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The Impact of Ergonomic Technology on the Prevalence of Work-Related Low Back Pain Among Physical Therapists in the South West Bank

Hamza M Shaheen[1], Aya Ayesh [1], Florentino Sayeh[1], Noura Fawaghra[1]
[1] Department of Physiotherapy, Palestine Ahliya University (Palestine)
hamzash@paluniv.edu.ps
Ayaayesh105@gmail.com
Florentinosayehs22@gmail.com
nouraahmad1312@gmail.com

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Abstract: ***Low back pain (LBP) is a prevalent work-related musculoskeletal disorder that significantly impacts the health and productivity of physical therapists. This study aims to investigate the prevalence of work-related low back pain (WRLBP) among physical therapists in the South West Bank of Palestine, identify the associated risk factors, and develop effective prevention and control strategies. A cross-sectional study design was employed, utilizing online questionnaires to collect data from 77 physical therapists working in various healthcare settings. Descriptive statistics and the Chi-square test were used to analyze the data, revealing that 94.8% of participants experienced LBP, with factors such as gender, daily working hours, and prolonged bad posture being significantly associated with LBP. The impact of LBP on job performance and absenteeism was substantial, with many participants reporting reduced work efficiency and frequent absences. The findings underscore the need for targeted ergonomic interventions and posture education to mitigate the high prevalence of LBP among physical therapists.***

Keywords: Low Back Pain; Work-Related Low Back Pain (WRLBP); Physical Therapists.

1. Introduction

Low back pain (LBP) is one of the most prevalent health problems worldwide and is the most frequently reported work-related musculoskeletal disorder (WMSD) associated with the physical demands of various professions [1]. It is a significant public health issue that requires accurate assessment for proper management and predicting prognosis [2]. The incidence of LBP can be attributed to multiple factors, including issues involving the interconnected network of the spinal cord, nerves, bones, discs, or tendons in the lumbar spine [3]. The impact of LBP is profound, affecting both the personal and professional lives of individuals by causing sleeping disorders, disability, invalidity, work absenteeism, lack of productivity, and difficulties in carrying out professional duties [4]. The clinical presentations of LBP can vary, with symptoms ranging from dull and diffuse pain in the lumbar region to radiating pain in the lower extremities and restricted range of motion [5].

LBP is commonly classified into non-specific (90%) or specific (10%) categories based on the reported cause [6]. Non-specific or mechanical LBP is defined as pain not attributable to a known cause and is often associated with activities such as lifting or twisting while holding heavy objects, operating vibrating machinery, prolonged sitting, falling, coughing, sneezing, and straining [7]. Specific causes of LBP include infection, malignancy, fractures, trauma, and spinal cord or nerve root compression [8]. Furthermore, LBP is typically categorized into three subtypes based on duration: acute LBP lasting less than six weeks, sub-acute LBP lasting between six and 12 weeks, and chronic LBP persisting for more than 12 weeks [9].

The multifactorial nature of LBP involves the interaction of several risk factors: constitutional factors (genetic predisposition, ages 40–80 years, female sex), occupational factors (excessive static or dynamic loading, frequent lifting, vibrations, repeated torsion and bending, incorrect postures), behavioral and environmental factors (smoking, obesity, sedentary lifestyle), and psychosocial factors (stress, anxiety, depression, work dissatisfaction) [10]. Effective treatment options for LBP include pharmacological therapy, surgical interventions, and physical therapy and rehabilitation. Physical therapy practices, such as regular exercise programs, spinal manipulation, Pilates, and water exercises, have been shown to reduce pain, improve function, and restore balance [11].

In the healthcare sector, physical therapists are particularly vulnerable to LBP due to the demanding nature of their work. Tasks that involve joint loading, extreme trunk flexion, frequent heavy lifting, patient transfers, and maintaining awkward or static postures, as well as psychological stress, contribute to back injuries [12]. Physical therapists often perform activities such as transferring dependent patients, assisting during gait, providing manual resistance, and lifting heavy equipment, putting them at risk of both acute and cumulative LBP.

Addressing the prevalence of work-related low back pain (WRLBP) among physical therapists is crucial, as LBP accounts for a significant portion of disability and is a severe healthcare burden with substantial societal costs [13]. WRLBP-related absences from work lead to prolonged sick leave and decreased workplace productivity [14]. Currently, there is limited information regarding the prevalence of WRLBP among physiotherapists in the South West Bank of Palestine. This study aims to investigate and estimate the prevalence of WRLBP and identify the body areas most associated with this pain among physical therapists in this region, contributing to the development of effective

prevention and control strategies. The aim of the study is to investigate and estimate the prevalence of work-related low back pain among physical therapists in the South West Bank and identify specific work tasks and risk factors associated with it, to develop effective prevention and control strategies.

2. Methodology

The current study conducted on cross-sectional study to provide insights into the prevalence, risk factors, and potential correlates of LBP among physiotherapists. Surveys or questionnaires will be administered to answer the research questions. This method was chosen because it is a fast and efficient design that can be completed within a short period.

The study was conducted in the Departments of Physiotherapy at hospitals, private clinics, and rehabilitation centers for physical therapy in the South of West Bank in Palestine using an online questionnaire. The study lasted for four weeks, starting in March 2024 and ending in April 2024. A carefully planned schedule ensured sufficient time for each part of the study, including participant recruitment, data collection, analysis, and result dissemination.

The study population consists of 77 participants aged between 22 and 55, working in various healthcare settings, including hospitals, rehabilitation centers, private clinics, and community health facilities. The inclusion criteria for participants were as follows: ages between 22 and 55 years, both genders, currently working as a physiotherapist, and working in the Southern West Bank. Exclusion criteria included physical therapists under 22 or over 55 years old, those not working as physiotherapists, those not working in the Southern West Bank, and pregnant women.

Questionnaires were distributed to physical therapists, who provided necessary personal information for the study with their consent. The questionnaire was designed to collect comprehensive data in several sections: personal information (demographics), work environment (working conditions), prevalence of low back pain (occurrence and severity of LBP using the Visual Analog Scale), prevention (exercise or stretches to prevent LBP), impact of low back pain (effect on job performance), and seeking treatment (types of treatment pursued). This data collection aimed to provide a thorough understanding of the prevalence, risk factors, impact, and management of work-related low back pain among physical therapists, ultimately informing strategies for prevention and intervention within the profession.

In this study, an online survey methodology was used based on a combination of previously published questionnaires and new sections tailored to the study's specific needs. The questionnaire link was sent to known therapists and shared on social media platforms such as Facebook. The study's objectives were explained to the therapists to encourage participation.

Descriptive statistics were primarily used to give a thorough overview of the participants' demographic features, including mean, standard deviation, and percentages to represent significant sample characteristics. The Chi-square test was employed to analyze associations between categorical variables such as gender, years of experience, and the incidence of LBP. Statistical software, especially SPSS (Statistical Package for the Social Sciences), facilitated the efficient organization, manipulation, and computation of descriptive statistics and hypothesis tests. Additionally, Microsoft Excel was used to create visual representations like graphs and charts to enhance the clarity and presentation of the results.

3. Results

The study involved 77 physiotherapist participants, ensuring a diverse sample for analysis. On average, participants were 28.83 years old, with typical physical characteristics including an average height of 170 cm and weight of 74.29 kg. The calculated average BMI of 25.65 suggests that, on average, participants fell within the normal weight range according to BMI classifications, indicating a relatively healthy sample.

Regarding gender distribution, males comprised the majority at 48.1%, while females made up 51.9% of the sample, providing context for potential gender-related differences in study outcomes.

The distribution of participants across marital status revealed that 44.2% were married, 54.5% were single, and 1.3% was divorced, offering insight into how marital status might influence study outcomes.

In terms of place of work, 50.6% of participants worked in Hebron, while 49.4% worked in Bethlehem. Approximately 46.8% reported being smokers, while 43.2% were non-smokers.

Regarding educational context, a significant majority (96.1%) were graduates, with the remainder either in their internship year or honor students.

In terms of daily working hours, 55.8% reported working 6-8 hours daily, 33.8% reported working less than 6 hours, and 10.4% reported working more than 8 hours.

Session duration varied, with 48.1% reporting sessions lasting 30-45 minutes, 45.5% reporting sessions lasting 45-60 minutes, and the remaining percentage reporting sessions lasting more than one hour.

Regarding workplace settings, 53.2% reported working in private clinics, 27.3% in hospitals, 5.2% in home visits, and the remaining participants in other settings such as rehabilitation centers. These findings offer insights into the distribution of physiotherapists across different work environments. Table 1 and table 2, provide a comprehensive overview of the demographic characteristics and workplace settings of the study participants, aiding in the understanding of the sample population and potential factors influencing study outcomes.

Table 1. Descriptive statics for the demographic data.

variable	Minimum	Maximum	Mean	Std. Deviation
Age	22	52	28.83	6.86
Weight (kg)	45	115	74.29	13.80
Height (Cm)	150	190	169.92	8.93
BMI	17.8	37.5	25.65	3.83

Table 2. Demographic data of the respondents

Variable	Frequency (n)	Percentage (%)
Gender		
Male	37	48.1
Female	40	51.9
Marital status		
Married	34	44.2
Single	42	54.5
Divorced	1	1.3
Place of work		
Hebron	39	50.6
Bethlehem	38	49.4
Smoking status		
Smoker	36	46.8
Non- smoker	41	53.2
Educational context		
Graduate	74	96.1
In internship year	3	3.9
Daily Working Hours		
less than 6	26	33.8
Between 6-8	43	55.8
More than 8	8	10.4
Session duration		
30 - 45 minute	37	48.1
45-60 minute	35	45.5
More than 60 minutes	5	6.5
Type of workplace		
Private clinic	41	53.2
Hospital	21	27.3
Home visit	4	5.2
Other	11	14.3

Through Table 3, Among the 77 physiotherapists who participated in the study, a significant majority, comprising 94.8% of the sample, reported experiencing low back pain (LBP) prior to the study. Among those experiencing LBP, severity varied, with 21.9% reporting mild pain, 60.3% reporting moderate pain, and 17.8% reporting severe pain. The frequency of LBP occurrence varied among participants, with 2.7% reporting never experiencing it, while others reported occasional (32.8%), rare (19.2%), frequent (19.2%), or constant (6.9%) occurrences. Regarding the timing of pain, a notable proportion experienced it in the evening (34.3%), followed by morning (31.5%), any time during the day (23.2%), and before bedtime (11%).

Causes of LBP were diverse, with 9.6% attributing it to lifting loads, 57.5% to maintaining bad posture for extended periods, 20.3% to sudden movements, and 12.3% to other factors. The impact of LBP on job performance was significant, as 67.1% reported that it affected their work, while 31.5% reported absence due to LBP. Despite the prevalence and impact of LBP, a majority (76.7%) sought medical care for their condition. Treatment approaches varied, with 50.8% opting for physical therapy, 9.5% choosing medication, and others combining both treatments.

Regarding the onset of LBP, 58.9% reported a gradual onset, while 41.1% reported a sudden onset. These findings underscore the prevalence and varied manifestations of LBP among physiotherapists, highlighting the importance of addressing musculoskeletal health concerns within the profession.

Table 3. Prevalence of Low Back Pain (LBP) among the respondents

Variable	Frequency (n)	Percentage (%)
Low Back Pain (LBP) experienced		
Yes	73	94.8
No	4	5.2
Severity of the Pain		
Mild	16	21.9
Moderate	45	60.3
Severe	13	17.8
LBP_Frequency.		
Never	2	2.7
Occasionally (1-3 times a month)	24	32.8
Rarely (less than once a month)	28	38.4
Frequently (more than 3 times a month)	14	19.2
Constantly	5	6.9
Pain_Timing_Day		
Evening	25	34.3
Morning	23	31.5
Any time during day	17	23.2
Before bed time	8	11
LBP_ Causes		
Lifting of a load	7	9.6
Bad posture for a long time	42	57.5
Sudden movement	15	20.3
Other	9	12.3
LBP Impact on Job Performance		
Yes	49	67.1
No	24	32.9
Absence due to LBP		
Yes	23	31.5
NO	50	68.5
Medical Care for LBP		
Yes	56	76.7
No	17	23.3
Treatment types for LBP		
Physical therapy	37	50.8
Medication	7	9.5
Physical therapy, Medication	29	39.7
Onset of LBP		
Gradually	43	58.9
Suddenly	30	41.1

In Table 4, we conducted a Pearson Chi-square test to investigate the relationship between various factors and the occurrence of Low Back Pain (LBP) among the participants. Gender emerged as statistically significant, with a p-value of 0.04, indicating a notable association between gender and LBP. This suggests that gender may indeed play a role in predisposing individuals to LBP. Furthermore, Daily Working Hours also showed a significant relationship with LBP, as indicated by a p-value of 0.035. This finding suggests that the duration of daily work might influence the occurrence of LBP among participants, emphasizing the importance of managing work schedules and promoting ergonomic practices to mitigate the risk of LBP.

The causes of LBP were also found to be statistically significant, with a p-value of 0.046, highlighting a notable association between LBP causes, especially prolonged bad posture, and the occurrence of LBP. This underscores the importance of maintaining proper

posture during work activities to prevent LBP and emphasizes the need for ergonomic interventions and posture awareness education. Interestingly, certain factors such as age, BMI, years of experience, smoking status, session duration, educational context, and marital status did not demonstrate significant associations with LBP (with p-values > 0.05). Although these factors are relevant to overall health and well-being, they may not directly contribute to the occurrence of LBP among the study participants.

These results provide valuable insights into the factors associated with LBP among physiotherapists, highlighting the significance of gender, daily working hours, and LBP causes, while also emphasizing the need for further exploration into other potential contributing factors. Understanding these associations can inform targeted interventions and preventive strategies to effectively manage and reduce the prevalence of LBP in this population.

Table 4. Relationship between Factors and Occurrence of Low Back Pain

Factor	Categories	LBP		Total	Pearson Chi-Square (Sig.)
		Yes	No		
Gender	Male	33	4	37	4.56 (0.04)
	Female	40	0	40	
Age	20- 30	50	3	53	0.27 (0.29)
	30-40	18	1	19	
	40-50	4	0	4	
	50-60	1	0	1	
BMI	Less than 18.5	2	0	2	2.7 (0.42)
	18.5-24.9	25	3	28	
	25-29.9	36	1	37	
	More than 29.9	9	0	9	
Years of experience	<5	40	3	43	1.3 (0.52)
	5-10	15	1	16	
	>10	18	0	18	
Smoking Status	Smoker	35	3	38	0.80 (0.35)
	No-smoker	38	1	39	
LBP causes	Lifting of a load	7	1	8	6.7 (0.042)
	Bad posture for a long time	42	0	42	
	Sudden movement	15	1	16	
	Other	9	2	11	
Daily Working Hours	< 6h	25	1	26	3.63 (0.035)
	6-8 h	40	3	43	
	>8h	8	0	8	
Session_Duration	30 - 45 min	35	2	37	0.29 (0.36)
	45-60 min	33	2	35	
	More than 60 min	5	0	5	
Educational context	Graduate	70	4	74	0.17 (0.92)
	In internship year	3	0	3	
Marital status	Married	33	1	44	0.729 (0.695)
	Single	39	3	42	
	Divorced	1	0	1	

In Table 5, we examined the impact of low back pain (LBP) on various activities of daily living among the respondents, including the extent of pain radiating to the leg or foot, job duties, and absenteeism from attendant work.

According to the Pearson Chi-Square test, there was no significant effect of LBP on the extent of pain radiating to the leg or foot, with a p-value > 0.05. This suggests that the presence of LBP may not necessarily correlate with pain extending to the leg or foot among the respondents.

Similarly, there was no significant effect of LBP on job duties, as indicated by a p-value > 0.05. This implies that the presence of LBP may not significantly impair the ability of respondents to carry out their job duties, suggesting that they may still be able to perform their work tasks effectively despite experiencing LBP.

However, there was a notable effect of LBP on absenteeism from attendant work, with a p-value < 0.05. This suggests that individuals experiencing LBP were more likely to be absent from attendant work compared to those without LBP. This finding underscores the significant impact of LBP on work attendance and productivity, highlighting the need for interventions to manage and reduce absenteeism related to LBP among the respondents.

These findings provide valuable insights into the specific areas of daily living affected by LBP among the respondents, emphasizing the need for targeted interventions to address absenteeism and support individuals in managing LBP-related challenges in the workplace.

Table 5. Effect of Low Back Pain on Activities of Daily Living

Effect of LBP on :	Categories	LBP		Total	Pearson Chi-Square (Sig.)
		Yes	No		
Pain Extent to Leg Foot	Yes	28	0	28	2.4 (0.15)
	No	45	4	49	
Job Duties	Yes	49	2	51	0.54 (0.41)
	No	24	2	26	
Absent from attendant work	Yes	23	0	23	3.68 (0.046)
	No	50	4	54	

4. Discussion

The prevalence of work-related low back pain among physical therapists in south of West Bank in Palestine is a crucial area of research that necessitates investigation. This study aims to delve into several key objectives: firstly, to ascertain the prevalence of low back pain within this professional group; secondly, to pinpoint occupational risk factors that contribute to its occurrence; thirdly, to comprehend the ramifications of this pain on job performance and absenteeism. Finally, with the insights gained, the study seeking to formulate effective interventions geared towards mitigating both

the frequency and severity of work-related low back pain experienced by physical therapists in in south of West Bank in Palestine [12].

The results of this study highlight a significant prevalence of low back pain (LBP) among physiotherapists, with 94.8% of participants reporting experiencing LBP prior to the study. The severity of LBP varied, with the majority of individuals reporting moderate pain. The frequency of LBP occurrences was notable, with a considerable proportion experiencing LBP on a frequent or constant basis. The timing of pain varied throughout the day, with a substantial number of participants reporting evening and morning as peak times for LBP [15].

Several factors were identified as significantly associated with LBP among physiotherapists. Gender emerged as a notable factor, with females showing a higher prevalence of LBP compared to males. Daily working hours also played a significant role, emphasizing the importance of managing work schedules to reduce the risk of LBP. Prolonged bad posture was identified as a leading cause of LBP, highlighting the critical need for ergonomic interventions and posture awareness education in the workplace [16].

LBP had a substantial impact on job performance among physiotherapists, with a significant proportion reporting that it affected their work. Absenteeism due to LBP was also prevalent, indicating the significant burden of LBP on work attendance and productivity.

In our study, we found that a significant proportion of physical therapists in the south of West Bank in Palestine experience low back pain (LBP) from work, with varying degrees of severity and frequency. This aligns with findings from other studies. For instance, a study conducted in France reported a self-reported whole-career prevalence of LBP of any type among physiotherapists at 81.0% [17]. Similarly, a study in the Riyadh region of Saudi Arabia found a prevalence of 89% for work-related LBP among physical therapists [18].

The findings of Ahmed et al. (2023) [14] are align with the current study's finding that certain work tasks, such as lifting loads or maintaining poor posture, actually increase the likelihood of developing work-related low back pain among physical therapists in the southern West Bank. The study determined that incorrect use of body mechanics, working in awkward positions, and repetitive bending and twisting movements were among the most common therapist-related risk factors that contribute to low back pain. In addition, Glowinskiet al. (2021) emphasized that bent or twisted postures during patient transfer, positioning, and joint mobilization can precipitate low back pain. This convergence of findings underscores the importance of addressing these specific occupational risk factors in interventions aimed at reducing the prevalence of work-related low back pain among physical therapists [19].

In comparing our findings on the gender prevalence of work-related low back pain (WRLBP) among physical therapists in the South West Bank with existing literature, several studies have reported similar trends. For instance, our research indicates that female physical therapists (51.9%) are more likely to experience WRLBP compared to their male (48.1%) counterparts. This aligns with studies that suggested that female therapists were at a higher risk of developing LBP after joining the PT profession than male physical therapists, due to Smaller body builds of females (heavier but shorter) compared to males is a disadvantage for women when lifting or transferring patients and using body force during treatment increasing spinal load leading to back pain [20].

The high prevalence of work-related low back pain (LBP) among physical therapists (PTs) in the South West Bank significantly impacts their job performance and leads to absences from work, aligning with findings from other studies. For instance, in a study conducted by Alghadir et al., (2017) involving 450 PTs who reported developing LBP after entering the profession, 31% of them reported being unable to accomplish daily activities involving bending, twisting, or stooping. This is consistent with previous research indicating that work activities such as prolonged standing (44%), lifting and pushing (37%), patient handling (34%), and prolonged sitting (28%) are most affected by LBP among PTs [18]. Moreover, the severity of LBP compelled 11% of PTs to decrease their work hours, while 34% had to either change work settings or take sick leave. Additionally, 5% of PTs claimed compensation due to LBP, highlighting the substantial impact of this issue on both the individual PTs and the healthcare system as a whole.

5. Conclusion

This study underscores the significant prevalence of work-related low back pain (WRLBP) among physical therapists in the South West Bank, highlighting its profound impact on both job performance and daily living. The findings reveal that a vast majority of physiotherapists experience LBP, with moderate pain being the most common severity. The occurrence of LBP is notably associated with gender, daily working hours, and poor posture, pointing to the need for targeted ergonomic interventions and posture education. The high prevalence of absenteeism due to LBP further emphasizes the burden of this condition on productivity and healthcare delivery. Comparisons with existing literature confirm that WRLBP is a pervasive issue globally, influenced by similar occupational risk factors. Addressing these risks through effective prevention and control strategies is crucial for improving the well-being of physiotherapists and enhancing their capacity to deliver quality care. Overall, this study provides valuable insights into the occupational health challenges faced by physiotherapists and underscores the necessity of comprehensive interventions to mitigate WRLBP.

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