



Prevalence, patterns, and coping strategies of musculoskeletal disorders among caterers in the selected local government areas of Lagos State in Nigeria, 2017

Ashiyat Akodu^{1*}, Ibitayo Famose²

1.PhD, Department of Physiotherapy, College of Medicine, University of Lagos, Lagos, Nigeria.

2.BSc, Department of Physiotherapy, College of Medicine, University of Lagos, Lagos, Nigeria.



Citation: Akodu A, Famose I. Prevalence, patterns, and coping strategies of musculoskeletal disorders among caterers in the selected local government areas of Lagos State in Nigeria, 2017. JOHE. 2019; 8(1):29-36.

Article Info

* Corresponding author:

Ashiyat Akodu,


E-mail:

akoduashiyat@gmail.com

Article history

Received: Dec, 2018

Accepted: March, 2019

 10.29252/johe.8.1.29

Print ISSN: 2251-8096

Online ISSN: 2252-0902

Peer review under responsibility of Journal of Occupational Health and Epidemiology

Abstract

Background: This study aimed to investigate the prevalence, patterns, and coping strategies of caterers and identify parts of the body most frequently affected by musculoskeletal disorders.

Materials and Methods: A cross-sectional survey was carried out involving 225 caterers (174 females and 51 males) from the selected local government areas of Lagos state in Nigeria during May and September 2017. The data were collected using a 58-item questionnaire which assessed the participants' personal characteristics, report of musculoskeletal disorders, and coping strategies used by them. The collected data were analysed using SPSS (version 22) through descriptive statistics including mean, standard deviation, frequency, and percentage, and also inferential statistics including the chi-square test.

Results: The 12-month prevalence of musculoskeletal disorders reported by the caterers was 203 (90%). The low back 154 (68.40%) was the body part most frequently affected followed by knees 117 (52%), shoulders 115 (51.10%), the neck 83 (36.90%), wrists/hands 74 (32.90%), ankles/feet 56 (24.90%), hips/thighs 36 (16.00%), the upper back 30 (13.30%), and elbow 23 (10.20%). The coping strategies used commonly by the respondents were faith and prayer, self-instruction, hoping, and cognitive distraction. The result revealed a significant correlation ($p = 0.01$) between years of working experience and the 12-month prevalence of musculoskeletal disorders among the participants.

Conclusion: This study shows a high prevalence of musculoskeletal disorders among caterers and the low back was the most affected part of the body, followed by knees, shoulders, the neck, and wrists/hands. The coping strategies most frequently used by the participating caterers were praying and self-instruction.

Keywords: Prevalence, Musculoskeletal Disorders, Coping

Introduction

Musculoskeletal disorders (MSDs) constitute less than 40% of the disease burden and are attributed to occupational risk factors internationally, resulting in considerable disability (1). The severity of such disorders may affect working and having a healthy lifestyle (2). The results of a prospective study by Ariens et al. (3) showed a positive association between sitting at work for more than 95% of the working time and the neck pain and also between the neck flexion and neck pain. Non-neutral postures of the shoulders (such as flexion and abduction) were found to be associated with musculoskeletal symptoms. Working with the body

structure in a neutral position reduces the menace of developing musculoskeletal problems (4).

Musculoskeletal disorders occur globally and are one of the most prevalent causes of long-standing pain and disability (5). The World Health Organization (WHO) and United Nations (UN) acknowledged this challenge with their endorsement of bone and joint decade 2000-2013(5).

Although some studies have been conducted on prevalence and risk factors of work-related musculoskeletal disorders among caterers in other parts of the world (6, 7), limited information is available on this topic. Hence this study was

designed to investigate prevalence and patterns of musculoskeletal disorders among caterers and coping strategies used by them in the selected local government areas of Lagos state, South West, Nigeria.

Materials and Methods

This descriptive qualitative cross-sectional survey was conducted between May and September 2017. The respondents were 225 caterers who were selected from a total number of 908 caterers working in food canteens and restaurants from the selected local government areas of Lagos state, south western Nigeria using the purposive sampling technique. The inclusion criteria were having consistently worked for 12 months and having a history of musculoskeletal pain. The exclusion criteria were met by those who had not been working for the past 12 months and those who were acting as part-time caterers.

Before conducting the study, a written permit was obtained from the Institutional Health Research and Ethics Committee of Lagos University Teaching Hospital (permit number: ADM/DCST/HREC/APP/1501). An informed written consent was also obtained from each participant before starting the study. The participants were assured of the confidentiality and non-closure of all information provided by them. Prior to the distribution of the copies of the questionnaire, the aim and objectives of the study were clearly explained to the participants. Then, the questionnaires were distributed to the participants by the researcher through personal visits to various catering departments of fast food restaurants in the selected local government areas of Lagos state. The questionnaires were self-administered.

The participants were given a choice of filling the questionnaires immediately or taking them home to be collected later since most participants were approached on duty. The participants who decided to take the questionnaires home were asked up by phone calls by the researcher to return back the questionnaires.

A close-ended structured, Standardized Nordic Musculoskeletal Questionnaire (NMQ) (8) for investigating work-related musculoskeletal symptoms in working populations was used in this study. Previous studies (9, 10) in Nigeria had utilized this modified version and found it suitable for the Nigerian environment and culture. The questionnaire consists of four (4) sections and a total number of 58 items.

Section A: This section aimed to collect data on demographic characteristics of the participants including their age, years of experience, work

setting, work status, and whether they had ergonomic training or not.

Section B: This section included 9 items that sought to identify areas of the body causing musculoskeletal problems. In order to help the participants to provide more accurate answers, they were provided with a body map that indicated nine symptom sites (the neck, shoulders, upper back, elbows, low back, wrist, hands, hip, thighs, knees, ankles, and feet).

Section C: This section contained items asked additional questions about any accidents functional impact at home and work (change of job or duties), duration of problem affecting the neck, the shoulders, and the lower back, and also assessments made by health professionals and musculoskeletal problems in the last 7 days.

Section D: The last section aimed to elicit information about the coping strategies used by the participants to minimize both the risks and effects of work-related musculoskeletal disorders (11).

The data were recorded into Microsoft Excel (Microsoft Corporation, Redmond, WA, 2010) and analyzed with Statistical Package for Social Sciences (SPSS) version 22.0. The data were summarized using mean and standard deviation and the results were presented in tables and bar charts. Inferential statistics including chi-square and independent samples t-test were used to find relationships between variables as well as comparison between them. All the statistical procedures were performed at a significance level of $p \leq 0.05$.

Results

A total of 310 copies of the questionnaire were distributed among the participants, and 225 questionnaires were returned and were found to be valid for the final analysis. A response rate of 72.11% was obtained. Fifty-one (22.70%) participants were males and 174 (77.00%) were females.

The mean age, height, weight, the body mass index (BMI), working hours, years of experience of the participants were 39.79 ± 12.493 years, 1.66 ± 0.04 m, 76.19 ± 10.45 kg, 27.69 ± 4.05 kg/m², 6.64 ± 2.34 hours, and 7.80 ± 6.66 years respectively (Table 1).

The majority of the participants 212 (94.20%) were right-handed. Two hundred and twenty-one (98.20%) persons worked for less than 12 hours per day, while 4 (1.80%) participants worked for more than 12 hours per day. One hundred and four participants (46.20%) stated that they worked for less than 5 years, and 9 (4.00%) participants worked for more than 20 years. besides,

205(91.10%) persons were employed (Table 1). Concerning the education level, 104 (46.20%)

participants had secondary education and 32 (14.20%) persons had tertiary education.

Table 1: Socio-demographic data of the participants

Variables	Frequency (n)	Percentage (%)	Mean
Age (years)	<20	14	6.20
	21-30	43	19.10
	31-40	65	28.90
	41-50	62	27.60
	51-60	33	14.70
	61-70	8	3.60
	Total	225	100.00
Sex	Male	51	22.70
	Female	174	77.30
	Total	225	100.00
Weight (Kg)	44-55	2	0.90
	56-75	109	48.40
	76-95	101	44.90
	96-105	13	5.80
	Total	225	100.00
BMI (kg/m2)	18.5-24.9	60	26.70
	25.0-29.9	99	44.00
	≥30	66	29.30
	Total	225	100.00
Height (Meters)	1.50-1.60	30	13.30
	1.61-1.80	195	86.70
	Total	225	100.00
Hand orientation	Right	212	94.20
	Left	13	5.80
	Total	225	100.00
Working hours	<12hrs	221	98.20
	>12hrs	4	1.80
	Total	225	100.00
Years of work experience	<5	104	46.20
	6-10	71	31.60
	11-15	27	12.00
	16-20	14	6.20
	>20	9	4.00
	Total	225	100.00

Key: BMI- Body Mass Index, 18.5-24.9 – Normal BMI, 25.0-29.9- Overweight, >30- Obese

This study shows that female participants (41.40±12.70 years) were older than male participants (34.27±10.04years). The height of the participants shows that the males (1.68±0.04m) were taller than the females (1.66±0.04m), and there was a statistically significant difference (p = 0.00) between the two genders in terms of height. The weight of the participants indicated that females (76.73±10.40Kg) weighed more than the males (74.35±10.56Kg) and there was a significant difference (p = 0.01) between the BMI of the male

and female participants. The analysis of the participants' working hours per day showed that the male participants worked for more hours than the female participants, but there was no significant difference between them (p=0.45). The female participants had more years of experience (8.37±7.07years) than male participants (5.86±4.53years) and there was a significant difference (p = 0.02) between years of experience of both sexes (Table 2).

Table 2: A comparison of participants' socio-demographic characteristics

Variables	Sex	N	Mean±SD	t **	P-value
Age (year)	Male	51	34.27±10.04	-3.68	0.00***
	Female	174	41.40±12.70		
Height(m)	Male	51	1.68±0.04	3.21	0.00***
	Female	174	1.66±0.04		
Weight(kg)	Male	51	74.35±10.56	-1.43	0.15
	Female	174	76.73±10.40		
BMI* (kg/m ²)	Male	51	26.45±3.65	-2.49	0.01***
	Female	174	28.05±4.10		
Working Hours	Male	51	6.86±1.96	0.76	0.45
	Female	174	6.58±2.44		
Years of experience (Year)	Male	51	5.86±4.53	-2.39	0.02***
	Female	174	8.37±7.07		

* BMI – Body Mass Index

** t – Independent-test

***P-Value (p ≤ 0.05)

Table 3 shows that some participants reported multiple sites of pain while others had a single site of pain. Out of 203 (90.20%) participants suffering

from musculoskeletal pain in the past 12 months, 22 (9.80%) reported no pain, and 3 (1.30%) reported pain in 9 different parts of the body.

Table 3: Prevalence of musculoskeletal disorders and the number of body parts affected

Variables	Frequency (n)	Percentage (%)
Overall Prevalence	Yes	203
	No	22
	Total	225
Number of body parts affected	None	22
	1	33
	2	44
	3	41
	4	33
	5	26
	6	10
	7	9
	8	4
	9	3
	Total	225

The part of the body affected most frequently by musculoskeletal disorders within the last 12 month was the low back, 154(68.4%) followed byknee pain, 117 (52.00%). Besides, 115 (51.10%) participantscomplained of shoulder pain, 83 (36.90%) participantsreported neck pain, 74

(32.90%) participants complained of wrist/hand pain,56 (24.90%) participants reported ankle/feet pain, 36 (13.30%) participants reportedhip/thigh pain, 30 (16.00%)participants complained of upper back pain, while the least prone site was elbow pain 23 (10.20%) (Figure1).

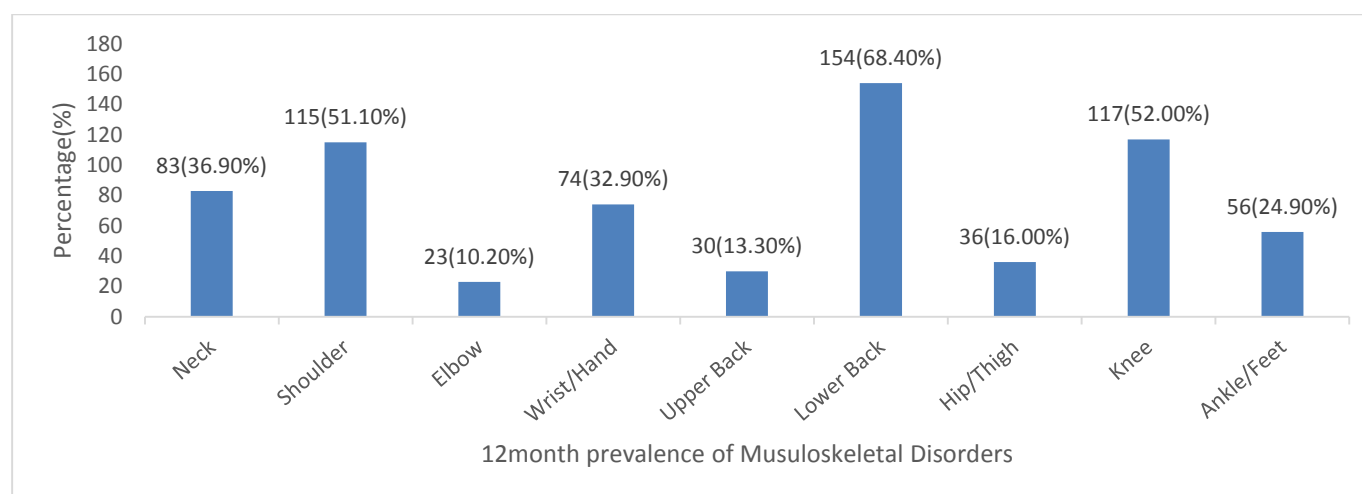


Figure 1: 12 month prevalence of musculoskeletal disorders among Participants

Sex was found to be associated with pattern of MSDs and it was shown that there was a significant association of sex with pattern of MSDs neck ($p =$

0.04), low back ($p = 0.02$) and knee ($p = 0.05$) of the participants (Table 4).

Table 4: Association of sex with MSD patterns

Variables	Male (N=51)		Female (N=174)		X ²	P-value
	(n)	(%)	(n)	(%)		
Neck	25	30.10	58	69.90	4.17	0.04*
Shoulders	28	24.30	87	75.70	0.34	0.54
Elbow	5	21.70	18	78.30	0.01	0.91
Wrist/Hand	15	20.30	59	79.70	0.36	0.55
Upper Back	8	26.70	22	73.30	0.31	0.57
Lower Back	28	18.20	126	81.80	5.60	0.02*
Hip	4	11.10	32	88.90	3.27	0.07
Knee	20	17.10	97	82.90	4.01	0.05*
Ankle/feet	11	19.60	45	80.40	0.40	0.53

*P-Value ($p \leq 0.05$)

It was observed that the participants between the ages of 21-30 years reported the highest 12-month prevalence 41 (95.30%) of musculoskeletal disorders, while 61-70 years reported the lowest 12-month prevalence 6 (75.00%) of musculoskeletal disorders. There was no statistically significant association between the participants' age and prevalence of musculoskeletal disorders ($p=0.42$) within the last 12 months.

It was also observed that the participants with 11-15 years of experience reported the highest prevalence

of 26 (96.30%) of musculoskeletal disorders within a 12-month period. It was shown that years of experience had a significant influence on 12-month prevalence of musculoskeletal disorders ($p=0.01$) (Table 5). However, the working hours had no significant influence on the 12-month prevalence of musculoskeletal disorders ($p=0.51$) and the participants with the highest prevalence 4 (100.00%) of musculoskeletal disorders reported that they worked for more than 12 hours per day in the last 12 months (Table 5).

Table 5: Association between age, year of experience, working hours and 12-month prevalence of musculoskeletal disorders

Variable	12 month Prevalence				X ²	P-value	
	MSD(N=203)		No MSD(N=22)				
	(N)	(%)	(N)	(%)			
Age (years)	≤20	12	85.70%	2	14.30%	4.93	0.42
	21-30	41	95.30%	2	4.70%		
	31-40	59	90.80%	6	9.20%		
	41-50	54	87.10%	8	12.90%		
	51-60	31	93.90%	2	6.10%		
	61-70	6	75.00%	2	25.00%		
Year of experience	≤5	94	90.40%	10	9.60%	12.93	0.01*
	6-10	65	91.50%	6	8.50%		
	11-15	26	96.30%	1	3.70%		
	16-20	9	64.30%	5	35.70%		
	>20	9	100.00%	0	0.00%		
Working hours	≤ 12	199	90.00%	22	10.00%	0.44	0.51
	> 12	4	100.00%	0	0.00%		

*P-value ($p \leq 0.05$)

As it can be seen, the two most frequently used adopted coping strategies were faith and praying 135 (60%) and self-instruction 99 (44%). The two least commonly adopted coping strategies were the catastrophizing factor (5.30%), and distractive behaviours (4.40%). The strategies adopted by the caterers to cope with MSDs are shown in Table 6.

As it can be seen, the two most frequently used adopted coping strategies were faith and praying 135 (60%) and self-instruction 99 (44%). The two least commonly adopted coping strategies were the catastrophizing factor (5.30%), and distractive behaviours (4.40%).

Table 6: Coping strategies used by the participants

Strategies	Coping Strategies (n=225)*					
	Almost always		Sometimes		Almost never	
	(N)	(%)	(N)	(%)	(N)	(%)
Catastrophizing	12	5.30%	117	52.00%	96	42.70%
Distractive behaviours	10	4.40%	113	50.20%	102	45.30%
Self-instruction	99	44.00%	110	48.90%	16	7.10%
Ignoring pain	38	16.90%	168	74.70%	19	8.40%
Reinterpreting the pain	38	16.90%	168	74.70%	19	8.40%
Hoping	95	42.20%	100	44.40%	30	13.3%
Excluded factor	21	9.30%	167	74.20%	87	38.70%
Faith and praying	135	60.00%	68	30.20%	22	9.80%
Cognitive distraction	49	21.80%	142	63.10%	34	15.10%

*Multiple responses

Discussion

This study evaluated the MSDs prevalence, patterns, and coping strategies of MSDs among caterers at a 12 month timeframe. This study revealed that the MSDs prevalence among the caterers was 90.2% across different body parts within the last 12 months. The high MSDs prevalence among caterers may be related to posture assumed by the caterers, the force of carrying bulk food packages, repetition while preparing food, and duration of work (7). They also stated that the high prevalence might be due to the diversity of organization, work methods, workplace layout, and tool/equipment design. The highest 12-month prevalence rate reported in this is in line with the self-reported MSDs prevalence (90.7%) reported by Fabunmi et al. (12) but slightly lower (87%) in a study on the occurrence of musculoskeletal pain among female kitchen workers within a 12-month period (13).

This study also showed females were more frequently affected by MSDs than the male participants. This finding is in line with the result of the study by Shiueet et al. (14) but contrary to Chyuanet et al. (15) who showed males were affected more commonly than females. This study also revealed that all the body regions were affected with musculoskeletal disorders, especially in the neck, wrists, the low back, and knees with a higher prevalence rate in the females than male's caterers. The findings of this study indicated that low back, knees, shoulders, the neck, wrists/hands, ankles/feet, hips/thighs, upper back, and elbows were the more commonly reported MSDs locations in caterers. Pain locations were found to be associated with functional limitations than either pain intensity or frequency (16). Kerssens et al. (17) found that patients with musculoskeletal disorders had pain in more than three major sites. The low back (68.40%) was found as the highest reported MSD site in this study, as was the case in the study conducted by Akodu et al. (18) who reported a higher low back MSD prevalence among

secretaries. This could be attributed to the stress imposed on the lower vertebral structures in a prolonged standing position, and also mechanical loading which could initiate disc degeneration in which stress gradients act to shear adjacent lamellae and could explain progressive annulus delamination and collapse (19).

Similarly, Shankar et al. (20) reported a high low back pain prevalence rate among male caterers (65.80%). Also a few studies stated the low back pain as a common symptom among several occupations like tailors (74.00%) (21), filling station attendants (84.60%) (2). In contrast, Haukka et al (13) stated that the neck was the most common MS location among the population studied. In addition, Chyuanet et al. (15) found that MSDs was more common in the shoulders (58.00%). The variations in the research results might be due to the nature of the work done by the caterers under study which involves prolonged standing, bending, the use of abnormal lifting techniques, and sitting in an awkward position for a long time.

Lower extremity pain is a common musculoskeletal symptom among working-age people, and its prevalence especially the knee pain varies from 10 to 60%, depending on age, occupation and the definition of lower extremity pain, yet only a few epidemiological studies exist on lower extremity pain and its risk factors (22). The knowledge of the risk factors for lower extremity pain, particularly with respect to occupational physical loading, overweight, and physical exercise is still limited mainly due to a very small number of prospective studies (23).

The prevalence of lower extremity MSDs in this study was higher in terms of knee pain (47%), followed by ankle pain (22.20%), and hip pain (13.80%). Standing for a long time, stereotyped repetitive usage, heavy external loading, awkward working positions, and injuries are potential risk factors which can often be found in many physical work tasks. Frequent lifting of heavy loads has biomechanical grounds to be a potential risk factor

for lower extremity MSDs. Overall physical work load seems to be the most important risk factor (22). This study revealed that the majority of the participants are overweight. This might be as a result of the nature of the occupation of the participants. This can predispose them to eating too much. Overweight is assumed to cause pain by increasing the mechanical stress on the weight-bearing joints. Overweight may also be an indicator of other factors, such as lack of physical fitness (23). The findings of this study showed no significant association between the age of participants and 12-month prevalence of MSDs among caterers ($p = 0.42$), implying that MSDs increase with age. It was observed that after the age of 50 and having working experience for 15 years and higher, there was a reduction in the prevalence of MSDs, as was observed in a previous research (24). The highest prevalence was found among the participants aged 21 to 30 years; a finding that is in line with the study conducted by Shankaret al. (20) on the workplace and prevalence of low back pain among male commercial workers but contrary to the results of a study by Haukka et al. (13). These contradictory observations could be due to gender differences because the present study focused on both sexes as well as the effect of other factors such as heavier task on younger caterers.

There was no significant association between the hours spent working and 12-month prevalence of musculoskeletal disorders among caterers. In contrast, Lee et al (25) reported an association between working hours and work-related musculoskeletal disorders of Korean paid workers. Besides, Yoon et al (26) revealed that there was an association between working hours and risk of back pain among manufacturing company workers. This may be due to the fact that the number of hours reported by the participants in this study is different from the number of hours in the other studies. Accordingly, it can be suggested that an increase in working hours of the caterers' does not have an influence on the prevalence of musculoskeletal disorders.

There was a significant association between the years of working experience and the prevalence of the WMSDs among the participants. It was also shown that a high percentage of the caterers experienced their first episode of MSDs in the first five to fifteen years of their career. This is consistent with the finding of Mussietet al. (27), who reported that one of the risk factors associated with the occurrence of the WMSDs among hairdressers was their length of professional engagement. Conversely, Ekpenyong and Inyang (28) reported a significant relationship between WMSDs and years of working experience. This association may be

partially explained on the basis of a high level of complaint of WMSDs among the participants in their first 5 years of working experience and a low level of professional experience and awareness of preventive medicines.

The coping strategies utilized by the participants in this study were faith and prayer, hoping, and self-instruction. The pain is often associated with the musculoskeletal system and connective tissue. Korkmaz, (22) observed that chronic pain is often associated with depression or other kinds of psychological distress. Kerssenset et al. (17) revealed that patients who were experiencing pain were going through some psychological distress. Leijonet et al. (29) revealed that there was an increase in the prevalence of neck-shoulder-arm pain and concurrent psychological distress in both males and females.

Vogt et al. (30) showed that the proportion of individuals with current depressive symptoms increased with increasing pain intensity; participants with current depressive symptoms had six times the odds of reporting severe/extreme pain.

However, this study was conducted with some limitations. Firstly, this study was based on NMQ which is a self-reported questionnaire with the likelihood of information bias. Secondly, the study is limited to the number of regions covered. Further studies can be carried out to determine the severity of musculoskeletal disorders their potential effects on caterers' quality of life and working ability.

Conclusion

There was a high prevalence of musculoskeletal disorders among caterers in selected local government areas of Lagos state, South West Nigeria. The lower back was the most commonly affected body part reported by the participants. The years of experience increased the risk of musculoskeletal disorders.

Acknowledgement

The authors wish to appreciate all the participants who contributed to the successful implementation of this study.

Conflict of interest: None declared.

References

1. Johnson WMS, Bertha A, Johnson P. Prevalence of upper extremity musculoskeletal disorders among workers in an industrial town in Tamilnadu. *Journal of Clinical and Diagnostic Research* 2011; 5(2):187-90.
2. Akodu AK, Taiwo AO, Jimoh OA. Prevalence of low back pain among traffic warders in Lagos

- state, Nigeria. *African Journal of Physiotherapy and Rehabilitation Sciences* 2014; 6(1-2):37-41.
3. Ariens GA, van Mechelen W, Bongers PM, Bouter LM, van der Wal G. Physical risk of neck pain. *Scand J Work Environ Health* 2000; 26(1):7-19.
 4. European Agency for Safety and Health at Work. Annual activity report 2017. Bilbao, Spain: European Agency for Safety and Health at Work; 2018. Available from: <https://osha.europa.eu/en/tools-and-publications/publications/annual-activity-report-2017-0/view>
 5. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. *Bull World Health Organ* 2003; 81(9):646-56.
 6. Chyuan JY, Du CL, Yeh WY, Li CY. Musculoskeletal disorders in hotel restaurant workers. *Occup Med (Lond)* 2004; 54(1):55-7.
 7. Xu YW, Cheng AS, Li-Tsang CW. Prevalence and risk factors of work-related musculoskeletal disorders in catering industry: a systematic review. *Work* 2013; 44(2):107-16.
 8. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sorensen F, Andersson G, et al. Standardized Nordic questionnaire for the analysis of musculoskeletal symptoms. *Appl Ergon* 1987; 18(3):233-7.
 9. Adegoke BO, Akodu AK, Oyeyemi AL. Work-related musculoskeletal disorders among Nigeria physiotherapists. *BMC MusculoskeletDisord* 2008; 9:112.
 10. Tinubu BM, Mbada CE, Oyeyemi AL, Fatunmi AA. Work-related musculoskeletal disorders among nurses in Ibadan, South-west Nigeria: cross sectional survey. *BMC MusculoskeletDisord* 2010; 11:12.
 11. Cromie JE, Robertson VJ, Best MO. Work-related musculoskeletal disorders and the culture of physical therapy. *PhysTher* 2002; 82(5):459-72.
 12. Fabunmi AA, Oworu JO, Odunaiya NA. Prevalence of musculoskeletal disorders among nurses in University College Hospital, Ibadan. *West African Journal of Nursing* 2008; 19(1):21-5.
 13. Haukka E, Leino-Arjas P, Solovieva S, Ranta R, Viikari-juntura E, Riihimaki H. Co-occurrence of musculoskeletal pain among female kitchen workers. *Int Arch Occup Environ Health* 2006; 80(2):141-8.
 14. Shiue HS, Lu CW, Chen CJ, Shih TS, Wu SC, Yang CY et al. Musculoskeletal disorder among 52,261 Chinese restaurant cooks cohort: result from the National Health Insurance Data. *J Occup Health* 2008; 50(2):163-8.
 15. Chyuan JY, Du CL, Yeh WY, Li CY. A cross-sectional study of musculoskeletal disorders in relation to work movement characteristics among hotel foodservice employees in Taiwan. *Taiwan Journal of Public Health* 2002; 21(2):140-9.
 16. Leveille SG, Zhang Y, McMullen W, Kelly-Hayes M, Felson DT. Sex differences in musculoskeletal pain in older adults. *Pain* 2005; 116(3):332-8.
 17. Kerssens JJ, Verhaak PF, Bartelds AI, Sorbi MJ, Bensing JM. Unexplained severe chronic pain in general practice. *Eur J Pain* 2002; 6(3):203-12.
 18. Akodu A, Akinfeleye A, Atanda L, Giwa S. Work-related musculoskeletal disorders of the upper extremity with reference to working posture of secretaries. *South African Journal of Occupational Therapy* 2015; 45(3):16-22.
 19. Stefanakis M, Lou J, Pollintine P, Dolan P, Adams MA. ISSLS Prize winner: Mechanical influences in progressive intervertebral disc degeneration. *Spine (Phila Pa 1976)* 2014; 39(17):1365-72.
 20. Shankar S, Shanmugam M, Srinivasan J. Workplace factors and prevalence of low back pain among male commercial kitchen workers. *J Back MusculoskeletRehabil* 2015; 28(3):481-8.
 21. Jin K, Sorock GS, Courtney TK. Prevalence of low back pain in three occupational groups in Shanghai, People's Republic of China. *J Safety Res* 2004; 35(1):23-8.
 22. Korkmaz NC, Cavlak U, Telci EA. Musculoskeletal pain, associated risk factors and coping strategies in school teachers. *Scientific Research and Essays* 2011; 6(3):649-57.
 23. Miranda H, Viikari-Juntura E, Martikainen R, Riihimaki H. A prospective study on knee pain and its risk factors. *Osteoarthritis Cartilage* 2002; 10(8):623-30.
 24. Cardoso JP, de Queiroz Batista Ribeiro I, de Araújo TM, Carvalho FM, dos Reis EJFB. Prevalence of musculoskeletal pain among teachers. *Rev Bras Epidemiol* 2009; 12(4):1-10.
 25. Lee JG, Kim GH, Jung SW, Kim SW, Lee JH and Lee KJ. The association between long working hours and work-related musculoskeletal symptoms of Korean wage workers: data from the fourth Korean working conditions survey (a cross-sectional study). *Ann Occup Environ Med* 2018; 30:67
 26. Yoon J, Sung H, Kim Y, Kim S-S. The relationship between experience of workplace violence and musculoskeletal pain among wage workers in South Korea. *Journal of Korean Society of Occupational and Environmental Hygiene* 2015; 25(2):211-9.
 27. Mussi G, Gouveia N. Prevalence of work-related musculoskeletal disorders in Brazilian hairdressers. *Occup Med (Lond)* 2008; 58(5):367-9.
 28. Ekpenyong CE, Inyang UC. Associations between worker characteristics, workplace factors, and work-related musculoskeletal disorders: a cross-sectional study of male construction workers in Nigeria. *Int J Occup Saf Ergon* 2014; 20(3):447-62,
 29. Leijon O, Wahlstrom J, Mulder M. Prevalence of self-reported neck-shoulder-arm pain and concurrent low back pain or psychological distress: time-trends in a general population, 1990-2006. *Spine (Phila Pa 1976)* 2009; 34(17):1863-8.
 30. Vogt MT, Simonsick EM, Harris TB, Nevitt MC, Kang JD, Rubin SM, et al. Neck and shoulder pain in 70- to 79-year-old men and women: findings from the Health, Aging and Body Composition Study. *Spine J* 2003; 3(6):435-41.