stomach problems, fast heartbeat and body pain.

Although different factors, like inappropriate term, lack of self-confidence etc. have been identified as correlates of stress however, of the work on stress is limited in exploring its connection with job satisfaction and other job-related factors (6-11). The link between food habits and stress levels is established (12-14). Some other factors like, gender, marital status, age, social environment, cultural norms, social and economic conditions have also been identified to correlate with stress level in different countries (15-21).
For Pakistani society, Mujeeb and Zubair (2012) tried to explore the causes of stress by taking a sample of 125 people from Rawalpindi (22). They concluded that people having migrated from their family areas are more stressed compared to others. Focused on only migration issues and relatively small samples were major limitations of study. The stress intensity and indicators were compared for Pakistanis and Americans and it was concluded that Pakistanis are in more stress in than Americans (23).

Keeping in view the relative scarcity of studies on correlation of stress for Pakistani society, there is an ample space for the present study which focuses on exploring determinants of stress in Pakistan by taking Faisalabad city as a case study.

**METHODOLOGY**

To identify potential contributory factors of stress, the present study collected data from 390 individuals from Faisalabad city. The sample size was determined by following formula given in Krejcie and Morgan (24).

\[ n = \chi^2 NP(1 - P) + (d^2(N - 1) + \chi^2 P(1 - P)), \]

where \( n \) is necessary sample size, \( \chi^2 \) is the tabulated value of chi-square for 1 degree of freedom (3.841), \( N \) is the size of population (taken as approximately 8 million for Faisalabad), \( P \) is the proportion of the population (0.50 so that it would give maximum sample size) and \( d \) is the degree of precision expressed as a percentage (0.05 which is common in such studies). The formula provided a sample size of 385 individual.

The data was collected through a designed questionnaire which was administered to respondents in face-to-face interviews. The questionnaire consisted of information about weight, age, different life habits, and some well-organized questions about level of stress that respondent faces. Precisely, the study explores the association of educational level, marital status, gender, smoking habit, habit of working late and body mass index with stress levels of individuals.

**MEASURING STRESS**

Stress was measured on six common symptoms/indicators (Feeling tension, Headache, Abnormal appetite, Blood pressure, Physical energy, Fatigue/ Energy loss). The respondents were asked demonstrate about last 15 days and report their response on scale of 1 to 5 points about each stress indicator. The scores on these six indicators were then added to compute a stress index of each individual. Finally, stress level (nominal, mild, moderate, severe) of each individual was determined on the basis of quartile analysis, specifically:

- Stress Level 1 (Nominal stress): if Stress Index < \( Q_1 \)
- Stress Level 2 (Mid stress): if \( Q_1 \leq \text{Stress Index} < Q_2 \)
- Stress Level 3 (Moderate Stress): if \( Q_2 \leq \text{Stress Index} < Q_3 \)
- Stress Level 4 (Severe stress): if Stress Index > \( Q_3 \)

where \( Q_1, Q_2 \) and \( Q_3 \) are lower, middle and upper quartile values of stress index.

**INDEPENDENT VARIABLES**

Independent variables gender, smoking and marital status were taken as nominal scale variables while habit of working late, education and obesity were measured at ordinal scale. For obesity, following Aslam et al. (25), standards by WHO (26) for Asia-pacific region were used.

**ANALYSIS**

The relatedness and significance of the different potential determinant of stress levels were assessed using some common statistical methods like frequency analysis and Chi-square test of association.

**RESULTS AND DISCUSSION**
In Table I, the results show a significant difference between marital status and level of stress as it indicates that respondents living single are under more stress compared to married persons.

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Nominal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>37 (26%)</td>
<td>34 (24%)</td>
<td>53 (37%)</td>
<td>18 (13%)</td>
</tr>
<tr>
<td>Married</td>
<td>95 (38%)</td>
<td>54 (22%)</td>
<td>64 (26%)</td>
<td>35 (14%)</td>
</tr>
</tbody>
</table>

The chi-square test also shows a significant association between marital status and stress level ($p$-value=0.0167). Table II, frequency analysis provides evidence that people with more education are expected to have less stress. Low $p$-value (0.0133) associated with chi-square test of independence indicates a significant association between educational and stress levels.

<table>
<thead>
<tr>
<th>Education</th>
<th>Nominal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matric</td>
<td>14 (28%)</td>
<td>15 (30%)</td>
<td>16 (32%)</td>
<td>5 (10%)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>14 (29%)</td>
<td>12 (25%)</td>
<td>17 (35%)</td>
<td>5 (10%)</td>
</tr>
<tr>
<td>Graduation</td>
<td>41 (38%)</td>
<td>17 (16%)</td>
<td>35 (32%)</td>
<td>16 (15%)</td>
</tr>
<tr>
<td>Master</td>
<td>42 (28%)</td>
<td>42 (28%)</td>
<td>44 (29%)</td>
<td>22 (15%)</td>
</tr>
<tr>
<td>M. Phil</td>
<td>21 (64%)</td>
<td>2 (6%)</td>
<td>5 (15%)</td>
<td>5 (15%)</td>
</tr>
</tbody>
</table>

It was investigated that whether people having a habit of late working in offices were under more stress or not. The results (frequency analysis as well as association tests) given in Table III, indicate that generally individuals often working late hours have higher stress levels.

<table>
<thead>
<tr>
<th>Work Late</th>
<th>Nominal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>44 (42%)</td>
<td>28 (26%)</td>
<td>27 (25%)</td>
<td>7 (7%)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>69 (40%)</td>
<td>34 (20%)</td>
<td>46 (26%)</td>
<td>25 (14%)</td>
</tr>
<tr>
<td>Mostly</td>
<td>8 (47%)</td>
<td>2 (12%)</td>
<td>5 (29%)</td>
<td>2 (12%)</td>
</tr>
<tr>
<td>Always</td>
<td>11 (15%)</td>
<td>15 (21%)</td>
<td>29 (40%)</td>
<td>17 (24%)</td>
</tr>
</tbody>
</table>

Concerning stress gender-wise, the study revealed no significant differences in male and females’ stress levels. Repeatedly again ($p$-value=0.2815) given in Table IV.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Nominal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>59 (31%)</td>
<td>50 (26%)</td>
<td>54 (28%)</td>
<td>28 (15%)</td>
</tr>
<tr>
<td>Female</td>
<td>73 (37%)</td>
<td>38 (19%)</td>
<td>63 (32%)</td>
<td>25 (13%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Smoking</th>
<th>Nominal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>113 (41%)</td>
<td>63 (23%)</td>
<td>76 (27%)</td>
<td>26 (9%)</td>
</tr>
<tr>
<td>Yes</td>
<td>19 (17%)</td>
<td>25 (22%)</td>
<td>41 (37%)</td>
<td>27 (24%)</td>
</tr>
</tbody>
</table>
The results presented in Table V provide an important insight for society, i.e. smokers are expected to be under more severe stress than non-smokers with a \((p\text{-value} < 0.0001)\). Finally, Table VI presents cross tabulation of obesity levels and stress levels.

**Table VI. Cross tabulation of stress level and obesity**

<table>
<thead>
<tr>
<th>Stress Level</th>
<th>Nominal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>(\chi^2) statistic ((p\text{-value}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under-Weight</td>
<td>11(13%)</td>
<td>16(19%)</td>
<td>41(49%)</td>
<td>15(18%)</td>
<td>94.35 (&lt;0.0001)</td>
</tr>
<tr>
<td>Normal</td>
<td>102(55%)</td>
<td>37(20%)</td>
<td>29(16%)</td>
<td>17(9%)</td>
<td></td>
</tr>
<tr>
<td>Moderate-Obesity</td>
<td>19(19%)</td>
<td>31(31%)</td>
<td>32(32%)</td>
<td>19(19%)</td>
<td></td>
</tr>
<tr>
<td>Severe-Obesity</td>
<td>0(0%)</td>
<td>4(19%)</td>
<td>15(71%)</td>
<td>2(10%)</td>
<td></td>
</tr>
</tbody>
</table>

Convincing evidence that obesity leads to increase stress as individuals not in the normal range of Body Mass Index (BMI) have reported higher levels of stress. The substantially low \(p\text{-value} < 0.0001\) also indicates a strong connection between obesity and stress. The results of the present study are in lines with findings of the previous studies (27–29) particularly with respect to connection between BMI or obesity and stress.

**CONCLUSION**

The present study focused on exploring different correlates of stress. The stress was measured on six different stress indicators frequency analysis and statistical tests of association, marital status, habit of late hour working, smoking, obesity and education were found to be significantly associated with stress levels. It is also found that there are no gender differences in stress. From findings of present study, it may be concluded that stress can be effectively reduced by avoiding smoking and maintaining physical health in terms of BMI which can be achieved by taking a healthy diet, proper sleep and physical activity, including aerobic activities (walking, cycling, playing, swimming), flexibility (stretching, yoga) and muscle-strengthening on a daily basis.

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Authors declare that there is no conflict of interest.

**Research involving animals:**

Not Applicable.

**Informed consent:**

Written informed consent was obtained from all subjects before the study.

**Ethical approval:**

Ethical approval for this study was obtained from the Institutional Review Board of Government College University Faisalabad.

**References:**


