FUW CENTRE FOR RESEARCH JOURNAL OF HEALTH SCIENCES (FUWCRJHS)

A Comparative Study on Prevalence of Low Back and Knee Pain among Clinical and Non-Clinical Undergraduate Students in a Nigerian University: A Cross-Sectional Study at Bowen University

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Abstract

Previous studies have reported high prevalence of musculoskeletal discomfort (MSD) among young adults including clinical students. However, there is a paucity of research investigating and comparing the prevalence of MSDs among clinical undergraduates and their age-matched non-clinical undergraduates. The aim of this study was to assess and compare the prevalence of low back pain and knee pain among clinical and non-clinical undergraduates. This cross-sectional survey used systematic random sampling to recruit 375 undergraduates from a sampling frame with 477 clinical students, and 259 non-clinical students. A total of 218 participants were recruited from clinical programs, and 157 from non-clinical programs. All the participants were in their 4th and 5th year of study with ages ranging between 18 and 25. A Demographic data form, and Cornell musculoskeletal discomfort questionnaire (CMDQ) were administered to each participant. Descriptive statistics of mean, standard deviation, percentages and frequency was used to summarize the socio-demographic variables. Chi-square test was used to determine the association between the prevalence of knee pain and back and T-test was used to determine the significant difference between the two groups. Data was analyzed using SPSS version 21.0 at 0.05 alpha level. There was a higher prevalence of low back and knee pain among clinical undergraduates (56.7%) than non-clinical (43.3%) with low back pain accounting for (78.95%) than knee pain (21.05%) with a significant difference between clinical and non-clinical participants. There was significant association between prevalence of MSD and gender, Programs, clinical, and non-clinical undergraduates. The study found that MSD was more prevalent in clinical undergraduates than their age matched non-clinical undergraduates. This underscores the fact that young adults are also predisposed to musculoskeletal conditions, hence preventive majors should be tailored towards addressing the predisposing factors early in their lives, in order to reduce the debilitating effects in old age.

Key words: Low back pain, Knee pain, Age-matched, Undergraduate

Introduction

The International Association for the Study of Pain[1] defined pain as an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage. Pain is always subjective and the experience of pain is sculpted by a

mosaic of factors unique to the person, which renders the pain experience completely individualize[2]. Musculoskeletal pain (MSKP), defined as any pain or discomfort that affects bones, joints such as low back and knee, ligaments, tendons, or muscles, can be caused by poor body ergonomics or certain repetitive movements[3]. University students worldwide have a sedentary lifestyle, spending an average of 10 hour per day being sedentary[4].

Musculoskeletal pain is predisposed by a sedentary lifestyle, and should come as no surprise that university students frequently experience this type of pain[5]. Low back pain (LBP) is a pain in the back between the last rib and the gluteal fold regardless of the presence of radiation to the legs[6]. People of all ages, from young children to the elderly, are affected by low back pain (LBP), making it one of the most prevalent health issues[7]. Studies have indicated that LBP is highly prevalent among healthcare workers[7,8], with some authors suggesting that in some of the cases, low back pain began even before the people started working in the healthcare profession[8].

Low back pain is a significant public health problem, its prevalence among college students is high 30-70%; its association with the sitting position in workers has been reported, but its study in university student population is limited[9]. Medical students have a very demanding curriculum and long work hours in hospital wards and clinics[10]. This can contribute to stress and a sedentary lifestyle, which may be the reason why low back pain is rather common in this population[10].

Knee pain is studied mostly in older age groups, although in young adults it may be an indicator of future impaired musculoskeletal health[11]. Young adults may develop knee pain after a sudden unexpected traumatic injury or with an insidious developing onset where the adolescent or parent does not know what initiated the pain[12]. The main factors associated with unspecified knee pain among young adults are being female, doing sports activities, being obese, and being older[13]. Clinical students usually undergo long-term medical training, during which the students are exposed to stress, long standing hours, and long training hours in hospital wards and clinics thereby leading to knee pain[14]. Low back pain is biomechanically linked to knee pain via the so-called knee-spine syndrome[15]. It is possible that severe knee pain and low back pain interact, meaning that having both conditions together would have a greater effect on disability than each one alone. According to[14,16], students with concurrent knee and low back pain have low quality of life.

Studies have shown that clinical undergraduates participate in long standing hours during their medical training hence, they are prone to have knee pain and low back pain, and non-clinical undergraduates on the other hand usually sit or stand for long lectures and laboratory hours on chairs that may not be ergonomically suitable thus, predisposing them to musculoskeletal pain[16,17]. Interestingly, studies on low back pain and knee pain in the older population abound. However, there is paucity of published findings on the prevalence of these MSD among University undergraduates, and comparison of the prevalence of MSD between clinical and non-clinical University students, hence the crux of this study.

Methods

This study was a comparative cross sectional survey involving participants between the ages of 18 to 26 years, 400 and 500 level clinical and non-clinical students of Bowen University selected from 7 departments (Bachelor of medicine Bachelor of surgery, medical laboratory science, Nursing science, Physiotherapy, Law, Engineering, and Agricultural economics). They were recruited using systematic random sampling technique. However, students with pre-existing low back and knee pain or those who participated in sporting activities were excluded from this cross-sectional study. The sample size for this study was determined using Slovin's formula n = 375 (clinical students = 218 and non-clinical student = 157)[18]. Ethical approval was obtained from Bowen University Teaching Hospital (BUTH) Health Research and Ethics Committee before commencement of this study. An informed consent stating the rationale for the study as well as an assurance of confidentiality and anonymity was attached to the self-administered questionnaires.

A socio- demographic form was used to collect socio- demographic information, while Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) was used to assess the participants' discomfort in the low back and knee region. The CMDQ is a 54-item questionnaire containing a body map diagram and questions about the prevalence of musculoskeletal ache, pain or discomfort in 18 regions of the body (neck, shoulders, upper back, lower back, forearms, wrists, hip/buttocks, thighs, knees and lower legs) during the previous week[19]. Descriptive statistics of mean, standard deviation, percentages and frequency was used to summarize the socio-demographics data. Chi-square test was used to determine the association between the prevalence of knee pain and back pain in clinical undergraduates versus their age-matched non-clinical undergraduates. Independent t-test was used to determine the difference between the two groups. Alpha level was set at 0.05.

Results

A total of 375 copies of the CMDQ questionnaires were distributed and completed by clinical and non-clinical undergraduates of Bowen University. Amongst which 38.7% were male and 61.3% were female. Also, 53.3% of the respondents were between the ages of 21 to 23, and a majority (92.3%) were Christians, 49.1% were in 400 level while 50.9% were in their 500 level of study. There were 218 clinical undergraduates; 71(18.9%) in MBBS, 61(16.3%) in physiotherapy, 43(11.5%) in Nursing and 43(11.5%) in MLS. A total of 157 non-clinical undergraduates participated in the study: 65(17.3%) in law, 21(5.6%) in agriculture and 71(18.9%) in general engineering (Table 1). Most 78(35.8%) of the clinical undergraduates spent greater than 16 hours sitting for lectures in a week while 23(10.6) spent 1-4 hours. Majority of them 56 (25.7%) spent >16 hours standing in a week and 33(15.1) spent 1-4 hours. For the non-clinical undergraduates, 6(3.8%) spent 1-4 hours sitting for lectures in a week and 32(20.4%) spent greater than 16 hours.

While majority 114(72.6%) spent 1-4 hours standing for practical in a week 5(3.2%) spent greater than 16 hours (table 2). For the clinical undergraduates, 190(87.2%) reported to have

experienced ache, pain and discomfort in last work week at the lower back. Out of the clinical undergraduates that experienced low back pain, discomfort and ache, 100(45.9%) reported that it did not interfere with their academic work, while 90(41.3%) reported it interfered with their work their academic work. Similarly, a majority 111(70%) of the non-clinical undergraduates reported to have experienced ache, pain and discomfort in last work week at the lower back. Out of the non-clinical undergraduates that experienced low back pain, discomfort and ache, 54(34.4%) reported that it did not interfere with their academic work, while 57(35.6%) reported it interfered with their academic work and (Table 3). For knee pain among clinical undergraduates, a majority of the respondents 126(57,8%) reported that they experienced knee ache, pain or discomfort in the last work week. Also, out of the respondents that experienced pain, discomfort and ache, 47(21.6%) reported that it interfered with their academic work, while 79(36.2%) reported it did not interfere with their academic work. Majority 93(59.2%) of the non-clinical respondents reported that they had never experienced knee ache, pain or discomfort in the last work week, while 64(40.8%) reported knee discomfort in the same period. Out of the respondents that experienced knee pain, discomfort and ache, 26(16.5%) reported that it interfered with their academic work while 38(24.3%) reported that it did not interfere with their academic work (Table 4).

There was significant association between prevalence of musculoskeletal discomfort and both gender (p=0.001) and programme (p=0.001). However, there was no significant association between prevalence of musculoskeletal discomfort and each of age group (p=0.128), religion (p=0.771) and current level of study (p=0.180). No significant association was found between clinical undergraduate and prevalence of low back pain (p=0.136). Likewise, there was no significant association between clinical undergraduates and prevalence of knee pain (p=0.065). There was no significant association between non-clinical undergraduates and prevalence of knee pain (p=0.456). However, there was significant association between non-clinical undergraduates and prevalence of low back pain (p=0.001). There was significant association between prevalence of knee pain and low back pain among clinical undergraduates (p=0.003).

There was significant association between prevalence of knee pain and low back pain among non-clinical undergraduates (p=0.040). There was a significant difference in the prevalence of both low back pain (p=0.001) and knee pain (p=0.008) in male and female respondents. There was a significant difference in the prevalence of both low back pain (p=0.001) and knee pain (p=0.001) in clinical and non-clinical undergraduates (Table 5).

There was no significant association between prevalence of musculoskeletal discomfort and level of study of clinical undergraduates (p=0.058). Similarly, there was no significant association between prevalence of musculoskeletal discomfort and level of study of non-clinical undergraduate (p=0.904). There was no significant relationship between level of study of clinical undergraduate and both low back pain (p=0.060) and knee pain (p=0.094). There was also no significant relationship between level of study of non-clinical undergraduate and both low back pain (p=0.587) and knee pain (p=0.844).

Table 1: Association between musculoskeletal discomfort and socio-demographic variables

Sociodemographic variables		Musculoskeletal Discomfort				
		No pain N	Have pain N	χ^2	Df	p-value
Gender	Male	32	113	13.317	1	0.001*
	Female	20	210			
Age group (Years)	18-20	28	126	4.109	2	0.128
	21-23	22	178			
	24-26	2	19			
Religion	Christian	49	297	0.519	2	0.771
	Muslim	3	24			
	Others	0	2			
Current level	400	30	154	1.797	1	0.180
	500	22	169			
Programme	MBBS	9	62	22.410	6	0.001*
	Physiotherapy	5	56			
	Nursing	1	42			
	MLS	4	39			
	Law	10	55			
	Agric	2	19			
	Engineering	21	50			

***P** Significant at $p \leq 0.05$

Table 2: Data on number of hours spent on academic activities per week of the clinical and non-clinical undergraduates.

Clinical Undergraduates	Clinical undergraduates		Non-clinical undergraduates	
	Frequency	(%)	Frequency	(%)
Hours spent sitting per week				
1-4	23	10.6	6	3.8
5-8	45	20.6	43	27.4
9-12	50	22.9	49	31.2
13-16	22	10.1	27	17.2
>16	78	35.8	32	20.4
Hours spent standing per week				
1-4	33	15.1	114	72.6
5-8	51	23.4	29	18.5
9-12	49	22.5	5	3.2
13-16	29	13.3	4	2.5
>16	56	25.7	5	3.2

Table 3: Musculoskeletal Discomfort experienced at the lower back among the participants and its impact on academic activity

Lower back Discomfort	Clinical undergraduates		Non clinical undergraduates	
	N	%	N	%
Frequency				
Never	28	12.8	46	29.3
1-2 times	78	35.8	41	26.1
3-4 times	42	19.3	36	22.9
Once every day	30	13.8	19	12.1
Several times per day	40	18.3	15	9.6
Severity				
Slightly uncomfortable	82	37.6	41	26.1
Moderately uncomfortable	78	35.8	49	31.2
Very uncomfortable	30	13.8	21	13.4
Interference with academic work				
Not at all	100	45.9	54	34.4
Slightly interfere	77	35.3	44	28.0
Substantially interfere	13	6.0	13	8.3

Table 4: Musculoskeletal Discomfort experienced at the knee among participants and its effect on academic work

Knee Discomfort		**Clinical undergraduates**		**Non clinical undergraduates**	
		N	**%**	**N**	**%**
Frequency					
	Never	92	42.2	93	59.2
	1-2 times	90	41.3	39	24.8
	3-4 times	22	10.0	15	9.6
	Once every day	6	2.8	7	4.5
	Several times per day	8	3.7	3	1.9
Severity					
	Slightly uncomfortable	79	36.2	34	21.7
	Moderately uncomfortable	39	17.9	23	14.6
	Very uncomfortable	8	3.7	6	3.8
Interference with work					
	Not at all	79	36.2	37	24.3
	Slightly interfere	39	17.9	23	14.6
	Substantially interfere	8	3.7	3	1.9

Table 5: Differences in Knee and low back pain among Clinical and non-clinical undergraduates

	Clinical		Non clinical			
	N	Mean Rank	N	Mean rank	T-test	P-value
Low back pain	218	1.87	157	1.71	4.024	0.001*
Knee pain	218	1.58	157	1.41	3.293	0.001*

*P Significant at $p \leq 0.05$

Discussion

Results from the study showed that a majority of participants in the study were females which is due to the higher enrollment of female students at the institution than males. This appears to be the trend in many higher institutions around the world and it agrees with a study by[20], who reported a recent trend in higher education which suggest that there are more women than men enrolled across all levels. The higher number of clinical undergraduates is attributable to the enrollment statistics of the school, which shows a higher enrollment for professional health science programmes when compared to other programmes, followed by law.

This trend is very common in other Universities in Nigeria, as both parents and students perceive higher job opportunities and higher income after graduation from health professions compared to others. Clinical undergraduate students spend a significant amount of time sitting for lectures, with the majority spending more than 16 hours per week. However, they also dedicated a considerable amount of time to practical sessions, spending more than 16 hours per week standing for clinic/practical sessions. A similar result was reported by[21], the authors reported that clinical students spend around 60 hours per week on clinical rotation. Another study by[22] also found that medical students often work long hours in the lab, including late evenings and weekends, with a faster-paced and more intensive curriculum compared to other subjects. Non-clinical undergraduate students, on the other hand, spend a relatively lower amount of time sitting for lectures compared to clinical students, with the majority spending 9-12 hours per week. However, they spend significantly less time standing for practical sessions, with the majority spending only 1-4 hours per week which agrees with[22] and it could be because a majority of their courses are purely theory based with no or less practical session required especially for the students in the college of Law who made up the largest population in the non-clinical group.

A majority of the clinical and non-clinical students, reported a weekly experience of ache, pain, and discomfort in their lower back and knees. Similarly, a majority of non-clinical undergraduate students, also reported experiencing lower back discomfort. These findings are consistent with several studies[23,24,25,26] that have investigated musculoskeletal disorders among undergraduate students. Additionally,[25] reported that the most common site of the musculoskeletal pain reported by both medical and non-medical students was neck followed by

lower back and knees. A study by[23] found that 77.5% of medical students experienced lower back pain, the authors also reported that clinical practice was shown to be associated with musculoskeletal pain reported among their students who may suggest the complicity of clinical training in hospitals. Additionally, findings are consistent with[24] which also reported a 65.1% weekly experience of musculoskeletal discomfort among clinical undergraduates, similarly,[24] also reported 36.3% weekly experience among undergraduates.

However,[27] reported a lower prevalence of musculoskeletal discomfort among undergraduates. Nonetheless, according to[28], undergraduates in a developing country like Nigeria may be exposed to some risk factors of musculoskeletal discomforts due to reduced mechanization of tasks as well as poor awareness and knowledge of ergonomics that may culminate in habitual and prolonged sitting hours during lectures, awkward study postures, non-ergonomic compliant study environments, poor lifestyle habits and physical inactivity. The higher prevalence of lower back and knee discomfort among undergraduates as reported by [23,24,25,26] is attributed to various factors, such as prolonged sitting during lectures, standing for extended periods during practical sessions, and carrying heavy backpacks which are activities that have been reported as being capable of causing musculoskeletal strain and contribute to the development of discomfort and pain according to the authors. The result of this study suggests that while the majority of the respondents experienced mild musculoskeletal discomfort, a notable percentage also experienced moderate to severe pain. From the results, a considerable number of participants in both groups reported some interference of MSD on their academic work.

The impact of lower back discomfort on academic performance is a crucial consideration,[29] reported that lower back pain (LBP) was very much higher and had significantly impacted the quality of life (QOL) of students. Also,[23] found that musculoskeletal pain among medical students was associated with decreased academic performance and increased absenteeism. Compared to the clinical undergraduates, the non-clinical undergraduates reported a lower prevalence and impact of lower back discomfort in their academic work. This difference may be attributed to the varying physical demands and nature of their academic programmes. On the effect of low back pain on the academic performance of students,[24,30] reported that low back pain generates higher monthly consumption of analgesics, and has severe repercussions on student work, quality of sleep and personal life. There was significant association between prevalence of musculoskeletal discomfort and both gender ($p=0.001$) and Programme ($p=0.001$). This means that being male or female and belonging to any of the programmes predisposes one to musculoskeletal discomfort. This finding agrees with a study done by[31] which concluded that both gender have a higher incidence of musculoskeletal discomfort with more than 70% of the prevalence. A similar result also reported by a study in Turkey, that more than 80% in both gender experienced low back pain among medical and health sciences university student[32]. Therefore, all previous studies reported that both gender have high incidence of musculoskeletal discomfort among university students[31]. Hence, this result indicates that young undergraduate students are predisposed to developing musculoskeletal discomfort.

There was no significant association between clinical undergraduate and prevalence of low back pain (p=0.136), likewise, there was no significant association between clinical undergraduates and prevalence of knee pain (p=0.065). A study by[33] reported that the overall association between educational factors and the prevalence of low back pain was not significant, indicating that other lifestyle or environmental factors might be more influential. Additionally, this result agrees with studies[23,24,25,26] that university undergraduates (both clinical and non-clinical) are all predisposed to musculoskeletal discomfort in the course of their academic activities. There was no significant association between non-clinical undergraduates and prevalence of knee pain (p=0.456). However, there was significant association between non-clinical undergraduates and prevalence of low back pain (p=0.001), which means that being a non-clinical student in Bowen University predisposes one to low back pain. This result agrees with[34] which reported that University students are at greater risk of developing low back pain due to the nature of academic environment that require an extended hours per day to attend lecture and study in uninterrupted sitting position. However, this study shows that these students spend a smaller number of hours during practicals. The result of the study may be due to the classroom furniture, their sitting postures during classes and laboratory sessions, and hostel furniture. Additionally, students in the department of agriculture usually go for their industrial training which predisposes them to low back pain as they spend hours working on farms.

There was a significant difference in the prevalence of both low back pain (p=0.001) and knee pain (p=0.001) in clinical and non-clinical undergraduates. The findings indicates that the prevalence of low back pain and knee pain varies significantly between clinical and non-clinical undergraduate students. This significant difference may be due to various factors, such as; physical academic work demands, stress, non-ergonomic compliant classroom furniture and posture assumed while learning. Conversely, [35] reported that University students in Saudi Arabia showed a significant association between low back pain severity and poor sleep quality as well as increased sedentary duration, however there was no significant difference between clinical and non-clinical students. There was a significant difference in the prevalence of both low back pain (p=0.001) and knee pain (p=0.008) in male and female respondents. This difference may be suggestive of some gender-specific factors contributing to these musculoskeletal conditions, such as; anatomical and physiological differences, hormonal factors, lifestyle and physical activity levels. According to studies[36,37] conducted among children and adolescents, girls have higher prevalence rates of low back pain than boys. Also,[10] reported that female medical students, in comparison with male students, significantly more often reported mental stress during an exam period, sitting at the university, fatigue, lack of exercise, and improper body posture as potential triggers for low back pain.

However,[13] reported that knee pain prevalence among the adolescents assessed was 22.6% , with no difference between boys and girls. Conversely,[38] observed that the prevalence of knee discomfort was higher in males compared with females, however, the difference was not statistically significant and different knee conditions appear to have a predominance in different genders according to the authors. However, my study was cross-sectional and reported a difference. There was no significant association between prevalence of musculoskeletal

discomfort and level of study of clinical undergraduate (p=0.058). Similarly, there was no significant association between prevalence of musculoskeletal discomfort and level of study of non-clinical undergraduate (p=0.904). Furthermore,[10] reported that fourth year medical students who were on clinical training had higher prevalence of low back pain which was also observed among older medical students, who are exposed to more practical activities. The lack of significant association between musculoskeletal discomfort and level of study for both clinical and non-clinical undergraduate students suggests that the prevalence of musculoskeletal discomfort may be more influenced by factors other than the level of study, such as individual characteristics, lifestyle, physical activity, or specific academic or professional demands. There was no significant relationship between level of study of clinical undergraduate and both low back pain (p=0.060) and knee pain (p=0.094).

There was also no significant relationship between level of study of non-clinical undergraduate and both low back pain (p=0.587) and knee pain (p=0.844).The lack of significant relationships between level of study and MSD in both clinical and non-clinical undergraduates suggests that the level of study does not seem to be a significant predictor of MSD, rather, factors such as individual characteristics, lifestyle, physical activity, or specific academic or professional demands may be more influential in determining the prevalence of MSD in this population. Although, there was a positive correlation for knee pain (0.114) and low back pain (0.127) among clinical undergraduates, also, for knee pain (0.016) and low back pain (0.044) among non-clinical undergraduates which is an indication that as the level of study increases, chances of developing MSD also increases. However, this is open to further studies.

Conclusion and Recommendations

This study showed that younger adults also experience musculoskeletal discomfort. The higher prevalence of low back pain and knee pain among clinical undergraduates may be attributed to potential factors, such as physical demands of clinical training, prolonged standing/sitting, or the type of classroom and hostel furniture. Understanding and addressing the broader range of factors that contribute to musculoskeletal discomfort in undergraduate students is crucial for improving their overall health and well-being.

Preventive measures should be implemented such as regular breaks in-between academic activities, ergonomic interventions and exercise programs to reduce the risk of low back pain and knee pain in clinical and non-clinical undergraduates. Furthermore, healthy sleep habits, stress management techniques, and maintaining a healthy body weight and postures should be encouraged, as these factors have been associated with lower prevalence of musculoskeletal pain. Furthermore, a longitudinal observational study is also recommended to better explore the changes in these young adults at different stages of their studies, and the most implicating factors involved could be identified, hence timely preventive measures would be implemented.

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