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Correlation Between Burnout and Musculoskeletal Pain in Architecture Students

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ABSTRACT

Background- Architecture as a curriculum requires immense physical skills and deep creative thinking from the student to cater to the course's demands. The work given to the students is physically and mentally exhausting. It can be postulated that this exhaustion may primarily be attributable to burnout. Burnout is a result of long-term involvement in intense workload and assignments, leading to mental drainage and loss of productivity. With respect to the execution of the assignments and projects, the students assume awkward faulty postures and work by using repetitive fine motor skills, giving rise to musculoskeletal pain. Burnout and musculoskeletal pain are prevalent among architecture students, and it is pertinent to think that there can be a possibility of a correlation between the two.

Aim and objectives- To correlate burnout and musculoskeletal pain in architecture students.

Method- This study included 60 architecture students as per the inclusion and exclusion criteria. All the subjects were provided with two scales, Oldenburg Burnout Inventory (OLBI) to assess burnout and the Visual Analogue Scale (VAS) to assess musculoskeletal pain. The results were calculated by correlating the scores of both scales.

Results- Statistical analysis showed a positive correlation between burnout and musculoskeletal pain. (P value – 0.000231, R value – 0.458) and the most commonly affected regions were Low back (70.3%), Head and neck (34.3 %), Right wrist (28.1%) and Right shoulder (6.4%).

Conclusion- The results showed a high prevalence of burnout and MSP in architecture students, and there was a strong positive correlation between them.

KEY WORDS: Musculoskeletal Pain, Burnout, Architecture students

INTRODUCTION

Architecture is a term described as a branch of knowledge that outlines, designs, and creates structures and establishments. [1] The students of architecture spend 5 long years on drawing boards, sketching, drafting, and making models. Owing to the covid-19 lockdown and the progress in the field of computational architecture, force today's students into spending an unrelenting amount of time on their computers/ laptops. [2] Studying Architecture necessitates long hours of work devoted to intricate drawings, physically and digitally. [2] Simultaneously fine motor skills are applied in performing jobs such as cutting, sticking, sculpting, and marking measurements. [2,3]An aspiring architect needs to have skills in the fields of logistics, graphic designing, engineering, and motor skills.[3] Burnout is a result of chronic participation in work situations leading to psychological and mental exhaustion. These situations are highly demanding owing to long hours of work and stress [4] Working too hard leads to the individual being drained and tired most of the time. [5] Burnout is a syndrome encompassing emotional fatigue and detachment in one's work. Job productivity decline is witnessed more frequently as

performance is also reduced. [6] Job stress is now being recognized as a significant occupational hazard since it not only impairs one's psychological wellbeing but exacerbates physical health and performance at work. [7] Musculoskeletal disorders (MSDs) are defined as the involvement of muscles, ligaments, tendons, and bone in pain and injuries that can occur after acute trauma or a chronic involvement, negatively impacting daily activities. [8] Musculoskeletal pain (MSP) and its risk factors can be categorized as psychological factors (such as emotional exhaustion, anxiety, mental block, etc.), personal reasons (such as comorbidities, age, height, etc.), and work factors (such as repetitive tasks, awkward and faulty postures, etc.). [8] MSPs are prevalent among working-age adults [9] Musculoskeletal pain range from pain right from the forearm and wrist to the postural muscles of the shoulder, neck, upper and low back to the knee and ankle. [2] Architecture students are subjected to burnout [10] and musculoskeletal pain [3] due to the demand of their course, affecting their quality of life, and mental and physical health.

Oldenburg Burnout Inventory (OLBI)- OLBI is an instrument used to measure burnout among various populations. It includes positive and negatively sentenced questions to measure the two areas of burnout- Exhaustion, and Disengagement. [11] While the most used scale to measure burnout is Maslach's burnout inventory (MBI), researchers have been highlighting the limitations and expense of this scale. [11] Hence OLBI is considered a preferred alternative to overcome the boundaries MBI provides. [11] There are 16 questions, divided into positive and negatively framed questions. Each item needs to be answered by filling up a score from 1 (strongly agree) – 4 (strongly disagree). [11] The highest score sums out to be 64, and the least 16. These items are written in the form of personal feelings and attitudes. [10,12] Exhaustion refers to a chronic state of emotional depletion. The major causes of exhaustion are excessive workload. The individual feels drained and taken up by the workload without any source of refreshment, leading to loss of energy and fatigue. [10,12] It consists of 8 items. Disengagement is a negative and detached response to one's work. It has a positive correlation to an overload of emotional exhaustion, causing reduced productivity, irritability, and pessimistic attitudes towards work. It consists of 8 items. [10,12] For both Exhaustion and Disengagement, higher mean scores correspond to higher burnout. Interpretation of OLBI- Low Burnout <44, Medium Burnout 44-59, and high burnout >59. [13] The Reliability coefficients for each subscale are assessed by Cronbach's coefficient alpha. For both the areas, Exhaustion and Depersonalization the Cronbach's alpha values are above 0.70 [12] It provides acceptable factorial, convergent and discriminative validity. [11]

Visual Analogue scale (VAS) - The Visual analog scale is an instrumental scale that is used to check the intensity of symptoms and assess the amounts of pain the individual experiences ranging from none to extreme amounts. [14] The VAS is a fixed horizontal line of a definite length, usually 100 mm (10 cm). This scale represents pain levels in fixed increments [14] and the current state of pain levels is marked by the subject. The VAS score is assessed by marking a point from the left part of the line to the right which represents no pain to extremes of pain. [14] Merits - This widely used scale is simple and flexible in a vast range of populations, less than 1 minute is required to fill, and only a ruler and pencil are used to mark on the 10 cm line. [14] Minimal instructions are required for the subjects to score easily. [15] Scoring and interpretation: Utilizing a ruler, the pain state is assessed by estimating the distance on the 10cm (100mm) line between the "no pain" anchor and extremes of pain, representing a range of scores from - No pain (0–0.4 cm), Mild pain (0.5–4.4 cm), Moderate pain (4.5–7.4 cm) and Severe pain (7.5– 10.0 cm). [14] The Validity and Reliability are good when

compared to other scales of pain. [16] It is highly sensitive too [16] Burnout and musculoskeletal pain are rampant among architecture students and hence become a crucial area to focus our attention towards. It is imperative to understand the behavior of students that contributes to their academic performance and quality of life.

Studies have been done on architecture students concerning musculoskeletal pain which have concluded that the most commonly affected areas are the neck, lower back, and the wrist. [3] Studies state that there is burnout in architecture students. [10,17] Pieces of literature have studied the correlation between burnout and musculoskeletal pain in various professions like occupational therapists [18] nursing professionals. [19] and health care students. [20] However, there is a lack of studies that correlate the burnout levels and musculoskeletal pain in architecture students, hence this study has been undertaken to find the relationship between them.

Research hypothesis- There will be a Positive correlation between burnout and musculoskeletal pain in architecture students. Null hypothesis- There will be a negative correlation between burnout and musculoskeletal pain in architecture students.

MATERIALS AND METHODS

This correlational study had a sample size of 60 subjects, who were selected based on the inclusion and exclusion criteria. Both male and female undergraduate architecture students aged 18-24 years from the first to the fifth year, throughout colleges in Mumbai were selected. Students with a normal BMI (18.50 – 24.49) were included in this study. The exclusion criteria were students having pre-existing musculoskeletal deformities, and neurological and cognitive impairments. Underweight and obese students were also excluded.

Materials – The materials used were a weighing scale, stadiometer, measuring tape, pencil, Oldenburg Burnout Inventory scale, and the Visual Analogue Scale.

Procedure - Ethical clearance from the ethical committee was done. A written consent form was given to all the subjects before the study and all the students were screened based on inclusion and exclusion criteria and the demographic data was taken. Student's Body mass index (BMI) – height and weight were taken. The procedure of this study was explained thoroughly. Oldenburg's burnout inventory and Visual Analogue Scale were administered and the subjects were explained the scores of the scale, and were asked to mark the score accordingly. The data was collected and statistically correlated. Oldenburg's Burnout inventory scale was administered, where the subjects answered the questions asked and filled up a score between 1-4. Once all forms were filled, the total score of the two components was calculated and filled in the Proforma. The Visual Analogue Scale was administered and the subjects filled out the scores from 1-to 10 from the respective body areas in the Proforma.

DATA ANALYSIS

Data was collected on an assessment sheet and encoded for computerized analysis using Python programming language and its libraries for data analysis. The correlational test used was Karl Pearson's correlational test to determine the correlation between burnout and musculoskeletal pain.

RESULTS

Table 1: Demographic Characteristics

Males	**65 %**
Females	**35 %**
Mean age ± SD (years)	**21.81667 ± 1.0407**

Table 1- Demographic Characteristics

A total of 60 subjects, 39 males (65%) and 21 females (35%) were enrolled in this study with no dropouts. The mean age was 21.816 respectively. (Table 1)

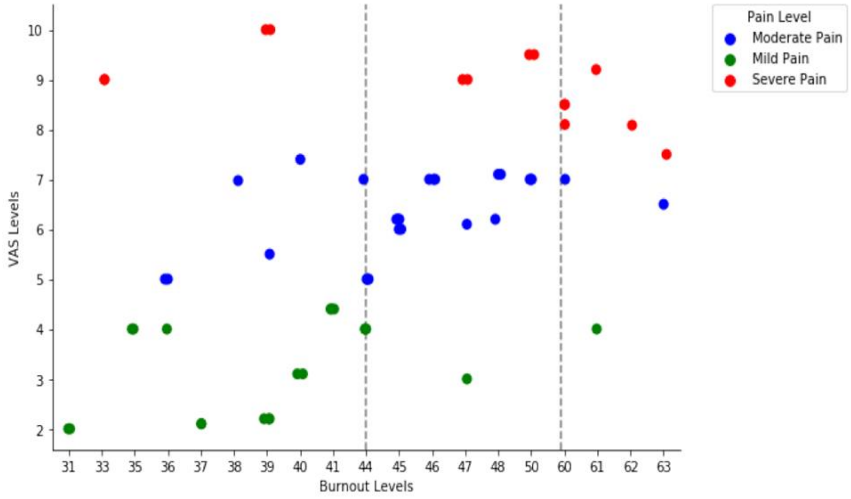
The data summary is presented in Table 2.

	Burnout score	Pain Score
Count	**60**	**60**
Mean	**44.966667**	**5.910000**
Standard Deviation	**8.402919**	**2.300015**
Min	**31.0000**	**2.00000**
Max	**64.0000**	**10.0000**

Table 2- Data Summary

The average score of burnouts was 44.966, with a minimum score being 31 and a maximum score being 64 and for musculoskeletal pain, the average score was 5.910, with a minimum score of 2 and maximum score of 10. (Table 2)

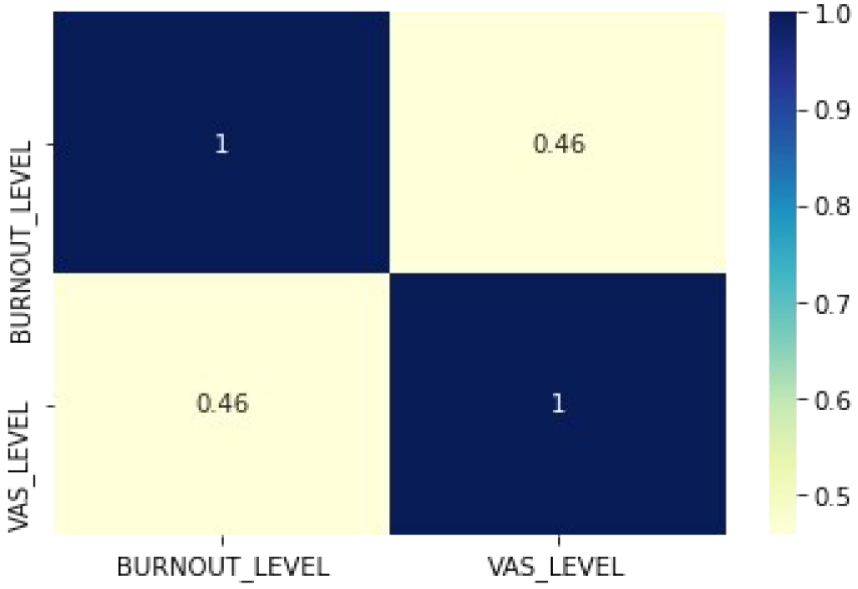
Graph 1: A scatter plot is made to represent the relation between burnout and pain.



Graph 1- Relationship between Burnout and Pain levels

Most of the subjects having mild burnout (score< 44) experienced mild levels of pain (VAS < 4.4), moderate burnout (score 44 to 59) experienced moderate levels of pain (VAS 4.4 to 7.4) and severe burnout (> 60) had severe pain levels (VAS > 7.5). (Graph 1)

Pearson's correlation co-efficient between burnout and musculoskeletal pain is shown in graph 2.



Graph 2: Pearson's Correlation between Burnout and Musculoskeletal Pain.

The results showed that there is a positive correlation between burnout and pain wherein Pearson's correlation coefficient R = 0.458 and P-value obtained = 0.000231. The P-Value assumed for the null hypothesis to be true is 0.05 or greater, hence we can safely reject the null hypothesis. (Graph 2)

The most common body region affected were Low back (70.3%), Head and neck (34.3 %), Right wrist (28.1%) and Right shoulder (6.4%). The most painful body regions were Low back (7.25) Head and neck (6.23) and Right Knee (5.2).

DISCUSSION

Architecture as an academic course proves to be rather strenuous physically and mentally owing to the aspects of creative thinking, physical modelling, site visits as well as an intensive 5-year duration of the course. The course demands unusually long working hours with assignments throughout the year and added pressure and workload right before the jury.

The overload generally leads to a lot of students dropping out midway or performing poorly due to burnout. With it being mentally and physically draining, the negative impacts generally tend to overpower the passion for the subject and lead to students just mechanically performing tasks without much thought resulting in the students being incompetent.

Students' burnout is one of the most important areas to give attention to, as it can be a way of understanding student behaviours which affect academic performance and quality of life [7] As a result of the heavy demands of architectural education, burnout has become prevalent within students. The excessive workload incites mental exhaustion which triggers a decline in productivity. The course's nature of execution is unforgiving and fails to cater to the mental needs of students who are struggling. In response to the normalized culture of working overtime, long hours in the front of the screen, and sheer quantity of work, feelings of loneliness and agitation are common observations.

This study was executed for a period of 18 months, on 60 subjects which included both Male (65.00%) and Female (35.00%) architecture students throughout colleges in Mumbai. A positive correlation was obtained between burnout and musculoskeletal pain (R = 0.458 and P-value = 0.000231)

A study done by Heeba shaikh et al concluded that musculoskeletal pain is prevalent among architecture students and it can be owed to faulty postures, and repetitive movements requiring fine motor skills during drawing, sketching, drafting, and model making.[3] Long hours of such continuous work pose a problem to these students as it leads to the beginning of musculoskeletal pain and similar problems.

Faulty postures are commonly witnessed in architecture students as a result of their static work postures and lack of dynamic strength required for fine motor movements. Static work postures while sitting in front of the computers and drafting on tables at inappropriate heights lead to muscular imbalances.[3] The immediate environment of a workplace determines the physical well-being of the student. Hence a good work environment leads to good physical health.

A biomechanical malalignment in the body is ought to have a significant increase in musculoskeletal problems. Students tend to have a slouched posture causing muscular imbalances in the upper body. [3] Excessive strain is placed on the back region, leading to tight pectoral muscles and upper cervical muscles, and weak upper back muscles like the middle trapezius, rhomboids, and anterior neck muscles. These imbalances lead to pain in the upper back and neck region. Along with this, strong shoulder stabilizers are required to perform fine motor tasks like drafting, drawing, and sketching. A lack of shoulder stability leads to the onset of muscular pain in the shoulders, wrist, and elbows. In addition, students lack the time needed for mobility

and exercises, which again add to their pain levels.

A similar study was conducted by Tahereh Gholamil et al on the correlation between burnout syndrome and musculoskeletal disorders in Nurses in Iran. This study also concluded that there was a significant correlation between the two. (P = 0.000, r = 0.122) [19]

Increased stress levels and mental exhaustion lead to an increment in the production of cortisol in the body. These soaring high cortisol levels directly affect the muscle tissues, causing an increased level of muscle tension. Amino acids that are usually absorbed by the muscles for protein and normal functioning of neurotransmitters are now not absorbed as much. This lack of amino acids leads to a reduction of muscle protein, causing reduced strength and functioning of these muscles. The neurotransmitters required for muscular contraction and relaxation are inadequate. Since the muscles now don't have the adequate strength required to fulfil the demands placed on them, the muscles are in a constant state of muscle tension, eventually being susceptible to high levels of pain and aches.

Hence, this study aimed to contribute to our knowledge and understanding of the correlation between burnout and musculoskeletal pain in architecture students. It is inferred that there is a strong positive correlation between burnout and pain, and most architecture students experienced moderate levels of burnout and pain levels. This study had the following limitation – the gender-related body changes, tolerances, and responses were not considered and the sample size taken was small.

CONCLUSION

This study concludes that there exists a strong positive correlation between burnout and musculoskeletal pain. The most commonly affected areas are Low Back, Head and neck., Right wrist, and Right shoulder. The most painful body regions are Low back, Head and neck, and Right Knee. Hence, it is imperative to highlight the hazard burnout levels can bring to the students which affect their musculoskeletal health.

Clinical Implication

The main concern should be to significantly reduce the overload of work given to these students, with ample amounts of rest periods given at periodic intervals. A Periodic screening should be done to assess the risk level of musculoskeletal pain and the faculty members / staff of architectural colleges should be educated about the risks of excessive burnout.

Abbreviations

MSP- Musculoskeletal Pain, VAS – Visual Analogue Scale, OLBI- Oldenburg Burnout Inventory

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