

Correlation Of Chronic Low Back Pain and Core Muscle Weakness Among Taxi Car Drivers

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ABSTRACT

Background: : Chronic low back pain (CLBP) is a widespread, debilitating condition affecting millions globally, particularly in high-risk occupations like taxi driving. Taxi drivers are prone to CLBP due to prolonged sitting, poor posture, repetitive motions, and exposure to whole-body vibrations, leading to core muscle weakness. Weak core muscles destabilize the spine, increasing strain on the lower back and exacerbating pain. The sedentary nature of driving, coupled with job-related stress, worsens muscle deconditioning, creating a cycle of pain and inactivity. Addressing core muscle weakness through targeted interventions can alleviate CLBP and improve taxi drivers' overall health.

AIM :To study about the correlation of chronic low back pain and core muscle weakness among taxi car drivers

METHODOLOGY: the study focused on individuals driving for two years, Age criteria was between 30- 60 years , and Individuals who work as taxi car drivers. The study was a survey method. A total of 81 participants were selected using a simple random sampling technique. The study was conducted in karad. The duration of the study was 6 months.

RESULT: The data shows that prolonged driving increases pain at rest and during activity, while decreasing muscle strength and core endurance. Drivers with longer hours (16-20) experience more pain, lower muscle strength, and reduced endurance, highlighting the need for targeted core training to prevent muscle deconditioning and injury.

CONCLUSION: The correlation between CLBP and core muscle weakness in taxi drivers is evident through various contributing factors such as prolonged sitting, poor posture, repetitive driving motions, and exposure to whole-body vibrations. These occupational demands lead to core muscle deconditioning, particularly in the deep stabilizing muscles that support the lumbar spine. As core muscles weaken, the spine becomes less stable, increasing mechanical stress on the lower back, which exacerbates CLBP..

Keywords: low back pain, taxi drivers, core muscle weakness.

1. INTRODUCTION

Millions of people worldwide suffer from chronic low back pain (CLBP), a widespread and crippling ailment that presents serious obstacles to people's lives, healthcare systems, and economies. Because of the particular demands of their job, cab drivers stand out among other occupational categories as a demographic that is especially susceptible to CLBP[1]. Sitting for extended periods of time, being in a car and Taxi drivers may be at risk for musculoskeletal strain due to the repetitive actions involved in driving, with the lumbar area being especially vulnerable.

The etiology of CLBP is multifactorial, often involving a complex interplay of biomechanical, psychosocial, and lifestyle-related factors[2]. Among these factors, core muscle weakness has emerged as a potential contributor to the development and exacerbation of CLBP in diverse populations, including taxi car drivers. The core musculature, comprising muscles such as the transversus abdominis, multifidus, and pelvic floor muscles, plays a pivotal role in providing stability and support to

the spine during various activities, including sitting and driving[3].

Taxi car drivers, by the nature of their occupation, are subjected to prolonged periods of sitting, which can lead to muscle deconditioning and weakening, particularly in the core muscle groups[4]. Additionally, the repetitive nature of driving may result in muscular imbalances and asymmetries, further predisposing drivers to musculoskeletal issues, including CLBP. Understanding the correlation between CLBP and core muscle weakness among taxi car drivers is not only essential for elucidating the underlying mechanisms but also for informing targeted preventive strategies and interventions aimed at mitigating the burden of CLBP in this occupational group[5].

As a major cause of disability, CLBP not only affects physical health but also limits individuals' ability to perform everyday tasks, thereby impacting their overall quality of life[6]. The condition is defined as pain or discomfort in the lower back that persists for 12 weeks or more, often despite interventions for acute back pain, which highlights its chronic nature. While CLBP can result from acute injuries, its persistence is typically linked to more complex, multifactorial etiologies that involve biomechanical, psychological, and lifestyle factors[7].

Among the myriad of occupational groups affected by CLBP, taxi drivers stand out as particularly vulnerable. Taxi drivers, by the nature of their work, are exposed to unique risk factors that make them more susceptible to developing chronic back problems[8]. Prolonged periods of sitting, often in a fixed and sometimes awkward posture, are an intrinsic part of a taxi driver's daily routine. Long hours on the road, navigating traffic, and handling repetitive driving-related tasks contribute to physical strain, especially in the lumbar region[9]. Additionally, taxi drivers are continuously exposed to whole-body vibrations from the vehicle, which, over time, can exacerbate musculoskeletal stress, particularly in the lower back. The physical demands placed on taxi drivers are exacerbated by the repetitive and asymmetrical nature of driving, which can lead to muscular imbalances and poor spinal alignment, further contributing to the development of CLBP[10].

Beyond the occupational hazards related to driving, another significant factor contributing to the susceptibility of taxi drivers to CLBP is the weakness of core muscles. The core muscles, which include the transversus abdominis, multifidus, pelvic floor muscles, and obliques, play a vital role in maintaining the stability and support of the lumbar spine[11]. These muscles act as a corset, stabilizing the spine and pelvis during movement and static positions like sitting. However, when these core muscles weaken or become deconditioned due to prolonged sitting and lack of physical activity, they lose their ability to provide adequate support to the spine. This leads to instability, poor posture, and increased load on passive structures of the lower back, such as the intervertebral discs and ligaments. For taxi drivers, whose occupation involves long hours of sitting with limited physical movement, core muscle weakness can be a key contributor to the onset and persistence of CLBP[12].

The link between core muscle weakness and CLBP is well-documented in the medical literature. Individuals with CLBP frequently exhibit diminished function in their core muscles, particularly the deep stabilizing muscles like the transversus abdominis and multifidus. These muscles are responsible for providing segmental stability to the lumbar spine, and when they are weak or fail to activate properly, other structures in the back are forced to compensate[13]. Over time, this compensation leads to abnormal movement patterns, increased mechanical stress on the spine, and the development of chronic pain. For taxi drivers, who spend long hours seated, often in suboptimal postures, the risk of core muscle deconditioning is especially high. This, in turn, creates a vicious cycle where muscle weakness leads to instability, which exacerbates pain, further limiting physical activity and contributing to greater muscle atrophy[14].

The biomechanical stresses experienced by taxi drivers are not limited to sitting alone. The very act of driving, which involves repetitive motions such as pressing pedals, turning the steering wheel, and shifting gears, can create muscular imbalances. Taxi drivers typically use one leg more than the other to operate the pedals, and this can lead to asymmetry in muscle strength and activation patterns[15]. Over time, these imbalances contribute to uneven loading of the spine, further aggravating the risk of developing CLBP. Moreover, the vibrations experienced while driving a vehicle have been shown to increase the risk of musculoskeletal disorders, particularly in the lower back. These whole-body vibrations can cause micro-trauma to the spinal structures, accelerating degenerative processes such as disc herniation or facet joint arthritis, both of which are common contributors to chronic back pain[16].

In addition to the physical and biomechanical factors at play, lifestyle and psychosocial aspects also contribute significantly to the risk of developing CLBP among taxi drivers. The sedentary nature of their work limits opportunities for physical activity, which is crucial for maintaining muscle strength, flexibility, and overall musculoskeletal health[17]. Many taxi drivers work long shifts, leaving little time for exercise or engaging in activities that could strengthen their core muscles. The lack of physical activity leads to muscle deconditioning, which exacerbates the core muscle weakness already prevalent due to prolonged sitting. Furthermore, high levels of job-related stress, long hours on the road, and the pressures of maintaining passenger safety and navigating traffic contribute to psychosocial stress, which has been linked to increased muscle tension and pain perception, particularly in the lower back[18].

The combination of physical, biomechanical, and psychosocial factors creates a perfect storm for the development and persistence of CLBP among taxi drivers. As the pain becomes chronic, it often leads to further deconditioning of the core muscles, as individuals with CLBP tend to avoid physical activity due to fear of exacerbating their pain[19]. This inactivity leads to a loss of muscle strength and endurance, which worsens the cycle of instability and pain. Additionally, the sedentary nature of taxi driving, combined with poor posture and inadequate ergonomic conditions, places even more strain on the lumbar spine. Over time, this cumulative stress can lead to more severe musculoskeletal issues, including degenerative disc disease, spondylosis, or sciatica, further compounding the problem of chronic low back pain[20].

The relationship between core muscle weakness and CLBP in taxi drivers is not merely a matter of cause and effect but represents a complex interplay of various contributing factors. While core muscle weakness may predispose individuals to developing CLBP, the chronic nature of the condition can also lead to further weakening of these muscles, creating a self-perpetuating cycle of pain and dysfunction[21]. Understanding the precise mechanisms underlying this relationship is crucial for developing targeted interventions aimed at preventing and managing CLBP among taxi drivers. Interventions that focus on strengthening the core muscles, improving posture, and promoting overall physical activity can help break this cycle, providing long-term relief from CLBP and improving the overall quality of life for taxi drivers[22].

2. METHODOLOGY

This is the study of correlation of chronic low back pain and core muscle weakness among taxi car drivers. This study was conducted in Krishna Vishwa Vidyapeeth, deemed to be university, Karad, Maharashtra. This was a survey study. An ethical clearance certificate was obtained by the institutional ethical committee of Krishna Institute of Medical Science ‘deemed to-be’ university, Karad.

Sample size: $n = Z^2 pq/L^2 = 81$

Z = standard normal variant at 95%=1.96

$p = 30\%$

$q = 100 - 30$

$L = 10$ (permissible limit of error)

$n = 80.61 = 81$

Patients were selected by simple random technique. Subjects were selected according to the inclusion and exclusion criteria. Patients were given enough information about the research before obtaining their permission. An informed consent form was obtained from the subjects with their full agreement, and 81 participants were recruited. Informed consent will be taken and data will be collected.

Based on the collected data the statistical analysis will be done

Participants were taken according to inclusion and exclusion criteria

INCLUSION: -

1. Who has been continuously driving for two years,
2. aged 30- 60
3. individuals who work as taxi car drivers.

EXCLUSION: -

1. Patients who are diagnosed with spondylosis
2. Those who are not willing to participate

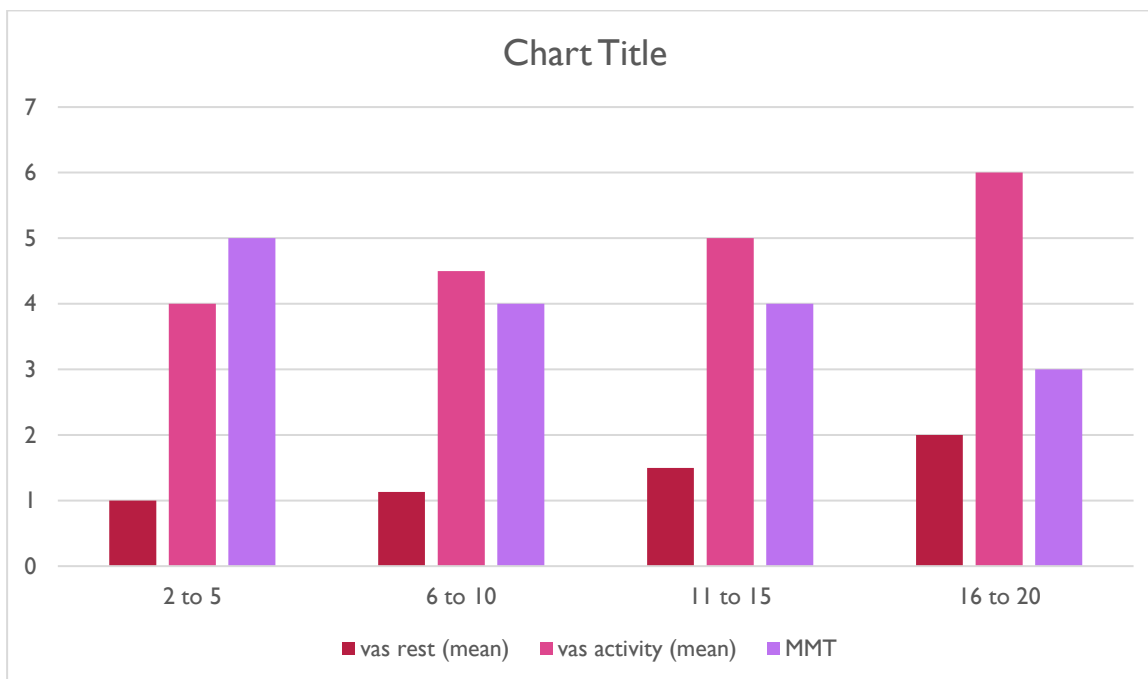
ETHICAL COMMITTEE

The study was approved by the Institutional Ethics Committee of Krishna Institute of Medical Sciences (Deemed to be University), Karad. An explanation about the study was given to participants and informed consent was obtained from them. They also had the authority to not participate in the study. All the respondents participated voluntarily and their confidentiality was maintained throughout the study.

DATA ANALYSIS AND INTERPRETATION

Duration of driving	No. of participants	Vas (rest) mean	Vas (on activity) mean	MMT mean
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2-5	16	1	4	5
5-10	42	1.13	4.5	4
10-15	18	1.5	5	4
16-20	5	2	6	3



The data suggests a clear relationship between the duration of driving, pain intensity (measured by VAS), and muscle strength (measured by MMT) among taxi drivers.

Pain at Rest (VAS Rest):

Drivers who spend between 2 to 5 hours driving have the lowest pain levels at rest, with a mean VAS score of 1. As driving duration increases, pain at rest also rises. For those driving between 16 to 20 hours, the mean VAS score increases to 2, indicating more discomfort, even when not engaged in activity.

Pain During Activity (VAS On Activity): The mean VAS score for pain during activity increases consistently with driving duration. Drivers who spend 2 to 5 hours driving report a mean score of 4, while those driving for 16 to 20 hours report a significantly higher mean score of 6. This indicates that prolonged driving leads to more pronounced pain during physical activity. The increase in pain during activity shows that extended periods of sitting and driving likely exacerbate physical strain, especially on the lower back.

Muscle Strength (MMT): Drivers with shorter driving durations (2 to 5 hours) exhibit the highest mean muscle strength (MMT score of 5). As driving duration increases, muscle strength decreases. Drivers in the 16 to 20-hour group have the lowest mean muscle strength (MMT score of 3). This decline in muscle strength with longer driving times suggests that prolonged sitting contributes to muscle deconditioning, particularly in the core and lower back muscles.

ENDURANCE TEST

Duration	Prone bridge(avg)	Lateral bridges(avg)	Torso flexion(avg)	Torso extensor (avg)
2-5	excellent	excellent	excellent	excellent
5-10	good	good	good	good

10-15	average	average	average	average
16-20	Below average	Below average	Below average	Below average

INTERPRETATION:

Decline in Endurance Over Time: As with the strength assessment, endurance for core stabilization exercises decreases over time. This decline is gradual, starting with an excellent rating in the 2-5 year range and dropping to below average in the 16-20 year range.

Core Stability and Endurance: Core endurance is crucial for maintaining posture, preventing injury, and performing daily activities or athletic movements. The decline in endurance over time may lead to poor postural control, lower back pain, and increased injury risk.

Clinical/Training Implication: If this table represents different phases of training or injury, it highlights the need for targeted endurance training, particularly for those in the later stages, to prevent or mitigate the decline in core function. Endurance-focused core training exercises such as planks, side planks, and back extensions could be crucial for maintaining core strength and reducing injury risk over time.

3. DISCUSSION

The correlation between chronic low back pain (CLBP) and core muscle weakness in taxi drivers has been explored in multiple studies, reflecting a growing interest in understanding the occupational factors contributing to musculoskeletal health in this demographic. Taxi drivers, due to their sedentary working conditions, prolonged sitting hours, and exposure to whole-body vibrations, represent a group that is particularly susceptible to CLBP. In this discussion, we will compare the findings of four related articles to the results and conclusions of the current study, highlighting areas of agreement and divergence.

One of the study done by Alperovitch-Najenson et al. (2010) showed that Alperovitch-Najenson and colleagues conducted a study on professional drivers, including taxi drivers, and found a high prevalence of CLBP, primarily linked to prolonged sitting and poor posture. The study emphasized the role of core muscle deconditioning due to extended driving hours, which compromised lumbar stability and increased the risk of back pain. The authors concluded that long hours of sitting, repetitive movements, and insufficient physical activity contributed significantly to muscle weakening, particularly in the trunk and lower back[23].

In comparison with our findings: The findings of Alperovitch-Najenson et al. align closely with our conclusions. Both studies highlight prolonged sitting as a major factor leading to muscle deconditioning and low back pain in taxi drivers. This study, like ours, emphasizes the need for interventions aimed at improving core muscle strength and recommends regular breaks and ergonomic adjustments to mitigate the risks of CLBP. Our study complements their results by further quantifying the impact of driving duration on pain levels and muscle strength (VAS and MMT scores), showing a clear correlation between longer driving hours and worsening symptoms.

Another study done by Tamrin et al. (2014) showed that Tamrin et al. investigated musculoskeletal disorders among commercial vehicle drivers, with a specific focus on CLBP. Their study identified that drivers who spent more than 10 hours per day behind the wheel had a significantly higher risk of CLBP. The authors concluded that core muscle weakness, exacerbated by the sedentary nature of driving, was a critical factor. Their study also pointed out that the vibrations experienced during driving contributed to spinal compression and musculoskeletal stress, aggravating pain and dysfunction[24].

In comparison with our findings: Tamrin et al.'s conclusions are consistent with our results, particularly concerning the relationship between driving duration and increased pain intensity. Both studies agree that core muscle weakness plays a central role in the onset and persistence of CLBP. In our study, we provided a more detailed breakdown of how increasing driving duration (from 2 to 20 hours) correlates with worsening pain (VAS scores) and declining muscle strength (MMT scores). The role of vibrations noted by Tamrin et al. is also discussed in our findings, where it is recognized as a contributing factor to spinal stress, particularly among those driving long hours.

Another study done by Lis et al. (2007) showed that Lis and colleagues performed a systematic review of the relationship between occupation and the prevalence of CLBP, with a focus on sedentary jobs, including driving. Their review highlighted that drivers, especially taxi and truck drivers, exhibited significantly higher rates of CLBP due to prolonged periods of immobility, which led to core muscle atrophy. The review suggested that core muscle strengthening exercises and improved postural support through ergonomic interventions could reduce the risk of CLBP in drivers[25].

In comparison with our findings: The systematic review by Lis et al. corroborates our conclusion that core muscle weakness

is a significant predictor of CLBP in taxi drivers. Like our study, it stresses the importance of physical activity and core strengthening exercises as preventive measures. The review also suggests that ergonomic improvements, such as better seat design, could alleviate CLBP, a recommendation that aligns with our suggestion for occupational interventions. While Lis et al. broadly discuss CLBP across multiple sedentary professions, our study provides a focused analysis on taxi drivers, offering specific data on how driving duration impacts pain and muscle strength.

Another study done by Magnusson et al. (1996) showed that Magnusson et al. explored the biomechanical impact of prolonged sitting on lumbar spine health in drivers. The study found that static postures, particularly sitting, led to increased lumbar disc pressure, reduced lumbar lordosis, and decreased core muscle activation. The authors concluded that taxi drivers are at a high risk for developing CLBP due to the constant strain placed on their spine and the deactivation of stabilizing muscles, such as the transversus abdominis and multifidus [26].

In comparison with our findings: Magnusson et al.'s biomechanical perspective closely aligns with our findings. Both studies recognize that prolonged sitting in drivers leads to reduced core muscle activation, resulting in weakened muscle support for the spine and increased risk for CLBP. Our study builds on these biomechanical findings by providing specific measurements of core muscle strength (MMT) and pain levels (VAS) across different driving durations, further quantifying the relationship between prolonged sitting and CLBP. Magnusson's focus on lumbar disc pressure adds another layer to our discussion, emphasizing how prolonged immobility not only weakens muscles but also increases mechanical stress on spinal structures.

4. CONCLUSION

In summary, the correlation between core muscle weakness and CLBP in taxi drivers is well-supported by the literature. Prolonged sitting, poor posture, and the sedentary nature of the job lead to deconditioning of the core muscles, increasing the risk of CLBP. Our findings complement existing research by providing detailed quantitative data on how driving duration affects pain and muscle strength. By comparing our study with the conclusions of other researchers, we reaffirm the importance of core-strengthening exercises and ergonomic improvements as effective measures for reducing the burden of CLBP in this high-risk occupational group

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