



Low back pain and pelvic floor dysfunction among bike riders: A literature review

Aayushi Raj, Md. Sufiyan, C. Nageswari*

*School of Allied Health science, Department of Physiotherapy, Galgotias University,
Greater Noida, India*

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Abstract

Bikers frequently experience lower back pain (LBP) as a result of repetitive motion. The stretched, contracted stance adopted by bike riders during pedaling can lead to the development of lumbar back pain due to the increased mechanical strain exerted on the lumbar spine. One possible method of preventing and treating bike rider's low back discomfort is to adjust the bike's settings based on the rider's unique anthropometric data. This study includes a narrative literature review about the prevalence of LBP in bike riders, the features of LBP in bike riders, and possible risk factors for LBP in bike riders. Among motorbike riders, the self-reported annual incidence of LBP was 42.9% in the cross-sectional research, with a lifetime prevalence of 50.7%. Bike riders reported LBP an average of 1.38 hours after setting out. Overuse pain in the lower back is a common complaint among bikers.

*Corresponding Author: C. Nageswari ✉ nageswari@galgotiasuniversity.edu.in

Introduction

In everyone's lifetime, 80–85% of people will experience low back pain, making it one of the most prevalent health issues. With an estimated 2–5% of persons suffering from chronic low back pain, many of whom are permanently disabled as a result; low back pain is the most common occupational condition in many countries. According to the study, between 30–70% of bike riders can tolerate cervical, dorsal, or lumbar back pain (Sultan *et al.*, 2022). These work-related issues and the consequent LBP may be exacerbated by risk factors from a person's lifestyle, such as smoking, inactivity, and obesity as said by Vindigni *et al.* in 2005. A large body of research has been done on the risk factors for LBP in the general population. Lack of exercise, poor health, obesity, smoking, substance abuse, and occupational variables including heavy lifting, awkward posture at work, twisting, bending, and stooping are all recognized as modifiable risk factors for low back pain. Those who cannot be changed are becoming older according to Vindigni *et al.* in 2005.

Compared to drivers of cars, motorbike riders are comparatively more vulnerable to the dangers of poor sitting posture. Basic scientific knowledge on motorcycle riders' unsupported back-leaning seating posture can be found by using ergonomic principles. Riders of motorcycles are typically thought of as sitting while operating the vehicle as per Karuppiah *et al.* in 2015 and Rajhans and Amrutkar in 2011. The pelvic floor muscles' dysfunction can lead to a variety of symptoms that millions of people experience as a health issue, lowering their quality of life as per Molina-Torres *et al.* in 2021. A few of these conditions have anything to do with issues with an overactive bladder, urine incontinence, perineal pain, and sexual dysfunction. Bike Riders appears to have a detrimental effect on men's sexual and urogenital function, in addition to the usual wrist, knee, or gluteal injuries according to Molina-Torres *et al.* in 2021.

LBP is a significant global public health issue that results in pain, functional impairment, and a low

quality of life. It is a typical diagnosis that causes absences from work. It is usually mentioned as a major economic burden and the root of a lot of personal suffering. Nearly 60% of Indians experience substantial back pain at some point in their lives, which is an alarming rate for LBP. The vertebral bodies, intervertebral discs, ligaments, muscles, nerves, or other structures in the spine may all be involved in LBP as said by Hoy *et al.* in 2010 and Abenhaim *et al.* in 2000. Bike Riders has become an increasingly popular mode of transportation and recreational activity worldwide. However, with the rise in Bike Riders participation, there has been a growing concern about the potential adverse effects on bike riders' health, particularly related to low back pain (LBP) and pelvic floor dysfunction (PFD).

This study aims to investigate the prevalence and potential risk factors associated with LBP and PFD among bike riders. The study's findings may provide valuable insights into designing targeted interventions to enhance the Bike Riders experience and promote bike riders' overall health and well-being. Bike Riders is considered an efficient and eco-friendly means of transportation and an enjoyable form of exercise. It offers numerous health benefits, such as improved cardiovascular fitness, muscle strength, and mental well-being. However, prolonged and repetitive Bike Riders movements can subject the body to specific biomechanical stresses that may lead to musculoskeletal issues, with the lower back and pelvic floor being particularly vulnerable.

Low back pain and pelvic floor dysfunction have been reported as common complaints among bike riders. LBP can impair bike riders' performance, decrease overall enjoyment, and limit Bike Riders participation. On the other hand, PFD can cause discomfort, urinary and fecal incontinence, and negatively impact bike riders' quality of life. Despite the growing interest in these issues, there is a lack of comprehensive research examining the association between Bike Riders and LBP/PFD, especially among recreational bike riders. The primary objective of this study is to investigate the prevalence of low back pain

and pelvic floor dysfunction among bike riders. Additionally, the study aims to identify potential risk factors that may contribute to these conditions, including Bike Riders habits, bike fit, and individual characteristics.

Bike Riders involves a sustained flexed position of the lumbar spine, which can cause compression and shearing forces on the intervertebral discs and surrounding structures. Over time, this may lead to LBP due to muscle imbalances, repetitive strain, and inadequate recovery.

Previous research has highlighted the importance of bike fit adjustments and proper posture to reduce the risk of LBP among bike riders as per Adams *et al.* in 1999. Prolonged pressure on the perineum during Bike Riders can lead to compression of the pudendal nerve, potentially contributing to pelvic floor dysfunction. Symptoms may include urinary urgency, incontinence, and sexual dysfunction. The relationship between Bike Riders and PFD remains a subject of interest, with limited studies exploring this association. Various factors may contribute to the development of LBP and PFD among bike riders, including age, gender, Bike Riders experience, training intensity, bike type, saddle design, and riding posture. Understanding these risk factors is crucial for implementing preventive strategies and optimizing bike riders' health as per Ahrens *et al.* in 1994.

Furthermore, the study's insights could be used to raise awareness among bike riders and Bike Riders communities about the importance of proper bike fit, posture, and training practices to reduce the risk of LBP and PFD. Low back pain (LBP) and pelvic floor dysfunction (PFD) are prevalent issues among individuals who engage in prolonged sitting, especially in the case of bike riders. Bike riders have gained popularity as a form of transportation, leisure activity, and sport in recent decades. Bike riders, both professional athletes and recreational enthusiasts, often spend long hours in the seated position, which can put strain on various

musculoskeletal structures. Among the most commonly reported complaints in this population are low back pain and pelvic floor dysfunction as said in the book American Academy of Orthopaedic Surgeons in 1988.

Regarding pelvic floor dysfunction, certain activities, such as bike riders, have been associated with increased intra-abdominal pressure, which can impact the pelvic floor muscles. However, few studies have directly investigated the relationship between bike riders and pelvic floor dysfunction, leaving a knowledge gap in understanding the potential implications for bike riders

Participants as per Andersson *et al.* in 1999, the study will recruit a diverse sample of bike riders, including professional bike riders, recreational riders, and commuters, to ensure a representative cross-section of the bike rider's community as per Andersson *et al.* in 1999. The repetitive nature of bike riders and the prolonged forward-flexed position can lead to muscle imbalances and structural changes that may contribute to low back pain among bike riders.

The biomechanical basis of bike riders-related low back pain

Very little hard evidence exists to back up these speculations, and in many cases they appear to be in direct opposition to one another. It's feasible, though, that these theories are part of a continuum and can't account for LBP in bike riders on their own. Muscle and spinal kinematics in bike riders with LBP were only evaluated for a brief time period (less than an hour) in all research that study probable pathomechanics of LBP in bike riders. More precise data on the pathomechanics of LBP in bike riders may be acquired by beginning to record motor patterns after a time period surpassing an hour and then continuing to record over a longer duration. Typically, bike events go much longer than one hour. Bike riders' low back pain (LBP) may be explained by a more generalized hypothetical model. For instance, the muscle

fatigue theory suggests that the spinal extensors may become fatigued early on while riding. Since the trunk's weight is distributed through the arms and hands while bike riders, the FR response may be delayed for a short while compared to flex sitting positions. However, if this condition is held for an extended period of time, FR may develop, followed by the onset of creep as the load is shifted from the active supporting components to the passive supporting structures. Further deactivation of the spinal stabilizing muscles may occur as a result of a ligament-muscle reflex arc triggered by the tension on the ligaments. Sitting posture in non-bike rider's athletes has been characterized as a process wherein a decrease in spinal muscular support increases strain on the spinal ligaments, which can cause injury to the ligaments and reflex muscle spasms in the spinal muscles Andersson *et al.* in 1999. Some research suggests that greater lumbar spine flexion and rotation might be caused by a lack of co-contraction of the stabilizing lumbar multifidi, which could lead to an unbalanced pressure on passive structures when active muscle support is diminished as per Bach *et al.* in 1985. This study of potential pathomechanics of low back pain in bike riders, however, makes it abundantly evident that there are very few data to support any of these ideas, and that more research is needed.

Lower back pain in bike riders: risk factors

Some research has documented potential risk factors that may be linked to the development of LBP in bike riders, however the aetiology of LBP in bike riders is yet unknown. However, there is scant scientific evidence to back up each of these potential dangers. There are both external and internal elements that might increase a cyclist's likelihood of becoming hurt. The cyclist's surroundings and training regimen are examples of extrinsic risk factors. The age, body mass index, physiological parameters (conditioning, muscular strength, and muscle balance), and behavioural parameters of a cyclist are all examples of intrinsic risk variables as said by Balague and Salminen in 1999.

Programming failures, racing conditions, and other factors

Mistakes in training are frequently cited as an extrinsic risk factor for injury in a variety of endurance sports, most notably running. Therefore, factors external to cycling may have a role in the onset of LBP. These include training characteristics including mileage, training on hilly terrain, and gear selection. Lower back discomfort was reported by 30.3% of the 518 bikers surveyed (30% of the men and 30% of the women) as per Barker *et al.* in 2004. The usage of lower gears (which increases resistance while pedaling but boosts power for forward propulsion of the bikes) and a lack of cycling experience were both associated with an increase in LBP. The usage of low gears and the effort to take part in long distance bikes events can also contribute to the onset of LBP. Windy weather, for example, may increase or decrease a cyclist's vulnerability to low back pain.

After completing a series of bikes events, participants in a questionnaire study stated that long distance cycling, riding in windy conditions, and riding up hills were all contributing factors to their neck pain. However, to the best of our knowledge, no previous research has examined training characteristics and ambient variables as potential risk factors for LBP in bikers as per Berquist-Ullman and Larson in 1977. The frequency with which bikers should stretch is not the subject of any peer-reviewed research.

LBP risk factors particular to bikers

The development of LBP in motorcyclists has been linked to a number of potential hereditary causes. Muscle dysfunction may be measured in a number of ways, such as 1) flexibility, especially lumbo-pelvic inflexibility; 2) strength and imbalance of trunk muscles; and 3) anthropometric factors (such as the cyclist / bicycle fit). Now, we'll take a look at the most recent studies that back up each of these inherent risks. Additional intrinsic factors that may have a role in the development of LBP in motorcyclists will also be proposed. Leg length inequality includes both short legs and a lack of hamstring flexibility.

Low back pain in bikers: risk factors for muscle dysfunction

Asymmetrical paravertebral muscle contractions

It has been theorized that bikers with asymmetrical firing patterns of the lumbar muscles on either side of the spine are at a higher risk for low back pain (LBP). Different spine kinematics and trunk muscle activation were seen in bikers with and without non-specific chronic LBP (n=18) in a case control study as per Berquist-Ullman and Larson in 1977. Greater lumbar flexion and rotation at the outset of cycling (pre-testing) was associated with an increased risk of experiencing lower back discomfort in the symptomatic group. No evidence was found that the person had successfully adapted to the pain by reducing lumbar spine flexion and rotation. The lumbar multifidus did not co-contract in these bikers, either. Bikers in this research did not have overt scoliosis, but their greater flexion and rotation of the spine may have disrupted the symmetrical firing of para-vertebral multifidi, leading to decreased spinal support. Interestingly, the LBP group experienced more exhaustion in the right erector spinae muscle compared to the left, which may indicate an asymmetry in loading at the end of the ride. All of the bikers in this study were right-handed, leading the researchers to conclude that the left sided distribution of weight is likely the result of a bias toward the dominant hand according to Biedermann *et al.* in 1991. Bikers with low back pain have unequal use of the para-vertebral multifidus and erector spinae muscles, leading to uneven fatigue. Bikers may have more low back discomfort as a result of this. People with acute and sub-acute LBP have been shown, in ultrasound imaging investigations of the general population, to exhibit unilateral atrophy of the lumbar multifidus. More research is necessary to determine whether the muscle atrophy before the beginning of the LBP or was a result of the LBP according to Biering-Sorenson in 1984 and Bogduk *et al.* in 1992.

Materials and methods

Search approach

Information sources

Publications were selected based on a literature search from 2013 to 2023. The following databases

were interrogated: Pub med, DOAJ, Sci ELO, PLOS ONE, EBSCO, JSTOR, Web of Science, Google Scholar, Scopus Elsevier, Cochrane, DOAJ, MEDLINE-NLM, Science Direct and MEDLINE-EBSCO. The Pubmed, PEDro, Google Scholar, and Web of Science are electronic databases that include the oldest data. We use a variety of combinations of bike riders, low back pain, and pelvic floor dysfunction drawing on the most recent ten years of articles. The search results were restricted to English and RCT. List of the reference articles that were checked in order to find additional full-text articles that the original & review search had turned up. There are four different kinds of publications: cross-sectional studies, experimental investigations, systematic reviews, and original studies. The publications are in English language only.

Eligibility criteria

This review investigated research on the low back pain and pelvic floor dysfunction among the bike riders.

Literature review

The study aims that to review current literature on the rationale for ED (erectile dysfunction) from bikes riding and outcome of bikes riding on erectile function and to present available research on preventative measures specifically regarding bikes riding .for many years ,reports in the literature have implicated bikes riding as causing increased risk of erectile dysfunction (Sultan *et al.*, 2022).

The study aims at finding the problems associated with motorcycle riding posture. Motorcycle is widely used by commuters which consist of college going students motorcycle is preferred mode of transport within city limits as it is considered as it is economical more manoeuvrable and need less space for parking. It is considered as constrained workstation for users of different sizes to fit on the same workstation that is persons with different anthropometry, some problems should be taken into consideration when designing a motorcycle (Rajhans and Amrutkar, 2011).

This cross-sectional survey on 200 bike riders (professional and non-professional) found that 52.5% of the riders had low back pain, with varying levels of severity. The study concludes that the prevalence of low back pain is higher among bike riders who ride for 5 or more hours a day and affects their daily activities (Sultan *et al.*, 2022).

This observational study aimed to analyze the relationship between the intensity of Bike Riders practice and urogenital and sexual problems in men. Results from 58 male bike riders aged 25-70 years showed a correlation between years of Bike Riders and prostate symptoms and between age and erectile dysfunction. The study suggests a slight correlation between high-intensity Bike Riders and lower urinary tract symptoms, highlighting the need for further research on the impact of Bike Riders on urogenital problems (Molina-Torres *et al.*, 2012).

The study investigated the prevalence of low back pain (LBP) in 598 Italian professional drivers exposed to whole-body vibration (WBV) and ergonomic risk factors. Vibration measurements were taken, and alternative measures of vibration dose were estimated. The study found that the occurrence of LBP significantly increased with increasing cumulative vibration exposure, and individual characteristics and physical load index were significantly associated with LBP outcomes. The study confirms that the professional driving industry is associated with an increased risk of work-related LBP, with WBV and physical loading factors at work being important components of the multifactorial origin of LBP in professional drivers. Since the population samples and study durations (exposure) differ across the few available studies of overuse injuries, it is therefore challenging to make similarities between them (Bohlman, 1981; Bressel and Larson, 2003). However, patella femoral pain (PFP) syndrome, which causes discomfort in the front of the knee, is the most prevalent overuse injury in bike riders, according to research. Results from questionnaire studies have revealed a 10-60% prevalence of LBP among bikers.

The incidence of low back pain (LBP) has been observed to range from 2.7% to 15% in bike riders who have competed in two different multi-day stage competitions (805 km over 8 days; and 7242 km over 80 days). The lifetime incidence of LBP in bikers is unknown, though. It has been shown that certain athletes are more susceptible to experiencing lower back discomfort than others. Wrestlers have been shown to have a significant lifetime prevalence of LBP. Point prevalence of LBP is greater in elite gymnasts and teenage multi-discipline athletes compared to matched controls.

Result and discussion

The findings of this study emphasize the significance of addressing low back pain and pelvic floor dysfunction in bike riders. These issues, affecting both male and female cyclists, highlight the need for inclusive interventions and preventive strategies tailored to diverse riding populations. The high prevalence of these conditions underscores the importance of early identification and proactive management to mitigate long-term health consequences.

Role of risk factors

Prolonged riding duration, improper bike fit, and inadequate posture emerged as key contributors to low back pain and pelvic floor dysfunction. These factors are modifiable, suggesting that targeted interventions can significantly reduce the burden of these health issues. Educational programs focusing on the importance of ergonomics and posture correction could empower riders to make informed decisions about their riding habits.

Saddle selection and fit

The study reinforces the critical role of proper saddle selection and fit in minimizing health risks. Saddle design that prioritizes comfort and pressure distribution can substantially improve riding experiences and prevent discomfort or injury. Collaborations with manufacturers to develop ergonomic saddles tailored to diverse body types and riding styles may further enhance these efforts.

Need for long-term monitoring

Long-term symptom monitoring among riders with a history of low back pain or pelvic floor dysfunction is vital for understanding the progression of these conditions. Regular check-ins and follow-ups could provide valuable data for identifying at-risk individuals and evaluating the effectiveness of interventions.

Conclusion

By addressing the identified risk factors and implementing preventive measures, bike riders can reduce their susceptibility to low back pain and pelvic floor dysfunction. Promoting awareness, encouraging regular monitoring, and fostering innovation in equipment design are crucial steps toward enhancing rider health and well-being. Collaborative efforts between researchers, healthcare professionals, and cycling industry stakeholders can pave the way for sustainable and evidence-based solutions, ultimately improving the cycling experience for individuals worldwide.

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