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Low Back Pain among Nurses: Prevalence, and Occupational Risk Factors

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Abstract

Objectives: Low back pain is a major occupational problem especially among nursing staff. The objectives of our study are to evaluate the prevalence of low back pain among nurses and to look for physical and psychosocial risk factors. **Methods**: It is a cross-sectional study based on a self-administered questionnaire destined for all nurses working in Farhat Hached Teaching hospital of Sousse (Tunisia). **Results:** Our study included 203 nurses with an average age of 39.8 years. The prevalence of low back pain over the last twelve months was 58.1%. The factors that are significantly associated to low back pain were: high BMI, number of pregnancies, arthritis, poor physical condition, daily frequency of inappropriate posture for the activity being performed, and the layout of materials in the workplace. **Conclusion:** Our study evidenced the high prevalence of LBP among nurses and allowed bringing to light the role of individual and ergonomic physical factors in the genesis of LBP. Such identification permits to undertake targeted preventive actions. The association between psychosocial factors and LBP was not emphasized.

Keywords

Low Back Pain, Prevalence, Nurses, Physical Factors, Psychosocial Factors

1. Introduction

As in most industrialising countries, musculoskeletal disorders are an important public health problem in Tunisia [1]. Actually, Low Back Pain, the most prevalent musculoskeletal disorders, represents a complex problem for certain occupational groups, such as nursing personnel [2]. Historically, back pain has been a major complaint, and nursing professionals are one at the highest risk [3].

Being called "social ill/evil" by many authors, low back pain has actually important harmful consequences due to various reasons including in particular the number of concerned subjects, the high socio-economic cost and the gravity of the repercussions on the socio-professional life.

In occupational environment, low back pain is a frequent chief complaint in occupational medicine. It is a major problem with regard to absenteeism and capacity for work, mainly in care environment [4] [5] [6] [7].

Within the Occupational Therapy Department in Farhat Hached Teaching Hospital of Sousse, an important frequency of complaints and absenteeism has been noticed over the last years because of back pain among the nurses of the Hospital. Heavy handling, prolonged bearing of inappropriate postures, working hours stress, psychological high demand and weak social support are all integral parts of the nurses' daily work. This pathology is not a specific problem of women; on the other hand, the associated factors can slightly differ from women to men [8]. Specific information on prevalence and risk factors in Nurses is needed for preventive interventions. Although LBP among nursing staff has been widely investigated in western countries, there is limited information on its prevalence and risk factors in Tunisia.

The objectives of the study were to estimate the prevalence of low back pain among the nurses of Farhat Hached Teaching Hospital of Sousse and to look for associations between LBP and workplace physical and psychosocial risk factors.

2. Methods

An analytical and cross-sectional study was carried out among the nursing staff working in Farhat Hached Teaching Hospital of Sousse (Tunisia) during the period ranging from November 2009 to January 2010.

The data collection was done with the help of an anonymous self administered questionnaire including many sections:

- The first allowed collecting the general socio-professional characteristics (age, marital status, number of pregnancies, body mass index, seniority, working hours, day journey…).
- The second part interested only the nurses with low back pain with the description of their complaint (onset, duration of evolution, triggering factors, recurrence…) as well as the outcomes (admission, absenteeism, work station transfer…).
- The third part explored the physical and organisational characteristics of the nurses' occupational environment (workplace, time stress, patients' autonomy, working postures, hardness of different tasks such as the handling of equipment, lifting, moving of and caring for patients…) while inspiring from the questionnaire of the French National Institute of Research and Safety specific to care centres [9]. Results of hardness have been calculated for each of these tasks: handling of equipment, lifting, moving of and caring for patients and this is starting from 4 to 5 items. Four levels of hardness have been predefined: null, moderate, important, very important. These levels of hard-

ness were determined after the calculations of underscore products of every element intervening in the relevant task. Table 1 shows examples of elements' scoring intervening in the assessment of hardness level.

- As a subjective assessment of physical workload, the Borg CR-10 scale [10] has been used. It is a visual scale subjectively evaluating the effort intensity implemented during the occupational activity. It is a graded from 0 to 10 where the 0 corresponds to the lack of physical effort and the 10 corresponds to the most difficult effort could be made.
- Psychosocial work demands were measured using the Job Content Questionnaire (JCQ) scales for psychological demands, decision latitude, and social support [11]. We have used the 27-question version of the JCQ. Karasek *et al.* [11] devised a model for studying job strain based on the notions of decision latitude (control), psychological demands, and social support at work: I—Control at work refers to the use of skills and decision authority; II—Psychological demands include time pressure and level of concentration required, task interruptions and need to wait for other team members to complete one's job. The control-demand model was expanded by Johnson with the inclusion of social support that includes coworker support and supervisor support [12]. This is one of the most widely used models in studies of stress at work. The constructed scales were sum scores of the individual items within the dimension at issue. The response options for the individual items ranged from 1 (strongly disagree) to 4 (strongly agree). A composite score on "psychosocial demands at work" was obtained based on the scores of all three scales. High psychosocial exposure criteria were high mental demands, low job control, and low social support. At least two of these criteria for high psychosocial exposure had to be met to be in this group. Low psychosocial exposure criteria were low mental demands, high job control, and high social support. At least two of these criteria for low psychosocial exposure had to be met to be in this group. The result of every employee questioned for every scale is compared with the median of the study sample.

The low back pain group was then compared with a healthy group in order to look for significant eventual differences concerning the physical and psychosocial factors of the workplace.

In our study, low back pain is defined as pains in the lower part of the back during the last 12 months preceding the research.

Table 1. Examples of elements scoring intervening in the assessment of hardness level.

Score	1	2	3	4
Weight unit	<5 kg	5 - 15 kg	16 - 30 kg	>30 kg
Material adaptation	well adapted	adapted	little adapted	not adapted
Daily frequency of corresponding task	nul	1 to 2 times/day	3 to 10 times/day	>10 times/day
Patient's autonomy	complete	partial dependence	strong dependence	total dependence
Time constraint	nul	little	moderate	important

The quantitative variables were summed up with averages ± their standard deviation and compared with Student's t test. The qualitative variables were presented in the form of absolute and relative frequencies and compared with Chi-squared test.

So as to identify the risk factors independently associated with low back pain, a multivariate analysis with multiple logistic regressions was conducted following Hosmer and Lemeshow goodness-of-fit test. The statistic significant point was fixed at 0.05.

The statistic analysis was conducted using SPSS software version 11.0.

3. Results

3.1. General Socio-Professional Characteristics

Among the 329 nurses working at the hospital, only 203 accepted to answer our questionnaire namely a participation rate of 61.7%.

The average age was 39.8 ± 9.47 years with some extremes ranging from 26 to 58 years. The majority of nurses are married (76.3%) with less than three dependent children.

Average work seniority was 14.35 ± 9.56 years; ward seniority was 9.28 ± 7.69 years.

More than the half of our sample (51.7%) worked in surgical wards, 29.6% in medical wards and 18.7% in laboratories.

3.2. Prevalence and Consequences of Low Back Pain

During the 12 months preceding the research, 118 nurses namely 58.1% complained of low back pain. Their average age was 42.04 ± 9.68 years. In 30% of the cases, the low back pain was daily and had repercussions on the daily activities of 38% of them. Low back pain characteristics are shown in Table 2.

Absenteeism was noticed in 38% with an average duration of 9.2 days. Hospitalisation was necessary only in 6% of subjects. Surgical treatment of a herniated disc was necessary in one case. Nearly one quarter (23.4%) needed job transfer because of their low back pain.

3.3. Factors Associated with Low Back Pain

3.3.1. Individual Factors

In univariate analysis, low back pain was significantly associated with: age , body mass index (BMI), number of pregnancies and number of dependent children, the notion of pre-existent vertebral pathologies, back injuries, arthritis and the absence of exercises (Table 3).

Marital status, smoking, the practice of an extra professional activity, the presence of medical or surgical history, other than low back pain, were not significantly associated with low back pain.

3.3.2. Occupational Factors

1) Physical Factors: (Table 4)

Table 2. Low back pain characteristics.

LBP characteristics	*Staff* (n = 118)	*Percentage* (%)
	Onset	
Brutal	56	47.5
Progressive	62	52.5
	Triggering factors	
Spontaneous	17	14.4
Load lifting	46	39.0
Traumatism	7	5.9
False movement	29	24.5
Pregnancy	19	16.1
	Pain intensity	
Discrete	12	10.2
Moderate	68	57.6
Intense	38	32.2
	Recurrence	
Yes	80	67.8
No	38	32.2
	Sedation factors	
Rest	32	27.1
Antalgic posture	15	12.7
Medical treatment	69	58.5
Surgical treatment	2	1.7

Table 3. Individual factors related to low back pain.

	LBP n (%)	*No LBP* n (%)	p	OR_a	p_a
	Age				
20 - 30	20 (17.1)	21 (25.9)			
31 - 40	24 (20.5)	37 (45.7)	$<10^{-3}$	___	___
41 - 50	46 (39.3)	16 (19.8)			
51 - 60	27 (23.1)	7 (8.6)			
	BMI*				
<25	52 (46.4)	55 (67.0)	0.004	1	0.008
≥25	60 (53.6)	27 (33.0)		2.78 [1.3 - 5.9]	
	Number of pregnancies				
<3	75 (63.6)	74 (87.1)	$<10^{-3}$	1	0.007
≥3	43 (36.4)	11 (12.9)		3.42 [1.39 - 8.4]	
	Number of dependent children				
<3	101 (85.6)	81 (95.3)	0.03	___	___
≥3	17 (14.4)	4 (4.7)			
	Arthritis				
Yes	34 (29.3)	7 (8.3)	$<10^{-3}$	4.65 [1.6 - 13.1]	0.004
No	82 (70.7)	77 (91.7)		1	
	Back injury				
Yes	12 (10.2)	2 (2.4)	$<10^{-3}$	___	___
No	106 (89.8)	83 (97.6)			
	Vertebral pathologies				
Yes	96 (85.0)	81 (95.3)	0.01	___	___
No	17 (15.0)	4 (4.7)			
	Physical exercise				
Yes	4 (3.4)	15 (17.6)	0.001	1	0.047
No	114 (96.6)	70 (82.4)		3.66 [1 - 13.2]	

BMI: Body Mass Index; LBP: low back pain; No LBP: no low back pain.

Table 4. Physical factors related to low back pain.

	LBP subjects n(%)	*No LBP n*(%)	p	OR_a	P_a
	Material state				
Good	13 (12.9)	21 (26.9)	0.04	___	___
Fair	60 (59.4)	43 (55.1)			
Bad	28 (27.7)	14 (17.9)			
	Work space				
Large	15 (12.8)	13 (15.5)			
Enough	54 (46.2)	54 (64.3)	0.17	___	___
Narrow	37 (31.6)	17 (20.2)			
Very narrow	11 (9.4)	0 (0.0)			
	Layout of material in the work place				
Well adapted	20 (17.1)	26 (31.0)		1	
Just adapted	47 (40.2)	42 (50.0)	0.005	1.64 [0.7 - 4.1]	0.01
Little adapted	36 (30.8)	15 (18.0)		3.47 [1.2 - 10.3]	
Not adapted	14 (12.0)	1 (1.2)		28.4 [2.8 - 284.3]	
	Trunk flexion				
Exceptional	6 (5.0)	14 (16.5)			
1 to 2 times/ day	33 (28.0)	45 (53.0)	$<10^{-3}$	___	___
3 to 10 times/ day	50 (42.0)	24 (28.0)			
>10 times/ day	29 (25.0)	2 (2.5)			
	Trunk torsion				
Exceptional	31 (26.0)	46 (54.0)		1	
1 to 2 times/day	41 (35.0)	28 (33.0)	$<10^{-3}$	2.45 [1.0 - 5.7]	0.05
3 to 10 times/ day	27 (23.0)	9 (11.0)		4.5 [1.5 - 13.2]	
>10 times/ day	19 (16.0)	2 (2.0)		10.1 [1.9 - 54.0]	
	Time granted				
Enough	35 (31.0)	37 (44.6)			
Just enough	51 (45.0)	38 (46.0)	$<10^{-3}$	__	__
Not enough	22 (19.0)	7 (8.4)			
Very enough	6 (5.0)	1 (1.0)			
	Patients' autonomy				
No	26 (23.0)	28 (33.0)			
Slight	53 (46.5)	44 (52.0)	0.24	__	__
Important	28 (24.5)	12 (14.0)			
Very important	7 (6.0)	1 (1.0)			
	Hardness of material handling				
Null	15 (19.5)	25 (40.3)			
Moderate	28 (36.4)	16 (25.8)	0.02	__	__
Important	21 (27.3)	18 (29.0)			
Very important	13 (17.0)	3 (4.8)			
	Hardness of rise of patients				
Null	1 (1.3)	6 (10.3)			
Moderate	35 (43.8)	26 (44.8)	0.09	___	___
Important	34 (42.5)	24 (41.4)			
Very important	10 (12.5)	2 (34)			
	Hardness of maintaining patients				
Null	10 (14.0)	9 (17.0)			
Moderate	17 (24.0)	24 (46.0)	0.01	___	___
Important	21 (29.0)	13 (25.0)			
Very important	24 (33.0)	6 (12.0)			

Significant associations have been found between low back pain and physical factors are summarized in Table 4.

There were no statistically significant relations of low back pain with: the ward surface, the number of patients per nurse and the number of mechanised beds.

There was a statistically significant difference between the low back pain group and the healthy subjects (p = 0.007) with regard to the subjective evaluation of the workload using Borg scale.

2) Psychosocial Factors:

More than a half of nurses (56%) was classified as tense with no statistically significant difference between the low back pain group and the healthy subjects (p = 0.6).

Table 5 presents the results of the univariate analyses of the relationship between the psychosocial work characteristics and low-back pain.

Low back pain was significantly linked to the high psychological demand (p = 0.05). Decision authority and social support were not found to be related to LBP.

Multivariate analysis:

After multivariate analysis, we retained six factors independently associated with low back pain: BMI, the number of pregnancies, arthritis history, the absence of exercise, the mean number of times per day in case of trunk torsion, the layout of the material in the workplace.

4. Discussion

Our study allows bringing into light the high prevalence (58.1%) of low back pain among nurses. In the literature, the annual prevalence of low back pain in hospital staff varies from 6% to 87% [13] [14] [15]. Actually, within a cross-sectional research involving 5491 hospital workers in Strasbourg Teaching Hospital, Burgmeier *et al.* in 1988 [13] reported a low back pain annual prevalence of 6%.

Table 5. Relationship between psychosocial work characteristics and the occurrence of low-back pain (LBP).

Risk factor	LBP (n%)	No LBP (n%)	p	OR	p_a
Psychological demand					
Low	49 (41.5)	47 (55.3)	0.05	1.7 [1 - 3]	__
High	69 (58.5)	38 (44.7)			
Decision authority					
Low	64 (54.2)	48 (56.5)	0.7	1.1 [0.6 - 1.9]	__
High	54 (45.8)	37 (43.5)			
Social support					
Low	63 53.4	43 (50.6)	0.6	0.9 [0.5 - 1.6]	__
High	55 (46.6)	42 (49.4)			
Job strain					
No	50 (42.4)	42 (49.4)	0.6	1.3 [0.7 - 2.3]	__
Yes	68 (57.6)	43 (50.6)			

In 2007, Sun *et al.* [14] found an annual prevalence of 87% among nurses working in intensive care units in China.

In 2009, in a study about 1600 employees from 6 hospitals in Turkey, Karahan *et al.* [15] found an annual prevalence of 61.3%.

Our results were comparable with those of Ando *et al.* in Italy [16] and Bejia *et al.* in Tunisia [1] who respectively found prevalence of 54.7% and 57.1%.

The absence of objective criteria to define low back pain could be at the origin of such great variability of frequency, all the more so the answers often call upon the memory of events which can go back to one year [17].

Apart from its great prevalence, low back pain has considerable medical, economic, and professional repercussions.

In our series, drug therapy was necessary in 58.6% of low back pain subjects.

In a study carried out in Fattouma Bourguiba Hospital in Monastir, Bejia *et al.* [1] reported that 42% of low back pain patients had recourse to medical treatment and 9.6% to physiotherapy.

Karahan *et al.* [15] report a rate of 33.3% of low back pain subjects who needed medical treatment.

Besides, the onset of low back pain in our research was brutal in 47.4% of cases which matches Dabbabi *et al.*'s [18] results where it was noticed in 44.6% of cases.

Concerning the absenteeism which is secondary to lumbar problems, it was higher in our research (38%) than those reported in the literature where the rate of absenteeism varied between 15% and 26.1% [16] [18] [19] [20] [21] [22]. This can be explained by a more important severity.

The origin of low back pain is multifactorial; indeed, many individual and occupational factors intervene in its genesis [23].

Non occupational factors such as: the socio-demographic characteristics (age, BMI, marital status, number of pregnancies and of dependent children...) and behavioural characteristics (tobacco addictions, sport...) were included in our study reinforcing the value of the found results.

After multivariate analysis, six factors were independently linked to low back pain: BMI, number of pregnancies, history of arthritis, absence of exercise, the layout of material in the workplace and the mean number of times per day of trunk torsion.

Among the individual factors, age is one of factors most reported in the literature [14] [16] [24] [25].

The association of high BMI with low back pain is frequent in the literature [13] [16].

According to Coste *et al.* [23], obesity is a cause of disc deterioration due to excess of mechanical strain or to reduction of activity inherent in such deterioration.

The large number of pregnancies is a risk factor for the outbreak of low back pain which can be secondary to pregnancy itself or to the number of dependent children.

After multivariate analysis, the presence of spinal arthritis history was closely linked to the genesis of low back pain among our surveyed female nurses. Such link is a bit surprising since a subject already complaining of spinal arthritis has more chance to develop low back pain than a healthy one. In a research carried out about 393 postmen, Berquez-Doise *et al.* could highlight such link among women [22].

According to our research, neither smoking, nor the number of dependent children, nor marital status was associated with low back pain, which is in opposition to the data of the literature [17] [21] [25] [26] [27].

The practice of exercise was a protection factor against low back pain.

With reference to the multivariate analysis, and among the occupational risk factors, we have retained as low back pain triggering factor: prolonged work with trunk torsion and the layout of material in the workplace which were frequently reported in the literature [14] [17] [20] [22] [28].

However, many other occupational factors have been found in the literature such as seniority as reported by Bejia *et al.* and Lallahom *et al.*, as well as the lifting of heavy loads [1] [15] [20] [29] [30].

As far as the rise of patients is concerned, it was considered by many authors as a risk factor [30] [31].

The psychosocial factors studied in our research were not associated with low back pain, however, many authors could object to such links [14] [24] [32] [33]. In a study realised about 330 Korean nurses, Smith *et al.* [30] found a risk of low back pain that is three times higher in nurses suffering from periodic bouts of depression.

Jansen *et al.* [34] could bring into light the statistically significant association between low back pain and the high psychological demand and the poor decision latitude among nurses working in nursing homes. In the literature, the psychosocial factors were mainly implicated in the transition to chronicity of low back pain and in the degree of invalidity linked to it [33] [35].

5. Conclusions

Among the many occupational risks to which nurses are exposed (physical load, biological agents, ionising radiations, night-work...), it is above all the musculoskeletal troubles with low back pain being the leading cause of the staff's lack of motivation and the abandoning of health care professions [36].

A high prevalence rate of LBP among Tunisian nurses was found. Individual factors as well as work-related factors found in our survey are in accordance with the literature. Encouraging nurses to undertake a regular physical activity and reduce overweight, as well as educating them on patient handling would help prevent back pain.

6. Study Limitations

It is a cross-sectional study where it is difficult to establish a causal link between the different evaluated criteria. Health information based on workers' self-report, a

common procedure in epidemiologic studies, can motivate some criticism concerning loss of objectivity. However, self-reporting is the main approach to study symptomatic disorders, especially considering the subjective nature of symptoms of low back pain. Other methods of clinical evaluation such as physical examination have also limitations. The physical examination does not always allow a diagnosis and its validity can be questioned as there is no gold standard method for comparison [37].

An important source of potential bias in occupational cohort studies is the healthy worker effect [38]. For this form of bias to be minimized, it would have been better to study newly employed workers, but such an approach was beyond the scope of our study.

The lack of significant association between LBP and job strain as Karasek's model could be due to this healthy worker effect. Another possible explanation could consist in our means of initial selection since we included in the study only female nurses. The rate of participation of 61.7% could equally be another limitation in our study leading to a misevaluation of the studied risks.

Conflict of Interest

No conflict of interest related to this article is to declare.

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