IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 10, Issue 2 Ser. VI (Mar. – Apr. 2021), PP 41-47
www.iosrjournals.org

Low Back Pain among the Nurses: A Cross Sectional Study on Selected Hospitals in Dhaka

Ahmed SU[1], Mafiz I[2], Nasir M[3]*

[1]*Assistant Professor, Department of Community Medicine, Holy Family Red Crescent Medical College, Dhaka, Bangladesh*
[2]*Lecturer, Department of Anatomy, Holy Family Red Crescent Medical College, Dhaka, Bangladesh*
[3]*Professor and Head, Department of Pharmacology, Holy Family Red Crescent Medical College, Dhaka, Bangladesh*
**Corresponding author: Nasir M (http://orcid.org/0000-0001-5296-7406)*

Abstract:
Low back pain is a common problem among adults. Many factors can contribute to low back pain (LBP). Many studies have been done previously, but still, the precise reason for low back pain among most Bangladeshi adults is inconclusive. Moreover, screening of LBP among healthcare workers, particularly nurses in Bangladesh is almost rare. Therefore, this cross-sectional study was conducted among nurses to find out the prevalence of LBP and its relation to the working environment in private hospitals. A total of 120 respondents (110 females and 10 males) were selected randomly who were engaged in the ward (73.3%), operation theater (8.3%), post-operative room (8.3%), and cabin (7.5%). The age of the majority of respondents was between 25 to 40 years and the mean age was 35 years. About 14% of respondents had diplomas in nursing. About 90% of respondents worked 8-12 hours/daily. Maximum (89.2%) respondents worked in only one shift. It was a very important finding that a high percentage (94.2%) was involved in sedentary work. About 83% had complaints of low back pain. There were severe (60.4%), moderate (29.7%), and mild pain (9.9%) among the respondents. Prolong sitting (77.2%) and prolong standing (14.9) were found with the pain aggravating factor. Besides, it was found that when they lay down, the pain was relieved. About 97.0% of respondents eased the pain by lying down. The onset of pain among respondents was sudden in 23.5% and persistent in 76.5%. The nature of pain among respondents was continuous in 2.9% and intermittent in 97.1%. Low back pain was responsible for absence in work among 74% of respondents. Prolong sitting was found to made pain worse about 61% of respondents. There was a significant relationship ($p<0.05$) between the nature of work and the pain aggravating factor. Nature of work was also found to increase the duration of pain ($p<0.01$). Respondents with frequent change of shifts who worked with bending posture were also significantly high with LBP. This study revealed that prolonged sitting and sedentary work were the common cause of LBP among nurses in Bangladesh. Further studies should be done in a larger sample size to review daily working hours, improper posture, uncomfortable seats, prolong sitting, aging, and obesity to reduce LBP as one of the important occupational health hazards in Bangladesh.

Key words: *low back pain, healthcare workers, nurses, Bangladesh, occupational health*

Date of Submission: 29-03-2021 Date of acceptance: 12-04-2021

I. Introduction:

The word disability refers to any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being[1] and low back pain (LBP) is one of the most frequent causes of the affliction. Most people suffer incapacitating low back pain at some time in their life. It is second only to headache among leading causes of pain[2]. LBP is a ubiquitous occupational health problem[3]. In most cases of back pain, no underlying diseases can be established and the causes of the complaints remain obscure[4]. Approximately 80% of workers experience low back pain sometimes during their active working life. At any given moment 10% to 15% of the adults in the USA population experience LBP. Back pain is the most frequent reason for the visit to a physician and the third-ranking reason for surgical procedures. Low back pain is the costliest occupational health problem in terms of visiting the physician[5]. In Bangladesh, although many people in the community have been suffering from low back pain not much work has been done among the healthcare workers, particularly nurses. Low back pain is second only to the common cold as a cause of self-limiting symptoms and disability in the community[6].

Low back pain is usually caused when a ligament or muscle holding a vertebra in its proper position is strained. Vertebrae are bones that make up the spinal column through which the spinal cord passes. When these muscles or ligaments become weak, the spine loses its stability, resulting in pain. Because nerves reach all parts of the body from the spinal cord, back problems can lead to pain or weakness in almost any part of the body[7]. LBP can occur if the job involves lifting and carrying heavy objects, or if you spend a lot of time sitting or standing in one position or bending over. It can be caused by a fall or by unusually strenuous exercise. It can be brought on by the tension and stress that cause headaches in some people. It can even be brought on by violent sneezing or coughing[7].

People who are overweight may have LBP because of the added stress on their back. Back pain may occur when the muscles, joints, bones, and connective tissues of the back become inflamed as a result of an infection or an immune system problem. Arthritic disorders as well as some congenital and degenerative conditions may cause back pain. Back pain accompanied by loss of bladder or bowel control, difficulty in moving legs or numbness or tingling in the arms or legs may indicate an injury in the spine and nerves, which requires immediate medical treatment[8].

The pain may be continuous or may occur only in certain positions. It may be aggravated by coughing, sneezing, bending, twisting, or straining during a bowel movement. The pain may occur in only one spot or may spread to other areas, most commonly down the buttocks and into the back of the thigh. A low back strain typically does not produce pain past the knee into the calf or foot8. Tingling or numbness in the calf or foot may indicate a herniated disk or pinched nerve[9]. Static working postures include primarily long-term sitting, which appears to increase the risk of low back pain and which, in combination with prolonged sitting which increases the LBP.

It is practically evident that low backache is a common problem in the Bangladeshi community and a large number of patients with a complaint with LBP are daily attending Outdoor Patient Department of different hospitals of which mostly are causes of occupational low back pain. Occupational LBP is mostly caused by incorrect working posture and some other factors having the greatest relation to the occurrence of low back pain[10]. Static postures include primarily long-term sitting, which appears to increase the risk of LBP and which, in combination with bending forward[10]. LBP and lower extremity pain often get lumped into one category, but the causes, and therefore the treatments, can be quite different. Lower extremity pain, when it radiates from the low back, is usually the result of pressure on a nerve. The pain is often in the distribution which the nerve supplies. LBP, on the other hand, is often related to the mechanics of the spine. Muscle strain, arthritis, trauma, osteoporosis, and fracture often causes. Often, disease processes that cause lower extremity pain can also cause LBP and vice versa. Psychological and emotional factors can play a role as well. When one has a tough day, their back might hurt, but later that day, while having fun with friends, the same person can completely forget about the pain. LBP can also be multifactorial, involving several causes like[10].

There is still a considerable lack of knowledge about the long-term course of LBP. Hence the current study aimed to describe the short and long-term course of LBP among nurses over several years. This would improve our understanding of the development of LBP and would make it possible to advance various strategies for treatment and rehabilitation. In particular, it is necessary to attempt to identify specific subgroups of LBP patients concerning specific MRI findings. Their identification would result in a significant step forward, as most patients and clinicians can better relate to a specific pathological and anatomical diagnosis than to a non-specific approach. It has been estimated by some that a somatic cause is found in 10-20% of cases with LBP, whereas others find that as much as 97% of LBP is called "non-specific" or "sprain/strain". Thus, low back pain refers to a set of symptoms or a syndrome rather than a diagnosis[11]. Although low back trouble would be a more precise term, LBP (or nonspecific low back pain) is the most commonly used term for non-specific trouble relating to the lower back.

Although 60-65% of the Nordic population experience low back pain during their lifetime, only a small subset of these become chronic/recurrent low back pain sufferers. It has been concluded in American economic analyses that 60-70% of the total costs associated with low back pain are related to this subset of individuals. Despite the difference in social security coverage and reimbursement systems, similar figures have been reported from the United States. There is a lot to gain for society as well as for the individual, if it were possible to identify, at an early stage, those with a high risk of chronicity[12].

To gain insight into disease development, it is necessary to understand the natural course of the disease. In a disorder with a highly variable course, such as LBP, this is difficult and requires long-term follow-up as well as careful considerations of outcome measures. It still needs to be established what the chances are, that the pain will run a transient, recurrent or chronic course. Furthermore, most studies have centered on adults, but LBP pain seems to originate earlier in life than hitherto thought. A recent study among Danish twins found that by the age of 18 for girls and 20 for boys more than 50% had experienced at least one LBP episode, and another study found that LBP at age 18 significantly increased the risk of LBP at age 30[13]. This indicates that it is important to learn more about this condition in the young to implement primary preventive measures at an early

age. This study was conducted as one of the few studies to find out the relationship between LBP and the working conditions, among the nurses of selected hospitals in Dhaka, Bangladesh.

II. Methodology:

The cross-sectional study was done in two non-government hospitals, Holy Family Red Crescent Medical College Hospital and City Dental College Hospital to find out the occurrence of low back pain among the selected hospital nurses from January to June 2019.

Non-probability Purposive sampling was done on 120 nurses having low back pain with the age of 25-40 years were included in the survey with the exclusion of age less than 25 years, working experience less than five years, and having low back pain before starting this profession.

The procedure of data collection: The nurses were interviewed for data collection considering the exclusion and inclusion criteria. Interviews were carried out with the help of an interview schedule. A face to face was carried out for each respondent as per the interview schedule finally the measurement was taken from the respondents. Weight was measured and recorded in kg by using a weighing machine. Height was measured by using a measuring tape.

Interview technique: Face-to-face informal interviews were conducted with the respondents. The interview schedule contained mostly structural questions, conscious effort was made to ask the question. No leading questions were asked.

Data processing, analysis, and interpretation: After completion of the data collection, data will be consolidated, processed, and edited to reduce error. Descriptive and statistical methods will be used in analyzing the data. The results will be calculated, tabulated, and analyzed with the help of SPSS 11.5 on a computer. Analyses will be performed using χ^2 to find out the associations between individual musculoskeletal disorders and potential risk factors.

III. Results:

Out of 120 respondents' females were 110 (91.7%) and males were 10 (8.3%). The picture indicates that most of the nurses were female than male. The religion of major percentage (72.5%) was Muslim, 20.0% was Hindu, 5.8% Christian, and 1.7% Buddhist. In this study, respondents were grouped into married and unmarried. The majority 112 (93.3%) were married and 8 (6.7%) were unmarried. It is evident from table 5 that 83 (69.2%) had secondary level education which was the highest among the respondents. 20 (16.7%) respondents were educated at the SSC level and only 17 (14.2%) had completed a diploma in nursing (Table-I).

Table-I: Demographic profile of respondents (n=120)

Age group	**Frequency**	**Percentage**
25-40 years	99	82.5%
> 40 years	21	17.5%
Gender		
Male	10	8.3%
Female	110	91.7%
Religion		
Muslim	87	72.5%
Hindu	24	20.0%
Christian	7	5.8%
Buddhist	2	1.7%
Marital status		
Married	112	93.3%
Unmarried	8	6.7%
Educational status		
SSC	20	16.7%
HSC	83	69.2%
Diploma in nursing	17	14.2%

Among 120 respondents, the largest job category was in the ward (73.3%), 10.8% of respondents worked in Post-Operative Room. The percentage of Operation theatre and cabin was 8.3 and 7.5 respectively. Both sitting and standing posture were maintained in the highest percentage that was 72 (60%), during sitting was 22.5 % and standing posture was 17.5% accordingly. Most of the respondents (90.8%) were found to maintain 8-12 hours of work and 9.2% of respondents worked for more than 12 hours.

Table-II: Distribution of respondents according to type of low back pain

Type of pain	Frequency	Percentage
Mild	10	9.9%
Moderate	30	29.7%
Severe	61	60.4%
Aggravating factor		
Prolong sitting	78	77.2%
Prolong standing	15	14.9%
Prolong walking	2	2.0%
Leaning forward	6	5.9%
Pain relieving factor		
Lying flat	93	91.2%
Massage	7	6.9%
Normal activity	1	1.0%
Others	1	1.0%
Total	102	100%

Out of total respondents, 60.4% (61) had severe pain, 29.7% had moderate and 9.9% had mild pain. There were some aggravating factors of LBP among the respondents like prolonging sitting, prolong standing, prolong walking, and leaning forward. Prolong sitting affected 77.2% of respondents, prolong standing affected 14.9% of respondents, prolong walking affected 2.0% of respondents, and leaning forward affected 5.9% of respondents. Almost 93 (91.2%) were identified lying flat as their pain-relieving factor. About 6.9% reported message and 1% reported other factors that relived pain, and 0.1% claimed normal activity as their pain-relieving factor (Table-II).

The nature of LBP was persistent in 2.9% and intermittent in 97.1%. None but only one respondent reported morning stiffness. Out of total respondents, 99.1% (106) had no restriction of body bending movement and 0.9% had a restriction in body bending movement. It was evident that (86.67%) had no history of trauma and 13.33% gave the history of trauma, mainly in hand 50%, leg 25%, back 12.5%, and head 12.5%.

The majority of respondents used a soft bed (89.6%) to sleep and used a hard bed (10.4%) for sleep. About 93.3% (112) respondents had no suffering from any other disease. The majority of respondents (96.3%) took no painkiller on the worst day of pain during the past two weeks. Only 3.7% took painkiller which was less than four painkiller tablets.

Table-III: Distribution of respondents according to the pain being worse by any of the following

The pain being worse by any of the following	Frequency	Percentage
Sneezing	1	1.1%
Sitting	55	60.4%
Standing	7	7.7%
Bending	27	29.7%
Walking	1	1.1%
Total	91	100%

Almost 84.7% of respondents could touch the ankle with the tips of the finger, and 12.7% could touch the floor without bending knees. It was observed that LBP had affected the sleep pattern of 94.5% of respondents. But 5.5 % did not lose any sleep but they needed tablets.

Out of 120 respondents, 82.9% of respondents could stand as long as they wanted without extra pain. But 17.4% could stand as long as they could stand but it gave aggravating the pain. LBP prevented walking more than 1 mile in 98.4% of respondents. Only 1.6% could walk any distance. The respondents concerning their posture in working place like sitting, standing, and any complaints of back pain on survey day indicates Chi-square value 3.808 and p-value 0.149 ($p>0.05$), so there was no significant relationship.

Table-IV: Distribution of respondents with nature of work and pain aggravating factor

Nature of work	Aggravating factor				Total	
	Prolong sitting	Prolong standing	Prolong walking	Leaning forward		
Sedentary work	76(74.1)	13(14.3)	1(1.9)	6(5.7)	96	$\chi^2 = 16.577$
Lifting heavy weight	1(3.1)	2(.6)	1(.1)	0(.2)	4	df = 6
Others	1(.8)	0(.1)	0(.0)	0(.1)	1	p = .01
Total	78	15	2	6	101	

For the respondents with their nature of work and pain aggravating factor, their chi-square value was 16.577, p <0.05, so there was a significant relationship between nature of work and pain aggravating factor. It was evident that there was a significant relationship (p<0.01) between the nature of work and duration of pain. Because their chi-square value was 33.380, p-value 0.0001 (p>0.01) so, sedentary work had higher risks of increasing the duration of pain (Table-IV).There was a significant relationship between the number of shifts and the increasing duration of pain because chi-square value 21.095, (p < 0.01).

Table-V: Distribution of respondents with job specification and type of pain

Job specification	**Types of pain**			**Total**	
	Mild	Moderate	Severe		
Ward	5	21	52	78	$\chi^2 = 10.381$, df = 6, p = 0.109
Operation Theatre	1	3	3	7	
Post-operative room	2	5	4	11	
Cabin	2	1	2	5	
Total	10	30	61	101	

Table-VI: Distribution of respondents with posture in working place and pain in right leg

Posture in working place	**Any pain in the following area**			**Total**	
	Pain in buttock	Pain in the thigh	Pain in the shin or calf		
Sitting	1(1.8)	24(22.0)	0(1.3)	25	$\chi^2 = 13.755$, df = 4, p = 0.008
Standing	2(1.3)	13(16.7)	4(1.0)	19	
Both	4(3.9)	50(48.3)	1(2.8)	55	
Total	7	87	5	99	

The relation between job specification and type of pain was analyzed and the chi-square value was 10.381, p-value 0.109 (p>0.05), So there were no significant relationships between job specification and type of pain (Table-V). It was observed that respondents with posture in working place and nature of pain where the chi-square value was 0.702 and p>0.05, so there was no significant relationship.

Among the respondents with posture in the working place and pain in the right leg, their chi-square value was 13.755, (p<0.01), so there was a significant relationship (Table-VI).

IV. Discussion:

Low back pain is one of the most common afflictions in our society. Almost every person will have at least one episode of LBP at some time in his or her life. The pain can vary from severe and long-term to short-lived. It will resolve within a few weeks for most people. LBP is a pain and stiffness in the lower back. It is one of the most common reasons people miss work[6].

A study on the prevalence of low backache in a different occupational group of peoples (rickshaw pullers, housewives, porters, office workers, cultivators) in Bangladesh shows the prevalence of LBP pain is 37.40% (187 out of 500). Static postures include primarily long-term sitting, which appears to increase the risk of low back pain in combination with nurses[14].

In the present study reported cases among 120 respondents, about 75.0% of respondents belong to the age group of 25-40 years. The mean age of the study population group was 35.11 ±6.47 years. According to several surveys, reports show that lower annual prevalence of low back pain in nurses varying between 45% and 58%[15,16]. As stated by others, comparison between studies might be difficult as definitions of the term low back pain vary considerably.

Furthermore, the heterogeneity of different nursing populations should be considered. About 84% had complaints of back pain during the survey day. Concerning the reliability of recall of former pain episodes, we found that subjects tended to underestimate the persistence of LBP, which means the lifetime duration of LBP since the first onset of complaints. However, the current results emphasize that nurses run a high risk of suffering from LBP.

Back pain was the second common disorder next to neck pain among the subjects studied for Rheumatological disorder attending the specialized clinic. A total of 4037 subjects of different Rheumatological disorders were studied for one and a half years, 22% of the total subjects studied were suffering from LBP[17].

Longitudinal studies found previous LBP to be a predictor of subsequent complaints. This is confirmed by results of a five-year follow-up study indicating[18] that previous back injury was a significant predictor of subsequent low back injury among nurses. Conversely, other authors reported no association between previous and subsequent LBP. However, some studies found that 67% of the total number of episodes reported by nurses

within a three-year follow-up were recurrences. The authors suggest the presence of a link between subsequent episodes, which could be partly due to an increased sensitivity of a previously injured spine[18]. One three-year follow-up study revealed that about half the nurses indicated stable complaints on all occasions. The proportion who developed new symptoms was as large as the proportion who recovered.

The main purpose of this study was to identify LBP among nurses concerning the job environment and job patterns and socio-demographic analysis. The association between LBP and age is controversial. It has been reported that the mean age of nurses with current back pain was slightly but significantly greater than those without[19]. Conversely, it has been found that LBP decreased with age,[19] whereas others suggested that it was not related to LBP[20]. Similarly, our results revealed no significant association between age and LBP.

Due to technological innovations, the number of static work has increased tremendously. They concluded in their review that prolonged sitting is a potential risk factor for the development of LBP[21]. During sitting, a prolonged compression force may increase the risk of disc problems, or the continuous activity of some type I motor units of (back) muscles may contribute to the development of fatigue[22]. The fact that several investigations mention an increased risk for low back disorders when jobs have to be performed sitting, compared with jobs where frequent changes in posture are adopted. In this study, it was found that a significant ($p<0.05$) relationship between nature of work and aggravating factor and a highly very significant ($p<0.01$) relationship among nature of work and duration of pain[23].

There was also a highly significant relationship (chi-square = 21.095, $p < 0.01$) between the number of shifts and duration of pain. An increasing number of shifts had the risk of increasing the duration of pain. Similar findings were observed in other clinical studies. Posture was found to be much related to developing pain[24]. Similar findings were observed in our study which indicates that there was a very significant relationship because chi-square value 13.755, ($p<0.01$), between posture in working place and pain in the right leg. Hence this study showed that LBP still poses a major problem among nurses. It was observed that working posture, duration of work, an increasing number of the working shift were closely related to developing LBP.

V. Conclusion:

As the number of nurses studied was very small and it was a selected private hospital based in Dhaka city, no firm conclusion could be drawn from this study. However, it is revealed that the problem of LBP is common among nurses. Pain assessment should be practiced by using pain intensity scales, so that right choice of analgesics can be prescribed according to the intensity of pain[25].

To prevent LBP adequate knowledge is essential. The study picture indicates that prolonged sitting and sedentary work were the common cause of low back pain among the respondents. It was found that LBP occurred more by longer professional career, long daily working hour, improper standing posture, uncomfortable seat, prolong sitting, aging, and obesity. Further depth study could help to investigate and explain the role of these factors related to LBP among nurses in Bangladesh to minimize occupational health hazards.

VI. Recommendations:

Low back pain can be minimizing by taking proper measures. Therefore, based on the findings of our present study following can be made: Proper posture should be maintained at working place, sedentary work should be prevented, the factors that aggravate the pain should be removed from the workplace place, the number of the shifting duty of work must be reduced, periodic health examination should be done among the nurses, health education should be intensified about the LBP in all hospitals, and training should be offered to the nurses for improvement of knowledge regarding low back pain.

Limitation of the Study:

The study had some limitations as no laboratory investigations were done due to resource constrain, no comparison group could be taken, and a large sample size could not be taken to represent the Bangladeshi population.

References:

[1]. Josephson M, Lagerström 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):681-685. doi:10.1136/oem.54.9.681.
[2]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1128844/
[3]. Keim HA, Kirkaldy-Willis WH. Low back pain. Clin Symp. 1987;39(6):1-32. PMID: 2963721. https://pubmed.ncbi.nlm.nih.gov/2963721/
[4]. Hermens V. Research on work related low back disorder. European Agency for Safety and Health at Work, Luxembourg, 2020; pp-12 Available at: https://osha.europa.eu/en/publications/report-work-related-low-back-disorders
[5]. Scientific approach to the assessment and management of activity-related spinal disorders. A monograph for clinicians. Report of the Quebec Task Force on Spinal Disorders. Spine (Phila Pa 1976). 1987 Sep;12(7 Suppl):S1-59. PMID: 2961086.
[6]. https://pubmed.ncbi.nlm.nih.gov/2961086/

[7]. Nahar, B., Ashan, G., and Khan, N. Prevalence of low back pain and associated risk factors among professional car drivers in Dhaka city, Bangladesh. South East Asia Journal of Public Health, 2013; 2(1), 60-63. https://doi.org/10.3329/seajph.v2i1.15267https://www.banglajol.info/index.php/SEAJPH/article/view/15267

[8]. Thorbjörnsson CO, Alfredsson L, Fredriksson K, et al. Psychosocial and physical risk factors associated with low back pain: a 24 year follow up among women and men in a broad range of occupations. Occup Environ Med. 1998;55(2):84-90. doi:10.1136/oem.55.2.84 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1757545/

[9]. Edwards, C. R. W., Bouchier, I. A. D., Haslett, C., Chilvers, E. R., & Davidson, S. (1995). Davidson's principles and practice of medicine. Edinburgh: Churchill Livingstone. pp-815.

[10]. Martel J. What you should know about Low Back Pain. Healthline. August 2019; Available at: https://www.healthline.com/health/low-back-pain-acute

[11]. Anderson GBJ, Fine LJ, Silverstein BA, Musculoskeletal disorders. Levy BJ, Wegman DH. Occupational Health: Recognizing and preventing work related disease and injury. 4th Edition. Lippincott Williams and Willkins; 2000, USA, pp- 503.

[12]. Borenstien DG; Low back pain. In Klippel JH, Dieppe AP (Editors). Rheumatic Diseases, St. Louis, Mosby 1994, 5.4.1-5.4.16

[13]. Koes BW, Bouter LM, van Mameren H, et al. Randomised clinical trial of manipulative therapy and physiotherapy for persistent back and neck complaints: results of one year follow up. BMJ. 1992;304(6827):601-605. doi:10.1136/bmj.304.6827.601

[14]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1881307/

[15]. Lagerström 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. doi: 10.1007/BF01831630. PMID: 8847110. https://pubmed.ncbi.nlm.nih.gov/8847110/

[16]. Stubbs DA, Buckle PW, Hudson MP, Rivers PM, Worringham CJ. Back pain in the nursing profession. I. Epidemiology and pilot methodology. Ergonomics. 1983 Aug;26(8):755-65. doi: 10.1080/00140138308963397. PMID: 6226521. https://pubmed.ncbi.nlm.nih.gov/6226521/

[17]. Hägg GM, Suurkula J. Zero crossing rate of electromyograms during occupational work and endurance tests as predictions for work related myalgia in the shoulder/neck region. European Journal Applied Physiology 1991; 62(6): 436-444.

[18]. Videman T, Nurminen M, Troup JDG. Lumbar spinal pathology in cadaveric material in relation to history of back pain: Occupation and physical loading. Spine 1990; 15: 728-.

[19]. Hales TR, Bernard BP. Epidemiology of work-related musculoskeletal disorders. Orthop Clin North Am. 1996 Oct;27(4):679-709. PMID: 8823390. https://pubmed.ncbi.nlm.nih.gov/8823390/

[20]. Biering-Sørensen F. A prospective study of low back pain in a general population. I. Occurrence, recurrence and aetiology. Scand J Rehabil Med. 1983;15(2):71-9. PMID: 6223365. https://pubmed.ncbi.nlm.nih.gov/6223365/

[21]. Knibbe JJ, Friele RD. Prevalence of back pain and characteristics of the physical workload of community nurses. Ergonomics. 1996 Feb;39(2):186-98. doi: 10.1080/00140139608964450. PMID: 8851524. https://pubmed.ncbi.nlm.nih.gov/8851524/

[22]. 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):160-163. doi:10.1136/oem.52.3.160

[23]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1128180/

[24]. Wakui T. Study on work load of Matrons under Shift Work in a Special Nursing Home for Elderly. Industrial Health 2000, 38, 280–288. https://www.yumpu.com/en/document/read/23679692/study-on-work-load-of-matrons-under-shift-work-in-a-special-

[25]. Nasir M, Perveen RA, Alam NN. Pattern of Analgesic Use in Post-Operative Pain Management in a Tertiary Level Teaching Hospital in Bangladesh. Research J Pharmacy and Tech. 2016; 9(5): 493-496. doi: 10.5958/0974-360X.2016.00091.3 http://www.indianjournals.com/ijor.aspx?target=ijor:rjpt&volume=9&issue=5&article=003

Morshed Nasir. "Low Back Pain among the Nurses: A Cross Sectional Study on Selected Hospitals in Dhaka." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 10(2), 2021, pp. 41-47.