

PREVALENCE OF MUSCULOSKELETAL INJURIES RESULTING FROM GYM WORKOUTS AMONG GYM MEMBERS IN ISLAMABAD AND RAWALPINDI, PAKISTAN

Javeria Yaseen^{*1}, Anum Faisal², Aimen Zahid³, Arooba Shah⁴

^{*1}Clinical Physiotherapist, APRC Clinic, Rawalpindi

²House officer, Core and Restore Clinic, Islamabad

³Internee, PAF Hospital, Rawalpindi

⁴Clinical Physiotherapist, Jasmine International Hospital, Timergara Swat

^{*1}yaseenjaveria56@gmail.com, ²anum69140@gmail.com, ³bintezahid0308@gmail.com,

⁴aroobashahpt255@gmail.com

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Corresponding Author: *

Javeria Yaseen

Abstract

Background: Regular physical activity and resistance training provide substantial health benefits; however, gym-based exercise may also expose participants to musculoskeletal problems, particularly when exercise technique, training load, recovery, and supervision are inadequate. Evidence concerning the prevalence of musculoskeletal problems among gym members in the local Pakistani population remains limited.

Objective: To determine the prevalence and distribution of musculoskeletal problems among individuals participating in gym workouts in fitness centers in Islamabad and Rawalpindi, Pakistan.

Methods: A cross-sectional study was conducted over six months, from August 2025 to January 2026, among gym members in selected fitness centers in Islamabad and Rawalpindi. A total of 370 male and female participants were recruited using non-probability convenience sampling. Participants were adults aged 18 years and above who had been attending a gym or fitness center for up to 12 months. Individuals with recent trauma, previous or diagnosed injuries, pregnancy, or injuries unrelated to gym training were excluded. Musculoskeletal problems were assessed using the Nordic Musculoskeletal Questionnaire. Descriptive statistics were performed using IBM SPSS to determine the frequency and percentage of reported problems across nine anatomical regions.

Results: Among 370 participants, 299 were male and 71 were female. The largest age group was 22–25 years (30.8%), followed by 26–29 years (22.2%) and 18–21 years (21.9%). Most participants had a normal body mass index (51.6%). During the previous 12 months, the lower back had the highest prevalence of musculoskeletal problems (33.5%), followed by the neck (26.8%) and shoulder (25.4%). Neck problems were associated with the highest reported limitation of normal activities (34.1%). Lower-back problems were the most frequently reported during the preceding seven days (24.9%).

Conclusion: Musculoskeletal problems were commonly reported among gym members in Islamabad and Rawalpindi, with the lower back, neck, and shoulder being the most frequently affected regions. The findings highlight the importance of appropriate exercise technique, adequate warm-up and recovery, injury-prevention education, and appropriate supervision in gym settings.

Introduction

Physical activity is an important component of a healthy lifestyle and is widely recognized for its beneficial effects on physical and psychological health. Regular participation in physical activity can improve physical fitness, functional capacity, and overall well-being, while also contributing to better mental health (1). Research has demonstrated positive effects of physical activity among adults experiencing psychological problems, including anxiety, with benefits that may be comparable with established therapeutic approaches in some circumstances. Despite these benefits, physical activity can also have negative consequences when performed improperly or excessively (2). Musculoskeletal (MSK) injuries are among the important adverse outcomes associated with physical activity and may result in pain, functional limitations, and disability (3). Commonly affected anatomical regions include the shoulders, elbows, knees, and vertebral structures of the spine (4). The increasing popularity of fitness centers and gym-based exercise has resulted in greater participation in structured physical activity. Gym culture has expanded considerably, influenced not only by the health and fitness benefits of exercise but also by social and environmental factors and the growing influence of social media-driven workout and wellness trends (5). Strength and fitness training can provide substantial health benefits and play an important role in addressing the public health consequences of physical inactivity. However, exercise participation may simultaneously introduce the risk of exercise-related MSK injuries (6).

Strength or resistance training is a specialized form of exercise designed to improve muscle strength, power, and endurance through the application of external or internal resistance (7). Resistance

training may involve body-weight exercises, such as push-ups and pull-ups, as well as free weights, resistance machines, and resistance bands (8). Although strength training provides multiple health benefits, inappropriate training practices may increase the risk of MSK injury. Weight training has been associated with several types of injuries, including meniscal injuries and intervertebral disc problems, particularly when free weights are used aggressively or without appropriate technique (9-12). Exercise-related injuries can develop through acute trauma or repetitive mechanical loading. Traumatic muscle injuries may occur following direct external trauma or excessive strain on skeletal muscle tissue during muscle activation and lengthening (13). Bone stress injuries, including stress fractures, may develop through repetitive loading and overuse, particularly when the applied load exceeds the capacity of the involved tissues to adapt (14). Tendinopathy is another common exercise-related condition characterized by pain, reduced function, and decreased exercise tolerance. Frequently affected tendons include the rotator cuff, medial and lateral elbow tendons, Achilles tendon, gluteal tendons, and patellar tendon (15).

The development of MSK injuries among gym members may be influenced by multiple individual and training-related factors. Poor exercise technique, insufficient rest, inappropriate training planning, and excessive loading have been identified as important factors associated with overuse injuries (16). The physical demands of exercise vary according to the type of activity, and each exercise may therefore present a distinct combination of injury-related risk factors (17). Individual characteristics, including body size and weight, as well as possible biomechanical abnormalities, may further influence the distribution of mechanical stress during exercise

(18). In addition, inadequate supervision may increase the risk of incorrect exercise performance, particularly among individuals who are inexperienced with resistance training equipment and exercise techniques. Postural malalignment, altered motor control, reduced physical fitness, and poor exercise execution have also been identified as potential contributors to exercise-related injuries (19). Appropriate recognition and management of MSK injuries are important to minimize pain, functional impairment, and the possibility of recurrent injury. Management strategies depend on the type and severity of the injury. prevention is particularly important in recreational gym settings because many exercise-related injuries may be associated with modifiable training behaviors. Appropriate exercise technique, gradual progression of training loads, adequate recovery, proper warm-up and cool-down, and appropriate supervision may contribute to reducing injury risk (20).

Despite the increasing participation in gym-based exercise, limited evidence is available regarding the prevalence and anatomical distribution of MSK injuries among gym members in Pakistan. In particular, there is limited local evidence describing MSK problems across multiple anatomical regions among recreational gym members in Islamabad and Rawalpindi. Information regarding the frequency and distribution of these problems can assist physiotherapists, fitness trainers, and gym members in identifying commonly affected body regions and developing appropriate preventive strategies. Establishing local prevalence data may also provide a basis for future research investigating specific exercise types, training loads, supervision, exercise technique, and other potential risk factors. Therefore, the present study aimed to determine the prevalence of musculoskeletal injuries resulting from gym workouts among gym members in Islamabad and Rawalpindi, Pakistan. The findings were intended to provide information regarding the occurrence of MSK problems across different anatomical regions and to contribute to the development of

appropriate injury-prevention approaches for individuals participating in gym-based exercise.

Methodology

This cross-sectional study was conducted over a period of six months, from August 2025 to January 2026, in selected fitness centers and gyms located in Islamabad and Rawalpindi, Pakistan. The target population comprised individuals who were actively participating in gym and fitness activities at the selected centers during the study period. A total sample of 370 participants was included in the study. The required sample size was calculated using Raosoft sample size calculation software. Participants were recruited through a non-probability convenience sampling technique, whereby gym members who were accessible and willing to participate were approached for inclusion in the study. Both male and female participants were considered eligible. The inclusion criteria consisted of individuals aged 18 years or older, current members of a gym or fitness center in Islamabad or Rawalpindi, and individuals with gym experience of 12 months or less. Participants were excluded if they were unwilling to participate, had experienced recent trauma or injury, were pregnant, had a diagnosed or previous musculoskeletal injury, or reported an injury unrelated to gym exercise. Injuries that occurred within a gym but were not related to exercise or training were also excluded.

Musculoskeletal problems were assessed using the Nordic Musculoskeletal Questionnaire (NMQ). The NMQ was developed as a standardized method for collecting information about musculoskeletal symptoms and permits comparison across nine anatomical regions. These regions include the neck, shoulders, upper back, elbows, wrists/hands, lower back, hips/thighs, knees, and ankles/feet. The questionnaire is intended for epidemiological assessment of musculoskeletal symptoms and was not developed as a clinical diagnostic instrument. In the present study, participants were asked four principal questions for each of the nine anatomical regions. First, they were asked whether they had experienced pain, discomfort, or other

musculoskeletal problems during the previous 12 months. Second, they were asked whether these problems had prevented them from performing normal activities, such as work, housework, or hobbies, during the previous 12 months. Third, participants were asked whether they had consulted a physician because of the reported musculoskeletal problem during the previous 12 months. Finally, they were asked whether they had experienced musculoskeletal problems in any of the specified anatomical regions during the previous 7 days. The validity of the Nordic Musculoskeletal Questionnaire has been demonstrated in previous research. The thesis reports that the questionnaire showed a sensitivity ranging from 66% to 92% for detecting pain in different body regions, while its reported specificity ranged from 71% to 88%. These psychometric characteristics supported its use for assessing self-reported musculoskeletal symptoms among the study participants (21,22).

Data were collected gym users from Islamabad and Rawalpindi who fulfilled the eligibility criteria were approached at the selected fitness centers. Convenience sampling was used to recruit willing and accessible participants. A total of 370 participants who fulfilled the inclusion criteria were included in the final study sample. Data were entered and analyzed using IBM SPSS Statistics version 22. Descriptive statistics, including frequencies and percentages, were used to summarize participants' demographic characteristics and the prevalence of musculoskeletal problems across the nine anatomical regions assessed by the Nordic Musculoskeletal Questionnaire. The results were

presented in tables for symptoms during the previous 12 months, activity limitations, physician consultation, and symptoms during the previous 7 days. A p-value of ≤ 0.05 was considered statistically significant. Ethical approval for the study was obtained from the Research Committee of the Department of Rehabilitation and Health Sciences, Abasyn University Islamabad Campus. Permission was obtained from the relevant fitness centers in Islamabad and Rawalpindi before commencing data collection. Written informed consent was obtained from each participant after providing information regarding the purpose and importance of the study. Participant information was kept confidential throughout the research process. Participation was voluntary, and participants retained the right to withdraw from the study at any point without penalty. These procedures were implemented to protect participant autonomy, privacy, and confidentiality.

Results

A total of 370 participants were included in the study. in which 299 (80.8%) were male and 71 (19.2%) were female. Regarding age, the largest proportion of participants belonged to the 22–25-year age group (30.8%), followed by 26–29 years (22.2%) and 18–21 years (21.9%). Participants aged 30–33 years constituted 11.6%, while 6.5% were aged 34–37 years and 7.0% were aged 38–41 years. Regarding body mass index, more than half of the participants (51.6%) were within the normal range, while 25.9% were overweight, 15.4% were underweight, and 7.0% were obese as shown in table 1

Table 1: Demographic characteristics of the study participants (N = 370)

Variable	Category	n	%
Gender	Male	299	80.8
	Female	71	19.2
Age (years)	18–21	81	21.9
	22–25	114	30.8
	26–29	82	22.2
	30–33	43	11.6
	34–37	24	6.5
	38–41	26	7.0

BMI	Underweight (<18)	—	15.4
	Normal (18-25)	—	51.6
	Overweight (26-30)	—	25.9
	Obese (>30)	—	7.0

Table 2: Musculoskeletal problems reported during the previous 12 months (N = 370)

Anatomical region	n	%
Neck	99	26.8
Shoulder	94	25.4
Upper back	62	16.8
Elbows	54	14.6
Wrists/hands	55	14.9
Lower back	124	33.5
Hips/thighs	63	17.0
Knees	73	19.7
Ankles/feet	73	19.7

Table 2 shows the prevalence of musculoskeletal problems reported during the previous 12 months. The lower back was the most frequently affected anatomical region, with 124 participants (33.5%) reporting problems, followed by the neck (26.8%) and shoulder (25.4%). Knee and ankle/foot problems were each reported by 19.7%

of participants. The lowest prevalence was observed for the elbows (14.6%), followed by the wrists/hands (14.9%). Overall, the findings indicate that the lower back, neck, and shoulder were the most commonly reported sites of musculoskeletal problems during the previous 12 months.

Table 3: Activity limitation due to musculoskeletal problems during the previous 12 months (N = 370)

Anatomical region	n	%
Neck	126	34.1
Shoulder	95	25.7
Upper back	69	18.6
Elbows	46	12.4
Wrists/hands	57	15.4
Lower back	102	27.6
Hips/thighs	61	16.5
Knees	83	22.4
Ankles/feet	71	19.2

Table 3 presents the proportion of participants who reported being prevented from carrying out normal activities because of musculoskeletal problems during the previous 12 months. The neck had the highest proportion of reported activity limitation (34.1%), followed by the lower

back (27.6%) and shoulder (25.7%). Knee problems resulted in activity limitation in 22.4% of participants, while ankle/foot and upper-back problems were reported by 19.2% and 18.6%, respectively. The lowest proportion of activity limitation was reported for the elbows (12.4%).

Table 4. Physician consultation for musculoskeletal problems during the previous 12 months (N = 370)

Anatomical region	n	%
Neck	66	17.8
Shoulder	66	17.8
Upper back	56	15.1
Elbows	47	12.7
Wrists/hands	43	11.6
Lower back	79	21.4
Hips/thighs	55	14.9
Knees	61	16.5
Ankles/feet	52	14.1

Table 4 summarizes physician consultation because of musculoskeletal problems during the previous 12 months. The highest proportion of physician consultation was reported for lower-back problems (21.4%), followed by neck and shoulder problems (17.8% each). Physician consultation was reported by 16.5% of participants with knee problems, while 15.1% reported consultation for upper-back problems. The lowest proportion of physician consultation was observed for wrists/hands (11.6%).

Discussion

The present study investigated the prevalence and distribution of musculoskeletal problems among gym members in Islamabad and Rawalpindi, Pakistan. Musculoskeletal problems were reported across all nine anatomical regions assessed using the Nordic Musculoskeletal Questionnaire. The lower back was the most frequently affected region during the previous 12 months (33.5%), followed by the neck (26.8%) and shoulder (25.4%). Lower-back problems also had the highest prevalence during the previous 7 days (24.9%), whereas neck problems produced the greatest activity limitation (34.1%). These findings indicate that the lower back, neck, and shoulder represent important sites of musculoskeletal problems among gym participants. The predominance of lower-back problems is consistent with recent evidence. Islam et al. (2024), in a nationwide cross-sectional study of 1,123 gym members, reported the highest prevalence of musculoskeletal injuries at the low back (36.6%), followed by the shoulder (24.7%) and knee (17.1%). Their study also found that

strength training was associated with increased odds of musculoskeletal injury. Other factors, including inappropriate weight handling and insufficient exercise knowledge, were also identified as potential contributors. The similarity in the predominance of low-back problems between the two studies strengthens the evidence that the lumbar region is a frequent site of symptoms among gym participants. However, differences in participant characteristics, training practices, sampling methods, and outcome definitions may explain differences in prevalence estimates. (23)

The current findings are also comparable with Alrushud (2024), who studied 713 gym members in Saudi Arabia and reported that approximately 57% had experienced at least one exercise-related injury. The knee and shoulder were the most frequently reported anatomical sites, while muscle strain was the most common injury type. The study also found associations between injury prevalence and factors including age, gender, training period, and the presence of a trainer. In contrast, the present study identified the lower back as the most frequently affected region. Such differences may be attributable to variations in exercise practices, participant characteristics, study instruments, and definitions of injury. (24) Neck and shoulder problems were also prominent in the present study, with prevalence rates of 26.8% and 25.4%, respectively. Neck problems were particularly important because they produced the greatest activity limitation (34.1%). Bernstorff et al. (2024) examined 1,387 recreational fitness athletes and found that 53.1% experienced pain

during fitness training. The shoulder was the most frequently affected region, followed by the lower back and knees. Free-weight exercises had higher reported pain rates than guided machine exercises, with exercises such as back squats, deadlifts, bench presses, and triceps dips frequently associated with pain. These findings provide a possible explanation for the distribution of symptoms observed in the present study; however, specific exercises were not assessed in our study, so direct relationships between particular exercises and musculoskeletal problems cannot be established. (25)

Trainer supervision may also be relevant. Ahmed et al. (2022) examined the association between fitness trainers' experience and trainees' musculoskeletal pain and reported that lower trainer experience was associated with greater musculoskeletal pain among trainees. This suggests that appropriate exercise instruction and supervision may have a role in reducing musculoskeletal problems. However, trainer experience, supervision, and quality of exercise instruction were not assessed in the present study; therefore, their contribution to the observed prevalence cannot be determined. (26) Evidence from Pakistan also demonstrates that strenuous physical training can result in clinically significant musculoskeletal injuries. Zafar et al. (2024), using magnetic resonance imaging among individuals exposed to rigorous physical training, reported stress fractures of the lower limbs as the most common injury, followed by anterior cruciate ligament injuries. Although their population and training context differed substantially from the present recreational gym population, their findings further demonstrate the musculoskeletal demands associated with strenuous physical training. (27) The present study has several limitations. Its cross-sectional design prevents determination of temporal or causal relationships. Convenience sampling may limit generalizability, and musculoskeletal problems were self-reported. In addition, specific exercise types, training intensity, frequency, duration, lifting technique, warm-up practices, and trainer supervision were not assessed. Future studies should use prospective

or analytical designs and examine these training-related factors to identify modifiable predictors of musculoskeletal problems.

Conclusion

This study demonstrated a substantial prevalence of musculoskeletal problems among gym members in Islamabad and Rawalpindi, with the lower back, neck, and shoulder being the most commonly affected regions. These findings highlight the need for appropriate exercise technique, progressive training, adequate recovery, and professional supervision to support musculoskeletal health among gym participants.

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