



Awareness about the effect of stress on muscles among undergraduate students

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ABSTRACT



Stress affects the body in many ways and causes various damages to the body. Some of the effects include headache, heart problems, fatigue, reduced memory, asthma and insomnia. When the body is stressed, muscles tense up as a reflex action to protect the body against injury. Chronic stress will cause the muscles in the body to be in a state of constant guardedness and leads to stiffness of muscles. This causes muscle pain. The aim of this study is to analyze the awareness level about the effect of stress on muscles in undergraduate students. A cross-sectional survey was conducted among undergraduate students to evaluate the awareness about the effect of stress on muscles. The study population in the study are undergraduate students with a sample size of 100. The questionnaire consisted of 16 questions and was shared to undergraduate students using the online survey platform. The results were obtained and statistically analyzed through SPSS software. 82% of the participants said that they had experienced muscle pain, and the remaining 18% have not experienced muscle pain. 40% of the participants get headaches when stressed, 30% do not, and the other 30% sometimes get headaches when stressed. From the results obtained, we can conclude that a moderate level of awareness is seen in undergraduate students about the effect of stress on muscles. More awareness is required among students.

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INTRODUCTION

Stress affects the body in many ways and causes a headache, increases blood pressure, heart problems, asthma, insomnia, fatigue and weakens the body's immune system (Ilankizhai and Devi, 2016; Dave and Preetha, 2016; Renuka and Sethu, 2015). The psychological effect of stress includes poor concentration, irritability and reduced memory (Yaribeygi *et al.*, 2017). Psychological stress is assumed to contribute to the development of musculoskeletal disorders, especially in the neck and shoulder (Lundberg, 2003). When the body is stressed, muscles tense up as a reflex action to protect the body against injury. Chronic stress will

cause the muscles in the body to be in a state of constant guardedness and leads to stiffness of muscles. This causes muscle pain. Headache, which is again a muscle pain, is also associated with muscle tension. Relaxation techniques or stress-relieving activities are found to be effectively reducing muscle pain and stress-related disorder (Dunford and Thompson, 2010).

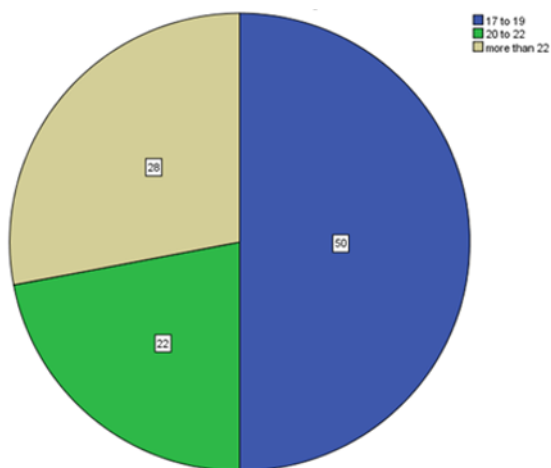


Figure 1: Pie chart showing the age group of the participants.

Generalized anxiety disorder patients were reported to feel tensed and often experience a feeling of tightness. Muscle relaxation therapy was found to be effective to decrease the sense of tightness (Pluess et al., 2009).

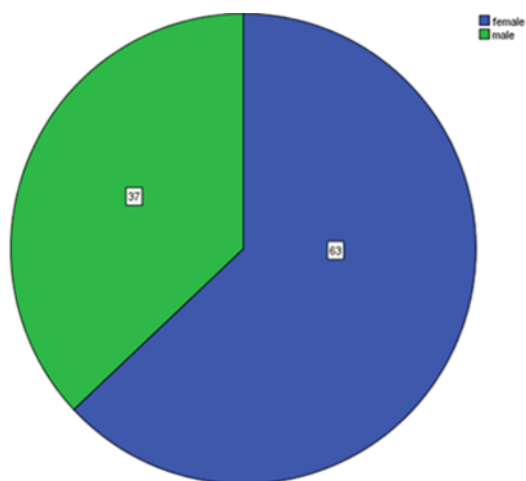


Figure 2: Pie chart represents the gender of the participants majority 63% are females (blue), and 37% are males (green).

Depression and anxiety were found to have an association with pain conditions like arthritis, migraine and back pain (McWilliams et al., 2004). Stress and musculoskeletal disorders are the most common causes of work-related ill health, and they frequently occur together, having an influence on each other.

In general, stress is required for survival, but too much of it leads to health and mental problems. Pain and stress both affect the body's homeostasis and share a common behavior of failure to destroy negative memories (Abdallah and Geha, 2017). Stress weakens the immune system and makes the person prone to many diseases (Timothy et al., 2019; Devi and Sethu, 2018). People living in modern society are exposed to more amount of stress, and studies have shown that stress inhibits attempts to perform physical activity. Reducing physical activities can also be a cause of developing muscle pain (Koo and Kim, 2018; Swathy and Sethu, 2015).

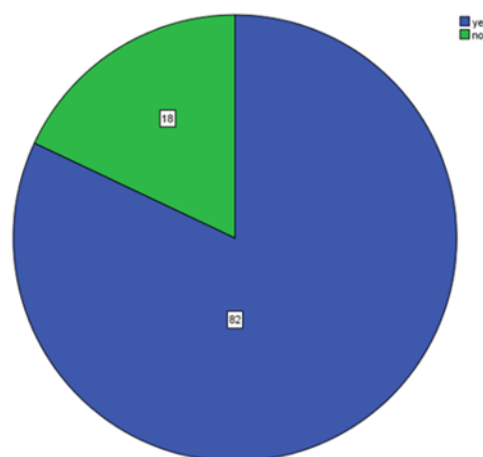


Figure 3: Pie chart represents that majority of the participants have experienced muscle pain 82% (blue) while some 18% have not experienced muscle pain (green).

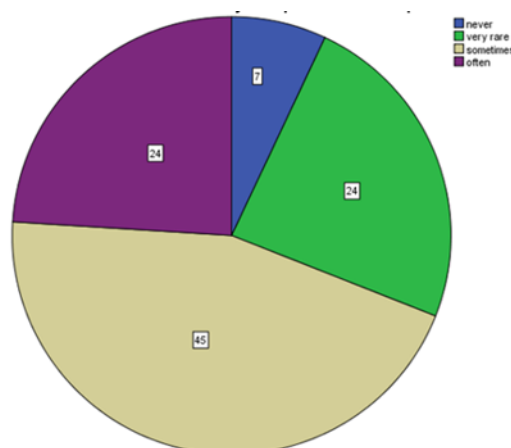


Figure 4: Pie chart showing the frequency of experiencing muscle pain among the participants, 7% never (blue), 24% very rare (green), 45% sometimes (cream) and 24% often gets muscle pain (violet).

Occupational stress increases the risk of musculoskeletal symptoms at work (Soteriades et al., 2019; Abigail et al., 2019). These symptoms, in turn,

affect productivity (David et al., 2019). Migraine, which is muscle pain, is mainly caused by repeated stress (Maleki et al., 2012). Awareness about the effect of stress on muscles is important because increasing our knowledge about the effect of stress on our body will help us not to stress over small problems in life. Reduced stress will make our body healthier and help us to lead a happy life.

For the people who are under stress, stress-relieving activities and therapies can be done to reduce muscle tension and decrease the occurrence of certain stress-related disorders such as headache and increase a sense of well-being.

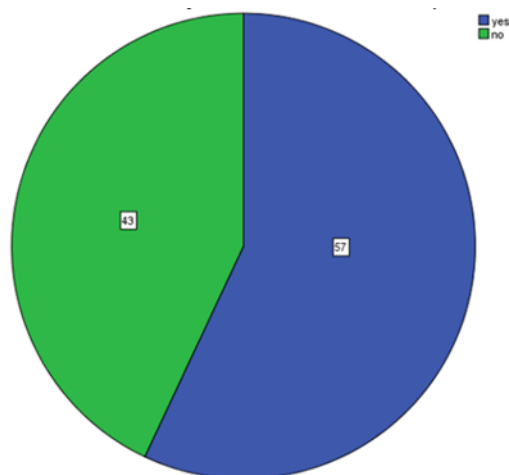


Figure 5: Pie chart showing that 57% of the participants know the causes of muscle pain (blue) and 43% don't know the causes of muscle pain (green).

Modern lifestyle has caused an increase in stress levels, obesity and occurrence of various diseases and disorders (Samuel and Devi, 2015; Shruthi and Preetha, 2018; Choudhari and Jothipriya, 2016). Obesity caused due to less physical activity has adverse effects on health (Baheerati and Devi, 2018; Fathima and Preetha, 2016).

Figure 7: Pie chart showing 40% of the participants get a headache when stressed (blue), 30% does not (cream), and the other 30% sometimes get a headache when stressed (green).

These activities also improve mood and daily function. The aim of this study is to analyze the awareness level about the effect of stress on muscles in undergraduate students.

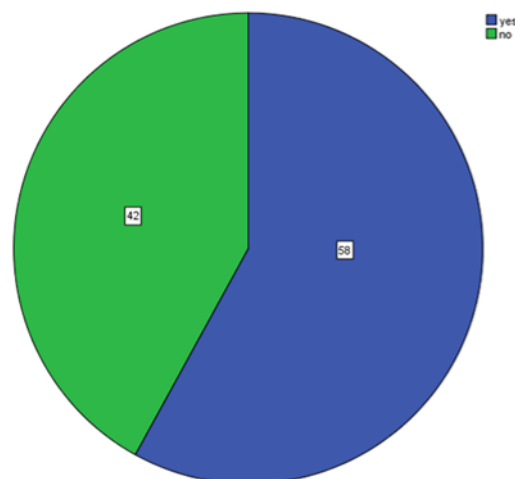


Figure 8: Pie chart showing that 58% of the participants were aware that muscle pain is the common side effect of stress (blue) and 42% were not aware (green).

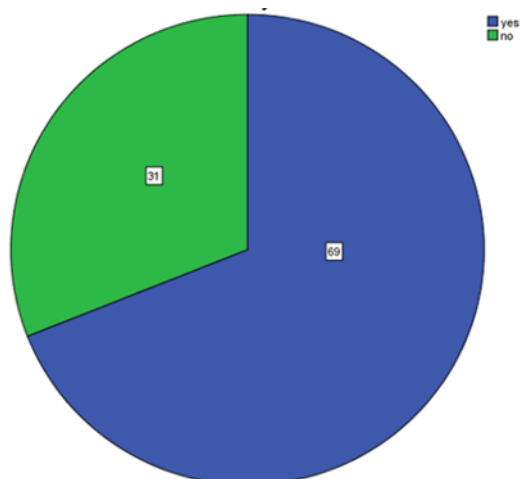


Figure 6: Pie chart showing that most of the participants 69% have said that their life is stressful (blue) while some 31% said that their life is not stressful (green).

MATERIALS AND METHODS

Study design

A cross-sectional survey was conducted among undergraduate students to evaluate the awareness

of the effect of stress on muscles. The sampling method is simple random sampling method. The sample size of this study is 100. The participants did the survey voluntarily, and no incentives were given to them. The study was conducted in the month of May 2020. The study was approved by the Institutional Review Board after getting informed consent from the participants.

Only completed surveys were taken for analysis, and the incompleting surveys were eliminated. The statistical test used is descriptive statistics. All the responses obtained were tabulated, and the reliability of the data was checked. Frequency table was prepared for each question using SPSS data analysis software version 20.

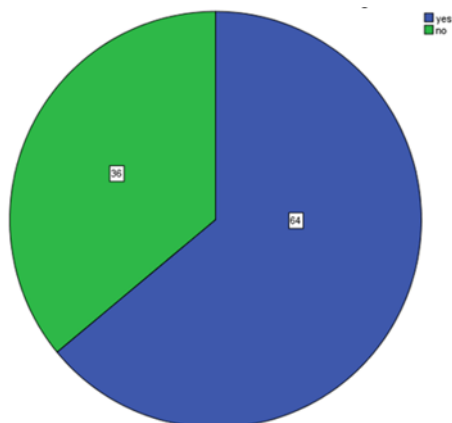


Figure 9: Pie chart showing that 64% of the participants have a friend or relative who has migraine (blue) and the remaining 36% does not have (green).

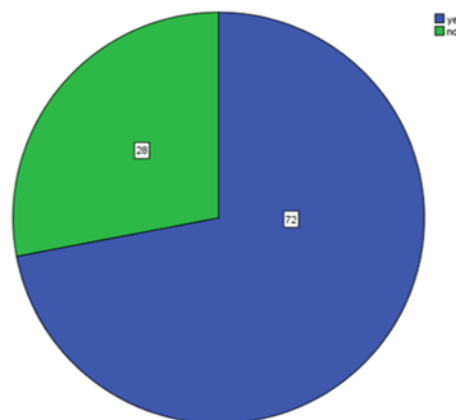


Figure 11: Pie chart showing that 72% of the participants were aware of the physical symptoms of stress (blue) and 28% not aware (green).

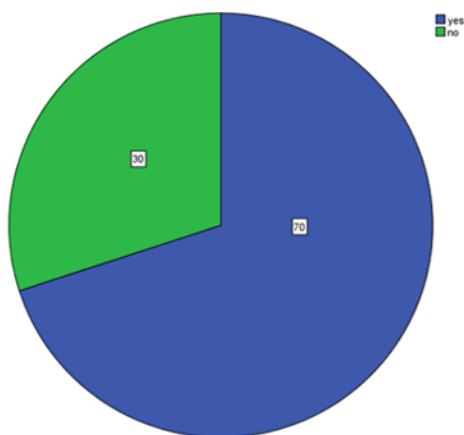


Figure 10: Pie chart showing that 70% know that stress is a cause of migraine (blue) and 30% were not aware (green).

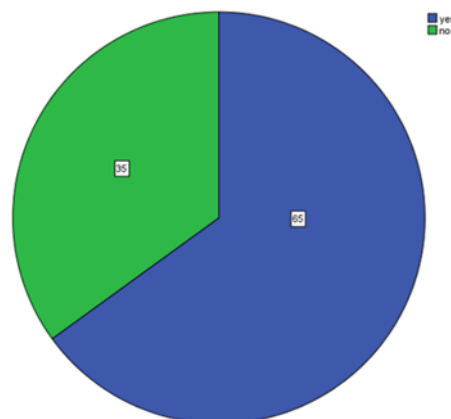


Figure 12: Pie chart showing that 65% of the participants were aware that muscle tension caused due to stress (blue) and 35% not aware (green).

Survey Instrument

The survey instrument, which was a questionnaire, was prepared after an extensive review of the existing literature. The questionnaire was reviewed, and amendments were made to improve the clarity of the questions to eliminate ambiguous responses.

The questionnaire consisted of 16 questions with both open and closed-ended questions. The questionnaire was shared to undergraduate students using the online survey platform.

Data analysis

RESULTS AND DISCUSSION

Out of the 100 participants, 50% of the participants belong to the age group of 17 to 19, 22% of the participants belong to the age group of 20 to 22, and the remaining 28% of the participants were more than 22 years (Figure 1). 63% of the participants were females, and 37% of the participants were males (Figure 2). 82% of the participants said that they had experienced muscle pain, and the remaining 18% have not experienced muscle pain (Figure 3). 24% of the participants often experience muscle

pain, 45% sometimes experiences muscle pain, 24% very rare, and 7% have never experienced muscle pain (Figure 4). 57% of the participants know the causes of muscle pain, whereas 43% of the participants do not know the causes of muscle pain (Figure 5). Majority of the participants, 69% said that their life is stressful, and 31% of the participants said that their life is not stressful (Figure 6). 40% of the participants get a headache when stressed, 30% does not, and the other 30% sometimes get a headache when stressed (Figure 7).

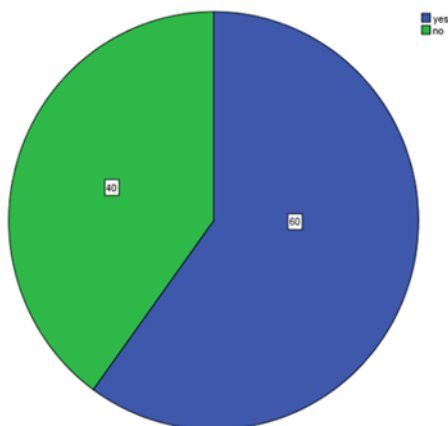


Figure 13: Pie chart showing that 60% of the participants were aware that muscle tension is a reflex reaction to stress (blue) and 40% of the participants were not aware (green).

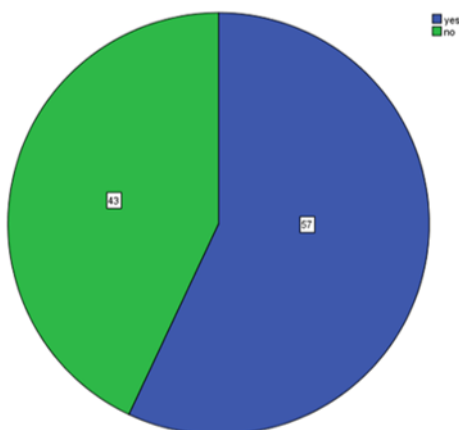


Figure 14: Pie chart showing that 57% of the participants were aware that stress also affects joints along with muscles (blue) and 43% not aware (green).

58% of the participants were aware that muscle pain is the common side effect of stress, and 42% were not aware (Figure 8). 64% of the participants have a friend or relative who has a migraine, whereas the other 36% did not (Figure 9). 70% of the participants were aware that stress causes migraine and 30% were not aware (Figure 10). 72% of the people were aware of physical symptoms of stress,

whereas the remaining 28% were not aware (Figure 11). 65% of the participants know that muscle tense up during stress conditions, and 35% did not know (Figure 12).

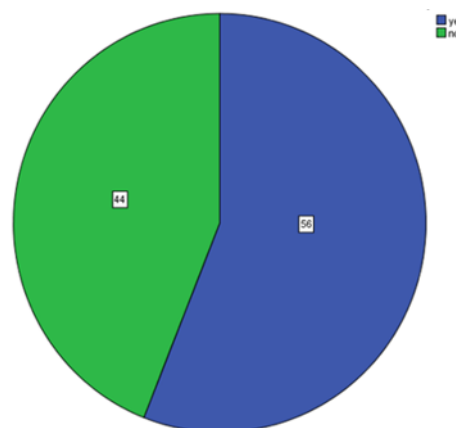


Figure 15: Pie chart showing that most of the participants 56% were aware of the causes of headache (blue) and 44% were not aware (green).

60% of the participants were aware that muscle tension is a reflex reaction to stress, 40% were not aware (Figure 13). 57% of the participants were aware that stress affects joints also, whereas 43% of the participants were not aware (Figure 14).

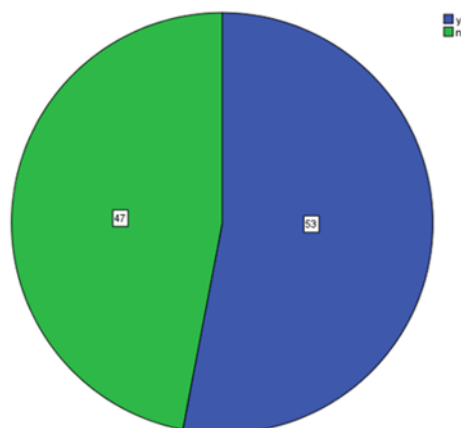


Figure 16: Pie chart showing that 53% of the participants were aware that the hormone released during stress decrease the muscle strength (blue) and 47% were not aware (green).

56% of the participants know that headache is associated with chronic muscle tension in the area of the shoulders, neck and head while 44% were not aware (Figure 15). 53% of the participants agreed that hormones released during stress decrease muscle strength, while the remaining 47% were not aware (Figure 16). In the chi-square analysis between gender and experiencing muscle pain, the p-value

obtained was 0.664, and it was statistically not significant (Figure 17). In the chi-square analysis between gender and awareness of the causes of muscle pain, the p-value obtained was 0.703, and it was statistically not significant (Figure 18). In the chi-square analysis between gender and awareness of stress causes migraine, the p-value obtained was 0.190, and it was statistically not significant (Figure 19). In the chi-square analysis between gender and awareness of muscle pain is the common side effect of stress, the p-value obtained was 0.518, and it was statistically not significant (Figure 20). In the chi-square analysis between gender and awareness of stress causes muscle tension, the p-value obtained was 0.185, and it was statistically not significant (Figure 21).

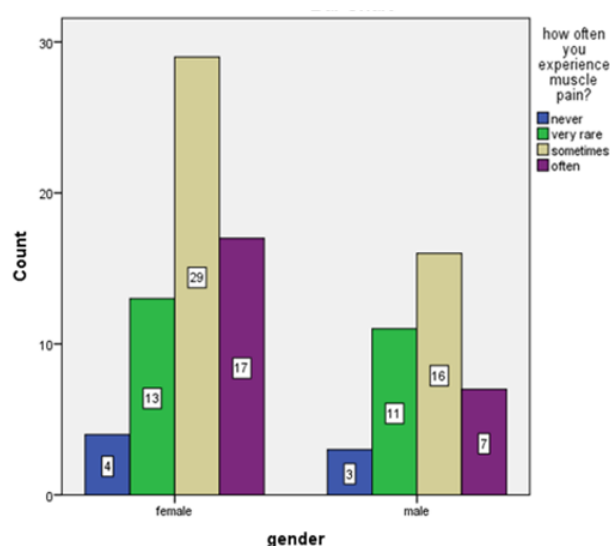


Figure 17: Bar graph represents the association between gender and prevalence of muscle pain.

Figure 17 shows that the X-axis represents the gender, and Y-axis represents the prevalence of muscle pain in the participants. Out of the 24% of the participants who get muscle pain often (violet), 17% are females, and 7% are males. Out of the 44% of the participants who get muscle pain sometimes (cream), 29% constitutes females, and 15% constitutes males. Hence, more females get muscle pain often than males. Chi-square test was done, and the association was found to be statistically not significant. Pearson's chi-square value: 1.578, DF -3, p-value: 0.664(>0.05). Figure 18 shows that the X-axis represents the gender, and Y-axis represents the awareness of the causes of muscle pain in the participants. Out of the 57% of the participants who are aware of the causes of muscle pain (blue), 35% constitutes females, and 22% constitutes males. Hence, more females were aware than males. Chi-square test was done, and the association was found to

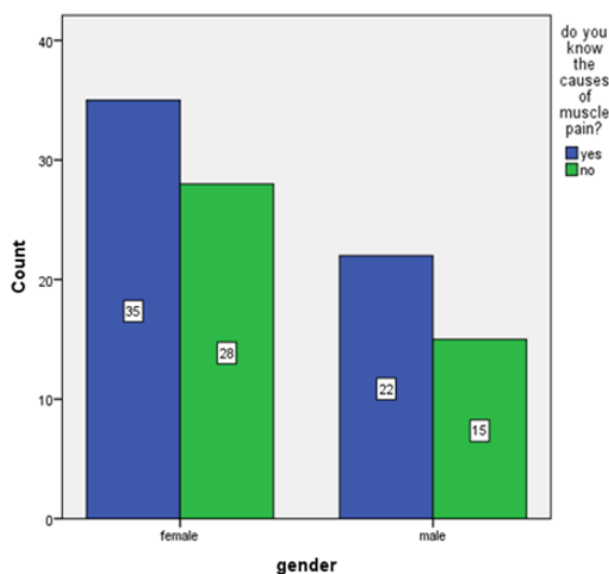


Figure 18: Bar graph represents the association between gender and awareness of the causes of muscle pain.

be statistically not significant. Pearson's chi-square value: 0.145, DF -1, p-value: 0.703(>0.05).

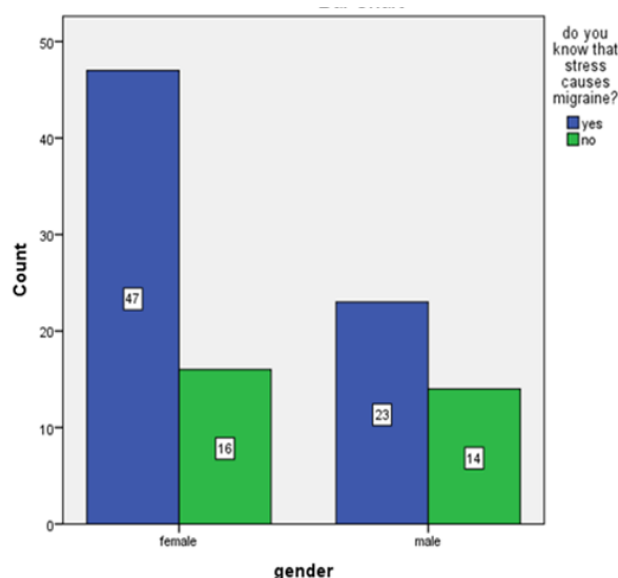


Figure 19: Bar graph represents the association between gender and awareness of stress causes migraine.

Figure 19 shows that the X-axis represents the gender, and Y-axis represents awareness of stress causes migraine in the participants. Out of the 70% of the participants who were aware that stress causes migraine (blue), 47% constitutes females, and 23% constitutes males. Hence, more females were aware than males. Chi-square test was done, and the association was found to be statistically not significant. Pearson's chi-square value: 1.718, DF -1, p-value: 0.190(>0.05).

Figure 20 shows that the X-axis represents the gender and Y-axis represents the awareness of muscle pain as the common side effect of stress in the participants. Out of the 58% of the participants who were aware that muscle pain as the common side effect of stress (blue), 35% constitutes females, and 23% constitutes males. Hence, more females were aware than males. Chi-square test was done, and the association was found to be statistically not significant. Pearson's chi-square value: 0.418, DF -1, p-value: 0.518(>0.05).

Figure 21 shows that the X-axis represents the gender, and Y-axis represents awareness of stress causes muscle tension. Out of the 58% of the participants who were aware that stress causes muscle tension (blue), 35% constitutes females, and 23% constitutes males. Hence, more females were aware than males. Chi-square test was done, and the association was found to be statistically not significant. Pearson's chi-square value: 1.754, DF -1, p-value: 0.185(>0.05).

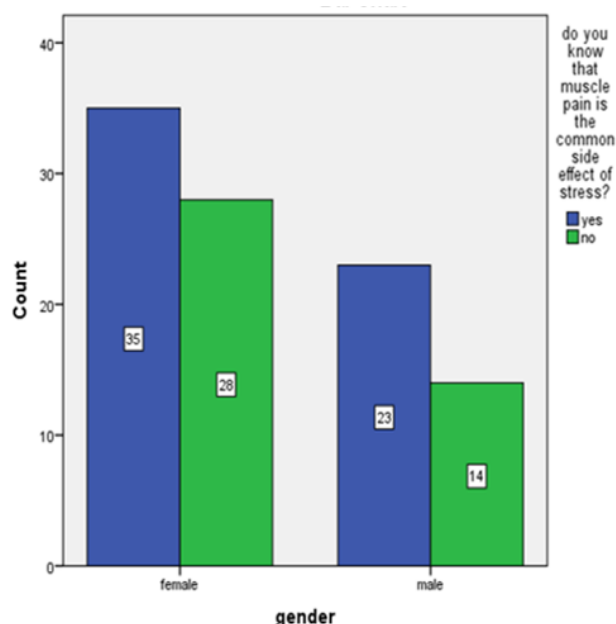


Figure 20: Bar graph represents the association between gender and awareness of muscle pain as the common side effect of stress.

The relation between stress and muscle pain is supported by our study. Stress causes many damages to the body and weakens the immune system thereby making us prone to many diseases and disorders (Harsha *et al.*, 2015; Iyer *et al.*, 2019). In a study conducted to examine the relationship between stress and health, 33.7% perceived that stress affected their health. In our study, only 54% agreed that stress decreases muscle strength, and 46% did not know that stress affects muscle strength. The slight difference is seen in the

results (Keller *et al.*, 2012). One of the previous studies revealed that people belonging to the age group of 61 to 70 have maximal stress, 71 to 80 years experience mild stress and people more than 80 years experienced minimal stress. Our study included young adults; 69% of them said they have a stressful life. Similar results are seen in all age groups with very slight variations (Poornima, 2014).

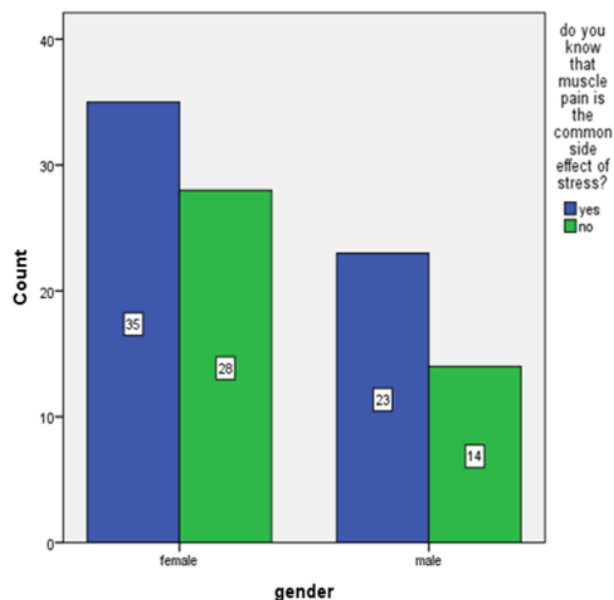


Figure 21: Bar graph represents the association between gender and awareness of stress causes muscle tension.

A study was conducted with a large sample size in Japan, 15 years and older people took part in a survey. Only 11.6% of them were aware that their headache is migraine. 74.2% complained that migraine affects their day to day life. Our study, 68% of the participants knew that stress causes migraine; hence awareness is higher in our study (Sakai and Igarashi, 1997). Another study conducted in Spain about the prevalence of migraine, 8.4% have a strict migraine, 4.2% of them experience portable migraine. In our study, 64% of the participants have a relative or friend who has a migraine. Hence, the results are similar (Matías-Guiu *et al.*, 2011). Another study was conducted about sex differences in muscle pain; no significant difference was found except that women tend to view exercise as more effective to reduce muscle pain than men. Our study also has similar results and no significant difference seen in awareness of males and females (Dannecker *et al.*, 2008). Some of the limitations in this study include the smaller samples size of 100. Larger sample size will give more accurate data. Wide variety of population can be included, our study only undergraduate students were included.

CONCLUSION

From the results obtained, we can conclude that a moderate level of awareness is seen in undergraduate students about the effect of stress on muscles. More awareness is required among students who will make them understand that they should not stress over small things as stress only causes harm to our mind and body.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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