Musculoskeletal Disorders, Computer Vision Syndrome and the Quality of Life among Banking Staff in Nepal

Shakya S,[1] Shakya BM,[2] Neupane S[3]

[1]Central Department of Public Health

[2]Department of Anaesthesiology,

Tribhuvan University Teaching Hospital,

Institute of Medicine,

Maharajgunj, Kathmandu.

Kathmandu, Nepal.

[3]Faculty of Social Sciences,

Tampere University, Tampere,

Finland.

Corresponding Author

Bigen Man Shakya

Department of Anaesthesiology,

Tribhuvan University Teaching Hospital,

Institute of Medicine,

Maharajgunj, Kathmandu, Nepal.

E-mail: bigensk@yahoo.com

Citation

Shakya S, Shakya BM, Neupane S. Musculoskeletal Disorders, Computer Vision Syndrome and the Quality of Life among Banking Staff in Nepal. *Kathmandu Univ Med J.* 2023;84(4):422-8.

ABSTRACT

Background

Musculoskeletal disorders (MSDs) and Computer vision syndrome (CVS) are work-related health problems affecting people of working-age, which result in loss of productivity and quality of life.

Objective

To assess the prevalence of musculoskeletal disorders and computer vision syndrome and their association with quality of life among the banking staff of Nepal.

Method

A cross-sectional questionnaire survey was conducted among 207 banking staff of the banks of Kathmandu. We used cluster random sampling to recruit the study participants. Musculoskeletal disorders was defined as pain or discomfort in one of nine body parts during the past 12 months using the English version of the Nordic Musculoskeletal Questionnaire (NMQ-E). Computer vision syndrome was defined as the presence of any visual symptoms like dry eye, excessive tearing, eye irritation, etc. at least once during the past 12 months. Quality of life (QoL) was assessed through the SF-36 questionnaire. Logistic regression models were fitted to determine the association of musculoskeletal disorders and computer vision syndrome with Quality of life.

Result

The prevalence of musculoskeletal disorders and computer vision syndrome were 65% and 92% respectively. The participants with musculoskeletal disorders were twice likely to have poor physical Quality of life (OR 2.34, 95% CI 1.20-4.58), while those with Computer vision syndrome were ten times likely to have low physical Quality of life (10.42, CI: 1.29-84.09).

Conclusion

Musculoskeletal disorders and computer vision syndrome were common among the bank workers in Nepal and are found associated with poor physical Quality of life. This calls for strategies emphasizing ergonomics and regular job shifting.

KEY WORDS

Computer, Low- and Middle-Income countries, Musculoskeletal pain, Occupational health

INTRODUCTION

Musculoskeletal disorders (MSDs) characterized by discomfort or pain in muscles, tendons, and other soft tissues are usually due to sudden and repetitive movements and sustained or unbalanced posture.[1] MSDs are common problems globally, especially among specific occupational groups, the cause of which is multi-factorial including individual, physical, and psychological factors at work.[2] The 12-month prevalence of MSD symptoms was 70% in Australian employees.[3] The scenario is similar in low-income countries like Bangladesh with a prevalence rate of 76%, Thailand with 63%, and India with 84%.[4-6]

The MSD symptoms occur mostly in working-age people and have a tendency for causing chronic problems. This creates a vicious cycle of disability to perform work and higher sickness absenteeism, which ultimately leads to loss of productivity and quality of life as long-term consequences. In EU nations, the total loss due to MSDs is approximately equivalent to 2% of the Gross Domestic Product.[7] Computer vision syndrome (CVS) or digital eye strain is a global issue and includes a group of eye- and vision-related problems resulting from prolonged or inappropriate use of a computer, tablet, cell phone, etc.[8] The contributing factors are poor lighting, glare, screen brightness, improper workstation, etc.[9]

Modern bank work involves tasks requiring prolonged sitting in front of computers and repetitive exposure to such working conditions, which put them at risk of MSDs and CVS. Although there are similar studies done among other occupational groups, we found no previous studies conducted exclusively among bankers in Nepal. Thus, we aimed to study the prevalence of MSDs and CVS, and their relationship with health-related quality of life among the banking staff of Nepal.

METHODS

This was a descriptive cross-sectional study conducted among bank workers from November 2019 to March 2020. The bank workers working in the commercial banks of Kathmandu were included. Kathmandu Metropolitan City was purposively selected as it is the capital city of Nepal where the banks are usually quite busy places with a large number of customers visiting each day. We included only the commercial (class A) banks, as the working nature of other banks is different from that of the commercial banks. For example, many finance companies are of a small scale where there is usually less use of computers. Similarly, many development banks are in the process of being merged with commercial banks.

The sample size was calculated by considering the estimated proportion of musculoskeletal disorders as 80%, level of significance (p) 0.05, allowable error 7%, and design effect 1.5 for cluster sampling, and non-response rate 10%.[10] The final calculated sample size was 210.[11] For possible non-response due to any reason, 220 participants were selected. The survey questionnaire was sent to 220 employees, and 13 employees (5.9%) did not respond. Thus, the final sample analyzed was 207.

Sampling was performed by using the cluster random sampling technique. Firstly, the list of all the commercial banks located in Kathmandu was obtained from the webpage of Nepal Rastra Bank, which is the monetary, regulatory, and supervisory authority of banks and financial institutions of Nepal.[12] From the available list, five banks (clusters) were selected through simple random sampling using the lottery method. Then 40 to 45 staff from each of the selected banks were again randomly chosen based on the calculated sample size. The structured self-administered questionnaire in the English language was used for data collection. The questionnaires were distributed to the study participants directly at the workplace and collected back after a week.

Ethical clearance for the study was obtained from an Institutional Review Committee (IRC) (Ref. 115/(6-11) E2/076/077). Written informed consent was obtained from each participant. Clear information about the study purpose and details of the data collection method was provided to the participants before data collection.

Measurement of variables

Musculoskeletal Disorders (MSDs)

MSDs were assessed by using the validated extended English version of the Nordic Musculoskeletal Questionnaire (NMQ-E).[13] It is a screening tool for detecting MSDs in various ergonomics contexts for occupational health care services. The respondents were asked to answer the dichotomous (yes/no) questions related to any pain/discomfort in nine body parts (neck, shoulders, elbows, wrists/hands, upper and lower back, hip/thigh, knees, and ankles/feet) and its influence in daily life. The respondents were asked to report pain/discomfort ever, during the past 12 months and the past month. MSDs were considered as the presence of pain/discomfort in any body part during the past 12 months.

Computer Vision Syndrome (CVS)

The respondents were asked if they had any one of the visual symptoms like dry eye, excessive tearing, eye irritation, etc., at least once a week during the past 12 months. The presence of any of the visual symptoms either intermittently or continuously was considered as having CVS. We adopted this questionnaire based on previous studies.[14,15] They needed to tick as many symptoms as they were experiencing during the period. A respondent was considered to have CVS if any one symptom was present as per the above-mentioned criteria. We adopted the above criteria in the absence of a standard diagnostic criterion after reviewing prior research and consulting experts.[14-17]

Health-Related Quality of Life (HRQOL)

The health-related quality of life (HRQOL) was assessed by using the standard English version of the SF-36 questionnaire after a few modifications.[18] Likert scale questions related to general health, limitation of activities, physical and emotional health problems, etc., all of which led to 8 scales/domains were used. The survey responses were re-coded according to standardized procedures for scoring. The raw scores were calculated as the sum of (re-coded) scale items and transformed to a 0 to 100 scale based on the given formula.[19] The higher the score, the better the HRQOL was considered. All the subdomain scores of the eight scales were categorized into the physical and mental domains of the composite scores through principal component analysis. Then, each scale was standardized through a z-score transformation based on the standard population mean score and standard deviation, which was followed by aggregation of scores into physical and mental domains, and a T-score transformation of component scores. Then Physical Health Component Score (PCS) and Mental Health Component Score (MCS) were calculated as the weighted sum of standardized scale scores. Finally, these component scores were categorized, based on cut-off point 50, into low (< 50) and high (≥ 50) quality of life.[19]

The reliability estimates of SF-36 questionnaires based on internal consistency and the test-retest method were 0.88 and 0.80 respectively.[19] The reliability of our study tool was assessed by pre-testing the questionnaire in 10% of the sample in a different bank of the same setting.

Socio-demographic characteristics

Demographic information like age (in years), sex (male, female), religion (Hindu, Buddhist, Muslim, Christian, Others), ethnicity (Brahmin/Chhetri, Janajati, Dalit, Others), education (undergraduate, graduate, masters and above) and marital status (single, married, widow/widower, divorced/separated) were assessed. Similarly, job-related questions were asked, which included the nature of work (e.g., highly repetitive task, constant standing or sitting for 2 hours or more, tasks requiring a high level of concentration for 2 hours or more, etc.), hours of work per day, hours of break time and whether the work or posture was changed while working.

We assessed the potential sources of bias during our study. The possibility of information bias was minimized by using standard tools and ensuring that the questions asked were specific and clear.

Descriptive statistics of the studied variables were calculated and presented. The frequency and percentage for the categorical variables and median with an interquartile range for the continuous variables were calculated. The prevalence of MSDs and CVS were calculated and presented in graphical figures. The prevalence of musculoskeletal disorders in different body sites was calculated by sex and odds ratio with their 95% CIs in each body site for male vs. female. Similarly, the prevalence of any of the CVS symptoms was assessed by sex. The association of demographic and work-related factors with MSDs was calculated using the chi-square test. Binary logistic regression models were fitted to determine the association of MSDs and CVS with low physical and mental quality of life. Two models were fitted, one with a crude model and the second by adjusting with age, sex, marital status, education, and work experience.

RESULTS

The median age was 29 years with more than half (55.6%) of the study participants being of the youngest age group (20 to 29 years). The majority were female (57.5%) and single (53.1%). The median years of work experience was 5 years (Table 1).

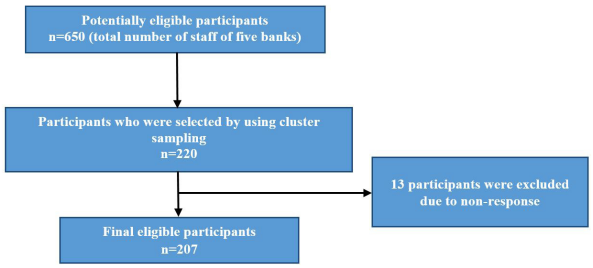

Figure 1. Participant flow diagram

Table 1. General Characteristics of the Bank Workers

Characteristic	Median (IQR)	Number n=207	Percent (%)
Age group (in years)	29 (8)		
20-29		115	55.6
30-39		79	38.2
40-49		9	4.3
50-59		4	1.9
Sex			
Male		88	42.5
Female		119	57.5
Marital Status			
Single		110	53.1
Married		97	46.9
Education			
Undergraduate		2	1.0
Graduate		62	30.0
Masters and above		143	69.1
Work experience (in years)	5 (7.5)		
Less than 1		26	12.6
1-5		89	43.0
6-10		61	29.5
More than 10		31	15.0

Abbreviation: IQR - Interquartile range

Prevalence of MSDs and CVS

The majority, that is, 134 participants (64.7%) had experienced pain or discomfort in any one of nine body regions during the past 12 months, and 127 (61.4%) suffered from such pain during the past month. The prevalence of any CVS was 92% (n= 191), and the most common visual symptoms included headache (55.6%), tiredness (54.1%), dry eye (37.7%), and itching (36.2%) (Fig. 2).

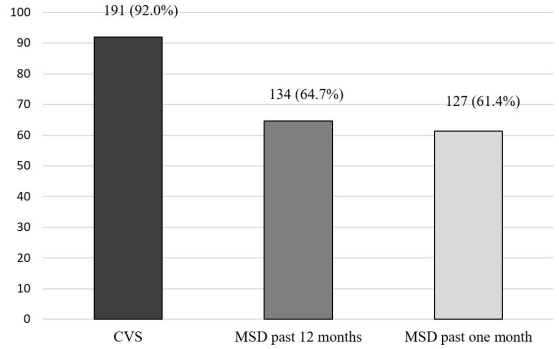

Figure 2. Prevalence of Computer Vision Syndrome (CVS) and Musculoskeletal Disorders (MSDs) during the past 12 months and past one month (n=207).

Prevalence of MSDs and CVS by sex and nature of work

Table 2 shows that females were more prone to shoulder, upper, and lower back pain as well as wrist pain than males ($p < 0.05$). Females had more than twice likely of having wrist/hand pain, shoulder pain, and elbow pain compared to males.

Table 2. Prevalence of MSDs (past 12 months) by Body Parts among Males and Females. Odds ratio and their 95% confidence intervals for male vs. female.

Pain in different body areas	Male n=88 (%[a])	Female n=119 (%[a])	OR	(95% CI)	p-value[b]
Neck pain	29 (33.0)	58 (48.7)	1.93	1.09-3.43	0.023*
Shoulder pain	20 (22.7)	52 (43.7)	2.64	1.43-4.89	0.002**
Upper back pain	15 (17.0)	35 (29.4)	2.03	1.03-4.01	0.040*
Elbow pain	2 (2.3)	6 (5.0)	2.29	0.45-11.59	0.471
Wrist/hands pain	8 (9.1)	26 (21.8)	2.80	1.20-6.52	0.014*
Lower back pain	28 (31.8)	53 (44.5)	1.72	0.97-3.06	0.064
Hip/thigh pain	5 (5.7)	11 (9.2)	1.69	0.57-5.06	0.343
Knee pain	10 (11.4)	14 (11.8)	1.04	0.44-2.47	0.929
Ankle/feet pain	6 (6.8)	12 (10.1)	1.53	0.55-4.26	0.410

*p<0.05, **p<0.001, [a]column percent, [b]chi-square test, OR: Odds Ratio, CI: Confidence interval

None of the CVS symptoms were significantly different between males and females, although the estimates show lower odds of CVS symptoms for female compared to males (Table 3).

Table 3. CVS Symptoms by Gender. Odds ratio and their 95% confidence intervals for male vs. female

CVS symptom	Male n=88(%[a])	Female n=119(%[a])	OR	(95% CI)	p-value[b]
Excessive tearing	9 (10.2)	12 (10.1)	0.98	0.40-2.45	0.973
Dry eye	28 (31.8)	50 (42.0)	1.55	0.87-2.77	0.134
Eye irritation	26 (29.5)	49 (41.2)	1.67	0.93-3.00	0.085
Pain in or around the eye	16 (18.2)	24 (20.2)	1.14	0.56-2.30	0.720
Tiredness of eye	47 (53.4)	65 (54.6)	1.02	0.59-1.78	0.932
Redness of eye	12 (13.6)	15 (12.6)	0.91	0.40-2.06	0.828
Blurring of vision	20 (22.7)	38 (31.9)	1.60	0.85-3.00	0.145
Double vision	6 (6.8)	9 (7.6)	1.12	0.38-3.27	0.838
Headache	42 (47.7)	73 (61.3)	1.74	1.00-3.04	0.051

[a]column percent, [b]chi-square test, OR: Odds Ratio, CI: Confidence interval

Work experience and nature of work like tasks requiring constant sitting or standing for more than 2 hours and tasks requiring a high level of concentration for more than 2 hours were significantly associated with MSDs during the past 12 months (p=0.03) (Table 4).

Table 4. Association of MSDs (past 12 months) with Sex, Work Experience and Nature of Work

Characteristic	MSDs		p value[b]	CVS		p value[b]
	Yes n (%[a])	No n (%[a])		Yes n (%[a])	No n (%[a])	
Sex			0.079			0.092
Male	51 (59.0)	37 (42.0)		78 (40.8)	10 (62.5)	
Female	83 (69.8)	36 (30.2)		113 (59.2)	6 (37.5)	
Work experience (in years)			0.008**			0.192
< 1	9 (34.6)	17 (65.4)		26 (13.6)	0 (0.0)	
1-5	61 (68.5)	28 (31.5)		80 (41.9)	9 (56.2)	
6-10	42 (68.9)	19 (31.1)		58 (30.4)	3 (18.8)	
> 10	22 (71.0)	9 (29.0)		27 (14.1)	4 (25.0)	
Constant sitting or standing for ≥ 2 hours at a time			0.033*			0.310
Yes	90 (70.3)	38 (29.7)		120 (62.8)	8 (50.0)	
No	44 (55.7)	35 (44.3)		71 (37.2)	8 (50.0)	
High level of concentration ≥ 2 hours at a time			0.004**			0.400
Yes	90 (72.6)	34 (27.4)		116 (60.7)	8 (50.0)	
No	44 (53.0)	39 (47.0)		75 (39.3)	8 (50.0)	

*p < 0.05, *p < 0.01, [a]column percentage, [b]chi square test

Table 5. Relationship of physical and mental well-being component Quality of Life with Musculoskeletal Disorders (MSDs) (past 12 months), Computer Vision Syndrome (CVS) and other characteristics.

Factor	Number	Low Physical QoL		Low Mental QoL	
		Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Age group					
20-29	115	Ref	Ref	Ref	Ref
30-39	79	0.69 (0.39-1.24)	0.50 (0.17-1.46)	1.21 (0.68-2.16)	0.95 (0.35-2.62)
40-49	9	2.04 (0.49-8.53)	1.37 (0.21-8.66)	1.83 (0.44-7.69)	1.44 (0.25-8.42)
50-59	4	3.05 (0.31-30.22)	2.31 (0.15-35.70)	0.92 (0.13-6.73)	0.66 (0.06-7.29)
Sex					
Male	88	0.42 (0.24-0.75)	0.47 (0.25-0.88*)	1.62 (0.92-2.83)	1.74 (0.95-3.18)
Female	119	Ref	Ref	Ref	Ref
Marital status					
Single	110	Ref	Ref	Ref	Ref
Married	97	1.27 (0.74-2.20)	1.73 (0.73-4.10)	1.37 (0.79-2.38)	1.39 (0.63-3.08)
Education					
Up to bachelors	64	Ref	Ref	Ref	Ref
Masters and above	143	0.54 (0.30-0.99)	0.54 (0.27-1.11)	0.99 (0.55-1.80)	0.87 (0.44-1.71)
Work experience					
< 1	26	Ref	Ref	Ref	Ref
1-5	89	0.89 (0.37-2.14)	1.06 (0.39-2.85)	0.88 (0.37-2.11)	1.18 (0.45-3.07)
6-10	61	0.85 (0.34-2.13)	1.11 (0.32-3.88)	1.42 (0.56-3.59)	1.67 (0.50-5.62)
> 10	31	0.94 (0.33-2.66)	1.35 (0.30-6.05)	0.91 (0.32-2.60)	0.96 (0.23-3.98)
MSD					
No	73	Ref	Ref	Ref	Ref
Yes	134	2.30 (1.27-4.15)	2.34 (1.20-4.58*)	0.54 (0.30-0.97)	0.52 (0.28-0.99*)
CVS					
No	16	Ref	Ref	Ref	Ref
Yes	191	15.48 (2.01-119.52)	10.42 (1.29-84.09*)	1.60 (0.57-4.48)	1.83 (0.60-5.60)

*significant at p<0.05, OR: Odds Ratio, CI: Confidence interval

Relationship of Quality of Life with MSDs and CVS

Table 5 shows the crude and adjusted association of physical and mental well-being components of quality of life with MSDs and CVS. The adjusted model shows that males were 53% less likely to have low physical quality of life compared to females (0.47, CI: 0.25-0.88). Moreover, those with MSDs were twice likely to have poor physical QoL (2.34, CI: 1.20-4.58) and lower odds of having poor mental QoL (0.52, CI: 0.28-0.99). Similarly, those suffering from CVS had ten times higher odds of having low physical QoL (10.42, CI: 1.29-84.09) and were nearly twice likely to have low mental QoL (1.83, CI: 0.60-5.60).

DISCUSSION

This study assessed the prevalence of MSDs and CVS, and their relationship with quality of life among bank workers in Nepal. The prevalence of MSDs at any of the body regions over 12 months period was 65% and that of CVS was 92%. Females were more likely to have pain in the shoulder, back, and wrist. The presence of MSDs or CVS was associated with lower physical and mental component scores of the quality of life.

Similar to our findings, a previous study conducted among office workers in Thailand reported a 63% prevalence of MSD.[5] But the annual prevalence of MSDs in another study among bank workers in India was much higher (84%).[6] The high annual prevalence rate of MSDs was also found in bank workers in Kuwait (80%) and Iran (78.5%).[10,20] The possible reason for the relatively low prevalence rate in our study might be due to young participants with short tenure (median: 5 years) compared to other studies such as Kuwait (mean: 7.6 years). The more the work experience of the bank workers, the more the chance of developing MSDs due to long exposure to repeated work.

The most commonly affected body regions during the past year were the neck (42%), lower back (39%), and shoulder (35%), which was consistent with other findings.[3,5,10,20] This was expected as the bank workers are required to perform their tasks sitting in front of a computer for several hours. The poor ergonomic design of workstations can aggravate maximum strain on muscles and ligaments of the neck, upper back, shoulder, and lower back.[21]

We found no significant difference in MSDs by sex. However, for individual body sites, the pain in the shoulder, upper and lower back, and wrist was found significantly more in females ($p < 0.05$). The sex predominance for female patients is also found in other studies.[3,5,10,20] The smaller body built in females and lower muscle mass have to bear a relatively higher load.[22] The other likely explanation could be that household activities may have put an extra load on the muscle and ligaments in females.[23]

We found a significant association between MSDs and tasks known to be risk factors, like constant sitting or standing and high concentration level, work experience, and long working hours. The repetitive and forceful task leads to microtrauma, which triggers local inflammation with fibrotic changes. This cycle repeats itself and the involved area becomes a potential source of pain generator.[24] The symptoms of MSDs can sometimes be so severe that the performance of an individual is decreased, which leads to work absenteeism.

The prevalence of CVS in our study was 92.3% and the most common symptoms were headache (55.6%), tiredness (54.1%), dry eye (37.7%), and itching (36.2%). This CVS prevalence is higher compared to other studies.[14,15,25]

One recent study by Das et al. estimated the prevalence of CVS and MSDs among the participants from IT software companies, offices, and banks in Nepal.[26] The prevalence of CVS was 89.4%, which is closer to our study, whereas the prevalence of MSDs was 80.5%. The higher prevalence of MSDs in their study might be due to the inclusion of other office workers too, whereas our study only included bank workers. The average length of a job in their study was 7.1±7.2 years, in contrast to 5 years median length of a job in our study. This once again highlights the increase in the prevalence of MSDs with an increase in the duration of the job.[26]

Musculoskeletal disorders and CVS proved to be significant physical and psychological stressors for bank workers. The higher physical composite scores of quality of life are more likely among men and those who did not have any MSDs or CVS compared to their counterparts. Similarly, the bank workers with CVS had significantly lower odds of having good mental composite scores. This reflects the comparatively worse quality of life associated with CVS and MSDs. Darvishi also showed significantly lower mean scores among MSD patients.[20] Other studies also illustrate the lower mean quality of life scores among patients with back pain.[27,28]

Implications of the study

Tasks requiring a sitting position for a prolonged period in front of the computer are now a part of modern work. This invariably leads to the development of MSDs and CVS in the productive age group if not properly addressed. Although this is a small-scale study, this could be an eye-opener to see the burden for the concerned authority. A large-scale survey representing a larger population is required to investigate the magnitude of the problem which will guide in formulating relevant policies in this aspect.

We used a standard validated self-reported Nordic-E questionnaire for assessing MSDs. We adopted cluster random sampling which has possibly increased the generalizability of the findings. However, there is a lack of causal inference due to the cross-sectional nature of the study. As this study depicts the picture of the capital city, it does not necessarily represent the national scenario. We did not use a standard tool for assessing CVS, and the prevalence was assessed based on the symptoms. The detailed information on associated practices of CVS like the use of glare, sitting arrangement, distance from the computer, etc. was not assessed considering the length of the questionnaire which might lead to non-response bias.

CONCLUSION

Musculoskeletal disorders and Computer vision syndrome are common among bank workers, and are associated with low physical quality of life. Enforcing strategies for improving the physical work setting of the bank offices considering the ergonomics and regular shifting of the nature of the job with intermittent breaks may help to reduce this problem.

REFERENCES

1. WorkSafe Victoria. Officewise - A guide to health and safety in the office, a handbook for workplaces [Internet]. 5th ed. 2006. Available from: https://www.ergonomicsnow.com.au/image/data/14/officewise.pdf
2. Malchaire J, Cock N, Vergracht S. Review of the factors associated with musculoskeletal problems in epidemiological studies. *Int Arch Occup Environ Health*. 2001;74(2):79-90.
3. Griffiths KL, MacKey MG, Adamson BJ, Pepper KL. Prevalence and risk factors for musculoskeletal symptoms with computer based work across occupations. *Work*. 2012;42(4):533-41.
4. Habib MM, Yesmin S, Moniruzzaman. A pilot study of prevalence and distributions of musculoskeletal symptoms (MSS) among paper based office workers in Bangladesh. *Work*. 2015;50(3):371-8.
5. Janwantanakul P, Pensri P, Jiamjarasrangsri V, Sinsongsook T. Prevalence of self-reported musculoskeletal symptoms among office workers. *Occup Med (Chic Ill).* 2008;58(6):436-8.
6. Moom RK, Sing LP, Moom N. Prevalence of Musculoskeletal Disorder among Computer Bank Office Employees in Punjab (India): A Case Study. *Procedia Manuf*. 2015;3:6624-31.
7. Bevan S. Economic impact of musculoskeletal disorders (MSDs) on work in Europe. *Best Pract Res Clin Rheumatol* [Internet]. 2015;29(3):1-18. Available from: http://dx.doi.org/10.1016/j.berh.2015.08.002
8. Saljoughian M. Computer Vision Syndrome. *US Pharm*. 2022;47(2):29-31.
9. Munshi S, Varghese A, Dhar-Munshi S. Computer vision syndrome-A common cause of unexplained visual symptoms in the modern era. *Int J Clin Pract*. 2017;71(7):1-5.

10. Akrouf QAS, Crawford JO, Al-Shatti AS, Kamel MI. Musculoskeletal disorders among bank office workers in Kuwait. *East Mediterr Heal J*. 2010;16(1):94–100.

11. Dhand NK, Khatkar MS. An online statistical calculator. Sample Size Calculator for Estimating a Single Proportion [Internet]. 2014 [cited 2022 Jan 15]. Available from: http://statulator.com/SampleSize/ss1P.html

12. Nepal Rastra Bank. List of Banks and Financial Institutions [Internet]. Available from: https://www.nrb.org.np/bank-list/

13. Dawson AP, Steele EJ, Hodges PW, Stewart S. Development and Test-Retest Reliability of an Extended Version of the Nordic Musculoskeletal Questionnaire (NMQ-E): A Screening Instrument for Musculoskeletal Pain. *J Pain* [Internet]. 2009;10(5):517-26.

14. Dessie A, Adane F, Nega A, Wami SD, Chercos DH. Computer Vision Syndrome and Associated Factors among Computer Users in Debre Tabor Town, Northwest Ethiopia. *J Environ Public Health*. 2018 Sep 16;2018:4107590.

15. Ranasinghe P, Wathurapatha WS, Perera YS, Lamabadusuriya DA, Kulatunga S, Jayawardana N, et al. Computer vision syndrome among computer office workers in a developing country: an evaluation of prevalence and risk factors. *BMC Res Notes*. 2016 Mar 9;9:150.

16. Logaraj M, Madhupriya V, Hegde S. Computer vision syndrome and associated factors among medical and engineering students in Chennai. *Ann Med Health Sci Res*. 2014;4(2):179-85.

17. Akinbinu R, Mashalla Y. Knowledge of computer vision syndrome among computer users in the workplace in Abuja, Nigeria. *J Physiol Pathophysiol*. 2013;4(4):58–63.

18. Hays RD, Morales LS. The RAND-36 measure of health-related quality of life. *Ann Med*. 2001;33(5):350-7.

19. Ware JE, Kosinski MA, Keller SD. SF-36 Physical and Mental Health Summary Scales:a User's Manual [Internet]. Boston, MA: Health Assessment Lab. 1994.

20. Darvishi E, Maleki A, Giahi O, Akbarzadeh A. Subjective Mental Workload and Its Correlation With Musculoskeletal Disorders in Bank Staff. *J Manipulative Physiol Ther* [Internet]. 2016;39(6):420-6. Available from: http://dx.doi.org/10.1016/j.jmpt.2016.05.003

21. Wahlström J. Ergonomics, musculoskeletal disorders and computer work. *Occup Med* (Chic Ill). 2005;55(3):168-76.

22. Punnett L, Herbert R. Work-Related Musculoskeletal Disorders: Is There a Gender Differential, and if So, What Does It Mean? In: Women and Health. San Diego, CA: Academic Press; 2000:474-92.

23. Strazdins L, Bammer G. Women, work and musculoskeletal health. *Soc Sci Med.* 2004;58:997-1005.

24. Barbe MF, Ann BE. Inflammation and the pathophysiology of work-related. *Brain Behav Immun.* 2006;20(5):423-9.

25. Venkatesh SH, Girish AT, Kulkarni P, Mannava S. A Study of Computer Vision Syndrome at the Workplace - Prevalence and Causative Factors. *Int J Contemp Med Res* [Internet]. 2016;3(8):2375-7. Available from: www.ijcmr.com

26. Das A, Shah S, Adhikari TB, Paudel BS, Sah SK, Das RK, et al. Computer vision syndrome, musculoskeletal, and stress-related problems among visual display terminal users in Nepal. *PLoS One* [Internet]. 2022;17(7):1-13. Available from: http://dx.doi.org/10.1371/journal.pone.0268356

27. Kabir-Mokamelkhah E, Bahrami-Ahmadi A, Aghili N. Work-related stress and quality of life among Iranian blue-collar workers with self-reported low back pain. *Med J Islam Repub Iran*. 2016;30:474.

28. Husky MM, Ferdous Farin F, Compagnone P, Fermanian C, Kovess-Masfety V. Chronic back pain and its association with quality of life in a large French population survey. *Health Qual Life Outcomes*. 2018;16(1):195.