LMJ LINK MEDICAL JOURNAL OF HEALTH AND COMMUNITY RESEARCH

Crossref DOI: https://doi.org/10.61919/rqv25n31

Original Article

Prevalence of Hamstring and Iliotibial Band Tightness Associated with Low Back Pain and Disability Among Traffic Wardens

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ABSTRACT

Background: Low back pain is a common occupational health problem that may impair physical function and work performance, particularly in traffic wardens exposed to prolonged standing, repetitive walking, and sustained postural loading. Reduced hamstring and iliotibial band flexibility may alter lumbopelvic mechanics and contribute to pain-related disability. **Objective:** To determine the prevalence of hamstring and iliotibial band tightness and assess their association with low back pain intensity and disability among traffic wardens. **Methods:** A cross-sectional observational study was conducted among 212 traffic wardens aged 30–50 years in Lahore, Pakistan. Hamstring tightness was assessed using the 90–90 straight leg raise test, iliotibial band tightness using Ober's test, pain intensity using the Numeric Pain Rating Scale, and disability using the Oswestry Disability Index. Data were analyzed using descriptive statistics and chi-square tests, with odds ratios calculated for clinically relevant associations. **Results:** Hamstring tightness was present in 136 participants (64.2%), while iliotibial band tightness was present in 84 participants (39.6%). Moderate pain was reported by 146 participants (68.9%) and severe pain by 46 (21.7%). Moderate disability was observed in 94 participants (44.3%), severe disability in 80 (37.7%), and complete disability in 12 (5.7%). Pain intensity was significantly associated with hamstring tightness ($\chi^2 = 12.67$, $p = 0.005$), iliotibial band tightness ($\chi^2 = 13.66$, $p = 0.003$), and Oswestry disability category ($\chi^2 = 41.76$, $p < 0.001$). Participants with severe pain had higher odds of severe-to-complete disability (OR = 4.60, 95% CI: 2.25–9.42). **Conclusion:** Hamstring tightness was highly prevalent and iliotibial band tightness was moderately prevalent among traffic wardens with low back pain. Greater pain intensity was significantly associated with lower-limb tightness and higher disability, supporting the need for routine flexibility screening and targeted occupational rehabilitation. **Keywords:** Low back pain; hamstring tightness; iliotibial band tightness; traffic wardens; Oswestry Disability Index; occupational health.

"Cite this Article" | **Received**: 17 October 2025; **Accepted**: 08 December 2025; **Published**: 31 December 2025

Author Contributions: Concept: MA; Design: RN; Data Collection: FA and LG; Analysis: MAK; Drafting: AR. **Ethical Approval**: University of Management and Technology, Lahore, Pakistan. **Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest; **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: N/A.

INTRODUCTION

Low back pain is one of the leading contributors to activity limitation and work-related disability worldwide, with substantial effects on physical function, occupational productivity, health-care utilization, and quality of life. Among working populations, prolonged static posture, repetitive loading, reduced flexibility, and insufficient recovery time may increase the burden of musculoskeletal symptoms, particularly in occupations that require extended standing and sustained postural control. Traffic wardens represent a physically exposed occupational group because their routine duties commonly involve prolonged standing, repetitive walking, static lower-limb loading, and limited opportunities for structured rest or corrective movement during duty hours. These occupational demands may place continuous mechanical stress on the lumbopelvic region and lower extremities, making low back pain and related functional disability clinically relevant concerns in this population (1,2).

Hamstring flexibility plays an important role in maintaining normal lumbopelvic rhythm, hip mobility, knee mechanics, gait efficiency, and functional movement. The hamstring muscle group, comprising the semitendinosus, semimembranosus, and biceps femoris, originates primarily from the ischial tuberosity and crosses both the hip and knee joints, contributing to hip extension and knee flexion. Reduced hamstring extensibility may alter pelvic position, restrict forward bending, increase compensatory lumbar movement, and contribute to mechanical loading of the lumbar spine during daily and occupational activities. Previous studies have reported that hamstring tightness may be associated with low back pain intensity, altered trunk flexibility, and disability, although the strength and direction of this relationship may vary across populations, measurement techniques, and clinical settings (3,4).

Muscle tightness is generally understood as increased passive or active resistance to stretch, which may restrict joint range of motion and influence posture, movement efficiency, and pain perception. In the lower limb, hamstring tightness may limit knee extension and hip flexion, increase posterior chain stiffness, and modify the force distribution across the pelvis and lumbar spine (5). These biomechanical changes may be particularly important in workers who stand for long periods because prolonged upright posture can increase fatigue in postural muscles and may contribute to compensatory movement strategies. Evidence from students, administrative workers, athletes, and individuals with nonspecific low back pain suggests that reduced hamstring flexibility is common and may coexist with low back pain and functional limitation (6).

The iliotibial band is another important structure in lower-limb and lumbopelvic biomechanics. It is a dense fascial structure extending from the iliac crest and tensor fasciae latae region toward the lateral aspect of the tibia, with anatomical and functional connections to the gluteus maximus, gluteus medius, vastus lateralis, and biceps femoris. Through these connections, the iliotibial band contributes to lateral hip and knee stability, lower-limb alignment, and force transmission during standing, walking, and running. Tightness of the iliotibial band may influence pelvic mechanics, hip mobility, knee alignment, and compensatory loading patterns, which may be relevant in individuals with low back pain and occupational postural stress (7,8).

Previous literature has examined iliotibial band tightness in office workers, cyclists, runners, bankers, health-care workers, and individuals with prolonged sitting or repetitive lower-limb activity. These studies indicate that iliotibial band tightness is not limited to athletic populations but may also occur in occupational groups exposed to sustained postures and repetitive mechanical demands (9). Reported prevalence values vary across populations, likely because of differences in work exposure, physical activity level, body mass index, test criteria, and assessment procedures. The Ober test is commonly used clinically to assess iliotibial band tightness, whereas hamstring tightness is frequently evaluated using tests such as the active knee extension test, straight leg raise test, or 90–90 straight leg raise test (10).

Although low back pain has been widely studied in general and occupational populations, limited evidence is available regarding the combined prevalence of hamstring and iliotibial band tightness among traffic wardens. This represents an important knowledge gap because traffic wardens are exposed to prolonged standing and continuous lower-limb loading, but their musculoskeletal flexibility profiles and related disability patterns have not been adequately explored. Existing studies in office workers, students, athletes, and health-care workers cannot be directly generalized to traffic wardens because the nature of occupational exposure differs substantially. Unlike seated office workers or competitive athletes, traffic wardens often combine prolonged standing, intermittent walking, environmental exposure, and limited ergonomic support, all of which may influence lower-limb muscle tightness and low back pain-related disability (11).

Understanding the relationship between hamstring tightness, iliotibial band tightness, low back pain intensity, and disability among traffic wardens may help identify modifiable occupational and clinical factors. If a meaningful association exists, screening for lower-limb tightness could support early

detection, preventive education, stretching programs, postural correction strategies, and workplace health interventions. This is clinically important because low back pain-related disability can affect walking, standing tolerance, sitting tolerance, lifting, sleep, social participation, travelling, and work performance. Assessing disability with a standardized low back pain disability measure further allows the burden of symptoms to be interpreted in relation to functional consequences rather than pain intensity alone (12).

Therefore, this study was designed according to a population–exposure–outcome framework in which the population consisted of traffic wardens with low back pain, the primary exposures were hamstring tightness and iliotibial band tightness, and the main outcomes were pain intensity and low back pain-related disability. The study aimed to determine the prevalence of hamstring and iliotibial band tightness among traffic wardens and to examine their association with low back pain intensity and functional disability. The research question was: among traffic wardens with low back pain, are hamstring tightness and iliotibial band tightness associated with greater pain intensity and higher levels of low back pain-related disability?

MATERIALS AND METHODS

This cross-sectional observational study was conducted to determine the prevalence of hamstring and iliotibial band tightness and to assess their association with low back pain intensity and low back pain-related disability among traffic wardens. A cross-sectional design was selected because it allowed simultaneous assessment of musculoskeletal tightness, pain intensity, and functional disability in a defined occupational population at a single point in time. The study was carried out at traffic warden centers across Lahore, Pakistan, where eligible traffic wardens were approached during the data collection period.

The target population consisted of on-duty traffic wardens aged 30–50 years who had been employed for at least two years and were routinely working duty shifts of approximately 5–8 hours or more. Participants were included if they reported low back pain and were willing to participate after receiving information about the study purpose and procedures. Traffic wardens were excluded if they had a diagnosed degenerative joint disease of the lower limb, recent lower-limb fracture within the previous 3–4 months, diabetes mellitus, diagnosed disc herniation, previous hip arthroplasty, pressure sores, or any condition that could independently affect lower-limb flexibility, pain reporting, or safe performance of the physical assessment procedures (13,14).

Participants were selected using a convenience sampling technique from accessible traffic warden centers. Eligible individuals were informed about the study objectives, assessment procedures, voluntary nature of participation, confidentiality of responses, and their right to withdraw at any stage without penalty. Written informed consent was obtained before enrollment. Demographic and occupational information was collected using a structured data collection form, including age, body mass index category, working hours, and duration of employment. Clinical assessment was then performed to evaluate hamstring tightness, iliotibial band tightness, hip flexion range of motion, pain intensity, and low back pain-related disability.

Hamstring tightness was assessed using the 90–90 straight leg raise test. During this test, the participant was positioned supine, the hip was flexed to 90 degrees, and the knee was gradually extended while maintaining the hip position. Limitation in knee extension during the test was used to classify hamstring tightness as positive or negative according to the predefined testing criterion.

Iliotibial band tightness was assessed using Ober's test. For Ober's test, the participant was positioned in side lying with the tested limb uppermost. The examiner stabilized the pelvis, flexed the knee, extended and abducted the hip, and then allowed the limb to move into adduction while preventing compensatory

pelvic movement. A positive test was recorded when the thigh failed to adduct toward the examination surface or remained abducted, indicating iliotibial band tightness.

Hip flexion range of motion was assessed using goniometric measurement and categorized into clinically interpretable ranges. Pain intensity was measured using the Numeric Pain Rating Scale, with scores categorized as no pain, mild pain, moderate pain, and severe pain. Low back pain-related disability was assessed using the Oswestry Disability Index, which evaluates the effect of low back pain on daily functional activities, including pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, travelling, and employment or homemaking activities. Disability scores were categorized into mild, moderate, severe, and complete disability according to standard Oswestry scoring interpretation.

The primary variables were hamstring tightness, iliotibial band tightness, low back pain intensity, and low back pain-related disability. Hamstring tightness was operationally defined as a positive 90–90 straight leg raise test, while iliotibial band tightness was operationally defined as a positive Ober's test. Pain intensity was operationalized through Numeric Pain Rating Scale categories, and disability was operationalized through Oswestry Disability Index categories. Demographic and occupational variables, including age group, body mass index category, working hours, and employment duration, were considered potential confounding factors because of their possible influence on musculoskeletal flexibility, pain severity, and functional limitation.

To reduce measurement bias, standardized clinical testing positions and procedures were followed for all participants. Participants were assessed under similar conditions, and the same operational criteria were applied consistently during classification of positive and negative test findings. To minimize information bias, data were collected using a structured form, and responses were checked for completeness at the time of collection. Confounding was addressed analytically by planning association testing between clinical tightness variables and pain/disability outcomes, with adjustment for relevant demographic and occupational variables where applicable. The sample size was calculated using the WHO sample size calculator. A 95% confidence level, an anticipated population proportion of 0.16, and a margin of error of 0.05 were used, producing a required sample size of 207 participants. After accounting for an anticipated attrition or non-response margin of approximately 2%, the final required sample size was increased to 212 traffic wardens (15).

Data were analyzed using SPSS version 25. Descriptive statistics were used to summarize demographic, occupational, and clinical characteristics. Frequencies and percentages were calculated for categorical variables, including age group, body mass index category, working hours, employment duration, Ober's test result, 90–90 straight leg raise test result, Numeric Pain Rating Scale category, and Oswestry Disability Index category.

Associations between hamstring tightness, iliotibial band tightness, pain intensity, and disability categories were assessed using chi-square tests. Where appropriate, effect size measures and logistic regression analysis were planned to estimate the strength of association between musculoskeletal tightness and clinically relevant disability outcomes while adjusting for potential confounders such as age, body mass index, working hours, and employment duration. Statistical significance was set at $p < 0.05$.

Ethical approval was obtained from the relevant institutional ethics committee before data collection. Written informed consent was obtained from all participants. Confidentiality was maintained by anonymizing participant information and storing data securely. No personally identifiable information was used during analysis or reporting. Data integrity was supported through structured data collection, completeness checks, consistent coding of variables, and verification of entered data before statistical analysis.

RESULTS

A total of 212 traffic wardens were included in the analysis. The demographic and occupational profile showed a nearly equal distribution across the two age groups, with 108 participants aged 30–40 years (50.9%) and 104 aged 41–50 years (49.1%). Most participants had a normal BMI (68.9%), while 25.5% were overweight and 5.7% were obese. The majority worked 8-hour shifts (82.5%), whereas 17.5% worked 10-hour shifts. Employment duration was most commonly 6–10 years (36.3%), followed by 11–15 years (28.8%), 16–20 years (24.5%), and 2–5 years (10.4%).

Table 1. Demographic and Occupational Characteristics of Participants

Variable	Category	Frequency (n)	Percentage (%)
Age group	30–40 years	108	50.9
	41–50 years	104	49.1
BMI category	18.5–24.9 kg/m², normal	146	68.9
	25.0–29.9 kg/m², overweight	54	25.5
	≥30 kg/m², obese	12	5.7
Working hours	8 hours	175	82.5
	10 hours	37	17.5
Employment duration	2–5 years	22	10.4
	6–10 years	77	36.3
	11–15 years	61	28.8
	16–20 years	52	24.5
Total		212	100.0

Clinical assessment showed that 136 participants (64.2%) had a positive 90–90 straight leg raise test, indicating hamstring tightness, while 84 participants (39.6%) had a positive Ober's test, indicating iliotibial band tightness. Hip flexion range was most frequently within 90–120 degrees in 126 participants (59.4%), followed by 46–89 degrees in 82 participants (38.7%). Moderate pain was the most common NPRS category, reported by 146 participants (68.9%), while 46 participants (21.7%) reported severe pain. Low back pain-related disability was also substantial: 94 participants (44.3%) had moderate disability, 80 (37.7%) had severe disability, and 12 (5.7%) had complete disability.

Table 2. Clinical Test Findings, Pain Intensity, and Disability Distribution

Variable	Category	Frequency (n)	Percentage (%)
Ober's test	Positive	84	39.6
	Negative	128	60.4
90–90 SLR test	Positive	136	64.2
	Negative	76	35.8
Hip flexion ROM	1–45 degrees	3	1.4
	46–89 degrees	82	38.7
	90–120 degrees	126	59.4
	>120 degrees	1	0.5
NPRS pain category	No pain	4	1.9
	Mild pain, 1–3	16	7.5
	Moderate pain, 4–6	146	68.9
	Severe pain, 7–10	46	21.7
Oswestry disability category	Mild disability, 5–14	26	12.3
	Moderate disability, 15–24	94	44.3
	Severe disability, 25–34	80	37.7
	Complete disability, 35–50	12	5.7
Total		212	100.0

Functional limitation was evident across multiple Oswestry domains. For pain intensity, the most frequent response was that pain was bad but manageable without painkillers, reported by 83 participants (39.2%). For personal care, 68 participants (32.1%) could look after themselves normally but experienced extra pain, while 55 (25.9%) reported that personal care was painful and performed slowly. Walking limitation was common: 66 participants (31.1%) were prevented from walking more than one mile, and 60 (28.3%) were prevented from walking more than half a mile. Sitting tolerance was also reduced, with 63 participants (29.7%) unable to sit for more than one hour and 31 (14.6%) unable to sit for more than half an hour. Standing ability showed a similar pattern, as 66 participants (31.1%) were prevented from standing for more than one hour and 25 (11.8%) for more than 30 minutes. Employment-related

limitation was notable, with 89 participants (42.0%) reporting that normal job or homemaking activities increased pain but remained possible.

Table 3. Functional Limitation Across Oswestry Disability Domains

Functional Domain	Most Frequent Response	Frequency (n)	Percentage (%)	Clinically More Restricted Response	Frequency (n)	Percentage (%)
Pain intensity	Pain is bad but manageable without painkillers	83	39.2	Painkillers give very little relief	8	3.8
Personal care	Can look after self normally but with extra pain	68	32.1	Needs help every day or stays in bed	4	1.9
Lifting	Can lift heavy weight but it causes extra pain	63	29.7	Can lift only very light weight or cannot lift	14	6.6
Walking	Pain prevents walking more than one mile	66	31.1	Uses stick/crutches or mostly bedbound	8	3.7
Sitting	Can sit only in favorite chair as long as desired	73	34.4	Pain prevents sitting more than 10 minutes	6	2.8
Standing	Pain prevents standing more than one hour	66	31.1	Pain prevents standing more than 10 minutes	3	1.4
Sleeping	Can sleep well only by using medication	76	35.8	Less than 2 hours sleep despite medication	7	3.3
Social life	Normal social life but pain increases	68	32.1	Restricted to home or no social life	4	1.9
Travelling	Can travel anywhere but with extra pain	77	36.3	Travel restricted to less than 30 minutes	7	3.3
Employment/homemaking	Activities increase pain but remain possible	89	42.0	Pain prevents even light duties	1	0.5

The association analysis showed a statistically significant relationship between pain intensity and hamstring tightness as assessed by the 90–90 SLR test. Overall, 64.2% of participants had a positive SLR test. SLR positivity was highest among participants with mild pain (87.5%) and severe pain (78.3%), compared with 58.2% among those with moderate pain and 25.0% among those with no pain. The chi-square test indicated a significant association between NPRS category and SLR status, $\chi^2 = 12.67$, $p = 0.005$, with a small-to-moderate effect size, Cramer's $V = 0.245$. Participants with severe pain had approximately 2.38 times higher odds of SLR positivity compared with participants without severe pain, OR = 2.38, 95% CI: 1.10–5.11.

Ober's test was also significantly associated with pain intensity. Ober positivity increased from 0.0% among participants with no pain to 43.8% among those with mild pain, 33.6% among those with moderate pain, and 60.9% among those with severe pain. The association between NPRS category and Ober's test result was statistically significant, $\chi^2 = 13.66$, $p = 0.003$, with Cramer's $V = 0.254$. Participants with severe pain had approximately 3.06 times higher odds of Ober positivity compared with those without severe pain, OR = 3.06, 95% CI: 1.56–5.99.

Table 4. Association of Pain Intensity With Hamstring and Iliotibial Band Tightness

Pain Category	SLR Positive n (%)	SLR Negative n (%)	Ober Positive n (%)	Ober Negative n (%)
No pain	1 (25.0)	3 (75.0)	0 (0.0)	4 (100.0)
Mild pain, 1–3	14 (87.5)	2 (12.5)	7 (43.8)	9 (56.3)
Moderate pain, 4–6	85 (58.2)	61 (41.8)	49 (33.6)	97 (66.4)
Severe pain, 7–10	36 (78.3)	10 (21.7)	28 (60.9)	18 (39.1)
Total	136 (64.2)	76 (35.8)	84 (39.6)	128 (60.4)
Inferential statistics	$\chi^2 = 12.67$; $p = 0.005$; Cramer's V = 0.245		$\chi^2 = 13.66$; $p = 0.003$; Cramer's V = 0.254	
Severe pain odds estimate	OR = 2.38; 95% CI: 1.10–5.11		OR = 3.06; 95% CI: 1.56–5.99	

Pain intensity was significantly associated with Oswestry disability category. Among participants with no pain, 75.0% had mild disability and none had severe or complete disability. Among participants with mild pain, 50.0% already had severe disability. In the moderate pain group, 50.0% had moderate disability and 31.5% had severe disability. Among participants with severe pain, disability burden was highest, with 56.5% classified as severe disability and 15.2% as complete disability.

Table 5. Association Between Pain Intensity and Oswestry Disability Category

Pain Category	Mild Disability n (%)	Moderate Disability n (%)	Severe Disability n (%)	Complete Disability n (%)	Total n (%)
No pain	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)	4 (100.0)
Mild pain, 1–3	1 (6.3)	7 (43.8)	8 (50.0)	0 (0.0)	16 (100.0)
Moderate pain, 4–6	22 (15.1)	73 (50.0)	46 (31.5)	5 (3.4)	146 (100.0)
Severe pain, 7–10	0 (0.0)	13 (28.3)	26 (56.5)	7 (15.2)	46 (100.0)
Total	26 (12.3)	94 (44.3)	80 (37.7)	12 (5.7)	212 (100.0)
Inferential statistics			$\chi^2 = 41.76$; df = 9; $p < 0.001$; Cramer's V = 0.256		
Severe pain odds estimate			OR for severe/complete disability = 4.60; 95% CI: 2.25–9.42		

Overall, the findings indicate a high prevalence of hamstring tightness and a moderate prevalence of iliotibial band tightness among traffic wardens with low back pain. Pain intensity showed statistically significant associations with both SLR positivity and Ober positivity, and increasing pain severity corresponded with greater Oswestry disability. The strongest clinical gradient was observed in the severe pain group, where 78.3% had hamstring tightness, 60.9% had iliotibial band tightness, and 71.7% had severe or complete disability.

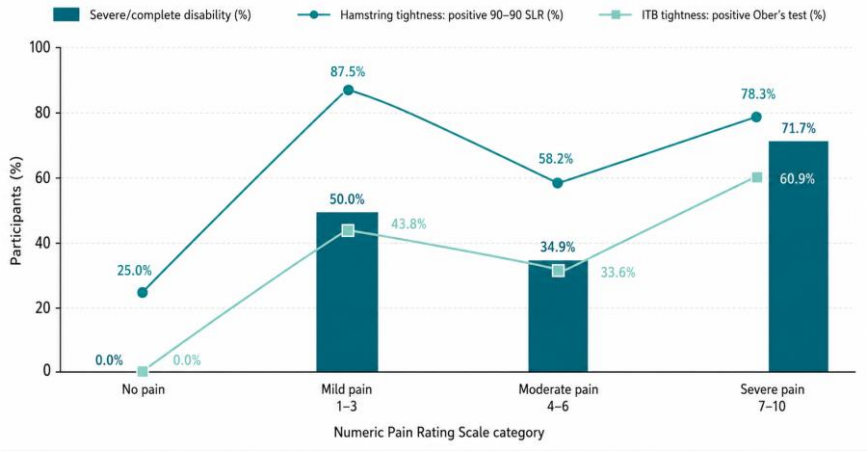

Figure 1. Pain Severity Gradient Across Lower-Limb Tightness and Low Back Disability

Figure 1 illustrates the distribution of severe/complete low back pain-related disability, hamstring tightness, and iliotibial band tightness across Numeric Pain Rating Scale categories. Severe/complete disability increased from 0.0% in participants with no pain to 50.0% in mild pain, 34.9% in moderate pain, and 71.7% in severe pain. Hamstring tightness was highest in the mild pain group (87.5%) and

remained elevated in the severe pain group (78.3%), while iliotibial band tightness increased most clearly among participants with severe pain (60.9%). Overall, the figure shows that higher pain severity was accompanied by a greater burden of lower-limb tightness and functional disability among traffic wardens.

DISCUSSION

This cross-sectional study identified a substantial burden of lower-limb muscle tightness, pain intensity, and low back pain-related disability among traffic wardens. Hamstring tightness, assessed through the 90–90 straight leg raise test, was present in 64.2% of participants, while iliotibial band tightness, assessed through Ober's test, was present in 39.6%. These findings indicate that hamstring tightness was more prevalent than iliotibial band tightness in this occupational group. The high frequency of hamstring tightness may be clinically important because reduced hamstring extensibility can restrict hip flexion and knee extension, alter pelvic mechanics, and increase compensatory lumbar movement during standing, walking, bending, and work-related activities. In traffic wardens, prolonged standing and repeated postural loading may increase posterior chain stiffness and contribute to the persistence of low back symptoms.

Pain intensity was predominantly moderate to severe, with 68.9% of participants reporting moderate pain and 21.7% reporting severe pain. This pattern suggests that low back pain among traffic wardens is not merely a mild discomfort but a clinically meaningful occupational health concern. The association analysis demonstrated a significant relationship between pain intensity and hamstring tightness, as 90–90 SLR positivity was observed in 58.2% of participants with moderate pain and 78.3% of participants with severe pain. The association was statistically significant, with $\chi^2 = 12.67$, $p = 0.005$, and participants with severe pain had approximately 2.38 times higher odds of SLR positivity compared with those without severe pain. This finding supports previous evidence that hamstring tightness may coexist with low back pain and may contribute to altered lumbopelvic movement patterns, especially in individuals exposed to prolonged static postures and repetitive functional loading (16).

Iliotibial band tightness also showed a significant relationship with pain severity. Ober's test positivity was present in 33.6% of participants with moderate pain and increased to 60.9% among participants with severe pain. This association was statistically significant, with $\chi^2 = 13.66$, $p = 0.003$, and severe pain was associated with approximately 3.06 times higher odds of Ober positivity. This pattern suggests that iliotibial band tightness may become more clinically relevant as pain severity increases. The iliotibial band has functional connections with the tensor fasciae latae, gluteal musculature, lateral thigh structures, and lateral knee stabilizers; therefore, tightness in this structure may influence hip mechanics, pelvic alignment, and lower-limb loading during prolonged standing and walking. These findings are consistent with occupational and clinical studies reporting iliotibial band tightness in workers exposed to sustained postures and repetitive mechanical stress (17,18).

The disability findings further strengthen the clinical relevance of the results. Only 12.3% of participants had mild disability, whereas 44.3% had moderate disability, 37.7% had severe disability, and 5.7% had complete disability. This indicates that most participants experienced functional consequences beyond pain alone. The Oswestry disability pattern showed that low back pain affected essential activities, including sitting, standing, walking, sleeping, travelling, lifting, personal care, social activity, and employment-related tasks. Standing and walking limitations were particularly relevant to traffic wardens because these functions are central to their occupational performance. For example, 31.1% of participants reported that pain prevented them from standing for more than one hour, and another 11.8% could not stand for more than 30 minutes. Similarly, 31.1% reported that pain prevented walking more than one mile, while 28.3% were restricted beyond half a mile. These limitations may directly affect duty tolerance, work efficiency, and quality of occupational life.

A statistically significant association was observed between pain intensity and Oswestry disability category, with $\chi^2 = 41.76$, $p < 0.001$. Disability increased progressively with pain severity, particularly in the severe pain group, where 56.5% had severe disability and 15.2% had complete disability. Participants with severe pain had approximately 4.60 times higher odds of severe-to-complete disability compared with those without severe pain. This finding highlights that pain severity in this population is strongly linked with functional restriction. The combined pattern of high SLR positivity, high Ober positivity, and high disability among participants with severe pain suggests that lower-limb tightness may be part of a broader biomechanical and functional impairment profile rather than an isolated flexibility finding.

The comparison with previous studies suggests both agreement and population-specific differences. Earlier research in nonspecific low back pain populations has reported hamstring tightness as more frequent than iliotibial band tightness, which aligns with the present finding that hamstring tightness was observed in nearly two-thirds of participants, while iliotibial band tightness was observed in approximately two-fifths (19,20). Studies among students, office workers, bankers, athletes, and health-care workers have also reported that reduced flexibility and muscle tightness are associated with musculoskeletal pain or functional limitation; however, traffic wardens differ from these groups because their work involves prolonged standing, outdoor duty, repeated weight shifting, and limited ergonomic support (21). Therefore, the present findings add occupationally specific evidence that lower-limb tightness and low back pain-related disability may be important screening targets in traffic wardens.

The higher proportion of hamstring tightness compared with iliotibial band tightness may be explained by the functional role of the hamstrings in posterior pelvic control and lumbar movement. Tight hamstrings may restrict anterior pelvic tilt during forward bending and increase compensatory lumbar flexion, potentially increasing lumbar tissue strain. In prolonged standing, posterior thigh stiffness may also affect pelvic positioning and lower-limb alignment, contributing to discomfort during walking, standing, and transitional movements. In contrast, iliotibial band tightness may have a stronger relationship with lateral hip and knee mechanics, which may explain why Ober positivity was especially high in participants with severe pain rather than uniformly distributed across all pain categories.

The findings have practical implications for occupational health and physiotherapy management. Routine screening of traffic wardens with low back pain should include assessment of hamstring flexibility, iliotibial band tightness, hip range of motion, pain intensity, and disability level. Preventive and rehabilitative strategies may include structured stretching of the hamstrings and iliotibial band, hip mobility exercises, gluteal strengthening, postural education, scheduled movement breaks, and workplace-based ergonomic recommendations. Since a large proportion of participants had moderate-to-severe disability, interventions should not focus only on pain relief but also on improving standing tolerance, walking capacity, sleep quality, lifting ability, and work-related function.

This study has several limitations that should be considered when interpreting the findings. The cross-sectional design prevents causal inference; therefore, it cannot be concluded that hamstring or iliotibial band tightness caused low back pain or disability. Convenience sampling may limit generalizability, and the study was restricted to traffic wardens from Lahore, which may not represent all traffic wardens or other occupational groups. The absence of a comparison group without low back pain also limits the ability to determine whether the observed prevalence of tightness is specific to symptomatic traffic wardens. In addition, although clinical tests such as the 90–90 SLR and Ober's test are commonly used, their results may be influenced by examiner technique, participant tolerance, and pain response. Future studies should use standardized bilateral measurements, assessor training, inter-rater reliability assessment, and adjusted regression models to account for age, BMI, working hours, employment duration, physical activity, and other occupational exposures.

Despite these limitations, the study provides useful evidence regarding the coexistence of lower-limb tightness, pain intensity, and disability among traffic wardens. The results show that hamstring tightness was common, iliotibial band tightness was more frequent among participants with severe pain, and

higher pain intensity was significantly associated with greater disability. These findings support the need for early musculoskeletal screening and targeted flexibility-based rehabilitation programs in this occupational group. Future longitudinal studies are recommended to determine whether reducing hamstring and iliotibial band tightness can improve pain, disability, and occupational performance among traffic wardens.

CONCLUSION

In conclusion, this study found a high prevalence of hamstring tightness and a moderate prevalence of iliotibial band tightness among traffic wardens with low back pain, with hamstring tightness identified in 64.2% and iliotibial band tightness in 39.6% of participants. Most participants reported clinically meaningful pain, particularly moderate pain (68.9%) and severe pain (21.7%), while low back pain-related disability was predominantly moderate (44.3%) or severe (37.7%). Pain intensity was significantly associated with both hamstring tightness and iliotibial band tightness, and participants with severe pain showed the greatest burden of positive 90–90 SLR findings, positive Ober's test findings, and severe-to-complete disability. These findings suggest that lower-limb muscle tightness may be an important clinical and occupational factor associated with low back pain severity and functional limitation among traffic wardens. Routine screening for hamstring and iliotibial band tightness, combined with targeted flexibility training, postural education, hip mobility exercises, and workplace-based preventive strategies, may help reduce pain-related disability and improve functional performance in this occupational group.

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