



Original Article

Low Back Pain and Associated Risk Factors in Cross-Country Motorcyclists in Pakistan: A Cross-sectional Study

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ABSTRACT

Background: Motorcycles have been one of the most essential means of conveyance worldwide. It is relatively difficult to point out the predisposing factors that cause lower back pain among cross-country motorcyclists. Factors that appear to have a significant impact on musculoskeletal problems in respect of the biological, environmental, vehicle, psychological, daily activities, and discomfort of motorcyclists particularly people who use motorcycles for recreational purposes. **Objective:** To find the prevalence of lower back pain in cross-country motorcyclists and the factors affecting it. **Method:** In this cross-sectional study, the data was collected from CRC-Club six months after approval of the synopsis. The sample size was calculated to be 150 in which the estimated proportion was 0.53, desired precision of estimate was 0.08, and the confidence level was 0.95. The motorcyclists who drive motorbikes for more than one hour daily, aged between 18 to 60 years and those who drive on different quality roads (highways, narrow and unpaved) and experience lower back pain for more than three months were included. Patients with a history of any infection or inflammation, recent injury, tumor, systemic or degenerative disease or disability were excluded from the study. Data collection procedure: A questionnaire was developed, and pilot testing was done to determine the reliability of the questionnaire using Cronbach's alpha. The data was collected by filling out questionnaires from CRC club bikers. **Result:** Out of 150 male cross-country motorcyclists, 72 had a smoking habit and 78 had not. About 10.7 percent of motorcyclists had no discomfort, 53.3 percent had mild, 32 percent had moderate discomfort, and 4 percent had severe discomfort. There was a significant association between sitting posture and lower back discomfort (p.000). Motorcyclists who had slumped postures had more severe pain than motorcyclists who had flat posture, long lordosis posture, or short lordosis posture, while there was no significant association between lower back discomfort and motorcycle type (p-value .321). **Conclusion:** With increased riding time, the discomfort in the lower back increased. It concluded that the worst posture between flat posture, long lordosis, and short lordosis is slump posture. When riding motorcycles, riders should avoid slumping posture.

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INTRODUCTION

For the majority of people in many low and middle-income countries, motorcycles are the main mode of transport and the largest growing segment of motor vehicle sales globally. Their presence on the roads is reflected in the growing number of victims of motorcycle accidents in countries with both high and low incomes.¹ The cause behind the rising number of community motorcycles is that motorcycles are selling at lower prices than most other automobiles.² Regardless motorcycles are the most common type, of transport, only a few studies on the ergonomics of motorcycles have been carried out, especially relating to the comfort of motorcyclists during their riding phase.³ For motorcyclists, because of the sitting position during the riding phase, ease and discomfort could be recognized as signs of discomfort on their parts of the body. Overall, several musculoskeletal conditions start with people feeling pain in their parts of the body. Several variables, like the vehicle (motorbike), the riding atmosphere, or the motorcycle rider himself, may be linked to the comfort and discomfort of the motorcyclist during the riding process.^{4,5} Motorcycle has been one of the essential ways of conveyance worldwide.

Motorcyclists who are subject to unnecessary physical requirements can have an impact on their fatigue (rider fatigue) while riding.⁶ All around the world, musculoskeletal disorders are common and costly medical problems. Musculoskeletal disorders are the second leading cause of years of living with disability (YLDs) globally, based on recent studies. Low back pain (LBP) has been classified first among various causes of YLDs worldwide. Musculoskeletal disorders are responsible for about 21.3 percent of all YLDs; however, about 10.7 percent of the entire YLDs (83.1 million YLDs) are given LBP alone. Some studies have been carried out in developed countries on LBP epidemiology and its risk

factors. However, the number of studies has recently increased in neighboring developing countries such as Turkey, Brazil, Cuba and India. A previous Iranian national health survey showed that the 1-month prevalence of LBP in the Iranian population was 29.3%(51) revealing that the prevalence of LBP among urban natives of Tehran was higher than the global mean values.⁷ The incidence of LBP is connected to the kind of professions involving a lot of inappropriate movements of the body, such as driving, riding, and manual handling.⁸ At a certain time during their lives, more than 80% of the population will experience an episode of LBP.⁹ The incidence of two-wheeler fatalities has been more frequent in several South-East Asian countries than in any other vehicle. One of the major reasons for the muscular exhaustion of the motorcycle rider leading to accidents or close accidents, from many causes of postural exhaustion, was awkward riding posture. The reasons for musculoskeletal exhaustion while ride seems to have been broken highways, poor weather conditions, elevated motorcycle vibratory effects, improper riding position, cognitive load, physiological aspects of the person, and motorcycle structure.¹⁰ The stance of a motorcyclist is impacted by path or ground aspects such as bouncy, and steep respectively. Due to poor driving conditions, the shock absorber system blocks the effect of movement produced. Bumpy areas such as dirt tracks or dusty steep descents, made the braking system unsuccessful. Numerous researchers have already tested the efficacy of various shock absorbers or dampers on hand-arm or whole-body vibration from unexpected road conditions or rough ride areas.¹¹⁻¹³

The motorcycle was a mobile workstation (vehicle) that had been fixed or non-adjustable. The adjustable feature was excluded: side view mirrors.¹⁴ Several other automobiles (workstations) such as cars,

trucks, and off-road vehicles have provided flexible seating configurations which help the driver complete their tasks despite minimal discomfort. The motorcycle rider would have to perform the task such as gear activity, front/back wheel brakes, control, etc. in a controlled ride stance, offering little outward movements regarding bikes.¹⁵ The location of the rider depended on the motorcycle's operating systems, such as seating/saddle, grasp of the clutch lever and feet support/floor. The aspect of those elements and placement/position was crucial for decided human postures.¹⁶ A rider's physical characteristics (suitable measure, age, sex, etc.), riding skill, riding length, etc. were also major factors of the riding role followed. Also in this sense, this was exceedingly tough to locate that the most likely aspect influenced the riding position and hence the pain/exhaustion¹⁰. Many of the motorcycles commercially available are not ergonomically built. They are structured to keep a particular community of individuals in mind.

Many bikes were meant to attract younger generations, many were designed to attract individuals who wanted a strong fuel economy and some wanted the bike to lift weight¹⁷. External features such as appearance and style, omitting elements of comfort, omitting the protective feature, and making the bike a 'design statement vehicle' have always governed the option of the bike. The showmanship was generally based on the ads for bicycles. To minimize posture tension and discomfort, functional relaxation and protection must also be kept in mind when buying a bike¹⁸. The purpose of this research is to provide a clearer understanding among motorcyclists of the risk factors of muscular fatigue due to bike riding. Factors that appear to have a significant impact on musculoskeletal problems in respect of the biological, environmental, vehicle, psychological, daily activities, and discomfort

of motorcyclists particularly people who use motorcycles for recreational purposes. The main purpose of the study was to find the prevalence of lower back pain in cross-country motorcyclists and the factors affecting LBP.

METHODS

In this cross-sectional study, the data was collected from CRC-Club six months after approval of the synopsis. The sample size was calculated to be 150 which an estimated proportion of 0.53, desired precision of estimate 0.08, and a confidence level of 0.95. The motorcyclists who drive motorbikes for more than one hour daily, aged between 18 to 60 years and those who drive on different quality roads (highways, narrow and unpaved) and experience lower back pain for more than three months were included. Patients with a history of any infection or inflammation, recent injury, tumor, systemic or degenerative disease or disability were excluded from the study. Data collection procedure: A questionnaire was developed, and pilot testing was done. We determine the reliability of the questionnaire using Cronbach's alpha. After that, data was collected by filling out questionnaires from CRC club bikers.

RESULTS

The results showed that 16 motorcyclists had no discomfort, 80 had mild discomfort, 48 had moderate discomfort and 4 had severe discomfort. The results showed that motorcyclists with a riding duration of 1 hour were 3, more than 3 hours were 98, 5-8 hours were 39 and 10 hours were 10 motorcyclists (Table 1). The results showed that the mean low back pain of the motorcyclist was 5.25 ± 2.32 the minimum was 0 and the maximum was 10 (Table 2). The results showed that there were a total of 3 motorcyclists whose riding duration was 1 hour out of them none had no discomfort, 2 had mild discomfort, 1 had moderate discomfort and none had severe

Table 1: Riding posture and Riding Duration of motorcyclists

		Frequency (%)
Riding posture	Slump	90(60%)
	Flat	12(8%)
	Long Lordosis	15(10%)
	Short Lordosis	33(22%)
Riding Duration	1 hour	3(2%)
	>3 Hours	98(65.3%)
	5-8 Hours	39(%)
	10 Hours	10(6.7%)

discomfort. There were a total of 98 motorcyclists whose riding duration was more than 3 hours out of them 23 had no discomfort, 31 had mild discomfort, 30 had moderate discomfort and 14 had severe discomfort. There were a total of 9 motorcyclists whose riding duration was 5 to 8 hours out of them none had no discomfort, 2 had mild discomfort, 1 had moderate discomfort and none had severe discomfort. There was a total of 10 motorcyclists whose riding duration was more than 10 hours out of them 3 had no discomfort, none had mild discomfort, 4 had moderate discomfort and 3 had severe discomfort. There is a strong association between riding duration and low back pain (Table 3). Results showed that there were a total of 90 motorcyclists who had slump posture out of them 8 had no neck discomfort. 24 had mild discomfort, 39 had moderate discomfort and 19 had severe discomfort. There were a total of 12 motorcyclists, 3 of them had no discomfort, 2 had mild discomfort, 5 had moderate discomfort and 2 had severe discomfort. There was a total of 15 motorcyclists who had long lordosis posture 8 of them had no discomfort, 6 had mild discomfort and 1 had mild and none had severe discomfort. There were a lot

of all 33 motorcyclists who had short lordosis 7 out of them had no discomfort, 13 had mild discomfort, 13 had moderate discomfort and none had severe discomfort. There was a strong association between riding posture and upper back discomfort (Table 4).

Table 2: Discomfort in Motorcyclists

Pain & Discomfort		Frequency (%)
Low Back Discomfort	No discomfort	26(17.3%)
	Mild	45(30.0%)
	Moderate	58(38.7%)
	Severe	21(14.0%)
Low Back Pain (Mean ±SD)		5.25±2.32

DISCUSSION

In the present study, we aimed to study the prevalence of lower back pain and associated risk factors in cross-country motorcyclists. In this study, one hundred and fifty cross-country motorcyclists participated. In this study, there was a significant association of sitting posture with lower back discomfort ($p=.000$). Motorcyclists who had slump postures had more severe pain than motorcyclists who had flat postures, long lordosis postures, and short lordosis postures. There might, therefore, be a need to educate cross-country motorcyclists to avoid slump posture while riding. In a previous study, sitting position on a motorcycle also had a significant statistical association with LBP ($\chi^2 = 10.73$ $p=0.001$), with a greater proportion of those who bend forward while riding (77.8%) having LBP compared to 38.9% among those who sit upright. Bending forward while riding was associated with LBP in a greater proportion of motorcyclists than sitting upright. In a 2017 study conducted by Wójcik R., Trybulec B.,

Table 3: Association between Low Back Pain and Riding Duration

Riding duration	Low back Discomfort				Total
	No discomfort	Mild discomfort	Moderate discomfort	Severe discomfort	
1 hour	0	2	1	0	3
More than 3 hours	23	31	30	14	98
5-8 hours	0	12	23	4	39
More than 10 hours	3	0	4	3	10
Total	0	2	1	0	3
P-value	.006				

Table 4: Association between Riding Posture and Low Back Discomfort

Riding posture	Low back Discomfort				Total
	No discomfort	Mild discomfort	Moderate discomfort	Severe discomfort	
Slump	8	24	39	19	90
Flat	3	2	5	2	12
Long lordosis	8	6	1	0	15
Short lordosis	7	13	13	0	33
Total	26	45	58	21	150
P-value	.000				

consisting of 2,124 motorcyclists aged 19-79 years, using motorcycles with an engine size greater than 50 cc and participating in at least 1 riding season. An initial questionnaire, consisting of questions about riding a motorcycle and diseases of all parts of the spine, was used online. In every section of the spine during motorcycle riding, 1,240 people (58.4%) reported pain. Men were more likely to experience pain 770(43.9%) than women 114 (30.8%). About 569 (26.8%) individuals reported neck pain, 187 individuals (8.8%) reported thoracic pain and 826 individuals (38.9%) reported lumbosacral pain. The VAS

pain level ranged from 3.96 ± 0.6 in the neck, 4.19 ± 1.75 in the thoracic spine, and 4.02 ± 1.7 in the lumbosacral spine. A statically relevant difference ($p=0.033$) between the severity of pain in the spine without division into separate parts and the type of motorcycle was registered. Cross/enduro users were found to have the highest proportion (51.1% of people with spinal pain). The disparity between neck pain and the use of sports-style motorcycles was also statistically significant ($p=0.001$); neck pain occurred in 31.5 percent of drivers of this type. There was no statistically significant difference between the type of

motorcycle and the frequency of incidence of pain in any specific spine section.¹⁹ In this study, cross-country motorcyclists who rode a motorcycle for longer hours in a day, experienced lower back discomfort because there is a significant association between riding duration and lower back discomfort ($p=.006$). Previous studies showed that participants who drove for more than 7 hours per day, i.e., 8-16 hours per day, increased the risk of LBP by approximately 10 times more than those who drove for 1-7 hours per day, but it is unlikely that this study was among car drivers. In Nigeria, Ogundele et al. reported that a higher percentage of full-time commercial motorcyclists who worked more than 8 hours per day reported LBP than part-time commercial motorcyclists who ride less than 7 hours per day.²⁰ The physical examination or diagnostic was not performed by the researchers. Biomechanical risk factors, environmental risk factors and psychological risk factors among motorcyclists were not reported in this study. To validate the finding of this study large-scale multicenter studies are recommended to screen motorcyclists for low back discomfort and its possible consequences.

CONCLUSION

It was found that low back discomfort increased as riding time increased. Therefore, while riding, riders should rest. In addition, it was determined that among flat posture, long lordosis, and short lordosis, slump posture is the worst. Therefore, riders on motorcycles should refrain from slumping.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

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