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A Survey Assessing the Prevalence of Calf Muscle Pain and Tightness Among Traffic Police Officers in India: A Cross-Sectional Study

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KEYWORDS

Traffic police; Calf muscle pain; Gastrocnemius tightness;

Musculoskeletal disorders;

Occupational health.

ABSTRACT:

Introduction: Traffic police officers are at risk of developing musculoskeletal disorders of the lower extremities due to their exposure to prolonged standing, walking on hard road surfaces, repetitive lower extremity use, and limited postures during their working hours. The calf muscle, which is one of the main muscles of the calf and plays a vital role in standing and walking, is at risk of developing overuse and myofascial tightness syndrome due to static loading. This study aimed to determine the prevalence of calf muscle pain and tightness among traffic police officers.

Objective: To assess the prevalence of calf muscle pain and tightness among traffic police officers and to identify associated occupational risk factors.

Methods: A cross-sectional survey was conducted among the traffic police officers working in Bhattarahalli, Bangalore. For this, a structured questionnaire was used to collect relevant information, like details about their age, work profile, and other job-related factors. Pain levels were measured using the Visual Analogue Scale (VAS), along with a 5-point Likert scale, and the presence of calf muscle tightness was also measured. Associations with duty hours, footwear use, and years of service were analyzed.

Results: A total of 50 traffic police officers volunteered to participate in the survey to determine the prevalence of calf muscle pain and tightness. Most of the officers who participated in the study were male (96%), between the ages of 22 and 49 years, with 5-10 years of work experience, and worked 9-10 hours a day (70%). Most of the officers experienced moderate levels of pain, with 52% of the officers experiencing a level of pain of 5/10 on the VAS scale. Pain was experienced in the left gastrocnemius (medial head), left soleus, and right gastrocnemius (lateral head) muscles. In total, 82% of the officers experienced calf muscle pain and tightness due to prolonged standing and the use of police boots during work hours.

Conclusion: The study concludes that Calf pain and tightness are extremely common among traffic police, as they have to stand continuously and wear heavy boots. It is recognized that most police officers felt moderate discomfort, especially in the gastrocnemius and soleus muscles. Preventive strategies such as regular stretching, strengthening exercises, and appropriate footwear may help reduce muscle fatigue and improve work performance.

1. Introduction

Traffic police personnel regulate the smooth flow of traffic, maintain road safety, and guarantee transportation discipline in urban areas. They have to continuously stand at the junctions of traffic for hours, organize the movement of vehicles, handle the problems of traffic congestion, and react to various dynamic situations on the flow of traffic. Unlike office workers, traffic police have to spend most of their working time standing; this imposes a heavy burden on the

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musculoskeletal system of the lower limb, especially on the posterior compartment of the leg, where the calf muscle is situate[2].

The calf muscle is important for maintaining posture, standing balance, and ankle plantarflexion while walking or moving around. Blood flow to the muscle might be compromised when it faces long hours of static or semistatic standing, which may promote muscle fatigue and induce ischemic pain. These changes can result in the tendency for chronic muscle tightness, loss of flexibility, and the eventual development of myofascial trigger points over time[1,2] Prolonged tightness of the gastrocnemius will alter ankle dorsiflexion and, subsequently, the overall biomechanics of the lower limb, which in turn causes functional activities like stair climbing and squatting to become difficult to carry out[3,4].

Prolonged standing has been strongly associated with musculoskeletal discomfort, especially affecting the calf, feet, and the lower back. for traffic police personnel, the physical demands of their work can also be exacerbated by various environmental and work-related factors such as heat, dust, noise, air pollution, and mental stress associated with managing uninterrupted traffic flow[5,6,7]. All these may result in tension and fatigue of the muscles.

Furthermore, legal duty wear and tear, which do not provide sufficient cushioning and arch support, and the standing on hard surfaces, which include concrete and asphalt, provide extra mechanical load to the calf muscle[8,9,10]. Otherwise, the tightness of the calf muscles might cause additional problems with the strains in the knee joint, the strains in the Achilles tendon and the irritation in the plantar fascia[11,12].

Calf muscle pain and calf muscle tightness are among the prevalences that should be comprehended in the surrounding of the occupational hazards of people in the traffic police. As well, one will need to determine the rates of calf muscle pain and calf muscle tightness that may become one of the components of preventive strategies, such as regular exercises, better-supported shoes, frequent breaks, and physiotherapy, which have been recommended by the prior research[13,16].These steps can lead to improved musculoskeletal health, a decrease in work-related discomfort, and better performance of duties or overall well-being among traffic police personnel[17,19].

2. Objectives

The aim of this study is to assess the prevalence of calf muscle pain and tightness among traffic police personnel and identify the occupational factors that contribute to the conditions.

3. Methods

Ethics statement: Ethical clearance for this research was obtained from the Institutional Ethics Committee of Garden City University, Bengaluru. Informed consent was obtained from all participants, and confidentiality was strictly maintained.

Study design: An observational cross-sectional survey to estimate the prevalence of calf muscle pain and tightness in traffic police.

Setting : The study was conducted online in Bengaluru, Karnataka during the month of May and October, Bengaluru was chosen as the study setting due to availability of different locations.

Participants: In total, 50 traffic police personnel from Bengaluru, Karnataka, India, were recruited for this cross-sectional study. The study participants were recruited by distributing a questionnaire via Google Forms and WhatsApp from May to October. The study recruited traffic police officers aged between 20 and 55 years and actively involved in road traffic policing activities, having a minimum of six months of continuous duty experience, and working for a minimum of five days a week. The study excluded individuals who have a history of recent lower limb fracture, ligament injury, surgery, neuromuscular disorders, severe varicose veins, underlying systemic inflammatory conditions, uncontrolled diabetes mellitus with neuropathic symptoms, and those undergoing physiotherapy for calf pain. This is because prolonged standing activities have been previously associated with an increased risk of lower limb musculoskeletal discomfort and calf fatigue among individuals in prolonged standing occupations such as traffic policing.

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Data collection: The cross- sectional survey used Physical (Paper-based) and Google Forms for the research, which has been provided through WhatsApp and. To protect participants privacy, the questionnaire was intended for anonymous collection of information. The survey is based on questionnaire. The questionnaire consisted of several sections including the demographic data section which include the name, age, gender. The survey aims to identify the occupational factors contributing to these condition.

STATISTICAL METHODS:

Data were collected using an online questionnaire which was circulated through Google Forms among the traffic police personnel in Bengaluru. The survey included questions related to demographic data, occupational details, and parameters related to pain and tightness in the gastrocnemius muscle, using a 5-point Likert scale. Participation in the study was on a voluntary basis, with informed consent obtained prior to submitting the responses to ensure the ethical nature of this research.

Table 1: This table describes the age distribution of the participants.

AGE	NO.OF PEOPLE	PERCENTAGE
20-30 YEARS	13	26%
31-40 YEARS	18	36%
41-50 YEARS	19	38%

Fig 1: The bar diagram shows the distribution of the ages of the study participants. Most of the participants were 35 years of age **(10%),** followed by 48 years **(8%),** while the rest of the ages accounted for **6%** and **4%** of the total number of participants. This implies that the participants were distributed in various age groups with a majority of adults and middle-aged people who could possibly be exposed to more occupational hazards and thus more likely to suffer from musculoskeletal disorders.

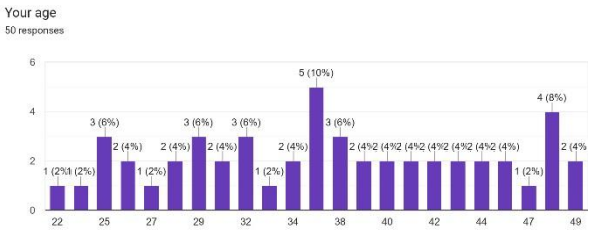

Table 2: this table depicts duty hours per day

DUTY HOURS PER DAY	NO. OF PEOPLE	PERCENTAGE%
<6 HOURS	6	12%
6-8 HOURS	17	34%
9-10 HOURS	25	50%
>10 HOURS	2	4%

Fig 2: this pie chart depicts duty hours per day and no.of people, percentage Most participants **(50%)** work 9–10 hours per day, while fewer work 6–8 hours **(34%),** less than 6 hours **(12%),** or more than 10 hours **(4%).**

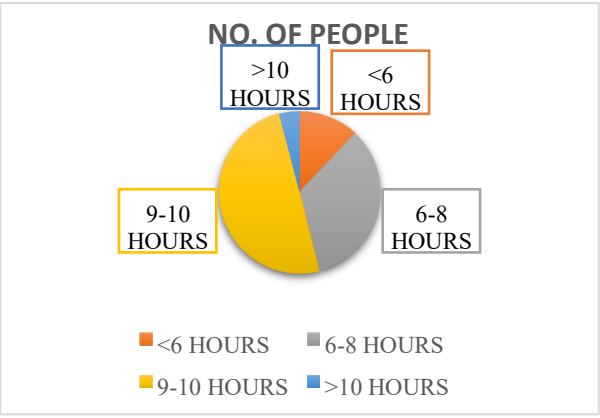

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Table 3: This table depicts information about years of working experience in traffic police.

YEAR OF EXPERIENCE	NO. OF PEOPLE	PERCENTAGE %
>5 YEARS	18	36%
5-10 YEARS	20	40%
11-15 YEARS	11	22%
>15 YEARS	1	2%

Fig 3: The pie chart shows that most traffic police have 5-10 years of experience **(40%)** followed by >5 years **(36%)** and 11-15 years **(22%).** Only a small portion **(2%)** have served more than 15 years, indicating most participants are mildcareer personnel.

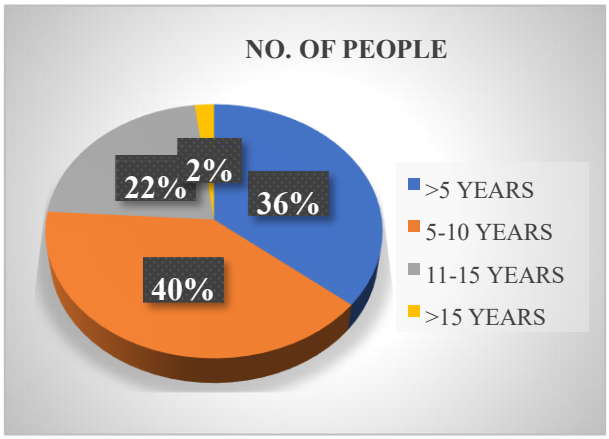

Table 4: This table shows the distribution of calf pain during duty hours.

CALF PAIN DURING DUTY HOURS	NO.OF PEOPLE	PERCENTAGE%
NONE	17	34%
MILD	9	18%
MODERATE	13	26%
SEVERE	10	20%
VERY SEVERE	1	2%

Fig 4: This pie chart shows the distribution of calf pain severity among traffic police during duty hours. Most participants reported no pain **(34%),** while moderate pain **(26%)** and mild pain **(18%)** were also common. Severe pain **(20%)** affected a smaller portion, and only **(2%)** experienced very severe pain.

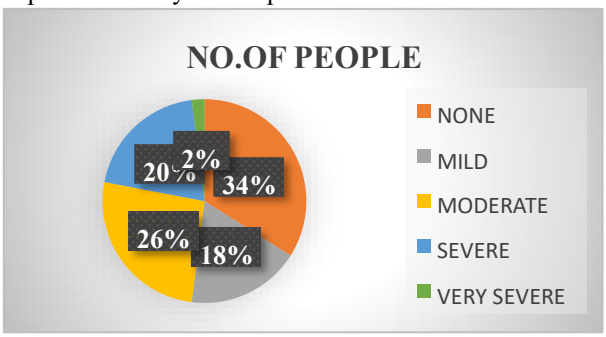

Table 5: This table depicts information about site of calf pain

SITE OF PAIN	NO.OF PEOPLE	PERCENTAGE%
Right leg gastrocnemius medius an lateral	13	29%

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Left leg gastrocnemius medial, lateral	12	27%
Right leg soleus	9	20%
Left leg soleus	11	24%

Fig 5. The pie chart illustrates the percentage distribution of people across different leg muscles: left soleus **(24%),** right gastrocnemius **(29%),** right soleus **(20%)**, and left gastrocnemius **(27%).**

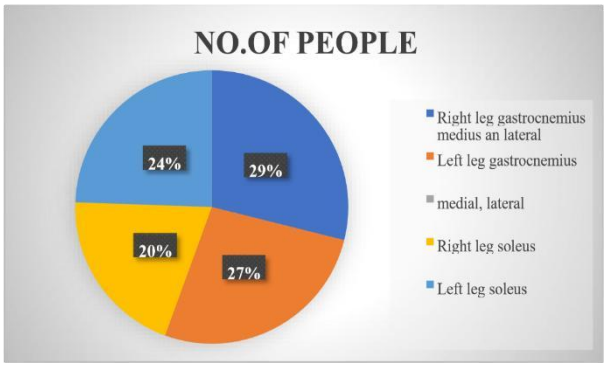

Table 6. The table shows the frequency of calf muscle tightness experienced by participants while on duty.

CALF MUSCLE TIGHTNESS DURING DUTY	**NO.OF PEOPLE**	**PERCENTAGE%**
NEVER	10	20%
RARELY	6	12%
SOMETIMES	20	40%
OFTEN	9	18%
ALWAYS	5	10%

Fig 6. This pie chart illustrates the frequency of a certain activity among a group of people.The majority of people engage in the activity "Sometimes" **(40%),** while the least number of people do it "Always" **(10%).** The remaining frequencies are distributed as "Never" **(20%),** "Often" **(18%),** and "Rarely" **(12%)**.

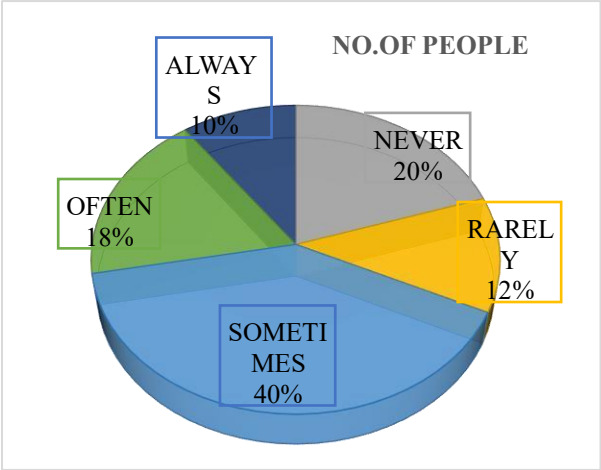

Table 7. This table shows the distribution of calf muscle pain intensity among traffic police personnel according to the Visual Analogue Scale (VAS).

VAS CATEGORY	**NO.OF PEOPLE**	**PERCENTAGE%**
NONE	14	28%
MILD	10	20%
MODERATE	16	32%
SEVERE	9	18%
VERY SEVERE	1	2%

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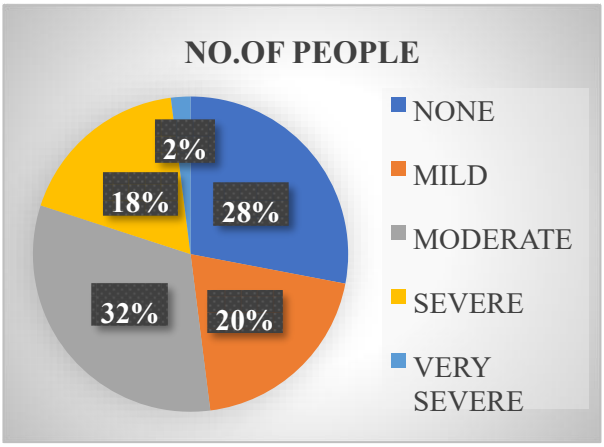
Fig7. The pie chart indicates the severity of the symptoms experienced by the participants. The most common severity experienced was moderate, which accounted for **32%,** while no symptoms, mild, and severe symptoms accounted for **28%, 20%,** and **18%,** respectively, while very severe symptoms were the least experienced, accounting for only **2%.**



4. Results

A total of 50 traffic police personnel were selected. The majority of the participants were male (96%), and their age group ranged from 22–49 years. A majority of the participants had 5-10 years of work experience, and 70% of the participants had 9-10 hours of work, indicating their prolonged standing and hard work during their duty hours. The majority of the participants reported moderate discomfort, followed by mild and severe pain, according to the 5-point Likert scale. A similar pattern of results was obtained when the participants responded to the modified Visual Analogue Scale (VAS). The average pain score of the participants was 5 out of 10, indicating a moderate level of pain. the affected areas were identified as left gastrocnemius (medial head) and right gastrocnemius (lateral head). In total, 82% of the participants exhibited a form of pain/tightness in their muscles, which proves that there is a high percentage of gastrocnemius pain among this particular group of people. The use of formal shoes or police boots was also considered a contributing factor for fatigue and stiffness of the muscles. All of this points to a high level of musculoskeletal strain among the traffic police personnel, as they had to stand for a long time and did not have time to rest.

5. Discussion

This research aimed to find out the prevalence of gastrocnemius muscle pain and tightness among traffic police personnel, who are often subjected to prolonged standing positions during their duty. The results showed that out of the participants, 82% had some level of calf pain or tightness. Also, the degree of pain or tightness, as per the participants, is moderate, as both the Likert scale and the modified Visual Analogue Scale (VAS) are employed. This is supported by the mean level of pain, whereby the result is at 5 out of 10. This indicates that gastrocnemius muscle is likely to be fatigued because it is always active when one is standing. It is due to its continued working which keeps the individual straight.

Most of the respondents were male officers (96-percent), aged between 22-49 years. Most of them were also 5-10 years of work experience, which implies that the accumulation of muscular stress during the working hours might also be potential due to the long hours of work in this job. Most of the participants (approximately 70 percent) had a daily workload of 9-10 hours, which too indicated existence of correlation between duration of work and discomfort of the muscles. Long term standing in one posture is known to slow blood flow to lower limbs which causes venous embankment and elevated pressure within the muscles, and metabolic fatigue of the muscles. This can ultimately lead to rigidity and pain in the muscles and lack of muscle elasticity.

Wearing of formal shoes or police boots which lacked proper ergonomic support has also contributed to this problem. This is a observation that has been made in previous research, musculoskeletal disorders have been prevalent in the lower limbs of individuals who are undertaking some occupations that require extended periods of standing. This indicates the necessity to take preventive actions, such as exercises, wearing proper shoes, and giving sufficient rest periods that will allow alleviating the exhaustion of the muscles, consequently, enhancing the occupational health of the traffic police staff.

The results indicate that calf muscle pain and tightness appear to be common among traffic police personnel, which might be related to prolonged standing and long hours of duty. Similar trends have been observed in other occupations that require long hours of standing. However,

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results should be interpreted cautiously because of the small sample and self-reported data.

The results of this study are in line with those of other studies which found that prolonged standing occupations are associated with calf muscle pain and lower limb discomfort. The slight differences in levels may result from differences in sample size and work conditions.

The findings of the present study can be useful to the personnel working in the traffic police department who work in similar conditions that demand long hours of standing during work. The present study was conducted in one region with a limited number of participants; hence, the findings can be used with caution for the traffic police personnel in other areas. The working conditions might vary in different areas.

Limitations

The sample size used in the study was small, with 50 participants. This might not be enough to generalize the results. The study used self-reported data, but objective methods were not used to assess the level of muscle tightness. The design used in the study is not suitable to determine the cause-effect relationship.

Suggestions

It is suggested that in future studies, a larger sample size should be included and objective assessment tools should be used to better evaluate the results. It is also suggested that the role of footwear, working conditions, and preventive physiotherapy exercises in reducing calf muscle pain and tightness in traffic police personnel should be studied.

6. Conclusion

This study results have revealed that muscle pain and tightness in calf muscles among the traffic police officers is a typical occurrence occasioned mainly by long standing, immobility and wearing heavy duty boots. The majority of the participants had the moderate degree of discomfort and gastrocnemius and soleus muscles were identified to be at a higher risk of muscle pains as these two muscles are the ones that mainly help to stand straight. The findings, additionally, indicate that extended hours of work without much rest can lead to fatigue, lack of proper blood flow circulation, and hardness of the lower extremities. based on the above, it can be proposed that preventive physiotherapy measures i.e. regular exercises, use of properly cushioned and supportive shoe types, and integration of rest periods into the working hours can prove to be helpful in muscle strain. In addition, the musculoskeletal health, functional efficiency, and comfort of the traffic police personnel can be enhanced by increased awareness regarding the significance of posture and ergonomics.

7. conflict of interest: there is no conflict of interest

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