



PREVALANCE OF MUSCULOSKELETAL DISORDERS, RISK FACTORS AND ITS IMPACT ON QUALITY OF LIFE IN TRAFFIC POLICE

Aysha Bibi¹, Haroon Khan², Touseef Akbar³, Kalsoom⁴, Hira Mushtaq⁵, Memoona Bibi⁶, Sadaqat Saleem⁷

¹Research Coordinator, KMU Oric Peshawar, Email: Ayshabibi.oric.kmu.07@gmail.com

²Physiotherapist, Ibadat International University Islamabad,
Email: Haroonkhan2k00@gmail.com

³Lecturer, Pakistan Education Foundation (PEF) Peshawar KPK,
Email: Touseefakbar5@gmail.com

⁴Physiotherapist, Rehman College of Rehabilitation Sciences, Email: Imkalsoom12@gmail.com

⁵Physiotherapist, Rehman College of Rehabilitation Sciences, Email: Heerkhan2500@gmail.com

⁶Senior Lecturer, Rehman College of Rehabilitation Sciences,
Email: Memoona92khan@gmail.com

⁷Physiotherapist, Ibadat International University, Islamabad,
Email: Sadaqatsaleem36@gmail.com

ARTICLE INFO:

Keywords:

MSK, QOL, Risk factors, Quality of life.

Corresponding Author:

Haroon khan, Physiotherapist,
Ibadat International University
Islamabad,
Email:
Haroonkhan2k00@gmail.com

Article History:

Published on 19 August 2025

ABSTRACT

Musculoskeletal disorders (MSDs) are a leading occupational health concern globally, especially among personnel in physically demanding jobs. Traffic police in Kohat are consistently exposed to prolonged standing, awkward postures, and repetitive movements, increasing their susceptibility to MSDs, which in turn may significantly impair their quality of life (QoL). This study aimed to assess the prevalence of MSDs among traffic police officers in Kohat, identify associated risk factors, and evaluate the impact of these disorders on their quality of life. A descriptive cross-sectional study was conducted with 218 male traffic police personnel aged 20–50 years, using convenience sampling. Data were collected using validated instruments: the Nordic Musculoskeletal Questionnaire (NMQ), Numerical Pain Rating Scale, Physical Activity Risk Factor and Quality of Life Assessment Questionnaire. Statistical analysis was performed using SPSS v27, applying chi-square tests and descriptive statistics. The study found that 88.1% of participants experienced moderate MSDs, with the lower back (21.1%), shoulders (14.7%), and neck (12.8%) being the most affected regions. Moderate QoL impairment was reported by 85.8% of the sample. Significant

associations were found between age and MSD severity ($p = 0.042$), pain duration and MSD severity ($p = 0.010$), and duration of service and pain intensity ($p < 0.001$). Physical activity risk increased with both age and service duration, indicating cumulative ergonomic stress. MSDs are highly prevalent among traffic police in Kohat and significantly affect their physical health and QoL. Risk increases with age, years of service, and prolonged pain duration. The findings underscore the need for early ergonomic interventions, routine health screenings, and policy reforms to mitigate occupational risks and enhance the well-being of traffic police personnel.

Introduction

Musculoskeletal disorders (MSDs) are a broad spectrum of disorders that affect muscles, bones, tendons, ligaments, joints, and nerves, normally caused by acute trauma, repetitive strain, or chronic bio-mechanical loading. (MSDs) are diseases that weaken the musculoskeletal system and are frequently referred to as "repetitive motion injuries," "repetitive stress injuries," or "overuse injuries(1). These conditions are some of the most prevalent and costly health problems, having a significant impact on individuals' daily activities. Accompanied by pain, stiffness, restricted range of motion, and impaired ability to do activities, MSDs represent a serious public health challenge, contributing significantly to global disability and compromised quality of life (QoL)(2). These disorders are particularly prevalent among individuals engaged in physically demanding occupations, though they also affect the general population due to sedentary lifestyles, aging, and poor ergonomic habits(3)

MSDs continue to be the leading cause of occupational disease worldwide, responsible for almost 30% of occupational illnesses in developed and developing countries alike(4). The World Health Organization has estimated that approximately 1.71 billion people suffer from musculoskeletal diseases worldwide, and 619 million people alone suffer from these disorders as low back pain(5). In

industrialized areas, these disorders are a major factor in medical costs and lost production, and in under-resourced environments, the lack of preventative care and rehabilitation increases their impact(6). In addition to work-related causes, other risk factors are sedentary activity, overweight body, and improper posture, so MSDs are a widespread problem in various sections of society.(7)

Globally, MSDs rank the second most important cause of disability, and the highest number of years lived with disability (YLD) is caused by lower back pain. Their prevalence differs based on geographical and occupational factors; for example, it is estimated that 20–33% of the adult population in North America and Europe suffers from chronic MSDs, while comparable rates are found in regions such as South Asia and Sub-Saharan Africa, although these are often underreported due to limited healthcare resources(8). In Pakistan, while data are limited, an estimated 25–40% of adults claim to have had musculoskeletal pain, with higher rates among manual workers, older persons, and healthcare workers(9).

Professions involving heavy physical stress, like those of police, have particularly high prevalence. Work-related musculoskeletal disorders (WRMSDs) are a heterogeneous group of inflammatory and degenerative conditions causing pain and limitation of movement in body regions like

the neck, shoulders, elbows, wrists, hands, and lower limbs in police personnel, the prevalence of MSDs can be high as 72%, of which neck pain is seen in 51% and lower back pain in 45%. Factors contributing to these problems include growing age, longer service history, prolonged working hours, regular alcohol consumption, and extended sitting times. Occupational requirements like night shifts, solitary work, frequent overtime, fatigue, and poor diet further expose them to harm (10)

Apart from physical health consequences, MSDs among traffic police may also cause significant psychological distress. (11) Long-term pain and impairment can lead to irritability, decreased morale, sleep disturbances, and even depression or anxiety disorders. This psychological pressure can further reduce social contact and work performance, a vicious circle where decreased physical capacity transforms into psychosocial distress, and the latter into enhanced perception and severity of pain. Thus, to address MSDs in this group of people, not only biomechanical treatments but also psychological support and stress management training is needed to provide overall well-being (12)

In addition, preventive strategies specific to the peculiar occupational needs of traffic police are critical to reduce the onset of MSDs. (13) These may include scheduled rest breaks, job rotation to reduce repetitive strain, provision of ergonomically designed uniforms and footwear, and workplace-based exercise programs to maintain joint mobility and muscular strength (14). Incorporating health promotion campaigns, routine screening, and early rehabilitation interventions in the traffic police health system can effectively decrease both the prevalence and burden of MSDs. Such interventions, over the long term, not only enhance quality of life at the individual level but also improve overall occupational function and diminish socio-economic costs

related to disability and lost work productivity (15)

Treatment and management of MSDs demand an integrative, multidisciplinary strategy. Physiotherapy is the key intervention by adding strength and flexibility exercises (e.g., core stabilization and stretching), manual techniques (e.g., joint mobilizations), and modalities like ultrasound and electrical therapy.

Educating patients regarding ergonomic enhancements, posture alignment, and activity modification is essential for long-term prevention from a health point of view, painkillers (16) From a health point of view, painkillers (e.g., NSAIDs), muscle relaxants, and corticosteroid injections are usually applied on a temporary basis, while overreliance on medications is problematic regarding side effects and addiction. (17) Surgical procedures such as joint replacement operations are usually reserved for resistant and severe cases. A growing focus on lifestyle modifications such as weight management, stress reduction, and the development of ergonomic workplace settings is a shift toward more holistic and preventive approaches to care (18)

Traffic police specifically experience high exposure to repetitive tasks and forced postures in their work, and thus these job hazards are compounded. Their constant necessity to guide traffic with and signals and stand statically in uncomfortable positions puts cumulative pressure on the body in the long term (19) Their repetitive task nature, poor posture alignment, and extensive working shifts all play a major role in the development of MSDs and affect their quality of life negatively. Quality of life is the manner in which one feels and experiences different facets of living, such as economic security, social well-being, security, and individual gratification (20)

Methodology

This descriptive quantitative cross-sectional study was done at Traffic Police, Kohat, Pakistan, with ethical clearance from the respective Authorized body. The sample size of 218 male traffic police between the age group of 20–50 years was determined by the OpenEpi sample size calculator for a 95% confidence level. Sampling was done through non-probability convenience sampling following well-established criteria. Inclusion criteria were male gender, active field duty, at least one year of service, willingness to cooperate, and capacity to understand the questionnaire. Exclusion criteria were female staff members, recent fractures or surgery, known systemic or neurological conditions, recent traumatic injuries, office-based police

work, and current physiotherapy or musculoskeletal rehabilitation. Questionnaires collected data from in-person interviews with validated instruments, Nordic Musculoskeletal Questionnaire (NMQ), Numerical Pain Rating Scale, Quality of Life evaluation, and Physical Activity Risk Factor Questionnaire (PARFQ), surveying musculoskeletal symptoms' presence, occupational exposures, lifestyle risks, and psychosocial determinants. Data were analyzed in SPSS version 27 with the application of descriptive statistics (means, frequencies, percentages, standard deviations) and inferential tests (Chi-square, logistic regression, and normality testing) to examine MSD risk factor associations with QoL.

Results

Descriptive Statistics of Age, Pain Intensity, Pain Duration, and Duty Duration

Variable	Value(Mean± SD)
Age of Participants	35± 9.268
Pain Intensity	1.688±0.625
Duration of Pain	2.990±1.689
Duty Duration	8.000±0.000

Participants indicated a moderate intensity of pain (mean = 1.688 ± 0.625) for an average of 2.990 ± 1.689 years. Each participant had a uniform mean duty of 8.000 hours daily,

which also proved to be uniform (SD = 0.000). The mean age of participants was 35, with a deviation of 9.268.

Distribution and Prevalence of Nordic Musculoskeletal Disorders questionnaire by Body Region and Symptom Severity

Body Region	Mild(n,%)	Moderate(n,%)	Severe (n,%)	Total(n)	Prevalence(%)
Neck	3(1.4%)	25(11.5%)	0(0%)	28	12.8%
Shoulders	2(0.9%)	30(13.8%)	0(0%)	32	14.7%
Upper Back	1(0.5%)	15 (6.9%)	0(0%)	16	7.3%
Elbows	0(0%)	10 (4.6%)	0(0%)	10	4.6%
Wrists/Hands	4(1.8%)	20 (9.2%)	0(0%)	24	11.0%
Lower Back	5(2.3%)	40(18.4%)	1(0.5%)	46	21.1%
Hips/Thighs	3(1.4%)	22(10.1%)	0(0%)	25	11.5%
Knees	4(1.8%)	20 (9.2%)	0(0%)	24	11.0%
Ankles/Feet	3(1.4%)	10 (4.6%)	0(0%)	13	6.0%

Total	25(11.5%)	192(88.1%)	1(0.5%)	218	100.0%
--------------	------------------	-------------------	----------------	------------	---------------

Results showed that the lower back was the most cited body region affected by symptoms (21.1% of respondents), followed by shoulders (14.7%), neck (12.8%), hips/thighs (11.5%), wrists/hands (11.0%), and knees (11.0%). Perhaps not surprisingly, moderate impairments were the most commonly reported

Severity level from all body regions. Moderate percentage symptoms were highest for the lower

Back (18.4%), shoulders (13.8%), and neck (11.5%), while severe percentage symptoms occurred only in the lower back

(0.5%). All body regions had low percentage of cases reporting mid symptoms ranged from 0.5% to 2.3% of respondents. The least impacted regions were the elbows (4.6%), upper back (7.3%), and ankles/feet (6.0%) with only the lower back as the region reporting severe symptoms. Overall, the study area symptoms reported by respondents were 88.1% moderate, 11.5% mild, and 0.5% severe, indicating that although musculoskeletal symptoms are prevalent in the area, the majority of cases are moderate in intensity.

Cross tabulation of Age groups and Quality of Life Impairment

Age Group	Quality of Life		Total
	Moderate Impairment	Mild Impairment	
20-29	62	15	77
30-39	58	6	64
40-50	67	10	77
Total	187	31	218

According to crosstab analysis, the rate of participants with reported moderate quality of life impairment is similar for all age groups. The chi-square outcomes ($p = 0.215$) show no statistically significant and clinically

significant relationship between participant age and quality of life impairment. It indicates quality of life problems were fairly consistent over at least three age groups with no significant difference.

Cross tabulation of Age Groups and Physical Activity Risk Factor

Age Group	Physical Activity Risk Factor			Total
	Mild	Moderate	Severe	
20-29	52	23	2	77
30-39	43	19	2	64
40-50	38	25	14	77
Total	133	67	18	218

The participants had a statistically significant association of age group and physical activity risk factors, $p < 0.05$ ($\chi^2 = 16.984$, $p = 0.002$). Adults 20-29 and 30-39 years usually reported

mild and moderate risk factors. Adults 40 - 50 reported the highest rate of physical activity severe risk factors among the younger age groups. As mentioned earlier, the severity of

the physical activity risk factors increases with age which was corroborated by the highly linear-by-linear association ($p < 0.05$).

This means that the severity of the physical activity risk factors continues to deteriorate with age.

Cross tabulation of Duration of pain (Hours) and Nordic Musculoskeletal disorders

Duration of Pain (Hours)	Nordic Musculoskeletal Disorders			Total
	Mild	Moderate	Severe	
1	14	38	0	52
2	5	47	0	52
3	3	35	0	38
4	0	24	0	24
5	2	26	0	28
6	1	21	1	23
7	0	1	0	1
Total	25	192	1	218

There was a high association between the duration of pain and the severity of the Nordic musculoskeletal disorders ($\chi^2 = 26.162$, $p = 0.010$). Subjects who were in pain for shorter periods (1-3 hours) usually showed mild and moderate levels of musculoskeletal disorders, while longer duration for being in pain (5-6

hours) showed mild and extreme levels of the disorders. The high linear-by-linear association ($p < 0.001$) indicates a trend that greater duration of pain was related to worsening quality of life; however, we need to exercise caution since 61.9% of cells had expected counts less than 5 which could restrict the reliability of the chi-square results.

Cross tabulation of Duration of pain (Hours) and QOL

Duration of Pain (Hours)	Quality of Life		Total
	Moderate Impairment	Mild Impairment	
1	39	13	52
2	46	6	52
3	36	2	38
4	21	3	24
5	21	7	28
6	23	0	23
7	1	0	1
Total	187	31	218

The cross-tabulation between duration of pain (hours) and quality of life reveals that the majority of participants in all pain duration had some exposure to the quality of life dimension and medium quality of life impairment. Although all the participants with

short duration of pain (1-3 hours) had medium quality of life impairment, a few participants exhibited no or mild impairment in quality of life. Symmetric measures revealed a very weak (-0.129) negative correlation between quality of life and duration of pain, though

this was not statistically significant (Spearman's rho = -0.129, p = 0.058) which means that while we may observe quality of

life decrease as duration increases, this was inconclusive within this data

Cross Tabulation of Duration of pain (Hours) and Physical Activity Risk Factor

Duration of Pain (Hours)	Physical Activity Risk Factor			Total
	Mild	Moderate	Severe	
1	36	16	0	52
2	33	17	2	52
3	27	8	3	38
4	9	11	4	24
5	14	9	5	28
6	14	5	4	23
7	0	1	0	1
Total	133	67	18	218

The analysis shows a statistically significant relationship between pain duration and risk factor for physical activity levels of the study participants ($\chi^2 = 22.898$, $p = 0.029$). With increased duration of pain, there was a consistent shift in the risk factor severity distribution, with a greater number of

participants shifting to moderate and severe risk groups compared to the mild risk group. This implies that longer pain duration could contribute to higher physical activity risk, potentially impacting function capacity and activity tolerance.

Cross Tabulation between Duration of Service and Nordic Musculoskeletal Disorders

Duration of Service (Years)	Nordic Musculoskeletal			Total
	Mild	Moderate	Severe	
1-5	14	45	0	59
6-10	1	31	0	32
11-15	5	26	1	32
16-20	1	28	0	29
21-25	4	50	0	54
26-30	0	12	0	12
Total	25	192	1	218

There is a significant statistical relationship between service duration and the severity of Nordic musculoskeletal disorder (NMSD) for participants ($\chi^2 = 21.689$, $p = 0.017$). It may be observed that when the years of service were more, the severity of NMSD had a wide

range for termination severity, yet the number of responses for every category of moderate severity was more than any other. Linear-by-linear association was significant ($p = 0.006$), showing a positive association and, therefore, moderate to severe NMSD is more likely with

increasing years of service.

Cross Tabulation between Duration of Service and Physical Activity

Duration of Service (Years)	Physical Activity Risk Factor			Total
	Mild	Moderate	Severe	
1-5	40	18	1	59
6-10	22	9	1	32
11-15	21	9	2	32
16-20	16	10	3	29
21-25	31	17	6	54
26-30	3	4	5	12
Total	133	67	18	218

There exists a statistically significant correlation between length of service and physical activity risk factor among participants ($\chi^2 = 25.172$, $p = 0.005$). As service years rise, there is a higher proportion of persons with serious physical activity risk, particularly in the 26-30 years category, in which 41.7 % (5 out of 12) were screened at the severe risk level. The Linear-by-Linear

Association ($p=0.001$) shows clear increasing trend the longer the service education, the higher the physical activity risk. An extended period of service is strongly correlated with an elevated risk of physical activity. The correlation is progressive; not only did we observe the risk factors for physical activity becoming worse over the years.

Cross tabulation between Duration of Service and Pain Intensity

Duration of Service (Years)	Pain Intensity			Total
	Mild	Moderate	Severe	
1-5	33	25	1	59
6-10	17	15	0	32
11-15	10	22	0	32
16-20	9	16	4	29
21-25	15	32	7	54
26-30	3	2	7	12
Total	87	112	19	218

There exists a statistically significant association between pain intensity and duration of service ($\chi^2 = 60.302$, $p < .001$). Mild pain is more those with lower duration of service. The growing probability of moderate pain and extreme pain is directly related to more years of service, beginning with a corresponding 21-30 years of service

duration. Extreme pain was most probable among subjects who have experienced 26-30 years of service duration (58.3%). There was a statistically significant Linear-by-linear Association ($p<0.001$) with a strong and apparent trend to reflect an increase in intensity of pain (and fatiguing across 5 capability levels of mild, moderate, severe

pain)

Discussion

It presents a high prevalence of musculoskeletal disorders (MSDs) among traffic police in Kohat, which is evident by moderate pain severity (mean = 1.69 ± 0.62) and moderate quality of life impairment (85.8%). Main risk factors are longer service time, higher age, and longer duration of pain, all of which are related to more severe MSD, lower capacity for physical activity, and more severe pain. Correlations between MSD duration/age and MSDs were significant, whereas impairment in QoL was equally common across all age groups.

Participants in the present study indicated pain intensity as moderate (1.69 ± 0.62) for a mean duration of 2.99 ± 1.69 years. More prolonged pain duration was strongly related to increased pain intensity ($\chi^2 = 28.530$, $p = 0.005$). Traffic policemen in Thailand had a 72% prevalence of low back pain with the mean pain intensity of 5.2 out of 10 in the parent study by Jan wan tana kuletal (2011). More than one year of pain duration was related to greater disability scores. This parent study also favors the current result since both confirm that longer pain duration is related to increased pain intensity (21)

In the present study, there was a strong correlation between older age (40–50 years) and greater severity of musculoskeletal disorder (MSD) ($\chi^2 = 9.928$, $p = 0.042$). In the parent study conducted by Bovenzi (2015), Italian traffic police aged 45 years and above had a 3.5 times greater risk of developing chronic MSDs than younger age groups. This parent study corroborates the present finding, validating age as an important risk factor for the development of MSDs (22)

In the present study, older participants (40–50 years) exhibited a greater risk of extreme physical activity restrictions ($\chi^2 = 16.984$, $p = 0.002$). In the parent study conducted by Bos et al. (2014), older than 40-

year-old Dutch emergency responders exhibited compromised functional capacity by musculoskeletal disorders, which restricted their capability to perform demanding physical activities. This parent study aligns with the current finding in favor of the deterioration of physical activity tolerance with age (12)

In this study, quality of life (QoL) was compromised by 85.8% of the participants, reflecting a moderate degree of impairment. Nonetheless, QoL impairment did not significantly correlate with age ($\chi^2 = 3.074$, $p = 0.215$). In the parent study conducted by Khan et al. (2020), Saudi police found QoL decline attributed to musculoskeletal disorders regardless of age, mainly because of work-related stressors. This parent study confirms the present finding, supplementing that QoL impairment happens evenly across all ages (23)

In another finding, the present study found a weak negative correlation between duration of pain and QoL (Spearman's rho = -0.129 , $p = 0.058$), which was statistically not conclusive. On the other hand, the parent study of Andersen et al. (2012) determined that Danish employees with over three years of MSD-related pain had significantly lower QoL ($p < 0.01$). This parent study is in conflict with the current study's non-significant trend, which may be attributed to cultural, occupational, or sample variation (24)

Conclusion

This research illustrates a high occurrence of musculoskeletal disorders (MSDs) among Kohat traffic police with 88.1% having moderate-to-severe MSDs and 85.8% having moderate quality of life (QoL) impairment. The most significant drivers are greater service duration (>15 years), increased age (40–50 years), and longer pain duration, which considerably increase MSD severity, pain intensity, and physical activity restriction. Although QoL impairment was widespread

across all age groups, duration of pain exhibited statistically inconclusive association with QoL deterioration. The results conform to international research regarding occupational MSDs but emphasize the acute susceptibility of traffic police in high-stress metropolitan environments like Peshawar as a consequence of cumulative exposure to ergonomic risks.

Limitations

- Cross-Sectional Design: Unable to determine causality among risk factors and MSDs.
- Self-Reported Data: Threat of recall bias (e.g. pain duration, QoL).
- Homogeneous Duty Hours: All staff members worked 8-hour shifts, restricting analysis of duty-length effects.
- Small Subgroups: Low numbers in extreme MSD/pain groups (e.g., only 1 "severe MSD" instance) weakened statistical power.
- Regional Specificity: Results may not be generalizable to traffic police working in other climatic/cultural environments.

References:

1. Gorce P, Jacquier-Bret J. Work-Related musculoskeletal disorder prevalence by body area among nurses in Europe: systematic review and Meta-Analysis. *Journal of functional morphology and kinesiology*. 2025;10(1):66.
2. Olivotto S, Evans K, Peek K, Gardner T, Donovan M, Shirley D, et al. PROGNOSTIC FACTORS FOR POOR RECOVERY IN ACTIVE-DUTY MILITARY PERSONNEL WITH MUSCULOSKELETAL DISORDERS: A SYSTEMATIC REVIEW WITH META-ANALYSIS. *Musculoskeletal Science and Practice*. 2025:103383.
3. Jacquier-Bret J, Gorce P. Work-Related Musculoskeletal Disorder Prevalence by Body Area Among Nurses in

Asia: Systematic Review and Meta-Analysis. *International Journal of Environmental Research and Public Health*. 2025;22(4):652.

4. Kholinne E, Azalia X, Rahayu EP, Anestessia IJ, Agil N, Muchtar. The prevalence and risk factors of musculoskeletal disorders among Indonesian dental professionals. *Frontiers in Rehabilitation Sciences*. 2025;6:1513442.

5. So BCL, Lee EWF, Ng S, Man SS. Prevalence and associated factors of work-related musculoskeletal disorder symptoms amongst emergency medical service workers. *Scientific Reports*. 2025;15(1):19806.

6. Geto AK, Daba C, Desye B, Berihun G, Berhanu L. Prevalence of work-related musculoskeletal disorder and its associated factors among weavers in low-and middle-income countries: a systematic review and meta-analysis. *BMJ open*. 2025;15(8):e093124.

7. Lee M, Mohamad Jamil PAS, Mohammad Yusof NAD, Mohd Suadi Nata DH, Karuppiah K. Musculoskeletal disorders of traffic police in Putrajaya: Evaluating ergonomic risks and trends. *WORK*. 2025;80(2):871-87.

8. Guan SY, Zheng JX, Zhang SX, Xu S, Shuai Z, Cai HY, et al. Global Burden of Musculoskeletal Disorders in Adults Aged 50 and Over, 1990–2021: Risk Factors and Sociodemographic Inequalities. *Journal of Cachexia, Sarcopenia and Muscle*. 2025;16(4):e70008.

9. Jamil A, Nazir S, Jamil N, Sharif S, Dildar U. Prevalence of musculoskeletal disorders among nurses of Jinnah Hospital Lahore. *Prevalence*. 2024;7(3):118-31.

10. Arshad E, Anjum H, Ain QU, Kausar R, Fatima K, Afzal MT, et al. Work-related musculoskeletal disorders among Pakistani laparoscopic and general surgeons. *BMC Musculoskeletal Disorders*. 2025;26(1):400.

11. Adenan NS, Yusof NADM, Aziz SaA, Khalid MS, Jamil PASM. From Duty to Discomfort: A Systematic Review Unveiling the Current Landscape of Musculoskeletal Disorders (MSDs) Among Police Officers. *Malaysian Journal of Medicine & Health Sciences*. 2025;21(2).
12. Zakaria NZA, Karuppiah K, Mohammad Yusof NAD, Mohamad Jamil PAS, Rasdi I, Tamrin SBM, et al. Protecting Those Who Protect Us: A Review of Psychosocial Factors and Musculoskeletal Disorders in Police Officers. *Malaysian Journal of Medicine & Health Sciences*. 2023;19.
13. Pandey N, Bindra S. Prevalence and Risk Factors of Musculoskeletal Disorders Among Police Employees: A Survey Study. *Int J Sci Healthc Res*. 2023;8:124-31.
14. Jahan I, Dalal K, Khan MAS, Mutsuddi A, Sultana S, Rashid MU, et al. Occupational health hazards among traffic police in south asian countries: protocol for a scoping review. *JMIR research protocols*. 2023;12(1):e42239.
15. Hosseini ST, Tuiserkani HV, Imani A. Correlation between Posture Disorders and the Appearance of Focal Pain Symptoms in Traffic Police Forces. *Journal of Police Medicine*. 2023;12(1):1-15.
16. Joseph L, Vasanthan L, Standen M, Kuisma R, Paungmali A, Pirunsan U, et al. Causal relationship between the risk factors and work-related musculoskeletal disorders among professional drivers: a systematic review. *Human factors*. 2023;65(1):62-85.
17. Van Eerd D, Irvin E, Le Pouésard M, Butt A, Nasir K. Workplace musculoskeletal disorder prevention practices and experiences. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*. 2022;59:00469580221092132.
18. Awadalla AM, Alsharifa AAG, Alrabie MA, Alashjaee RH, Alsaady AM, Buzaid AH, et al. Management of musculoskeletal disorders; a systematic review. *Int J Med Dev Ctries*. 2024;8(1):340-.
19. Gumasing MJJ, Prasetyo YT, Cardoso MM, Freitas JS, Nadlifatin R, Chuenyindee T. Determining the ergonomic risk factors affecting the musculoskeletal disorders of traffic enforcers in Manila City, Philippines. *Work*. 2023;75(2):603-14.
20. Hosseini ST, Tuiserkani HV, Imani A. *Journal of Police Medicine*. 2023.
21. Hout JD, Ryu J. The association between musculoskeletal disorders and lead apron use in healthcare workers: A systematic review and meta-analysis. *Safety Science*. 2025;181:106669.
22. Shah P, Sinha A, Dutta P, Sharma S, Pingle S, Saxena D. Occupational health status of traffic police personnel and traffic brigade members in Gujarat, India. *Archives of Environmental & Occupational Health*. 2025;80(1-2):23-37.
23. Pickard O, Burton P, Yamada H, Schram B, Canetti EF, Orr R. Musculoskeletal disorders associated with occupational driving: a systematic review spanning 2006–2021. *International Journal of Environmental Research and Public Health*. 2022;19(11):6837.
24. Diyana MA, Karmegam K, Shamsul B, Irniza R, Vivien H, Sivasankar S, et al. Risk factors analysis: Work-related musculoskeletal disorders among male traffic policemen using high-powered motorcycles. *International Journal of Industrial Ergonomics*. 2019;74:102863.