

Work-related musculoskeletal disorders among nurses in various specialty areas in a Nigerian tertiary health institution



Samuel Olufemi Bolarinde*, Isaiah Oyewole, Adesola Felix Abobarin

Department of Physiotherapy, Federal Medical Centre, Owo, Nigeria

Received: 20 January 2019

Accepted: 13 April 2019

Published online: 24 April 2019

***Corresponding author:** Samuel Olufemi Bolarinde,
Tel: +2348033775472
Email: sobolarinde@yahoo.co.uk

Competing interests: None.

Funding information: None.

Citation: Bolarinde SO, Oyewole I, Abobarin AF. Work-related musculoskeletal disorders among nurses in various specialty areas in a Nigerian tertiary health institution. *Journal of Emergency Practice and Trauma* 2019; 5(2): 41-46. doi: 10.15171/jept.2019.04.

Abstract

Objective: Musculoskeletal disorders (MSDs) are one of the major complaints in the work place. This study investigated the prevalence and pattern of work-related MSDs, risk factors and the strategies of management among nurses working in various specialty areas in a tertiary health institution in Nigeria.

Methods: This cross-sectional survey recruited 150 nurses working in various specialty areas of a government own tertiary institution in South-west, Nigeria. Data were obtained on demographic characteristics, occupational profile, work-related musculoskeletal symptoms, perceptions on job risk factors and management strategies. Data were presented using descriptive statistics of percentages and frequency tables.

Results: The most common MSD among the respondents was low back pain (LBP) (60.0%), followed by neck pain (48.0%), while elbow pain was the lowest work-related musculoskeletal pain (5.3%). Findings indicated that respondents working in Intensive Care Unit (100.0%), Dental Unit (100.0%), Accident and Emergency (77.8%), Orthopaedics (75.0%), Ear Nose and Throat (75.0%) and Medicine (72.7%) suffered from LBP more than other respondents in other specialty areas. Results also revealed that frequent bending (64.0%), prolonged standing (49.3%) and frequent lifting of patients (48.0%) were major factors that contributed to LBP among the respondents. Rest (56.0%), pain killer drugs (50.7%), and exercise (36.0%) were the most preferred pain management strategies among the respondents, while only 12.0% preferred physiotherapy management.

Conclusion: A great percentage of Nigerian nurses suffer from work-related MSDs in their professions with the low back being the most injured body part. Nurses working in Intensive Care Unit, Dental, Accident and Emergency and Orthopedics are more prone to work-related LBP. Education programs on back care and workplace ergonomics are recommended for reduction and prevention of occupational hazards among nurses.

Keywords: Nurses, Work-related musculoskeletal disorders, Low back pain, Nigeria

Introduction

Musculoskeletal disorders (MSDs) are painful anatomical defects that are characterized by inflammatory and degenerative conditions in muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels (1,2). MSDs are an important public health challenge and one of the major complaints in work place (3). Work-related MSDs (WMSDs) are defined as MSDs that result from work-related activities (4). WMSDs are common among hospital workers particularly the nursing profession (5,6). These disorders are often characterized by pain and complaint in hand, wrist, elbow, shoulder, neck, low back, foot and legs.

Several epidemiology studies have shown that extrinsic occupational factors (manual handling activities, frequent bending and twisting, forceful movement, repetitive heavy

lifting and awkward working posture) (7-9), intrinsic personal factors (age, gender, body mass variability and tobacco smoking) (10,11), and psychological factors (high job demand, low control, low mood and poor job satisfaction) (12,13) are important risk factors for WMSDs.

Previous epidemiological studies have reported that WMSDs negatively affect the quality of life (1), cause loss of productive hours, and increase the level of functional disability (12-14) more than any other group of diseases (15,16) with a significant economic burden on the individual, family, the organization and the society (17).

Nurses among other health workers routinely perform work activities that predispose them to WMSDs. These activities include bed making, patient hygiene, changing patients' position and maintenance of awkward working



postures (18-20) which put nurses at a high risk for acute and recurrent WMSDs. Previous epidemiological studies have reported the prevalence of musculoskeletal symptoms resulting from tasks that overload the body musculature among nurses (19,20).

Although the prevalence of WMSDs among nurses has been documented in the developed world (21,22), however, data on the pattern of WMSDs among nurses across various specialty areas in Nigeria has not been fully investigated. This study was designed to investigate the prevalence and pattern of WMSDs, risk factors and managing strategies among nurses working in various specialty areas in a Nigerian tertiary health institution.

Methods

A cross-sectional survey was conducted on the prevalence of work-related MSDs among nurses working in various specialty areas of Federal Medical Centre, Owo, Nigeria. The rationale behind the study was explained to all participants and informed consent was granted from them before their participation. The survey instrument for the study was a four sectioned questionnaire. Section A was on demographic profile, while section B was on occupational health in nursing practice and work history such as: years of practice, work setting, practice specialty, and nursing activities. A standardized Nordic questionnaire (23) sought information on the symptom-survey of the occupational health in nursing practice. Section C sought information on job risk factors and effects of MSDs, while section D consisted of data on management strategies. Data were summarized using Statistical Package for Social Science (SPSS) version 20.0 software. Results were presented in the percentages and frequency tables.

Results

A total of 150 nurses participated in this study in which 130 (86.7%) were females and only 20 (13.3%) were males. Concerning the marital status, 16 (10.7%) were single, 130 (86.7%) were married and 4 (2.7%) were widowed. Regarding the age, 31-40 was the age group with the highest percentage (44.0%) followed by 41-50 (40.0%), while 21-30 age group had the least percentage (6.7%) (Table 1). In terms of work experience, 16-20 years of working experience had the highest percentage (26.7%) among the respondents, while 31 years and above was the year of experience with the lowest percentage (1.3%). Concerning qualification, 114 (76.0%) had Bachelor of Nursing Science degree as the highest qualification, while 2 (1.3%) had Master of Science degree in nursing. Results also showed that Medical unit had the highest number of nurses (14.7%) followed by Accident and Emergency unit (12.0%), while the Intensive Care Unit had the lowest number of nurses (2.7%) in the hospital.

Table 2 shows that low back pain (LBP) (60.0%) was the most common MSD among the respondents followed by neck pain (48.0%), while elbow pain was the lowest

Table 1. Socio-demographic characteristics of respondents (N =150)

		No.	%
Age group	21-30	10	6.7
	31-40	66	44.0
	41-50	60	40.0
	51-60	14	9.3
Gender	Male	20	13.3
	Female	130	86.7
Marital status	Single	16	10.7
	Married	130	86.7
	Widow	4	2.7
Years of experience	1-5	12	8.0
	6-10	36	24.0
	11-15	32	21.3
	16-20	40	26.7
	21-25	20	13.3
	26-30	8	5.3
	≥31	2	1.3
Qualification	Diploma	34	22.7
	B. NSc	114	76.0
	MSc	2	1.3
	A&E	18	12.0
	Medicine	22	14.7
	Surgery	12	8.0
	ICU	4	2.7
	O&G	16	10.7
	Psychiatry	10	6.7
	Specialty of work	Paediatrics	16
Children Emergency		12	8.0
Orthopaedics		8	5.3
Theatre		6	4.0
Dental Dept		6	4.0
Ophthalmology		6	4.0
ENT		8	5.3
Community Health		6	4.0

work-related musculoskeletal pain (5.3%) among the respondents. Findings also showed that 37.3% of the respondents could not do their normal work due to LBP; similarly, 26.7% of respondents could not do their normal work due to neck pain, while 20.0% of the respondents with knee pain could not do their normal work. The results revealed that female respondents (53.33%) suffered from LBP more than their male counterparts (6.67%). Similarly, married participants (53.33%) suffered from LBP more than singles (3.99%) and widowed participants (2.67%), while the participants in the age range of 41-50 years (29.33%) suffered more from LBP compared with participants in other age groups.

Table 3 shows that Intensive Care Unit and Dental unit had the highest percentage of respondents (100%) that suffered from work-related LBP followed by Accident and Emergency (77.8%), 75.0% in Orthopaedics, 75.0% in Ear Nose and Throat and 72.7% in Medicine unit. Also, results showed that 100% of respondents in Intensive Care Unit, 77.8% in Accident and Emergency unit, 72.7% in Medicine unit and 75% in Ear Nose and Throat suffered

Table 2. Pattern of Work-Related Musculoskeletal Pain Among Respondents

Body part	Have had pain in the last 12 months		Have been prevented from doing normal work because of the pain? In the last 12 months		Have had pain at any time during the last 7 days?	
	No.	%	No.	%	No.	%
Neck	72	48.0	40	26.7	20	13.33
Shoulder	46	30.7	18	12.0	24	16.0
Elbow	8	5.3	6	4.0	0	0.0
Wrist/hand	32	21.3	22	14.7	14	9.3
Upper back	44	29.3	24	16.0	18	12.0
Lower back	90	60.0	56	37.3	28	18.7
One or both hips/thigh	28	18.7	14	9.3	12	8.0
One or both knees	50	33.3	30	20.0	18	12.0
One or both ankles/feet	14	9.3	10	6.5	8	5.3

Variables	Have had pain in the low back in the last 12 months		Have been prevented from doing normal work because of the low back pain?		Have had pain at any time during the last 7 days at the low back?	
	No.	%	No.	%	No.	%
Gender						
Male (n = 20)	10	6.67	2	1.33	2	1.33
Female (n = 130)	80	53.33	54	35.99	26	17.33
Marital status						
Single (n = 16)	6	3.99	2	1.33	0	0
Married (n = 130)	80	53.33	50	33.33	24	15.99
Widow (n = 4)	4	2.67	4	2.67	4	2.67
Age group						
21-30 (n = 10)	2	1.33	0	0	0	0
31-40 (n = 66)	34	22.67	22	14.67	8	5.33
41-50 (n = 60)	44	29.33	28	18.67	16	10.66
51-60 (n = 14)	10	6.67	6	3.99	4	2.67

Table 3. Distribution of work-related musculoskeletal pain among respondents according to specialties

Specialty	Have had pain with low back in the last 12 months		Have had pain with neck in the last 12 months		Have had pain with knee in the last 12 months	
	No.	%	No.	%	No.	%
A& E (n=18)	14	77.8	14	77.8	16	88.9
Medicine (n=22)	16	72.7	16	72.7	2	9.1
Surgery (n=12)	6	50.0	6	50.0	4	33.3
ICU (n=4)	4	100	4	100	2	50.0
O & G (n=16)	6	37.5	4	25.0	4	25.0
Psychiatry (n=10)	4	40.0	4	40.0	2	20.0
Paediatrics (n=16)	4	25.0	6	37.5	4	25.0
Children Emergency (n=12)	6	50.0	2	6.7	6	50.0
Orthopaedics (n=8)	6	75.0	4	50.0	0	0
Theatre (n=6)	4	66.7	2	33.3	2	33.3
Dental Dept. (n=6)	6	100	0	0	2	33.3
Ophthalmology (n=6)	4	66.7	0	0	2	33.3
ENT (n=8)	6	75.0	6	75.0	2	25.0
Community Health (n=6)	4	66.7	4	66.7	2	33.3
Total (N=150)	90	60.0	72	48.0	50	33.3

from work-related neck pain, while 88.9% of respondents in Accident and Emergency unit and 50.0% in Children Emergency suffered from work-related knee pain.

Table 4 shows that LBP caused restriction of any activity in 76 (50.7%) respondents, while 17.3% of the respondents took some days off because of LBP. Furthermore, 12.0 % of respondents experienced LBP once in a week, 28.0% once in a month, while 44.0% experienced LBP more than once in a year. The results also revealed that the main contributing factors related to LBP were frequent bending (64.0%) followed by prolonged standing (49.3%) and frequent lifting of patients (48.0%). The result on the management of pain showed that 56.0% of participants preferred having enough rest, 50.7% preferred using pain killer drugs, 36.0% preferred exercising exercise, while only 12.0% had a tendency towards physiotherapy management.

Discussion

Multiple risk factors such as gender, age, psychosocial profile, work demand and social support have been associated with LBP. Higher rates of LBP have been reported among health workers due to the level of physical and emotional factors involved in their occupation compared with workers in other occupations (24). High incidents of job-related LBP have been reported among nurses due to heavy emotional and physical work, and the exposure to a combination of mechanical and psychosocial stress at work (25).

The one-year prevalence of LBP in this study was 60%. This finding is in line with previous similar studies that reported a high prevalence of work-related musculoskeletal LBP among nurses. Related studies in Nigerian hospitals revealed a high one year prevalence of LBP (71%) among nurses (26). Lela and Frantz in a study among nurses in Rwanda reported a one-year prevalence of 78% for LBP (27), similarly, Aljeesh and Al Nawajha reported a prevalence of 70.6% for LBP among nurses (28). Furthermore, similar studies from Greece and Turkey also reported a high prevalence of LBP among nurses (29,30). This shows that nurses in Nigeria suffer from a high prevalence of LBP as recorded in other countries. Other MSDs reported in this study were neck pain, upper back pain, wrist/hand pain, knee pain and shoulder pain.

Our findings revealed that females (53.33%) suffered from LBP more than males (6.67 %). This is in accordance with the findings of Sikiru and Hanifa that reported 67.5% prevalence for LBP among female nurses (31). The reasons for a higher prevalence among female nurses in this study may be related to the higher number of female participants, the anatomical, physiological and structural differences which predispose females to a more mechanical disadvantage (25).

In this study a great proportion of nurses with a high prevalence of LBP were married (53.33%). This is similar to previous studies that reported a high prevalence for LBP

Table 4. Effects, frequency, aggravating factor and management strategies of low back pain by respondents

	No.	%
Effect of back pain		
It causes restriction of activities	76	50.7
Seeking transfer to another unit	12	8.0
Leaving nursing services	4	2.7
Taking some days off' duty	26	17.3
Frequency of pain		
Daily	6	4.0
Once a week	18	12.0
Once a month	42	28.0
A few times a year	66	44.0
Once a year	4	2.7
Causative factor		
Lifting patient with help (in-bed)	44	29.3
Lifting patient without help (in-bed)	72	48.0
Lifting patient from floor with help	30	20.0
Lifting patient from floor without help	60	40.0
Transferring patient	48	32.0
Bending	96	64.0
Bedside wound dressing	62	41.3
Prolonged standing	74	49.3
Pulling	42	28.0
Twisting	44	29.3
Running during emergency	36	24.0
How do you manage your pain?		
I do not do anything	30	20.0
I take pain killer drugs	76	50.7
I take enough rest	84	56.0
I use back belt/ corset	14	9.3
I reduce movement at work	50	33.3
I reduce movement at home	58	38.7
Use of muscle relaxant	44	29.3
Exercise	54	36.0
Physiotherapy	18	12.0

among married nurses (27,31). In this study, nurses in the age range of 41-50 years demonstrated a higher prevalence of LBP compared to nurses in other age groups. The observed higher prevalence of LBP with ageing agreed with the result from previous studies (26). Ageing is linked with both physiological changes and occupational risk factors. Ageing increases the level of older workers' susceptibility to MSDs (32). Our study revealed that a lower incidence of LBP (6.67%) was observed among the very senior nurses in the age group of 51-60. The lower incidence observed in this study may be attributed to the involvement in more administrative duties, less patient handling, acquisition of adequate knowledge about injury prevention and proper patient lifting techniques over the years (33).

In the present study, ICU, Dental, A&E and Orthopedics reported the highest incidence of LBP with 100%, 100%,

77.8% and 75.0%, respectively, while Pediatrics (25.0%) and Obstetrics and Gynaecologic (37.5%) reported the least. This result is in line with the study conducted by Abou El-Soud et al that reported 95.0% prevalence of LBP among nurses working in the ICU (34). The high prevalence of LBP in these departments may be attributed to the unique time constraint in responding to emergency situations, nature of the work that demands prolonged standing and heavy workloads.

Bending (64%) and prolonged standing (49.3%) were reported by the respondents as the main risk factors responsible for LBP in this study. Other patient care activities that contributed to LBP were Lifting patient from floor without help (48%), patients' wound dressing (41.3%), lifting patient from floor without help (40%), and transferring patients (32.0%). This is similar to the studies done by Wong et al and Abou El-Soud et al, that reported bending forward (69.8%), prolonged standing (73.9%), twisting, prolonged sitting, and walking for long distances as different work postures that predispose nurses to an increased risk of back pain (34,35). This study showed that LBP causes restriction of activities in majority of the respondents. This is in line with reports from previous studies that work-related LBP has a negative effect on functional independence and working ability in working population (36,37).

Involvement of physiotherapy as a management strategy for LBP is yet to be fully appreciated in this research environment as majority of the respondents reported that they preferred to manage their LBP by taking enough rest (56%), while only 12.0% reported the need for physiotherapy. This is similar to a study report by Cilliers et al, where 51.0% of the participants preferred bed rest after developing LBP to other treatments (38).

Conclusion

Work-related MSDs are often reported by Nigerian nurses. Work-related LBP appears to be the most common MSD affecting females more than males. Intensive Care Unit, Dental, Accident and Emergency and Orthopedics are the specialties with the highest incidence of work-related LBP. Frequent bending, prolong standing, lifting patients in the bed without assistance, and bedside wound dressing were the most reported work-related risk factors for LBP. Restriction of activities and taking days off duty are the major consequences of LBP. Management of LBP with physiotherapy has not been fully established among nurses as few of the nurses attended physiotherapy during their episodes of back pain. We recommend educational back care programs, back care ergonomics and patient transfer should be organised for nurses in order to reduce the rate of work-related MSDs. In addition, adequate transferring or lifting equipment should be procured and be available in hospitals in order to reduce the high prevalence of LBP among nurses.

Ethical issues

The study protocol was approved by the Health Research Ethics Committee of Federal Medical Centre, Owo (FMC/OW/380/LXV111/67).

Authors' contributions

SOB conceived the idea for this study, participated in the design of methodology and data collection and prepared the final manuscript for publication. IO participated in the design of methodology and data collection and drafted the manuscript. AFA conducted the analysis and interpretation of data and drafted the manuscript. All authors read and approved the final manuscript.

References

1. Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. *J Electromyogr Kinesiol* 2004; 14(1): 13-23. doi: 10.1016/j.jelekin.2003.09.015.
2. Smith DR, Leggat PA. Musculoskeletal disorders in nursing. *Aust Nurs J* 2003; 11(1): 19-21.
3. Gopal K, Thomas M, Sreedharan J. Work-related musculoskeletal disorders (WMSD) in hospital nurses: Prevalence and coping strategies. *Gulf Medical Journal* 2012;1(S1):S159-63.
4. Salik Y, Ozcan A. Work-related musculoskeletal disorders: a survey of physical therapists in Izmir-Turkey. *BMC Musculoskelet Disord* 2004; 5: 27. doi: 10.1186/1471-2474-5-27.
5. Arvidsson I, Gremark Simonsen J, Dahlqvist C, Axmon A, Karlson B, Bjork J, et al. Cross-sectional associations between occupational factors and musculoskeletal pain in women teachers, nurses and sonographers. *BMC Musculoskelet Disord* 2016; 17: 35. doi: 10.1186/s12891-016-0883-4.
6. Menzel NN, Brooks SM, Bernard TE, Nelson A. The physical workload of nursing personnel: association with musculoskeletal discomfort. *Int J Nurs Stud* 2004; 41(8): 859-67. doi: 10.1016/j.ijnurstu.2004.03.012.
7. Josephson M, Lagerstrom M, Hagberg M, Wigaeus Hjelm E. Musculoskeletal symptoms and job strain among nursing personnel: a study over a three year period. *Occup Environ Med* 1997; 54(9): 681-5. doi: 10.1136/oem.54.9.681.
8. Smedley J, Egger P, Cooper C, Coggon D. Manual handling activities and risk of low back pain in nurses. *Occup Environ Med* 1995; 52(3): 160-3. doi: 10.1136/oem.52.3.160.
9. Yip Y. A study of work stress, patient handling activities and the risk of low back pain among nurses in Hong Kong. *J Adv Nurs* 2001; 36(6): 794-804.
10. Smith DR, Leggat PA, Smyth W, Wang RS. Musculoskeletal disorders among female Australian nurses working in a unique tropical environment: results from a pilot study. *Ergon Aust* 2003; 17 (3): 14-7.
11. Lagerstrom M, Wenemark M, Hagberg M, Hjelm EW. Occupational and individual factors related to musculoskeletal symptoms in five body regions among Swedish nursing personnel. *Int Arch Occup Environ Health* 1995; 68(1): 27-35.
12. Bongers PM, Kremer AM, ter Laak J. Are psychosocial

- factors, risk factors for symptoms and signs of the shoulder, elbow, or hand/wrist?: A review of the epidemiological literature. *Am J Ind Med* 2002; 41(5): 315-42. doi: 10.1002/ajim.10050.
13. Smith DR, Wei N, Zhao L, Wang RS. Musculoskeletal complaints and psychosocial risk factors among Chinese hospital nurses. *Occup Med (Lond)* 2004; 54(8): 579-82. doi: 10.1093/occmed/kqh117.
 14. Holder NL, Clark HA, DiBlasio JM, Hughes CL, Scherpf JW, Harding L, et al. Cause, prevalence, and response to occupational musculoskeletal injuries reported by physical therapists and physical therapist assistants. *Phys Ther* 1999; 79(7): 642-52. doi: 10.1093/ptj/79.7.642.
 15. Badley EM, Rasooly I, Webster GK. Relative importance of musculoskeletal disorders as a cause of chronic health problems, disability, and health care utilization: findings from the 1990 Ontario Health Survey. *J Rheumatol* 1994; 21(3): 505-14.
 16. Riihimaki H. Hands up or back to work--future challenges in epidemiologic research on musculoskeletal diseases. *Scand J Work Environ Health* 1995; 21(6): 401-3.
 17. Kemmlert K. Prevention of occupational musculo-skeletal injuries. Labour Inspectorate investigation. *Scand J Rehabil Med Suppl* 1996; 35: 1-34.
 18. Ando S, Ono Y, Shimaoka M, Hiruta S, Hattori Y, Hori F, et al. Associations of self estimated workloads with musculoskeletal symptoms among hospital nurses. *Occup Environ Med* 2000; 57(3): 211-6. doi: 10.1136/oem.57.3.211.
 19. Kim YO, Koo JW. Musculoskeletal symptoms and related factors on the nurses in several general hospitals. *Korean J Occup Health Nurs* 2002; 41(3): 131-41.
 20. Daynard D, Yassi A, Cooper JE, Tate R, Norman R, Wells R. Biomechanical analysis of peak and cumulative spinal loads during simulated patient-handling activities: a substudy of a randomized controlled trial to prevent lift and transfer injury of health care workers. *Appl Ergon* 2001; 32(3): 199-214.
 21. Wilkinson WE, Salazar MK, Uhl JE, Koepsell TD, DeRoos RL, Long RJ. Occupational injuries: a study of health care workers at a northwestern health science center and teaching hospital. *AAOHN J* 1992; 40(6): 287-93.
 22. Harber P, Billet E, Gutowski M, SooHoo K, Lew M, Roman A. Occupational low-back pain in hospital nurses. *J Occup Med* 1985; 27(7): 518-24.
 23. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sorensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Appl Ergon* 1987; 18(3): 233-7.
 24. Al-samawi MAG, Abdallah Awad HAM. Why do women have back pain more than men? A representative prevalence study in the federal republic of Germany. *Clin J Pain* 2006; 22(8): 738-47. doi: 10.1097/01.ajp.0000210920.03289.93.
 25. Al-samawi MAG, Abdallah Awad HAM. Prevalence of low back pain among nurses working in Elmak Nimer university hospital. *International Journal of Research - Granthaalayah* 2015; 3(9): 108-21.
 26. Sikiru L, Shmaila H. Prevalence and risk factors of low back pain among nurses in Africa: Nigerian and Ethiopian specialized hospitals survey study. *East Afr J Public Health* 2009; 6(1): 22-5.
 27. Lela M, Frantz JM. Physical activity among nurses in Kanombe military hospital. *African Journal of Physiotherapy and Rehabilitation Sciences* 2012; 4(1-2): 63-6. doi: 10.4314/ajprs.v4i1-2.10.
 28. Aljeesh Y, Al Nawajha S. Determinants of low back pain among operating room nurses in Gaza governmental hospitals. *J Al Azhar Univ (Nat Sci)* 2011; 13: 41-54.
 29. Roupia Z, Vassilopoulos A, Sotiropoulou P, Makrinika E, Noula M, Faros E, et al. The problem of lower back pain in nursing staff and its effect on human activity. *Health Sci J* 2008; 2(4): 219-25.
 30. Karahan A, Kav S, Abbasoglu A, Dogan N. Low back pain: prevalence and associated risk factors among hospital staff. *J Adv Nurs* 2009; 65(3): 516-24. doi: 10.1111/j.1365-2648.2008.04905.x.
 31. Sikiru L, Hanifa S. Prevalence and risk factors of low back pain among nurses in a typical Nigerian hospital. *Afr Health Sci* 2010; 10(1): 26-30.
 32. Bejia I, Younes M, Jamila HB, Khalfallah T, Ben Salem K, Touzi M, et al. Prevalence and factors associated to low back pain among hospital staff. *Joint Bone Spine* 2005; 72(3): 254-9. doi: 10.1016/j.jbspin.2004.06.001.
 33. Charlotte ER, Stuart GP. Molecular genetics and age-related disease. *Age Ageing* 2001; 30: 449-54.
 34. Abou El-Soud AM, El-Najjar AR, El-Fattah NA, Hassan AA. Prevalence of low back pain in working nurses in Zagazig University Hospitals: an epidemiological study. *Egyptian Rheumatology and Rehabilitation* 2014; 41(3): 109-15. doi: 10.4103/1110-161x.140525.
 35. Wong TW, Teo N, Kyaw MO. Prevalence and risk factors associated with low back among health care providers in a District Hospital. *Malays Orthop J* 2010; 4(2): 23-8.
 36. Reid MC, Williams CS, Gill TM. Back pain and decline in lower extremity physical function among community-dwelling older persons. *J Gerontol A Biol Sci Med Sci* 2005; 60(6): 793-7. doi: 10.1093/gerona/60.6.793
 37. 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. doi: 10.1016/j.pain.2005.05.002.
 38. Cilliers L, Maart S. Attitudes, knowledge and treatment of low back pain amongst nurses in the Eastern Cape, South Africa. *Afr J Prim Health Care Fam Med* 2013; 5(1): 535. doi: 10.4102/phcfm.v5i1.535.