Original Article:

Musculoskeletal Problems Associated with University Students Computer Users: A Cross-Sectional Study

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Abstract: While several studies have examined the prevalence and correlates of musculoskeletal problems among university students, scanty information exists in South African context. The objective of this study was to determine the prevalence, causes and consequences of musculoskeletal problems among University of Venda students' computer users. This cross-sectional study involved 694 university students at the University of Venda. A self-designed questionnaire was used to collect information on the sociodemographic characteristics, problems associated with computer users, and causes of musculoskeletal problems associated with computer users. The majority (84.6%) of the participants use computer for internet, wording processing (20.3%), and games (18.7%). The students reported neck pain when using computer (52.3%); shoulder (47.0%), finger (45.0%), lower back (43.1%), general body pain (42.9%), elbow (36.2%), wrist (33.7%), hip and foot (29.1%) and knee (26.2%). Reported causes of musculoskeletal pains associated with computer usage were: sitting position, low chair, a lot of time spent on computer, uncomfortable laboratory chairs, and stressfulness. Eye problems (51.9%), muscle cramp (344.0%), headache (45.3%), blurred vision (38.0%), feeling of illness (39.9%) and missed lectures (29.1%) were consequences of musculoskeletal problems linked to computer use. The majority of students reported having mild pain (43.7%), moderate (24.2%), and severe (8.4%) pains. Years of computer use were significantly associated with neck, shoulder and wrist pain. Using computer for internet was significantly associated with neck pain (OR=0.60; 95% CI 0.40-0.93); games: neck (OR=0.60; 95% CI 0.40-0.85) and hip/foot (OR=0.60; CI 95% 0.40-0.92), programming for elbow (OR= 1.78; CI 95% 1.10-2.94) and wrist (OR=2.25; CI 95% 1.36-3.73), while word processing was significantly associated with lower back (OR=1.45; CI 95% 1.03-2.04). Undergraduate study had a significant association with elbow pain (OR=2.47; CI 95% 1.03-5.95). There is high prevalence of musculoskeletal problems among the University of Venda students which were predominantly neck, shoulder and wrist pain, attributed to prolonged time on the computer/incorrect sitting position, uncomfortable laboratory chairs and stress.
Key Words: Musculoskeletal problems, university students, computer users.

Introduction:
Musculoskeletal disorders are now a growing health problem affecting both adults and young people. Musculoskeletal disorders (MSD) are usually musculoskeletal-related occurrence or recurring injuries and pains in the body. The commonly affected body parts are the back, neck, and shoulder.[1-9] Computer use is widely perceived as a new risk factor for musculoskeletal disorders.[1]

Computer usage has become increasingly important in people's daily lives, and students are no exception.[10] Computers have made work to be accomplished faster, easier, neater and less frustrating to the users.[11] However, its use has some side effects. Several studies[2,6-7,9,12-17] have found association between computer use and musculoskeletal disorders among university students. The academic demand of university students entails rigorous work (assignments, tests and writing examinations). These academic tasks involve the constant use of the computers; as such students spend most of their times in computer laboratories. Several reasons could be advanced to explain the prevalence of musculoskeletal problems among the university students. These included the lifting of heavy load, prolonged sitting, improper posture, stress, high academic demand/workload and lack of regular exercise. University students subject themselves to hours of prolonged reading [18,19] writing and computer work [20] which make them high-risk group for various musculoskeletal problems. From the health, economic and educational standpoint, recurrent musculoskeletal pain symptoms in students may likely result to negative health outcomes to students and their society. Pain is usually link to discomfort, and may limit students 'daily and leisure time, increase psychological stress and financial costs because of the repetitive use of the rehabilitative therapeutic health care services. Fundamentally, recurrent pain symptoms may affect

the academic performance of the students as well as their future working capacity and health in their transition from university to working life. Viewed in this context, it is important for university authorities to identify the possible modifiable musculoskeletal problems risk factors and plan early supportive and preventative measures for a better quality of life for students, who are future leaders.

While there is plenty of information on musculoskeletal problems among university students' computer users in other countries; to our knowledge, there is a dearth of studies on the prevalence of musculoskeletal problems associated with computer use among South African university students. Therefore, the present study was designed to determine the prevalence, causes and consequences of musculoskeletal disorders among University of Venda students' computer users. Given that musculoskeletal problems in at risk-population of students are potential precursor to their future events in the workplace, the determination of the prevalence and pattern of musculoskeletal symptoms is one of the important steps in the effective intervention and prevention of further chronic pain syndromes in young adults.(21,22)

Methods

This cross sectional study involved 694 (413 males and 281 females) students; purposively selected in all the eight faculties of the University of Venda. All available and willing students at the Computer Laboratory at University of Venda were selected to participate in the study. The Computer Laboratory serves as a focal point for students, irrespective of their faculty or disciplines.

A self-designed questionnaire was used for data collection. The questionnaire was divided into three sections. Section A focus on the demographic information (age, gender, school and level of study) of the participants; section B concerns the problems associated with computer users, while section C dwelt on the causes of musculoskeletal problems associated with computer users, among the students.

Data collection took place between May and July 2015. The questionnaires were distributed to the students at the university computer laboratory and students residences. At computer laboratory, the questionnaires were administered to the students and were collected after completion on the spot. However, at the student's residences, the questionnaires were handed to willing participants and were instructed to complete at their convenient time. A returned visit was made to retrieve the questionnaires, where repeated visits were undertaken to collect the questionnaires. Of the 720 questionnaires administered, 694 were completely and correctly filled, while 26 questionnaires were incomplete and were usable for data analysis.

Prior to data collection, participants were briefed on the aim and nature of the study. Informed consent was obtained from the participants before data collection. The participants were assured of anonymity, privacy and confidentiality of their information. The protocol for the study was presented to the Research Committee of the Centre for Biokinetics, Recreation and Sport Science, University of Venda; and approval was granted to conduct the study.

Data analysis: Data were analysed using a combination of descriptive and inferential statistics. Data were presented in frequency and percentages. Chi-square statistics was used to examine the significant relationship between variables. Multivariate analysis by logistic regression was applied to verify independent association of risk factors with musculoskeletal pains. All statistical analyses were carried out using the Statistical Package for Social Sciences (SPSS) for Windows version 22.0. For all statistical analyses, the level of significance was set at $p \leq 0.05$.

Results

The mean age of the participants was 22.7 ± 3.6 years. The majority of participants were in the School of Health Sciences (26.1%) and undergraduates (97.4%). Most students do not regularly participates in exercise (49.9%), while 31.1% do not participate in exercise. The majority of the students had used computer for three (22.5%), four (18.0%), two (17.9%), above five (17.2%) years, respectively. Majority of students uses computer for one to five hours (80.8%), six to ten hours (17.7%), 11-15 hours (1.4%) (Table 1).

Table 1: Demographic profile of the participants (N =694)		
	Frequency	Percentage (%)
Gender		
Male	413	59.5
Female	281	40.5
School		
Agriculture	45	6.5
Education	103	14.8
Environmental Sciences	79	11.4
Health Sciences	181	26.1
Human and Social Sciences	99	14.3
Law	74	10.7
Management Sciences	58	8.4
Mathematics and Natural Sciences	55	7.9
Level of study		
Undergraduate	676	97.4
Post-graduate	18	2.6
Frequency of exercise		
Regularly	132	19.0
Not regularly	346	49.9
None	216	31.1
Experience of computer use		
0-1 year	104	15.0
2 years	124	17.9
3 years	156	22.5
4 years	125	18.0
5 years	62	8.9
Above 5 years	123	17.2
Hours of computer use per day		
1-5 hours	561	80.8
6-10 hours	123	17.7
11-15 hours	10	1.4
N= Total number		

Figure 1 displays the reasons for using computer by the participants. Majority (n=587; 84.6%) of the participant use computer for internet, wording processing (n=141; 20.3%), games (n=130; 18.7%) and programming (n=59; 8.5%).
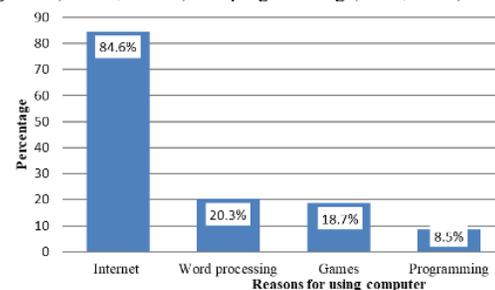

Figure 1: Reasons for using computer

Majority of the students indicated they always felt neck pain when using computer (52.3%); shoulder (47.0%), finger

(45.0%), lower back (43.1%), general body pain (42.9%), elbow (36.2%), wrist (33.7%), hip and foot (29.1) and knee (26.2%) (Table 2).

The cause of musculoskeletal pain among the participants is indicated in Table 3. Collapsed in the category of participants in the 'Agree' and 'Strongly Agree', majority of the participants affirmed that sitting position (Agree=241(34.8%); Strongly Agree=157(22.7%)); low chair (Agree=167(24.1%); Strongly Agree=161(23.2%)); a lot of time spent on computer (Agree=143(20.6%); Strongly Agree=160(23.1%)); uncomfortable laboratory chairs (Agree=174(25.1%); Strongly Agree=230(33.1%)); and stressfulness (Agree=179(25.8%); Strongly Agree=180(25.9%)); were the causes of musculoskeletal pain in their usage of the computer. There was no statistically significant relationship between their responses.

The responses of the participants concerning the consequences of musculoskeletal problems pertaining to their use of computer (Table 4) indicate that students always have eye problems (360/51.9%), muscle cramp (305/44.0%), headache (314/45.3%), blurred vision (264/38.0%), feel ill (277/39.9%) and missed lectures (202/29.1%).

Table 2: Musculoskeletal problems associated with computer usage

Anatomical site	Males [n=413]			Females [n=281]			All [n=694]			
	S n(%)	A n(%)	N n(%)	S n(%)	A n(%)	N n(%)	S n(%)	A n(%)	N n(%)	p-value
Neck	143(20.6)	217(31.3)	53(7.6)	93(13.4)	146(21.0)	42(6.1)	236(34.0)	363(52.3)	95(13.7)	X^2= 0.6716, p= 0.7148
Shoulder	168(24.2)	191(27.5)	54(7.8)	96(13.8)	136(19.6)	49(7.1)	264(38)	327(47)	103(14.8)	X^2=4.1742, p=0.124
Elbow	218(31.4)	149(21.5)	46(6.6)	145(20.9)	102(14.7)	34(4.9)	363(52.3)	251(36.2)	80(11.5)	X^2=0.1812, p=0.9134
Wrist	212(30.6)	145(30.6)	56(8.1)	138(19.9)	89(12.8)	54(7.8)	350(50.4)	234(33.7)	110(15.9)	X^2=4.1264, p=0.127
Chest	313(45.1)	71(10.2)	29(4.2)	212(30.6)	52(7.5)	17(2.5)	525(75.7)	123(17.7)	46(6.6)	X^2=0.4039, p=0.8172
Lower back	147(21.2)	193(27.8)	73(10.5)	108(15.6)	106(15.3)	67(9.7)	255(36.7)	299(43.1)	140(20.2)	X^2=6.6709, p=0.0356*
Knee	269(38.8)	108(15.6)	36(5.2)	183(26.4)	74(10.7)	24(3.5)	452(36.7)	182(26.2)	60(8.7)	X^2=0.0081, p=0.9959
Headache	178(25.7)	168(24.2)	67(9.7)	109(15.7)	123(17.7)	49(7.1)	287(41.4)	291(41.9)	116(16.7)	X^2=1.2804, p=0.5272
Hip and foot	266(38.3)	117(16.9)	30(4.3)	174(25.1)	85(12.3)	22(3.2)	446(63.4)	202(29.1)	52(7.5)	X^2=0.4459, p=0.8001
Ankle	280(40.4)	101(4.6)	32(4.6)	174(25.1)	80(11.5)	27(3.9)	454(65.4)	181(26.1)	59(8.5)	X^2=2.5964, p=0.273
Finger	148(21.3)	199(28.7)	66(9.5)	99(14.3)	113(16.28)	69(9.9)	247(35.6)	312(45.0)	135(19.5)	X^2=8.7006, p=0.0129*
General body	190(27.4)	175(25.2)	48(6.9)	114(16.4)	123(17.7)	44(6.3)	304(43.8)	298(42.9)	92(13.3)	X^2=3.259, p=0.196

S=Sometimes; A=Always; N=Never; * Statistically significant at p< 0.05

Table 3: Causes of musculoskeletal pain among the participants

Statements	Male					Female					All				p-value
	A n(%)	SA n(%)	N n(%)	D n(%)	SD n(%)	A n(%)	SA n(%)	N n(%)	D n(%)	SD n(%)	A n(%)	SA n(%)	N n(%)	D n(%)	SD n(%)	
Bad sitting position	146 (21.1)	97 (14.0)	78 (11.3)	55 (7.9)	36 (5.2)	95 (13.7)	60(8.7)	62(8.9)	34(4.9)	30(4.3)	241(34.8)	157(22.7)	140(20.2)	89(12.8)	66(9.5)	X^2=2.155, P=0.7073
My chair is very low	103 (14.8)	104(15)	90(13)	78 (11.2)	38 (5.5)	64(9.2)	57(8.2)	71 (10.2)	47(6.8)	42(6.1)	167(24.1)	161(23.2)	161(23.2)	125(18.0)	80(11.5)	X^2=8.1466, P=0.0864
I spend a lot of time on a computer everyday	86(12.4)	100(14.4)	95(13.7)	84(12.1)	48(6.9)	57(8.2)	60(8.7)	61(8.8)	60(8.7)	43(6.2)	143(20.6)	160(23.1)	156(22.5)	144(20.8)	91(13.1)	X^2=2.5518, P=0.6354
The computer laboratory's chairs are not comfortable	105(15.1)	144(20.8)	67(9.7)	51(7.4)	46(6.6)	69(9.9)	86(12.4)	42(6.1)	48(6.9)	36(5.2)	174(25.1)	230(33.1)	109(15.7)	99(14.3)	82(11.8)	X^2=4.1627 P=0.3844
I get stressed when I sit on a computer for a very long time	109(15.7)	111(16)	88(12.7)	50(7.2)	55(7.9)	70(10.1)	69(9.9)	61(8.8)	43(6.2)	38(5.5)	179(25.8)	180(25.9)	149(21.5)	93(13.4)	93(13.4)	X^2=1.7821, P=0.7758

S=Sometimes; A=Always; N=Never; * Statistically significant at p < 0.05

Table 4: Consequences of musculoskeletal problems among university students

Statements	Male			Female			All			
	S n(%)	A n(%)	N n(%)	S n(%)	A n(%)	N n(%)	S n(%)	A n(%)	N n(%)	p-value
I feel I am having eye problems as a result of using computer	109 (15.7)	222 (32.0)	82 (11.8)	89(12.8)	138 (19.9)	54 (7.8)	198 (28.5)	360 (51.9)	136 (19.6)	$X2$=2.3638,P=0.3067
I do have muscle cramp when I use computer for a long time	159 (22.9)	187 (27.0)	67(9.7)	117 (16.9)	118 (17.0)	46 (6.6)	276 (39.7)	305(44.0)	113(16.3)	$X2$=0.8271,P=0.6613
I feel headache when I work on the computer for long time	134(19.3)	188(27.1)	90(13.0)	91(13.1)	126(18.2)	64(9.2)	225(32.5)	314(45.3)	154(22.2)	$X2$=0.0893,P=0.9563
I do have blurred vision when I work on the computer for more than two hours	162(23.3)	165(23.8)	86(12.4)	144(20.8)	99(14.3)	38(5.5)	306(44.1)	264(38.0)	124(17.9)	$X2$=11.447,P=0.0033*
I think using computer for long hours makes me ill	182(26.2)	176(25.4)	55(7.9)	137(19.7)	101(14.6)	43(6.2)	319(46.0)	277(39.9)	98(14.1)	$X2$=3.1308,P=0.209
I missed lecturers at times due to musculoskeletal pains	263(37.9)	123(17.7)	27(3.9)	183(26.4)	79(11.4)	19(2.7)	446(64.3)	202(29.1)	46(6.6)	$X2$=0.2268,P=0.8928

S=Sometimes; A=Always; N=Never; * Statistically significant at $p < 0.05$

Table 5: Multivariate analyses of risk for musculoskeletal pains

Risk factors	Neck pain OR (95% CI)	Shoulder pain OR (95% CI)	Elbow OR (95% CI)	Wrist OR (95% CI)	Chest OR (95% CI)	Lower back OR (95% CI)	Hip/foot OR (95% CI)	Ankle OR (95% CI)	Finger OR (95% CI)
Age								0.96 (0.92-1.0)	
Experience of computer use	1	1		1					
0-1 year	0.78 (0.47 1.30)	1.04 (0.63-1.71)		1.14 (0.68-1.91)					
2 years	0.52 (0.32-0.90)	0.71 (0.44-1.15)		0.82 (0.51-1.33)					
3 years	0.49 (0.31-0.77)	0.68 (0.43-1.06)		0.64 (0.41-1.01)					
4 years	0.73 (0.45-1.18)	0.81 (0.50-1.30)		1.07 (0.66-1.74)					
5 years	0.94 (0.52-1.71)	0.39 (0.22-0.70)		0.40 (0.22-0.71)					
School					1				
Agriculture					2.01 (0.82-4.90)				
Education					1.60 (0.80-3.22)				
Environmental Sciences					2.45 (1.12-5.37)				
Health Sciences					2.14 (1.12-4.11)				
Human and Social Sciences					1.60 (0.79-3.24)				
Law					2.67 (1.19-6.01)				
Management					0.73 (0.35-1.52)				
Reasons for using computer	1								
Internet	0.60 (0.40-0.93)								
Games	0.60 (0.40-0.85)						0.60 (0.40-0.92)		
Programming			1.78 (1.10-2.94)	2.25 (1.36-3.73)					
Word processing						1.45 (1.03-2.04)			
Level of study		1							
Undergraduate		2.47 (1.03-5.95)							
Computer use hours									1
1-5 hours									3.44 (1.10-11.22)
6-10 hours									2.44 (0.72-8.23)
11-15 hours									

Neck	Shoulder	Elbow	Wrist	Chest	Lower back	Knee	Headache	Hip and foot	Ankle	Finger	Overall prevalence	Setting	Sample	Reference
51	30		35		42							Estonia	220	(1)
82					64						92	Malaysia	568	(2)
66	51.3	11.5	50.3		55.5							Tehran, Iran	191	(3)
24.1	8.6				27.2						45.7	Malaysia	232	(4)
28	29				14							Turku, Finland		(5)
54.0											54.0	Taif, Saudi Arabia	300	(6)
69.2	75.7R,72L	37.3	64.5		63.6					61.0	50.3	Ile-Ife, Nigeria	376	(7)
83.8	40.1	15.1	18.4									China	272	(8)
11.3	20.6	5.6	7.4		38.1	26.3		16.5	12.3			Saudi Arabia	486	(9)
33.9					11.4							Ibadan, Nigeria	472	(11)
14.2	7.1		9.2		10			0.4	0.4		52.8	Dublin, Ireland	321	(12)
											86	India	1544	(13)
43.3					43.7							Turkey	871	(14)
											37.5	Nigeria	1365	(15)
80	86.7	6.7	20									Netherland	15	(16)
											51.1	Brazil	262	(17)
34.6	23.8		12.7		59.2	25		16.5	11.9		80	Japan	260	(23)
29.3											38.4	Italy	195	(24)
46.0											46.0	Bangkok, Thailand	684	(25)
72	56	11	51							28		Houston	116	(26)
											55	USA	48	(27)
20							33.4					Australia	1073	(28)
20.7					15.4		19.7					Finland	436	(29)
76.9	46.2		41		51.3								39	(30)
						65.4						Osun state, Nigeria	4441	(31)
	26	17	49									California	206	(32)
52.3	**47.0**	**36.2**	**33.7**	**17.7**	**43.1**	**26.2**	**41.9**	**29.1**	**26.1**	**45.0**	**57.4**	**Thohoyandou, South Africa**	**694**	**Present study**

Table 6: Prevalence of musculoskeletal problems among university students compared with the present study.

R=Right; L= Left

Figure 2 shows pain perception concerning musculoskeletal problems associated with computer use. Majority of the students reported having mild pain (43.7%), moderate (24.2%), and severe (8.4%) pains.
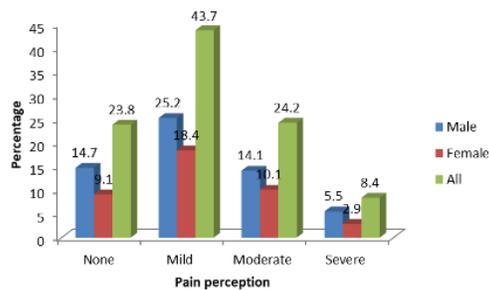

Figure 2: Pain perception due to the use of computer systems

The results of the multivariate analyses on risk for musculoskeletal pains are shown in Table 5. Years of computer use were significantly associated with neck, shoulder and wrist pain. Using computer for internet was significantly associated with neck pain (OR=0.60; 95% CI 0.40-0.93); games: neck (OR=0.60; 95% CI 0.40-0.85) and hip/foot (OR=0.60; CI 95% 0.40-0.92), programming for elbow (OR= 1.78; CI 95% 1.10-2.94) and wrist (OR=2.25; CI 95% 1.36-3.73), while word processing significantly associated with lower back (OR=1.45; CI 95% 1.03-2.04). Undergraduate study had a significant association with elbow pain (OR=2.47; CI 95% 1.03-5.95).

Discussion

This present study examines the prevalence of musculoskeletal problems experienced by university student population in a rural setting; and provided evidence that could inform appropriate interventions. There is hardly data available on the prevalence of musculoskeletal pain among South African University students to compare the present results. In this regards, the results of this study could only be compared to studies from other countries (Table 6). Notwithstanding the different prevalence rates in different studies, which could be associated with methodological issues (target population, examined symptoms, time intervals, and frequency classifications and in the structure of questions); the prevalence of musculoskeletal disorders observed in this present study are high and worrisome, given the musculoskeletal health implications of long and improper postural positioning of computer use. Although, the students in this present study may find solutions to short-term problems of acute effects of computer usage, they cannot resolve the problems caused by chronic symptoms which develop over many years. Therefore, the need to educate the students on the effects and causes of musculoskeletal problems associated with computer use becomes imperative. The higher prevalence of musculoskeletal disorders in computer users has been ascribed to posture, work tasks, furniture and positioning of the computes relative to the users. Awkward head and body posture, irregular body posture and task difficulty, number of working hours with the computer is significantly associated with neck complaints among computer users (33). These causes of computer-related problems as alluded to by Eltayeb et al.(33) are apparent in the present study, as most participants affirmed adopting a bad sitting position, have low chairs and spend a lot time on the computer (Table 3).

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The finding of this study indicated that the frequently reported musculoskeletal problems by the students were neck pain, shoulder, finger, lower back and general body pain. This finding concurs with several studies (Table 6), which cited neck, shoulder and lower back pains as the most frequently reported health complaints among university students. Similarly, Abdulmonem et al. (9) study involving female Saudian school teachers reported shoulder pain, neck pain and lower back pain as affecting the health of the teachers. Several reasons could be advanced to explain the prevalence of MS pain among the university students. These included the lifting of heavy load, prolonged sitting, improper posture, stress, high academic demand/workload and lack of regular exercise. University students subject themselves to hours of prolonged reading (18,19) writing and computer work(20) which make them high-risk group for neck pain.(19). As shown in this study, most students do not regularly participate in exercise (49.9%).

The finding of this present study demonstrated that improper sitting position; low chair, time spent on computer, uncomfortable laboratory chairs and stress are causes of musculoskeletal pain associated with computer usage among the students. Majority (80.8%) of the students uses computers for 1-5 hours. Compared to other studies, (7,34) the duration of computer use among the university of Venda students in this present study is low; but similar to other studies. (12,14,26) Spending several hours on the computer predisposes one to increased risk of hand and arm symptoms and disorders.(35). Furthermore, it should be noted almost all the University of Venda students have notebook computers, which was either offered to them by the university or parents/ guardians/ relatives. According to Jacobs et al. (27), considering that:

"*notebook computer's multi-faceted use and physical constraints of the university hostel room environment within which it is used, the physical characteristics of its use are frequently mismatched to the body's needs. Typically, students spend a large portion of their day in a static siting position, in a classroom, the library or at desk in their hostel room on a hard wooden or plastic chair that has limited support. The hostel room desks are often small, cluttered and like the chairs are not adjustable, which may contribute to bad postures. Computing is done in the hostel room at student desk, on the bed or on the floor, which would be even more difficult to rectify except through education*"

Most students in the current study reported using a computer for internet, followed by wording processing and games. This was an expected finding because, irrespective of leisure and social use, written coursework assignments are now submitted as a typed electronic and/or hard copy document.(12) It is expected that to be able to perform these tasks, the students are to search for internet, get the necessary materials or information required. Besides, in most South African universities, University of Venda inclusive, the e-learning is highly encouraged and patronised, where students frequently search for lecture materials, assignments, course information and requirements, and submit same. Therefore, the frequent usage of computer for internet becomes glaringly a predominant phenomenon among university students. Besides, internet is being used by the students for a wide variety of reasons. It serves as a resource for education, social interaction and entertainment. University students are commonly seen finding information from internet web sites, downloading materials or notes, and communicating with friends. In most cases, there will be delay in the internet connectivity, slow access to speed, difficulty in finding relevant information and its slowness makes downloading of materials very slow. This often results to considerable time spent on the internet by the students. Unempirical as these

might appears, it should not be ignored as providing possible explanations for the observed higher usage of computers for internet purpose among the university students found in this present study.

Similar to other studies conducted elsewhere, significant associations between demographic variables and the occurrence of musculoskeletal pains were identified in the present study. Using computer for internet is associated with neck pain (OR=0.60; 95% CI 0.40-0.93); games: neck (OR=0.60; 95% CI 0.40-0.85) and hip/foot (OR=0.60; CI 95% 0.40-0.92), programming for elbow (OR= 1.78; CI 95% 1.10-2.94) and wrist (OR=2.25; CI 95% 1.36-3.73), while word processing is associated with lower back (OR=1.45; CI 95% 1.03-2.04). Increasing daily hours of computer use significantly increased the risk of developing finger pain. The prolonged use of the computer overtime increases the musculoskeletal system discomfort.(11,14,33). It has been showed that frequent computer-related activities are independent risk factor for neck, shoulder and low back pain and independently related to the intensive use of the mouse device and keyboard. (36) Among the adolescents group, daily use of the computers exceeding 2-3 hours would result to neck and shoulder pain.(11)

The finding of the study indicated that age has a significant association with occurrence of ankle pain. Most of the participants in this study are in the ages of 17-39, with a mean age of 22.7 ± 3.6 years. The younger age represents the period where most individuals are more active in life and probably have more computer work load. Musculoskeletal problems associated with computer users are commonly prevalent among individuals' ages 30 years and below.(36)

The findings of this present study should be interpreted with caution bearing in mind the several limitations of the study. This study was a questionnaire-based, cross-sectional study and one of the limitations of questionnaire-based studies is that what people report may differ from their real situation. It is possible that musculoskeletal problems could have been associated with previous injuries; which was not included in the questionnaire. Another limitation of the study relate to the lack of an accompanying physical examination to verify disorders. Also, the recall bias for computer use hours is another concern. Given the small sample size, it is not possible to generalize the results of this study to student population at large. Despite these limitations, the study provides comparative data for future studies involving musculoskeletal problems associated with computer users in university students' population in South Africa, which no information exist.

Conclusion

Compared with previous studies and consistent with the literature, the findings of this present study highlights high prevalence of musculoskeletal problems among the University of Venda students which were predominantly neck, shoulder and wrist pain, attributed to prolonged time on the computer/ incorrect sitting position, uncomfortable laboratory chairs and stress. Using computer for internet was significantly associated with neck pain; games had a significant relationship with neck and hip/foot, programming for elbow and wrist, while word processing was significantly associated with lower back. As part of the health services package for students, the university should organise an ergonomics training programme to teach students computer ergonomics principles and how to re-organise and adjust their workstations.

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