International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

IJAMSCR |Vol.14 | Issue 2| Apr - Jun - 2026

www.ijamscr.com

DOI : https://doi.org/10.61096/ijamscr.v14.iss2.2026.715-735

ISSN: 2347-6567

A Survey on Prevalence of Prolonged Two-Wheeler Riding on Shoulder Pain in Young Adults

[1*]Surendar Raj A, [2]Dr. Shwetha Sasidharan, [3]Dr. Pinky Dutta

[1]*Masters of Physiotherapy, Garden City University*
[2]*Assistant Professor, Garden City University*
[3]*HOD of Physiotherapy Department, Garden City University Garden City University, Bengaluru.*

Published on: 27.04.2026
Published by: Futuristic Publications

Abstract:

Background: Two-wheeler riding is one of the most common modes of transportation among young adults, especially in urban areas. Prolonged riding involves maintaining a static posture with the arms extended and shoulders elevated, which places continuous strain on the shoulder and upper back muscles. Over time, this posture, combined with vibration and repetitive movements, can lead to shoulder pain and functional limitations. Understanding the prevalence and contributing factors of shoulder discomfort among frequent two-wheeler riders is essential for developing preventive physiotherapy and ergonomic strategies.

Objective: This study was conducted to determine the prevalence of Prolonged Two-Wheeler Riding on Shoulder Pain in Young Adults.

Methods: An observational cross-sectional survey was conducted among young adults aged 18–35 years who regularly ride two-wheelers. Participants completed a structured Google Form that included demographic details, riding habits, and the Shoulder Pain and Disability Index (SPADI) to assess pain intensity and functional limitations. Data were analysed descriptively to determine the prevalence of shoulder pain and its relationship with riding exposure.

Results: This study included 104 two-wheeler riders aged 19–35 years, with more males (64.4%) than females (35.6%). Most were students or working professionals who rode frequently, with 41.3% riding 60–90 minutes daily. Scooters (44.2%) and motorbikes (38.5%) were the most used vehicles. About 73.5% carried backpacks while riding, and only 23.1% maintained an upright posture. Shoulder pain was reported by 85.6% of participants, mostly moderate to severe (NPRS 6–7). SPADI scores indicated moderate pain and disability, especially during sleeping on the painful side, lifting, and overhead activities. The study highlights a strong association between prolonged riding, poor posture, and shoulder pain, emphasizing the need for ergonomic awareness and preventive physiotherapy.

Conclusion: The study concludes that prolonged two-wheeler riding is associated with increased risk of shoulder pain and functional limitations in young adults. Promoting ergonomic awareness, maintaining proper riding posture, and performing regular shoulder and upper back exercises can help prevent musculoskeletal strain and improve comfort and performance during riding.

Keywords: Shoulder Pain, Two-Wheeler Riders, SPADI, Young Adults, Ergonomics, Musculoskeletal Disorders, Posture, Physiotherapy, Riding Duration, Functional Disability.

A Survey on Prevalence of Prolonged Two-Wheeler Riding on Shoulder Pain in Young Adults -Observational Study

INTRODUCTION:

Two-wheeled vehicles, encompassing motorcycles, scooters, and mopeds, constitute a pivotal component of the global transportation matrix. Their prominence is particularly pronounced in low- and middle-income countries, where they serve as an affordable and efficient solution to urban congestion, and in high-income nations, where they are valued for recreation and specific commercial applications [1]. The utilitarian scope of these vehicles is vast, ranging from daily commuting and logistical support to specialized sectors like food delivery, courier services, and ride-hailing, industries increasingly dominated by a young, dynamic workforce [2]. While the acute, traumatic injuries resulting from two-wheeler accidents have justifiably been the focus of extensive public health campaigns and research, a more insidious and chronic health issue has garnered increasing attention: the non-traumatic musculoskeletal consequences associated with prolonged riding [3]. This shift in focus recognizes that the very act of operating a two-wheeler, even in the absence of a collision, exposes the rider to a unique constellation of physical stressors capable of inducing significant musculoskeletal morbidity over time [4].

The operational dynamics of two-wheeler riding impose a complex biomechanical load on the human body, distinct from that experienced in four-wheeled vehicles or sedentary office environments. Riders are required to maintain sustained, semi-static postures for extended periods while simultaneously managing whole-body balance and reacting to a constantly changing traffic environment [5]. This role demands continuous neuromuscular engagement, particularly from the upper quadrant, to stabilize the vehicle, control the handlebars, and absorb mechanical shocks from road irregularities [6]. Consequently, the musculoskeletal system of a regular rider is subjected to a combination of sustained postural stress, whole-body and segmental vibration, and repetitive, low-intensity dynamic loading [7]. These factors are established risk factors for the development of work-related musculoskeletal disorders (WRMSDs) in various occupational groups, yet their combined and specific impact on two-wheeler riders is only beginning to be systematically quantified [8].

Within the anatomical regions affected, the shoulder complex emerges as a critically vulnerable site. The shoulder, a marvel of mobility comprising the glenohumeral, acromioclavicular, and scapulothoracic articulations, is central to the riding task [9]. It functions as a primary link between the rider's torso and the handlebars, responsible for steering input, maintaining stability against crosswinds and road camber, and executing controlled manoeuvres such as braking, leaning, and counter-steering [10]. To perform these tasks, the rotator cuff muscles, deltoid, and scapular stabilizers (e.g., trapezius, serratus anterior) must maintain continuous, often low-level, activation. This prolonged activation can lead to muscle fatigue, reduced blood flow, and the accumulation of metabolic waste products, initiating a cascade of discomfort and pain [11]. Furthermore, the riding posture itself is a significant contributor to shoulder pathology. A common posture on many standard motorcycles and scooters involves a forward trunk lean with the arms reaching forward and upward to grasp the handlebars [12]. This position can place the shoulder in a state of sustained flexion and abduction, potentially leading to impingement of the subacromial structures, including the supraspinatus tendon and subacromial bursa [13].

The pathophysiological mechanisms linking prolonged riding to shoulder pain are multifactorial and often interrelated. The first key mechanism is sustained static postural load. Unlike dynamic activities, riding often requires maintaining a fixed or semi-fixed upper body position for long durations [14] This static load on the shoulder girdle musculature, particularly the upper trapezius and levator scapulae, has been strongly correlated with the development of myofascial pain and tension neck syndrome in other occupational settings, such as computer users and assembly line workers [15]. The forward head and rounded shoulder posture adopted by many riders can lead to adaptive shortening of the pectoralis minor and tightening of the posterior shoulder capsule, thereby altering scapular kinematics—a condition known as scapular dyskinesis [16]. This dyskinesis disrupts the normal rhythm of the shoulder, compromising the subacromial space and predisposing the rider to rotator cuff tendinopathies and other impingement syndromes.[17]

A second, critically important mechanism is exposure to mechanical vibration. Two-wheelers transmit vibration from three primary sources: the engine, the tires, and the road surface. This vibration is channelled directly into the rider's body through the handlebars (hand-arm vibration) and the seat (whole-body vibration) [18]. Whole-body vibration has been prospectively linked to disorders of the spine in professional truck and bus drivers, with evidence suggesting it can cause microtrauma to vertebral structures and sustained muscle contraction [19]. More pertinent to the shoulder, vibration transmitted through the handlebars can cause vasoconstriction in the digital vessels (a component of Hand-Arm Vibration Syndrome) and, more broadly, induce reflexive co-contraction of the muscles of the forearm and shoulder as the body attempts to dampen the vibrations and maintain a firm grip [20]. This involuntary, high-frequency muscle activity significantly increases the meTableolic demand on the shoulder muscles, accelerating fatigue and potentially leading to overuse injuries [21]. A study on agricultural workers exposed to hand-arm vibration found a significantly higher prevalence of shoulder pain, underscoring the relevance of this mechanism to two-wheeler riders [22].

The third mechanism involves repetitive and dynamic loading. Riding is not a purely static endeavour. The rider must constantly make micro-adjustments to the handlebars to maintain balance and trajectory. More significant forces are generated during manoeuvres like hard braking, which requires isometric strength to resist the forward momentum of the body, and cornering, which engages the shoulder in controlling the lean angle of the bike [23]. These actions impose cyclical loads on the tendons and ligaments of the shoulder. Without adequate recovery time, this repetitive loading can lead to cumulative microtrauma, inflammation, and the development of overuse conditions such as bicipital tendinitis, rotator cuff tendinosis, and subacromial bursitis [24].

Empirical evidence is accumulating to substantiate the significant burden of shoulder pain among two-wheeler riders. An occupational study of pizza delivery riders, a group with high exposure times, found that 62.1% of respondents reported musculoskeletal complaints, with the shoulder being the second most commonly affected site, reported by 39.2% of the cohort. Similarly, a study of commercial motorcyclists in Karachi, Pakistan, revealed that 34.4% of riders experienced shoulder discomfort, with a clear association to their daily riding duration, which averaged 6-8 hours [25]. This suggests a potential dose-response relationship, a hallmark of occupational musculoskeletal disorders. Further supporting this, a study among medical representatives in India, who extensively use two-wheelers for travel, demonstrated a positive correlation between the number of hours spent riding per day and the severity of self-reported pain and disability, particularly in the neck and shoulder regions [26]. The problem is not confined to any single region; studies from Nigeria, Thailand, and Brazil have similarly reported a high prevalence of shoulder and upper back pain among commercial motorcyclists, indicating a global pattern [27].

Despite this compelling evidence, a significant research gap persists. Much of the existing literature on two-wheeler-related morbidity either focuses on traumatic injuries or groups shoulder pain with other regional complaints, such as "neck-shoulder" pain, thereby obscuring the specific risk factors and impact unique to the shoulder complex [3]. Furthermore, while young adults represent a core demographic for two-wheeler use, both for economic commuting and in the burgeoning gig economy (e.g., food delivery platforms), there is a paucity of studies that specifically target this population for a detailed investigation of shoulder health [2]. Young adulthood is a critical period where preventive interventions could have the greatest impact, potentially averting the development of chronic, disabling pain that affects long-term productivity and quality of life.[19]

Therefore, this observational study is designed to systematically investigate the effect of prolonged two-wheeler riding on shoulder pain in young adults. By focusing specifically on this anatomical region and this vulnerable demographic, the study aims to quantify the prevalence of shoulder pain, identify key exposure variables (such as riding hours, vehicle type, and postural habits), and explore the functional impact on daily activities. The findings from this research will provide crucial evidence to inform public health strategies, guide the development of ergonomic interventions and rider education programs, and contribute to the occupational health discourse surrounding the safety of the millions of young people who depend on two-wheeled vehicles for their livelihood and mobility.

OBJECTIVE OF THE STUDY:

- Aim of the study is to determine the prevalence of prolonged two-wheeler riding on shoulder pain among young adults.

METHODS:

STUDY DESIGN: An observational cross-sectional study was conducted among young adults riding in a two-wheeler in prolonged time and to determine the prevalence of prolonged two-wheeler riding on shoulder pain among young adults.

STUDY SETTING AND DURATION: The study was conducted online in Bengaluru, Karnataka during the month of April 2025 to December 2024, across Bengaluru was chosen as the study setting due to availability of different locations.

SAMPLE SIZE

INCLUSION CRITERIA:

1. Age between 18–35 years.
2. Regular two-wheeler riders for ≥6 months.
3. Riding ≥2 hours per day or ≥10 hours per week.
4. Riders with or without shoulder pain.
5. Regular helmet use during riding (minimum 90% of rides).
6. Rides a motorbike minimum 4 days in a week.

Exclusion Criteria

1. History of shoulder injury or surgery in the past 12 months.
2. Acute shoulder pain or trauma within the last 6 weeks.
3. Inflammatory or rheumatologic disorders.
4. Neurological conditions affecting upper limb or shoulder.
5. Involvement in occupations/sports with heavy shoulder use.

METHODOLOGY

Data Collection: The cross- sectional survey used 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 prolonged two-wheeler riding on shoulder pain in young adults.

Statistical Analysis:

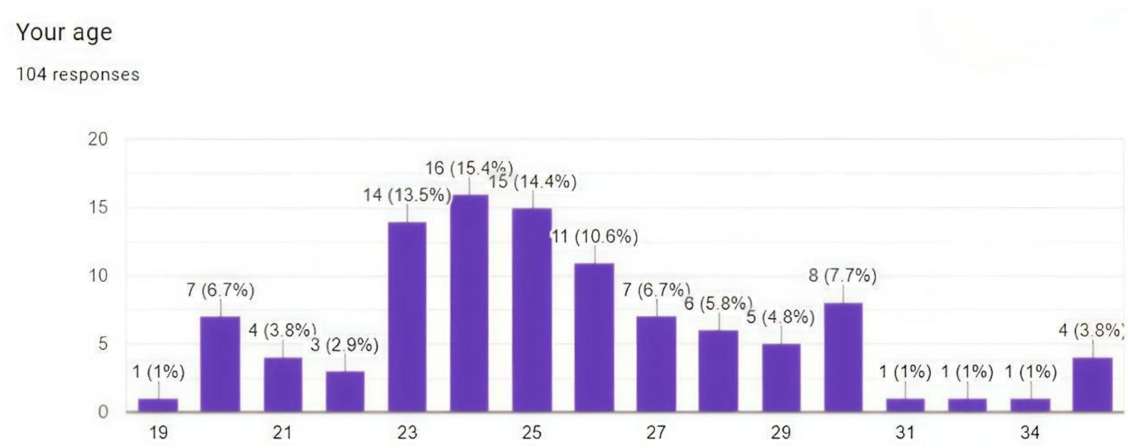
This study statistical analysis was conducted to evaluate the relationship between riding habits, ergonomic factors, and the prevalence of shoulder pain among two-wheeler riders. A total of 104 participants responded to the survey, which included both male and female riders from various occupational backgrounds. The study aimed to assess the frequency and duration of riding, types of two-wheelers used, postural habits, and protective equipment preferences such as helmets and backpacks.

Additionally, the analysis focused on identifying the prevalence, intensity, and functional impact of shoulder pain using standardized assessment tools, including the Numeric Pain Rating Scale (NPRS) and the Shoulder Pain and Disability Index (SPADI). These measures helped quantify both the subjective experience of pain and the extent of disability in performing daily activities. The collected data were summarized using descriptive statistics such as frequency distributions and percentages, enabling an understanding of demographic patterns (age, gender, occupation) and riding behaviour trends. The analysis also explored associations between variables—such as posture, riding duration, helmet type, and shoulder discomfort—to identify potential ergonomic risk factors contributing to musculoskeletal issues among riders.

1. AGE:

Table 1: A Table showing the number of respondents in each age group

Age	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
No of responses	1	7	4	3	14	16	15	11	7	6	5	8	1	1	0	1	4

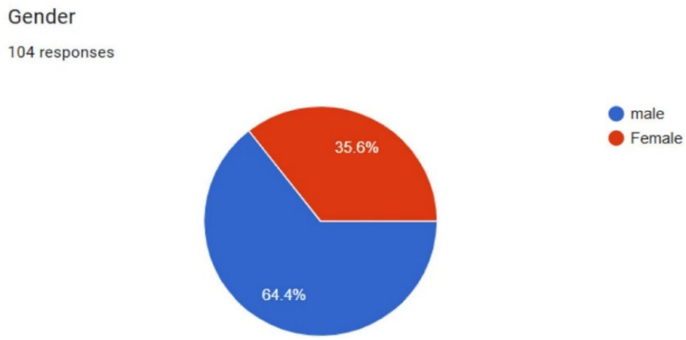


Graph 1: The bar graph shows that most respondents were between 23-25 years old, representing the young adult age group.

2. GENDER:

Table 2: A Table showing the number and percentage of respondents in according to gender.

Gender	**Male**	**Female**
No of responses	67(64.4%)	37(35.6%)

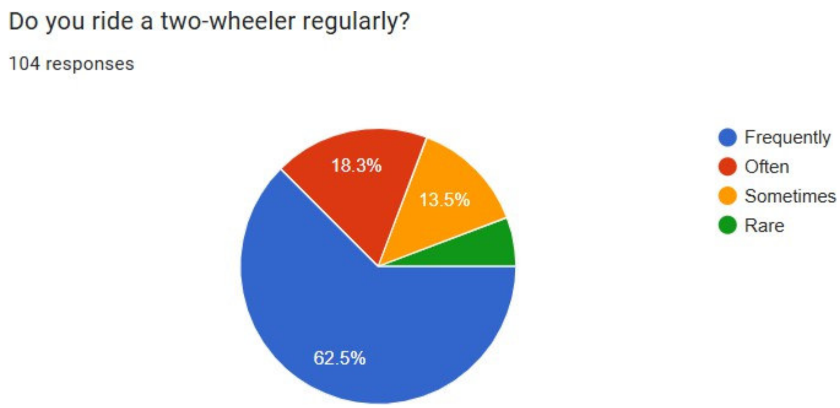


Graph 2: The pie chart shows the 67(64.4%) males and 37(35.6%) females are responded by gender. Out of a total of 104 respondents, the majority were male (64.4%), while female respondents accounted for 35.6%. This indicates a higher representation of males in the sample.

3. RIDING HABITS & ERGONOMICS:

Table 3.1: The Table shows the number and percentage of participants who ride a two-wheeler regularly.

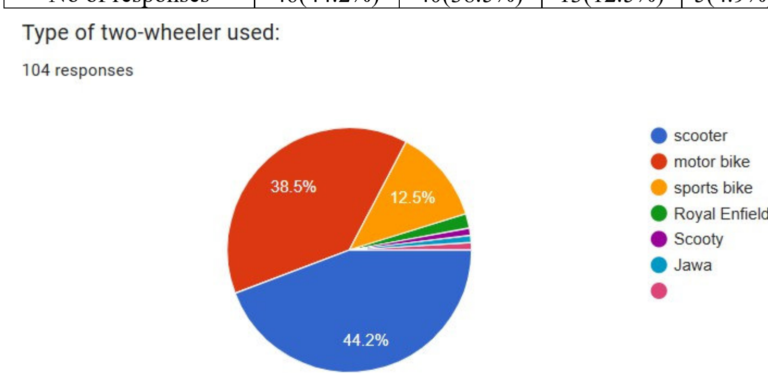
Ride a two wheeler regularly	Frequently	Often	Sometimes	Rare
No of responses	65(62.5%)	19(18.3%)	14(13.5%)	6(5.8%)



Graph 3.1: The pie chart shows the frequency of two-wheeler riding among participants. The majority (62.5%) reported riding frequently, 18.3% often, 13.5% sometimes, and only 5.8% rarely. This shows that most respondents are regularly involved in two-wheeler riding, which may contribute to higher chances of developing shoulder discomfort or pain over time.

Table3.2: The Table shows the number and percentage of participants according to the type of two-wheeler they used.

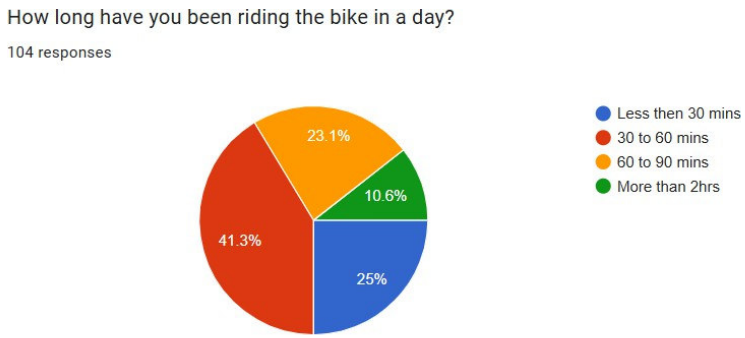
Type of two-wheeler	scooter	motorbike	sports bike	others
No of responses	46(44.2%)	40(38.5%)	13(12.5%)	5(4.9%)



Graph 3.2: The pie chart shows the distribution of respondents based on the type of two-wheeler they used. The majority (44.2%) used scooters, followed by 38.5% who used motorbikes. About 12.5% of respondents used sports bikes, while a small proportion used other types of two-wheelers such as Royal Enfield, Scooty, and Jawa.

Table 3.3: The Table shows the distribution of respondents according to their riding time in a day.

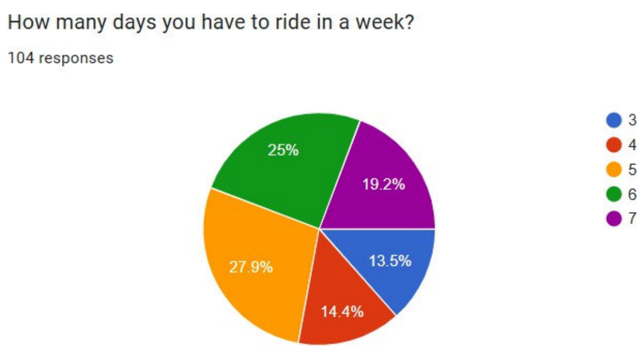
Riding time	Less than 30 mins	30-60mins	60-90mins	More than 2hours
No of Responses	26(25%)	43(41.3%)	24(23.1%)	11(10.6%)



Graph 3.3: The pie chart shows the daily riding duration of respondents. The majority of participants (41.3%) reported riding their bikes for 30 to 60 minutes per day. About 25% of respondents rode for less than 30 minutes, while 23.1% rode for 60 to 90 minutes. Only 10.6% of respondents reported riding for more than two hours per day.

Table 3.4: The Table shows the distribution of respondents according to the number of days they ride in a week.

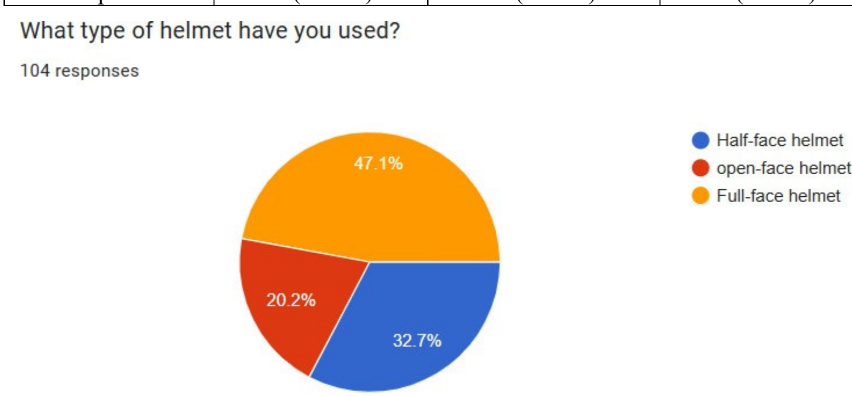
Day of ride in a week	3	4	5	6	7
No of Responses	14(13.5%)	15(14.4%)	29(27.9%)	26(25%)	20(19.2%)



Graph 3.4: The pie chart shows that the highest proportion of participants (29 respondents, 27.9%) reported riding five days a week, followed by 26 respondents (25%) who rode six days a week. About 20 respondents (19.2%) rode seven days a week, while smaller groups rode four days (15 respondents, 14.4%) and three days (14 respondents, 13.5%) per week.

Table 3.5: The Table shows the distribution of respondents based on the type of helmet they used**.**

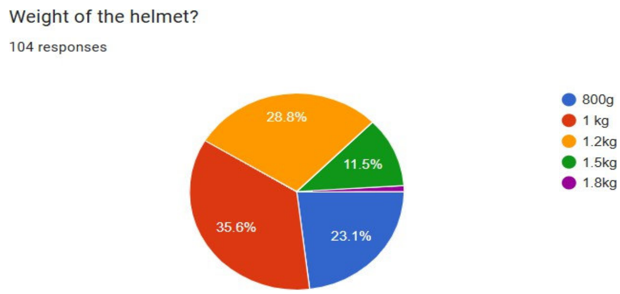
Type of helmet	Half-Face Helmet	Open-Face Helmet	Full-Face Helmet
No of responses	34(32.7%)	21(20.2%)	49(47.1%)



Graph 3.5: The pie chart shows the majority of participants (49 respondents, 47.1%) reported using a full-face helmet, followed by 34 respondents (32.7%) who used a half-face helmet, and 21 respondents (20.2%) who used an open-face helmet.

Table 3.6: The Table shows the distribution of respondents according to the weight of the helmet they used.

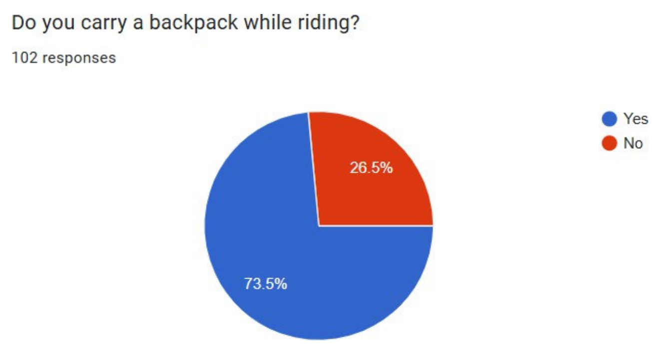
Weight of the helmet	800g	1kg	1.2kg	1.5kg	1.8kg
No of responses	24(23.1%)	37(35.6%)	30(28.8%)	12(11.5%)	1(1%)



Graph 3.6: The pie chart shows the majority of participants (37 respondents, 35.6%) reported using helmets weighing 1 kg, followed by 30 respondents (28.8%) who used helmets weighing 1.2 kg. About 24 respondents (23.1%) preferred helmets weighing 800 g, while 12 respondents (11.5%) used helmets weighing 1.5 kg, and only one respondent (1%) reported using a 1.8 kg helmet.

Table 3.7: The Table shows the distribution of respondents based on whether they carry a backpack while driving.

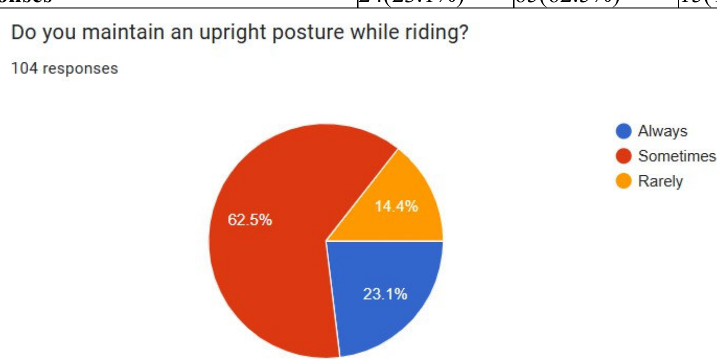
Carry a Backpack while Driving	yes	No
No of responses	75(73.5%)	27(26.5%)



Graph 3.7: The pie chart shows the majority of participants (75 respondents, 73.5%) reported carrying a backpack, while 27 respondents (26.5%) indicated that they do not carry one.

Table 3.8: The Table shows the distribution of respondents based on how often they maintain an upright posture while driving.

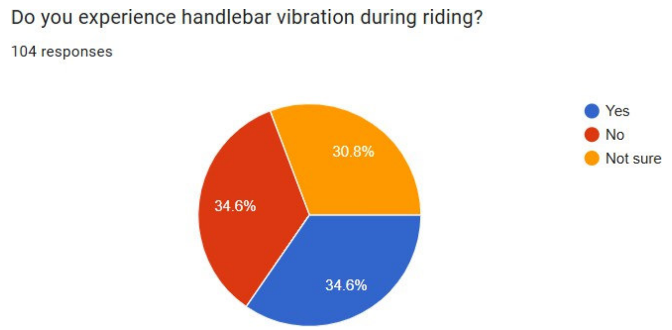
Maintain an upright posture while driving	always	sometimes	rarely
No of responses	24(23.1%)	65(62.5%)	15(14.4%)



Graph 3.8: The pie chart shows the majority of participants (65 respondents, 62.5%) reported sometimes maintaining an upright posture, while 24 respondents (23.1%) stated they always do so, and 15 respondents (14.4%) indicated they rarely maintain an upright posture while driving.

Table 3.9: The Table shows the distribution of respondents regarding handlebar vibration during riding.

Handle bar vibration during riding	yes	No	Not sure
No of responses	36(34.6%)	36(34.6%)	32(30.8%)

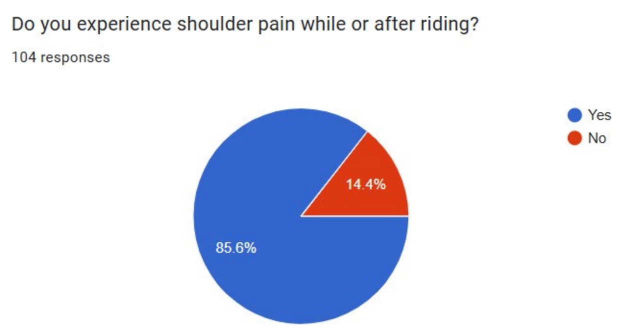


Graph 3.9: The pie chart shows an equal number of participants (36 respondents, 34.6%) reported experiencing or not experiencing handlebar vibration, while 32 respondents (30.8%) were not sure about it.

4. SHOULDER PAIN ASSESSMENT:

Table 4.1: The Table shows the number and percentage of participants who experienced shoulder pain while or after riding.

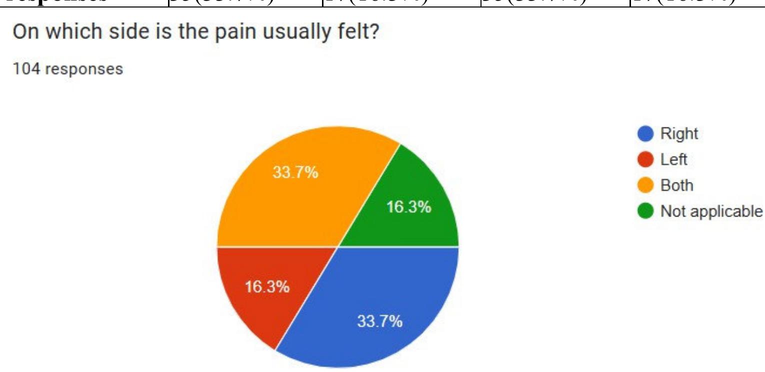
Shoulder pain while or after ride	yes	No
No of responses	89(85.6%)	15(14.4%)



Graph 4.1: The pie chart shows that the majority of respondents (85.6%) reported shoulder pain, while only 14.4% did not experience any pain.

Table 4.2: The Table shows the number and percentage of participants according to the side of shoulder pain experienced while or after riding.

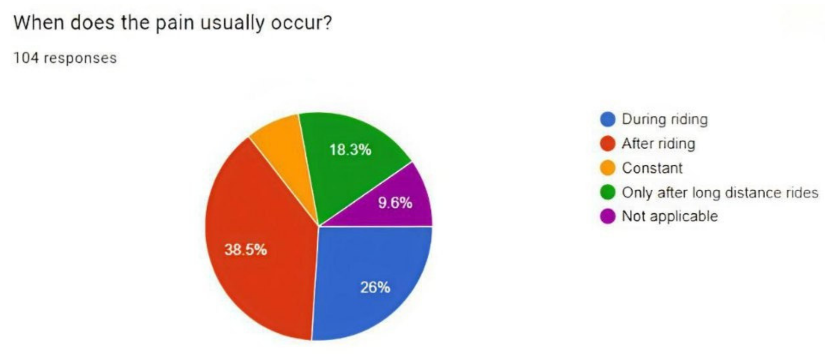
Side of the pain	Right	Left	Both	Not applicable
No of responses	35(33.7%)	17(16.3%)	35(33.7%)	17(16.3%)



Graph 4.2: The pie chart shows that an equal proportion of respondents (33.7%) reported pain on the right side and both sides, while 16.3% experienced pain on the left side and 16.3% reported no pain.

Table 4.3: The Table shows the number and percentage of participants according to when shoulder pain usually occurs.

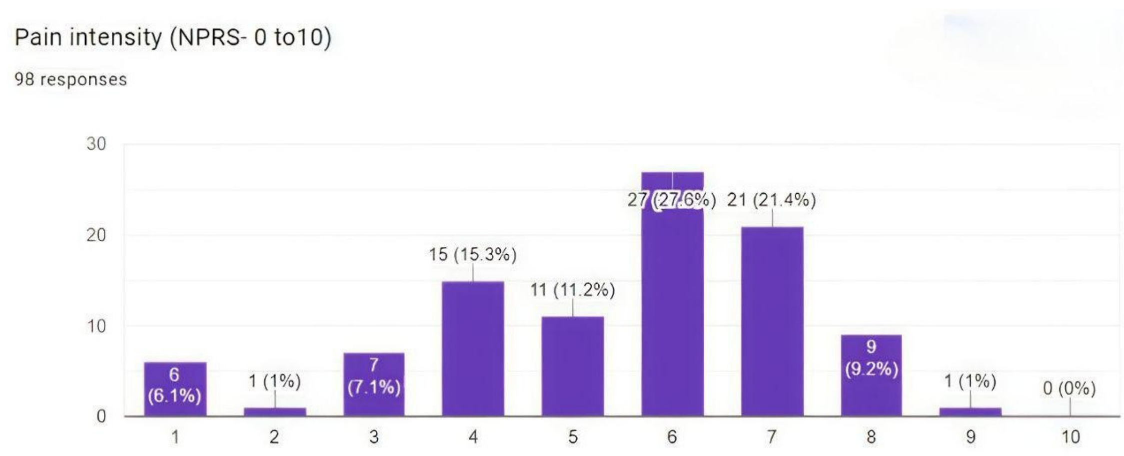
When the pain usually occurs	During ride	After ride	constant	Only after long distance rides	Not applicable
No of responses	27(26%)	40(38.5%)	8(7.7%)	19(18.3%)	10(9.6%)



Graph 4.3: The pie chart shows that the majority of respondents (38.5%) experienced pain after the ride, followed by 26% during the ride, 18.3% only after long-distance rides, 7.7% reporting constant pain, and 9.6% who did not experience any pain.

Table 4.4: The Table shows the number and percentage of participants according to the intensity of shoulder pain measured using the Numerical Pain Rating Scale (NPRS).

Pain Intensity (NPRS)	No of responses
0	0
1	6(6.1%)
2	1(1%)
3	7(7.1%)
4	15(15.3%)
5	11(11.2%)
6	27(27.6%)
7	21(21.4%)
8	9(9.2%)
9	1(1%)
10	0



Graph 4.4: The bars shows that most respondents (27.6%) rated their pain at level 6, followed by 21.4% at level 7 and 15.3% at level 4. Very few participants reported minimal pain levels (1–3) or higher levels (8–9), while none reported no pain (0) or the maximum level (10).

5. FUNCTIONAL IMPACT(SPADI):

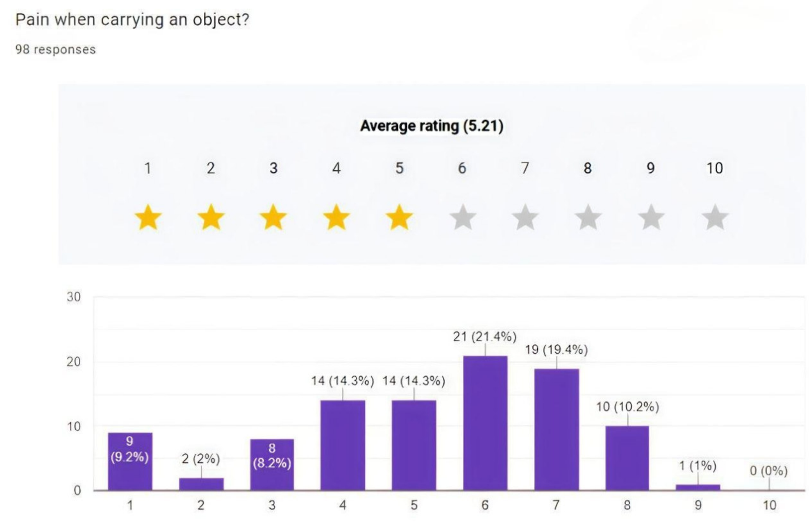
Table 5.1: The Table shows the number and percentage of participants according to the intensity of pain at its worst, measured using the SPADI scale.

PAIN AT ITS WORST	NO OF RESPONSES
0	0
1	7(7.1%)
2	2(2%)
3	10(10.1%)
4	8(8.1%)
5	20(20.2%)
6	26(26.3%)
7	17(17.2%)
8	8(8.1%)
9	0(%)
10	1(1%)

Graph 5.1: The bars shows that most respondents (26.3%) reported a pain level of 6, followed by 20.2% at level 5 and 17.2% at level 7. Smaller percentages reported lower pain levels (1–4) or higher levels (8–10), while none of the participants reported a pain level of 0 or 9.

Table 5.2: The Table shows the number and percentage of participants according to the intensity of pain experienced while carrying an object, measured using the SPADI scale.

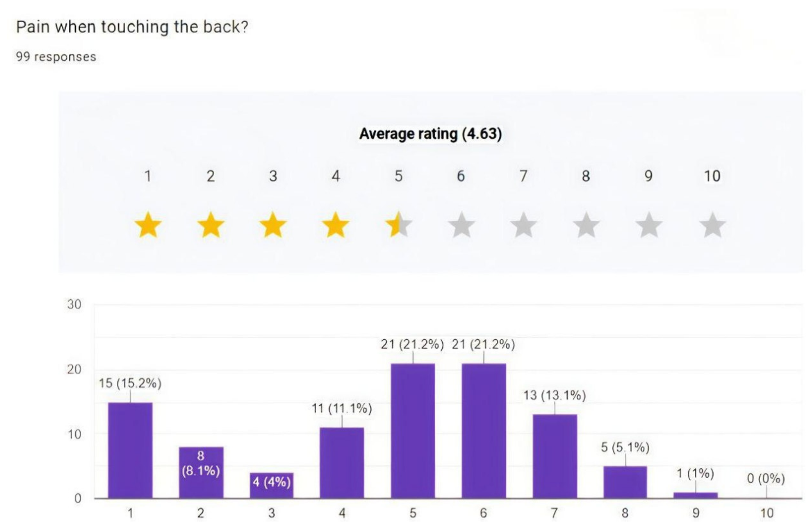
Pain when carrying on object	No of responses
0	0
1	9(9.2%)
2	2(2%)
3	8(8.2%)
4	14(14.3%)
5	14(14.3%)
6	21(21.4%)
7	19(19.4%)
8	10(10.2%)
9	1(1%)
10	0



Graph 5.2: The bars shows that most respondents (21.4%) reported a pain level of 6, followed by 19.4% at level 7 and 14.3% at levels 4 and 5. Smaller percentages reported lower pain levels (1–3) or higher levels (8–10), while none of the participants reported no pain (0) or the maximum pain level (10).

Table 5.3: The Table shows the number and percentage of participants according to the intensity of pain experienced when touching the back, measured using the SPADI scale.

Pain when touching the back	No of responses
0	0(%)
1	15(15.2%)
2	8(8.1%)
3	4(4%)
4	11(11.1%)
5	21(21.2%)
6	21(21.2%)
7	13(13.1%)
8	5(5.1%)
9	1(1%)
10	0(0%)



Graph 5.3: The bars shows that most respondents reported moderate pain levels, with 21.2% rating their pain as 5 and 21.2% as 6, followed by 13.1% at level 7. Smaller percentages reported lower pain levels (1–4) or higher levels (8–9), while none of the participants reported no pain (0) or the maximum pain level (10).

Table 5.4: The Table shows the number and percentage of participants according to the intensity of pain experienced while washing hair, measured using the SPADI scale.

Pain when washing hair	No of responses
0	0(%)
1	18(18.6%)
2	8(8.2%)
3	8(8.2%)
4	11(11.3%)
5	18(18.6%)
6	13(13.4%)
7	12(12.4%)
8	7(7.2%)
9	2(2.1%)
10	0(%)

Graph 5.4: The bars shows that most respondents reported moderate pain levels, with 18.6% rating their pain as 1 and 18.6% as 5, followed by 13.4% at level 6 and 12.4% at level 7. Smaller percentages reported lower (2–3) or higher pain levels (8–9), while none of the participants reported no pain (0) or the maximum pain level (10).

Table 5.5: The Table shows the number and percentage of participants according to the intensity of pain experienced during any activity, measured using the SPADI scale.

Pain during any activity	No of responses
0	0(%)
1	14(14.4%)
2	6(6.2%)
3	9(9.3%)
4	14(14.4%)
5	8(8.2%)
6	15(15.2%)
7	20(20.6%)
8	5(5.2%)
9	4(4.1%)
10	2(2.1%)

Graph 5.5: The bars shows that most respondents reported moderate to severe pain levels, with 20.6% rating their pain as 7, followed by 15.2% at level 6 and 14.4% at levels 1 and 4. Smaller percentages reported lower (2–3) or higher pain levels (8–10), while none of the participants reported no pain (0).

6. DISABILITY SUBSCALE

Table 6.1: The Table shows the number and percentage of participants according to the difficulty experienced while placing an item on a high shelf, measured using the SPADI scale

Difficulty placing item on high shelf	No of responses
0	0(%)
1	16(16.7%)
2	7(7.3%)
3	9(9.4%)
4	5(5.2%)
5	17(17.7%)
6	13(13.5%)
7	21(21.9%)
8	6(6.3%)
9	1(1%)
10	1(1%)

Graph 6.1: The bars shows that most respondents reported moderate to severe difficulty, with 21.9% rating their difficulty as 7, followed by 17.7% at level 5 and 16.7% at level 1. Smaller percentages reported lower (2–4) or higher difficulty levels (8–10), while none of the participants reported no difficulty (0).

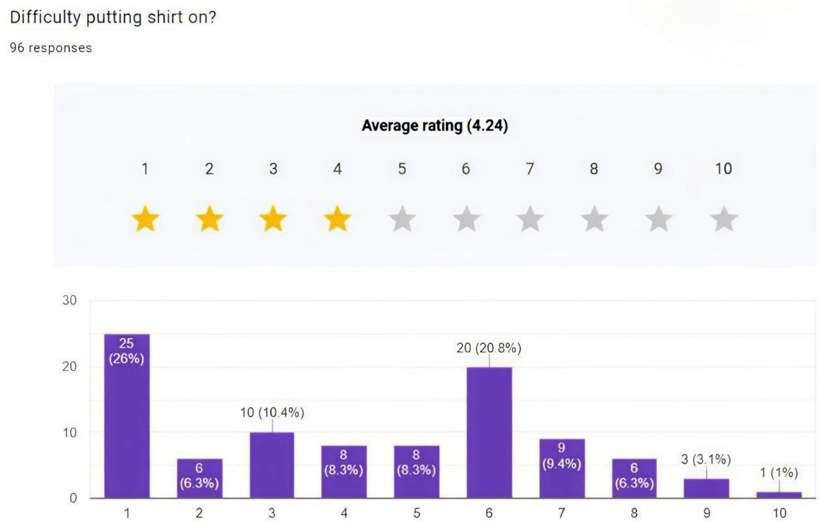
Table 6.2: The Table shows the number and percentage of participants according to the difficulty experienced while washing the back, measured using the SPADI scale

Difficulty washing back	No of responses
0	0
1	22(22.7%)
2	5(5.2%)
3	8(8.2%)
4	6(6.2%)
5	20(20.6%)
6	9(9.3%)
7	17(17.5%)
8	7(7.2%)
9	3(3.1%)
10	0(%)

Graph 6.2: The bars shows that most respondents reported moderate difficulty, with 22.7% rating their difficulty as 1, followed by 20.6% at level 5 and 17.5% at level 7. Smaller percentages reported lower (2–4) or higher difficulty levels (6–9), while none of the participants reported no difficulty (0) or the maximum difficulty level (10).

Table 6.3: The Table shows the number and percentage of participants according to the difficulty experienced while putting on a shirt, measured using the SPADI scale.

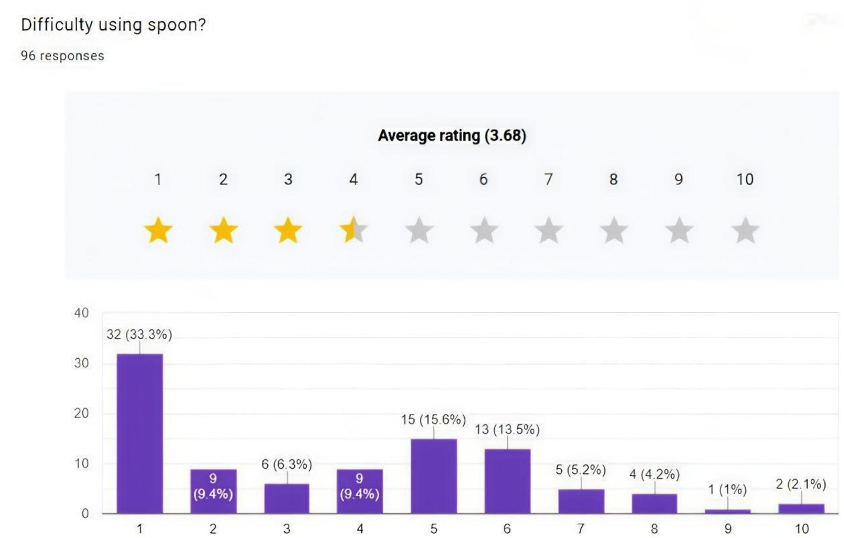
Difficulty putting shirt on	No of responses
0	0(%)
1	25(26%)
2	6(6.3%)
3	10(10.4%)
4	8(8.3%)
5	8(8.3%)
6	20(20.8%)
7	9(9.4%)
8	6(6.3%)
9	3(3.1%)
10	1(1%)



Graph 6.3: The bars shows that most respondents reported moderate difficulty, with 26% rating their difficulty as 1, followed by 20.8% at level 6 and 10.4% at level 3. Smaller percentages reported other lower (2, 4–5) or higher difficulty levels (7–10), while none of the participants reported no difficulty (0).

Table 6.3: The Table shows the number and percentage of participants according to the difficulty experienced while using a spoon, measured using the SPADI scale.

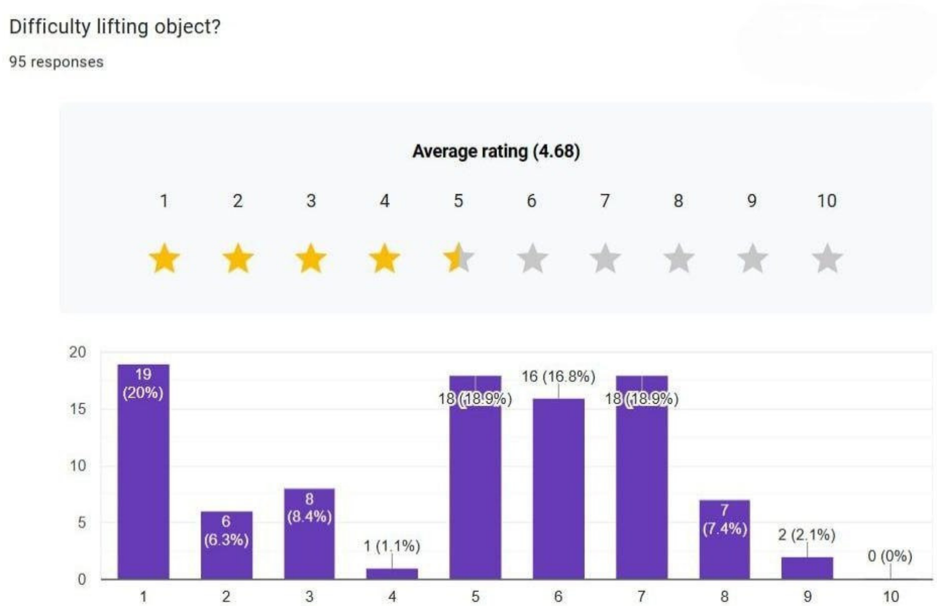
Difficulty using spoon	No of responses
0	0(%)
1	32(33.3%)
2	9(9.4%)
3	6(6.3%)
4	9(9.4%)
5	15(15.6%)
6	13(13.5%)
7	5(5.2%)
8	4(4.2%)
9	1(1%)
10	2(2.1%)



Graph 6.4: The bars shows that most respondents reported mild to moderate difficulty, with 33.3% rating their difficulty as 1, followed by 15.6% at level 5 and 13.5% at level 6. Smaller percentages reported other lower (2–4) or higher difficulty levels (7–10), while none of the participants reported no difficulty (0).

Table 6.5: The Table shows the number and percentage of participants according to the difficulty experienced while lifting an object, measured using the SPADI scale.

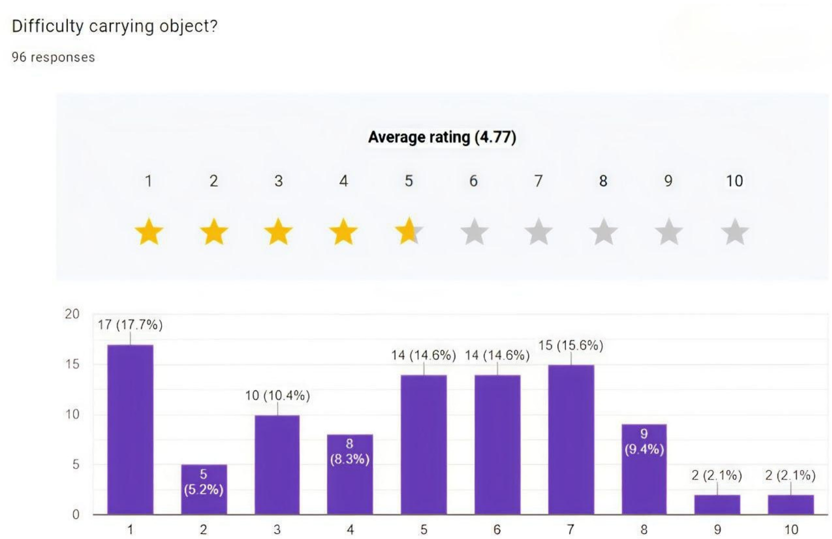
Difficulty lifting object	No of responses
0	0(%)
1	19(20%)
2	6(6.3%)
3	8(8.4%)
4	1(1.1%)
5	18(18.9%)
6	16(16.8%)
7	18(18.9%)
8	7(7.4%)
9	2(2.1%)
10	0(%)



Graph 6.5: The bars shows that most respondents reported moderate difficulty, with 20% rating their difficulty as 1, followed by 18.9% at levels 5 and 7, and 16.8% at level 6. Smaller percentages reported other lower (2–4) or higher difficulty levels (8–9), while none of the participants reported no difficulty (0) or the maximum level (10).

Table 6.6: The Table shows the number and percentage of participants according to the difficulty experienced while carrying an object, measured using the SPADI scale

Difficulty carrying object	No of responses
0	0(%)
1	17(17.7%)
2	5(5.2%)
3	10(10.4%)
4	8(8.3%)
5	14(14.6%)
6	14(14.6%)
7	15(15.6%)
8	9(9.4%)
9	2(2.1%)
10	2(2.1%)



Graph 6.6: The bars shows that most respondents reported moderate difficulty, with 17.7% rating their difficulty as 1, followed by 15.6% at level 7 and 14.6% at levels 5 and 6. Smaller percentages reported other lower (2–4) or higher difficulty levels (8–10), while none of the participants reported no difficulty (0).

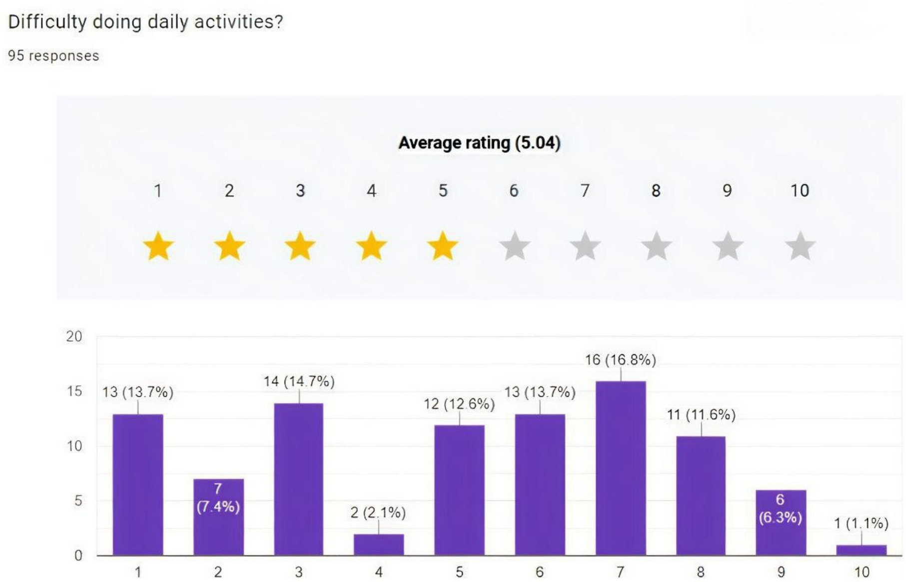
Table 6.7: The Table shows the number and percentage of participants according to the difficulty experienced while sleeping on the painful side, measured using the SPADI scale.

Difficulty sleeping on painful side	No of responses
0	0(%)
1	12(12.4%)
2	7(7.2%)
3	9(9.3%)
4	8(8.2%)
5	12(12.4%)
6	13(13.4%)
7	15(15.5%)
8	13(13.4%)
9	6(6.2%)
10	2(2.1%)

Graph 6.7: The bars shows that most respondents reported moderate difficulty, with 15.5% rating their difficulty as 7, followed by 13.4% at levels 6 and 8, and 12.4% at levels 1 and 5. Smaller percentages reported other lower (2–4) or higher difficulty levels (9–10), while none of the participants reported no difficulty (0).

Table 6.8: The Table shows the number and percentage of participants according to the difficulty experienced while performing daily activities, measured using the SPADI scale

Difficulty doing daily activities	No of responses
0	0(%)
1	13(13.7%)
2	7(7.4%)
3	14(14.7%)
4	2(2.1%)
5	12(12.6%)
6	13(13.7%)
7	16(16.8%)
8	11(11.6%)
9	6(6.3%)
10	1(1.1%)



Graph 6.8: The bars shows that most respondents reported moderate difficulty, with 16.8% rating their difficulty as 7, followed by 14.7% at level 3 and 13.7% at levels 1 and 6. Smaller percentages reported other lower (2, 4–5) or higher difficulty levels (8–10), while none of the participants reported no difficulty (0).

RESULTS:

The study involved 104 two-wheeler riders aged between 19 and 35 years, with a higher proportion of males (64.4%) than females (35.6%). Most participants were young adults, predominantly students and working professionals. A majority of respondents (62.5%) rode frequently, and 41.3% reported riding for 60–90 minutes daily. Scooters (44.2%) and motorbikes (38.5%) were the most common vehicles used. About 73.5% carried a backpack while riding, and only 23.1% maintained an upright posture consistently. Shoulder pain was reported by 85.6% of participants, with 33.7% experiencing pain on both sides and 38.5% noting that it occurred after riding. The average pain intensity on the Numeric Pain Rating Scale ranged from moderate to severe (scores 6–7). According to the Shoulder Pain and Disability Index (SPADI), participants experienced moderate pain and functional disability, with the highest difficulty reported during activities such as sleeping on the painful side, carrying or lifting objects, and performing overhead tasks. The findings highlight a significant link between prolonged riding duration, poor posture, and shoulder discomfort, emphasizing the need for ergonomic corrections, posture training, and preventive physiotherapy strategies among regular two-wheeler users.

DISCUSSION:

This study found a high prevalence of shoulder pain (85.6%) among young adults engaged in prolonged two-wheeler riding, mainly due to poor posture, extended riding time, weight of the helmet and backpack use. Similar findings were reported by Koley et al. (2019), who observed increased shoulder and neck pain among frequent riders because of sustained posture and vibration exposure. Only 23.1% of participants in this study maintained an upright posture, emphasizing the need for better ergonomic awareness. Previous studies have examined musculoskeletal pain in motorcyclists in general, but limited research has focused specifically on young adults and the impact of prolonged riding duration on shoulder pain. This study addresses that gap and highlights the importance of ergonomic corrections and preventive physiotherapy to reduce discomfort among regular riders.

The findings of the study demonstrate a high prevalence (85.6%) of shoulder pain among young adults who ride two-wheelers frequently. This suggests that repetitive strain and static posture during riding are major contributors to shoulder discomfort. The predominance of male participants reflects the demographic trend of higher male involvement in two-wheeler commuting. Most respondents belonged to the 23–25 years age group, which is consistent with the population that most frequently uses two-wheelers for daily commuting, education, and work. Ergonomic factors such as helmet weight, posture, and carrying backpacks appear to play a significant role in the development of shoulder pain. Riders using heavier helmets (>1.2 kg) and those who carried backpacks regularly reported more pain and discomfort, likely due to increased load on the trapezius and deltoid muscles, leading to muscle fatigue and strain.

The finding that a majority of riders (62.5%) maintained an upright posture only sometimes indicates that poor riding ergonomics contribute to shoulder pain. Previous studies have reported similar associations between sustained forward head posture, rounded shoulders, and muscular imbalance in riders. The SPADI results further reinforce that functional activities involving shoulder movement, such as lifting, reaching overhead, and dressing, were affected. These findings suggest early signs of musculoskeletal strain due to repetitive or prolonged static loading of the shoulder girdle. Pain intensity, with most participants rating between 4–7 on the NPRS, indicates moderate chronic pain, which may worsen if ergonomic factors remain unaddressed. Overall, the data suggest that prolonged riding duration, suboptimal posture, and additional load (backpacks or heavy helmets) are significant contributors to shoulder pain and reduced upper limb function among young adults.

LIMITATIONS AND SUGGESTIONS

This study has certain limitations. It was conducted only among young adults aged 18–35 years who ride two-wheelers regularly, which limits the generalization of the results to other age groups or professional riders. The data were collected using self-reported questionnaires, which may lead to recall bias or subjective variations in pain reporting. Factors such as riding posture, handlebar height, seat position, and physical activity levels were not directly measured, which might have influenced the findings. The study design was cross-sectional; therefore, a cause–effect relationship between prolonged riding and shoulder pain cannot be established. Despite these limitations, the study provides valuable insight into the musculoskeletal health concerns of young two-wheeler riders.

Based on the results, it is suggested that regular ergonomic awareness and physiotherapy-based education programs should be organized to guide riders on maintaining proper posture, adjusting handlebar height, and taking adequate rest breaks during long rides. Riders should be encouraged to perform shoulder and upper back stretching and strengthening exercises to improve endurance and reduce fatigue. Two-wheeler manufacturers and training institutes can also promote ergonomic designs and posture training to minimize strain on the shoulder region. Regular physiotherapy screening and early intervention can help identify riders at risk of developing chronic shoulder pain. Further studies involving a larger population, inclusion of posture analysis, and long-term follow-up are recommended to develop more effective preventive and rehabilitative strategies for riders.

CONCLUSION

This study concludes that shoulder pain is commonly observed among young adults who engage in prolonged two-wheeler riding. The main contributing factors include sustained static posture, forward leaning, continuous handlebar holding, and exposure to road vibration during long rides. These elements place constant stress on the shoulder and upper back muscles, leading to fatigue, stiffness, and functional discomfort. The study emphasizes the importance of ergonomic awareness and posture correction among regular riders to prevent shoulder-related musculoskeletal problems. Implementing preventive strategies such as proper riding posture, periodic rest breaks, and shoulder-strengthening and stretching exercises can significantly reduce discomfort and improve overall riding comfort. Regular physiotherapy screening, ergonomic education, and appropriate modifications in vehicle design can help promote better musculoskeletal health and enhance the safety and well-being of young two-wheeler riders.

CONFLICT OF INTEREST: There is no conflict of interest.

REFERENCES

1. World Health Organization. (2018). *Global status report on road safety 2018*. World Health Organization.

2. Okunribido, O. O., Magnusson, M., & Pope, M. H. (2008). Delivery drivers and low-back pain: A review of the literature. *International Journal of Industrial Ergonomics*, 38(11-12), 925-931.

3. Kumar, A., & Singh, J. K. (2019). Prevalence of musculoskeletal disorders among motorcycle riders: A systematic review. *Journal of Transport & Health*, 15, 100625.

4. Widanarko, B., Legg, S., Devereux, J., & Stevenson, M. (2014). The combined effect of physical, psychosocial/organisational and/or environmental risk factors on the presence of work-related musculoskeletal symptoms and its consequences. *Applied Ergonomics*, 45(6), 1610-1621.

5. Cripton, P. A., & Brubaker, J. R. (2007). Biomechanics of motorcycle riding: A review. *International Journal of Industrial Ergonomics*, 37(7), 555-567.

6. Rose, L. M., & Orrenius, U. E. (2016). Analysis of rider and driver musculoskeletal discomfort and vehicle design. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 60(1), 937-941.

7. Punnett, L., & Wegman, D. H. (2004). Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. *Journal of Electromyography and Kinesiology*, 14(1), 13-23.

8. da Costa, B. R., & Vieira, E. R. (2010). Risk factors for work-related musculoskeletal disorders: A systematic review of recent longitudinal studies. *American Journal of Industrial Medicine*, 53(3), 285-323.

9. Ludewig, P. M., & Reynolds, J. F. (2009). The association of scapular kinematics and glenohumeral joint pathologies. *Journal of Orthopaedic & Sports Physical Therapy*, 39(2), 90-104.

10. Michener, L. A., McClure, P. W., & Karduna, A. R. (2003). Anatomical and biomechanical mechanisms of subacromial impingement syndrome. *Clinical Biomechanics*, 18(5), 369-379.

11. Visser, B., & van Dieën, J. H. (2006). Pathophysiology of upper extremity muscle disorders. *Journal of Electromyography and Kinesiology*, 16(1), 1-16.

12. Lewis, J. S. (2009). Rotator cuff tendinopathy/subacromial impingement syndrome: is it time for a new method of assessment? *British Journal of Sports Medicine*, 43(4), 259-264.

13. Solem-Bertoft, E., Thuomas, K. A., & Westerberg, C. E. (1993). The influence of scapular retraction and protraction on the width of the subacromial space. An MRI study. *Clinical Orthopaedics and Related Research*, (296), 99-103.

14. Ariëns, G. A., van Mechelen, W., Bongers, P. M., Bouter, L. M., & van der Wal, G. (2000). Physical risk factors for neck pain. *Scandinavian Journal of Work, Environment & Health*, 26(1), 7-19.

15. Szeto, G. P., Straker, L., & Raine, S. (2002). A field comparison of neck and shoulder postures in symptomatic and asymptomatic office workers. *Applied Ergonomics*, 33(1), 75-84.

16. Thigpen, C. A., Padua, D. A., Michener, L. A., Guskiewicz, K., Giuliani, C., Keener, J. D., & Stergiou, N. (2010). Head and shoulder posture affect scapular mechanics and muscle activity in overhead tasks. *Journal of Electromyography and Kinesiology*, 20(4), 701-709.

17. Kibler, W. B., Ludewig, P. M., McClure, P. W., Michener, L. A., Bak, K., & Sciascia, A. D. (2013). Clinical implications of scapular dyskinesis in shoulder injury: the 2013 consensus statement from the 'Scapular Summit'. *British Journal of Sports Medicine*, 47(14), 877-885.

18. Griffin, M. J. (1990). *Handbook of human vibration*. Academic Press.

19. Bovenzi, M. (2015). A prospective cohort study of neck and shoulder pain in professional drivers. *Ergonomics*, 58(7), 1103-1116.

20. Fridén, J. (2001). Vibration damage to the hand: clinical presentation, prognosis and length of sick leave. *Journal of Hand Surgery (British & European Volume)*, 26(5), 471-474.

21. Palmer, K. T., & Griffin, M. J. (2000). The prevalence and pattern of hand-arm vibration syndrome in Great Britain. *Occupational Medicine*, 50(5), 334-341.

22. Bovenzi, M., D'Agostin, F., & Rui, F. (2008. A follow-up study of vascular disorders in vibration-exposed forestry workers. *International Archives of Occupational and*

23. *Environmental Health*, 81(4), 401-408. Karmegam, K., Sapuan, S. M., Ismail, M. Y., & Bahri, M. T. S. (2009. A study on motorcycle riding posture and its relationship to rider comfort and fatigue. *Journal of Applied Sciences*, 9(18), 3304-3310.
24. Seitz, A. L., McClure, P. W., Lynch, S. S., Ketchum, J. M., & Michener, L. A. (2012). Effects of scapular dyskinesis and scapular assistance test on subacromial space during static arm elevation. *Journal of Shoulder and Elbow Surgery*, 21(5), 631-640.
25. Khan, T., & Ahmed, S. (2021). Musculoskeletal discomfort and associated factors among commercial motorcyclists in Karachi, Pakistan. *Work*, 68(3), 789-797.
26. Das, D., & Kumar, A. (2020). Occupational health hazards and musculoskeletal disorders among food delivery riders. *International Journal of Occupational Safety and Ergonomics*, 28(1), 1-8.
27. Ojo, T. O., & Akanbi, O. G. (2017). Work-related musculoskeletal disorders among commercial motorcyclists in Ilorin, Nigeria. *Journal of Musculoskeletal Research*, 20(02), 1750009.