Effects of physical demands on neck and shoulder during clinical posting in physiotherapy students

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Abstract: Physiotherapy is a field requiring high physical and mental demands. Physiotherapy students, while on clinical postings, have to adapt to different awkward body postures, lift heavy weights, excessive bending, patient transfers, apply manual therapy techniques, maintain recordkeeping, etc., and these act as risk factors for musculoskeletal disorders, like neck pain and shoulder pain. The present study aims to assess the association of specific activities that contribute to physical demands during the clinical postings in physiotherapy students, with neck and shoulder pain they experience. The data collection was done from 40 physiotherapy students at Amity University, Noida, between the ages of 18 to 26 years, who were going for clinical postings in different hospitals. Their demographic data was collected. Frequency of specific physical demand activities was collected using the self-analytical physical demands analysis tool. Pain levels at neck and both shoulders were collected using the numerical pain rating scale (NPRS). The data was analyzed for mean and standard deviations of the pain levels at neck and both shoulders and frequency of each physical demand activity. Pearson's correlation coefficient was calculated to assess the association of pain at neck and both shoulders with physical demands activities frequency. The study found a positive association between neck pain and standing at same place (r=0.289), back strongly bent, or twisting of back (r=0.176), squatting and kneeling (r=0.223). Pain at left shoulder was found to have positive association with arms at/above shoulder height (r=0.510), repetitive arm movement (r=0.454), and pushing/pulling/lifting (r=0.179). Right shoulder pain showed positive correlation with arms at/above shoulder height (r=0.375), repetitive arm movement (r=0.356), and pushing/pulling/lifting (r=0.129). The findings suggest the need for physiotherapy students to work with caution and follow ergonomic postures while working during the clinical postings in hospitals, to avoid having neck and shoulder pain.

Keywords: Physiotherapy students; Neck and Shoulder Pain; Physical Demands

I. INTRODUCTION

Physiotherapy is a very demanding field, both mentally and physically. Physiotherapy students especially encounter unique hurdles during their clinical postings where they get to observe and apply the practical aspects of the occupation. During these postings, one of the most serious issues they face is neck and shoulder pain as a result of physical demands associated with their work [1].

Awkward body postures, excessive bending, lifting of heavy weights, patient transfers, applying manual therapy techniques, maintaining recordkeeping, etc. are all work-related activities, that act as risk factors for musculoskeletal disorders [2,17,18,19].

The aim of this project is to explore whether there is an association between these physical demands and prevalence of neck and shoulder pain among physiotherapy students. It has been observed that such musculoskeletal problems result from clinical postings where the physiotherapy students have to undergo long and continuous hours standing, bending over, or lifting objects [3].

By investigating this association, the project hopes to shed light on the occupational health risks faced by physiotherapy students. This study could potentially make some contributions towards the development of guidelines for safe practice thereby enhancing the health status and wellness of the future physiotherapy professionals [4].

The project talks about the specific physical tasks and movements that are most associated with activities in physiotherapy clinical postings. This includes tasks such as patient transfers, manual therapy techniques, and other physically demanding procedures [5, 19].

II. REVIEW OF LITERATURE

Table 1 Summary of Review of Literature

S. No.	Authors	Year	Aim & objective	Conclusion
1.	Keith T Palmer, Julia Smedley	2007	The aim was to review how the work-related neck-shoulder problems are associated to physical findings.	A systematic review of chronic neck pain work-relatedness was conducted by Palmer and Smedley (2007). It was seen that occupational factors play an important part in the development of chronic neck pain as an important source, stressing the importance of including work-related aspects in treatment and prevention. It was seen that occupational factors play a crucial role to develop chronic neck pain [6].
2.	Ismail Almogbil, Lana Alrashidi, Rahaf Alhajlah, Abdullah Alqasim, Nader Alharbi, Mohammed Alghamdi, Abdullah Alshahrani	2023	To investigate how prevalent is the neck and shoulder pain among health-care workers in the Saudi Arabia's central region.	Shoulder and neck pain were studied in a population of 409 healthcare workers in Saudi Arabia. The study concludes that there is a high prevalence of neck and shoulder pain among health-care professionals, which suggests that the physical exertions due to healthcare work can be considered as one of the factors contributing to musculoskeletal disorders development [7].
3.	Sebastian Venge Skovlund, Rúni Bláfoss, Emil Sundstrup, Lars L Andersen	2020	To determine how physical work demands and work ability are associated among physical workers having MSDs in the upper body.	Based on their study, they checked how physical work demands and work ability are associated, in 5377 individuals whose occupation required high physical demands. In their research, they identified that physical work demands, and work ability are negatively associated, meaning that workers suffering from pain would most likely see a decrease in their level of workability if the level of physical work demand increases [8].
4.	David Hallman, Andreas Holtermann, Sofie Dencker-Larsen, Marie Jørgensen, Charlotte Rasmussen	2019	The objective is to ascertain how underlying patterns of neck-shoulder discomfort relate to self-reported instances of sick leave and the ability to work. This is based on regular repeated assessments over one-year period in a working population.	They conducted a 1-year prospective study on whether shoulder-neck pain is associated with sick leave and working ability of workers. The findings of their suggests that persistent shoulder and neck pain is associated with increased sick leave along with reduced working ability [9].
5.	Johanna Borg, Maria Westerståhl, Sara Lundell, Guy Madison,	2016	To check the ability of work-related measures, body composition, physical activities, and fitness levels to predict shoulder or neck pain at the age of 52 years.	They carried out a longitudinal study studying factors associated with shoulder or neck pain at the age of 52. The study cohort was comprised of 429 adolescents, aged 16, who were selected randomly and subsequently followed up at ages 34 and 52. They discovered that neck/shoulder pain is caused by both physical and

	Ulrika Aasa			psychosocial factors, thereby implying that a multifactorial strategy can be used for its treatment and prevention [10].
6.	Stijn Keyaerts, Lode Godderis, Ellen Delvaux, Liesbeth Daenen	2022	To explore the relationship between physical and psycho-social factors that are associated with work and musculoskeletal problems in health-care workers, particularly focusing on the moderating role of the fear of movement.	They performed a study involving 305 healthcare workers employed in Belgian hospitals. The study tried to understand the correlation between work-associated physical and psycho-social factors and Musculo-skeletal disorders (MSDs), focusing on the moderating role of fear of movement (FOM). The study found that physical job demands, autonomy at work, and FOM were positively associated with MSDs, while high social support at work was associated with fewer MSDs. In the study, FOM interacted negatively with workload and autonomy at work on MSDs. The study concluded that FOM, along with work-associated physical and psycho-social factors, are related to musculoskeletal disorders among health-care workers. The study suggests that FOM should be assessed in health-care workers to prevent or address MSDs [11].

III. METHODOLOGY

Study Population: Physiotherapy students.
Place of Data Collection: Amity University, Noida
Sampling Method: Purposive sampling
Sample Size: 40

Inclusion Criteria:

- Physiotherapy students studying at AIHAS, Amity University, who are going for clinical postings in clinics/hospitals.
- Age – 18-26 years

Exclusion Criteria:

- Students, other than that of physiotherapy
- Any congenital skeletal deformity
- Neurological problems
- Cardiac problems
- Recent injury/surgery
- Cancer

Procedure:

- The research procedure was explained to the participants.
- Participants' demographic data, self-analytical physical demands analysis form [8], which depicts activities of physical demands and their frequency on a 5-point Likert scale, and the intensity of pain on the NPRS for the neck and both shoulders, were collected.
- The mean and standard deviation of age, frequency of each activity of physical demand, NPRS scores of neck and of both the shoulder joints were calculated, and the association between physical demands with neck and shoulder pain was determined through a bivariate correlation using Pearson's correlation coefficient using the IBM SPSS Statistics.

IV. DATA ANALYSIS

Mean and standard deviation of age, frequency of each physical activity, Numerical Pain Rating Scale (NPRS) scores of neck and of both the shoulder joints were calculated.
Pearson's correlation coefficient calculated for each activity/posture (Standing in the same place, Back strongly bent/twisting, Arms at/above shoulder height, Repetitive arm movement, Squatting or kneeling, and

pushing/pulling/lifting), and the correlation of each, with the pain at neck, left and right shoulders respectively, using IBM SPSS Statistics.

V. RESULTS

Forty physiotherapy students participated in the study, having the mean age of 22.25±1.03 years. Frequency of 6 work-related physical activities, depicting physical demands during clinical postings of each participant was noted:

a. Standing in the same place
b. Back strongly bent/twisting
c. Arms at/above shoulder height
d. Repetitive arm movement
e. Squatting or kneeling
f. Pushing/pulling/lifting

Mean and standard deviation of frequency of each activity during clinical postings, is shown in Table 2.

Table 2 Activity/Posture and their Mean and SD

Activity/Posture	**Mean±Standard Deviation of frequency of activities**
Standing in the same place	2.97±1.40
Back strongly bent/twisting	3.04±1.31
Arms at/above shoulder height	2.82±1.50
Repetitive arm movement	2.6±1.41
Squatting or kneeling	2.27±1.15
Pushing/pulling/lifting	2.37±1.44

The Numeric Pain Rating Scale (NPRS) was used to depict the intensity of pain during the work-related physical demand activities. Mean and standard deviations for pain (NPRS) at neck, left shoulder and right shoulder are shown in Table 3.

Table 3 Pain area and their Mean and SD

Pain Area	**Mean±Standard Deviation of Pain (NPRS)**
Pain at Neck	4.65±1.77
Pain at Left Shoulder	4.05±1.98
Pain at Left Shoulder	4.65±2.05

Association of physical demands with neck and shoulder pain during clinical postings was deduced using the Pearson's Correlation Coefficient, depicted in Table 4.

Table 4 Association of physical demands with neck and shoulder pain

		Standing in the same place	**Back strongly bent/ twisting**	**Arms at/ above shoulder height**	**Repetitive arm movement**	**Squatting or kneeling**	**Pushing/ pulling/ lifting**
Pain at Neck	Pearson Correlation	0.289	0.176	-.476**	-.361*	0.223	-.542**
Pain (Lt Shoulder)	Pearson Correlation	-.316*	-.568**	.510**	.454**	-0.197	0.179
Pain (Rt Shoulder)	Pearson Correlation	-.349*	-.564**	.375*	.356*	0.014	0.129
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

VI. DISCUSSION

This research was conducted to study the association of physical demands and neck and shoulder pain among physiotherapy students going for clinical postings. A total of 40 students participated in the study, wherein they filled in a physical demands form, depicting work-related activities and levels of frequency at which that particular activity is performed. NPRS was used to analyse the intensity of pain due to perceived physical demand activities.

The results of the study showed correlation of different physical activities with pain at neck, and both shoulders. The study showed a positive correlation (r=0.289) of standing in same place and neck pain, can be due to poor posture, muscle fatigue and static loading. Positive correlation (r=0.176) of back strongly bent & twisting of back and neck pain was seen, that can be due to undue pressure on the structures, poor posture, and repetitive action. Positive correlation (r=0.223) of squatting & kneeling and neck pain was observed which can be due to poor posture, biomechanical loop and muscle imbalances. Positive correlations were observed for arms at/above shoulder height with left shoulder pain (r=0.510), and right shoulder pain (r=0.375) which can be because of poor posture and muscle fatigue. Positive correlations were seen for repetitive arm movement with left shoulder pain (r=0.454) and right shoulder pain (r=0.356), was seen, that can be caused due to repetitive strain injury. Positive correlations for pushing/pulling/lifting with left shoulder pain (r=0.179) and right shoulder pain (r=0.129) were observed, that may result due to improper posture, muscle imbalances and muscle fatigue.

Thus, the result of this study implies that there is a correlation, showing the association of different work-related postures with neck and shoulder pain. Therefore, working in similar postures for long periods during the clinical postings may increase the neck and shoulder pain perceived by the physiotherapy students. The finding of this study is congruent with the results of the study conducted by Alireza Choobineh et al (2006) which also reported that among all perceived physical demands investigated, awkward postures were most frequently and strongly associated with musculoskeletal disorders [12]. The result of this study is also similar to the study done by Alison M. Trinkoff et al (2003), where perceived physical demands involving awkward positions were strongly associated with reported musculoskeletal disorders of neck and shoulder [13].

Limitations of the study

- Small sample size.
- Reliability of self-report data.
- Only the pain related to neck and shoulder were considered in the study.
- Only six postures/activities were considered for this study.
- Only physiotherapy students were included in this study.

Future Scope of Study

- Study with larger sample size can be designed.
- The pain other than neck and shoulder can be considered for study.
- More postures/activities can be considered for further study.
- A study can be carried out with students/professionals of other professions as well.

VII. CONCLUSION

The study results show that there is an association between the frequency of physical activities and the chances of suffering from neck and shoulder pain. Higher frequency of physical demands on the body in the form of different activities, put undue stress on the body parts, which results in pain.

The results of this study can be used to develop prevention strategies of these physical activities and teaching proper ergonomic positions to perform various activities at the clinical postings, to reduce the chances of suffering from neck and shoulder pain due to improper, awkward, and repeated postures.

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