



Research Paper

Prevalence of Musculoskeletal Pain and Its Association with Physical Fitness Among Collegiate Students in Kota City, India: A Cross-Sectional Study

Samrej Khan¹, Pushpendra K. Yaduvanshi^{1*}

¹Department of Physiotherapy, Career Point University, Kota, Rajasthan, India

^{1*}Professor & Head, Department of Physiotherapy, Career Point University, Kota

ABSTRACT

Background: Musculoskeletal (MSK) pain is a common complaint among collegiate students and has been linked to prolonged sitting, poor posture, academic stress, and low levels of physical activity. Data on its prevalence and correlates among university students in Kota, Rajasthan, India, remain limited.

Objective: To determine the prevalence and severity of self-reported musculoskeletal pain among collegiate students in Kota City and to describe the demographic profile of the affected population, as a basis for examining its association with physical fitness.

Methods: A cross-sectional survey was conducted among 99 university students (aged 18–33 years) in Kota City using a self-administered Musculoskeletal Health Questionnaire (paper-based and Google Forms). The instrument captured demographic details, pain location, intensity (numerical rating scale), duration, and impact on daily activities, together with physical-fitness-related items (exercise frequency and body mass index). Descriptive statistics (frequencies and percentages) were used to summarise pain prevalence and severity.

Results: Of the 99 respondents, 41 (41.41%) reported no musculoskeletal pain, 27 (27.27%) reported slight pain, 19 (19.19%) reported moderate pain, 8 (8.08%) reported fairly severe pain, and 4 (4.04%) reported very severe pain. Overall, 58 students (58.59%) reported some degree of musculoskeletal discomfort, and 31 (31.32%) reported moderate-to-very-severe pain. Most participants were between 19 and 23 years of age.

Conclusion: Musculoskeletal pain affects a substantial proportion of collegiate students in Kota City, with nearly one-third experiencing moderate-to-severe symptoms. These findings support the need for posture-correction programmes, structured fitness education, and ergonomic improvements in academic settings, and highlight the importance of future studies that formally test the pain–fitness association using inferential statistics.

Keywords: Musculoskeletal pain; Physical fitness; Collegiate students; Prevalence; Cross-sectional study; Kota; India

Received 17 Aug., 2026; Revised 28 Aug., 2026; Accepted 31 Aug., 2026 © The author(s) 2026.

Published with open access at www.questjournals.org

I. INTRODUCTION

Musculoskeletal (MSK) pain refers to discomfort, ache, or stiffness arising from the muscles, tendons, ligaments, joints, and supporting structures of the body. It is one of the most frequently reported health complaints among young adults, and its burden appears to be rising in academic populations, including school and university students.

Musculoskeletal disorders (MSDs) encompass a broad spectrum of inflammatory and degenerative conditions that range from mild, transient discomfort to chronic conditions that interfere with activities of daily living [3]. Reviews of the student literature consistently identify prolonged sitting, poor postural habits, extended study hours, heavy backpack loads, and reduced physical activity as key contributors to musculoskeletal complaints in this population [3,5].

Occupations and academic pursuits characterised by sustained static postures—such as long lecture hours, desk-based study, and computer or smartphone use—are particularly associated with neck, shoulder, and low-back discomfort. Comparable patterns have been reported among healthcare workers who perform frequent or heavy manual tasks, underlining that both physical loading and postural strain are important determinants of musculoskeletal pain across occupational and academic settings [6].

Physical activity and physical fitness are believed to modulate musculoskeletal pain through both mechanical and neurophysiological pathways. Regular exercise has been associated with reduced pain sensitivity (exercise-induced hypoalgesia) and improved tolerance for physical and postural loading, whereas physical inactivity is thought to predispose individuals to deconditioning, poor postural control, and heightened pain perception [13]. The transition from school to university is frequently accompanied by reduced physical activity, changing dietary patterns, and increasing academic and psychosocial stress, all of which may compound musculoskeletal risk in this age group.

Several cross-sectional studies from different countries have examined the prevalence of musculoskeletal pain among student populations, reporting rates ranging from roughly 38% to more than 80%, depending on the population studied, the case definition used, and the assessment tool employed (see Section 3, Review of Literature, for details) [2,3,7,9–12]. Despite this growing body of evidence, data specific to collegiate students in Kota, Rajasthan—a city known for its intensive, examination-focused academic culture—remain scarce, and the association between musculoskeletal pain and physical fitness in this population has not been formally quantified. This study therefore aimed to determine the prevalence and severity of self-reported musculoskeletal pain among collegiate students in Kota City and to describe the demographic characteristics of the sample, as a foundation for future work examining its association with physical fitness in this population.

II. AIMS, OBJECTIVES, AND HYPOTHESES

Aim

To assess the prevalence of musculoskeletal pain among collegiate students in Kota City and to explore its association with physical fitness.

Objectives

- To determine the proportion of collegiate students reporting musculoskeletal pain and to classify pain severity using a numerical rating scale.
- To describe the age distribution and demographic profile of the study sample.
- To lay the groundwork for future analysis of the relationship between musculoskeletal pain and physical fitness indicators (exercise frequency, body mass index) in this population.

Hypotheses

Null hypothesis (H^0): There is no association between physical inactivity and the prevalence or severity of musculoskeletal pain in collegiate students.

Alternate hypothesis (H^1): Increased physical inactivity is positively associated with the prevalence and severity of musculoskeletal pain in collegiate students.

III. MATERIALS AND METHODS

Study Design and Setting

A descriptive, cross-sectional survey was conducted among collegiate students attending universities and colleges in Kota City, Rajasthan, India. Data collection was carried out over a 90-day period using a combination of in-person and online (Google Forms) administration to maximise accessibility and response rate.

Participants and Sample Size

A total of 99 students who met the eligibility criteria consented to participate and completed the survey. Participants were recruited from various colleges and universities within Kota City using a convenience sampling approach.

Inclusion Criteria

- University or college students currently enrolled in an institution in Kota City.
- Both male and female students.
- Age between 18 and 30 years.
- Willingness to participate and provide informed consent.
- Ability to understand and respond to the study questionnaire.

Exclusion Criteria

- Individuals not enrolled in any college or university in Kota City.
- Students below 18 or above 30 years of age.
- Individuals unwilling to participate.

Instrumentation and Data Collection

Data were collected using a structured, self-administered Musculoskeletal Health Questionnaire, distributed both as a printed form and via Google Forms. The questionnaire recorded (i) demographic information (age, gender, academic details), (ii) musculoskeletal pain history, including anatomical location, intensity (numerical rating scale), duration, and impact on daily activities, and (iii) physical-fitness-related items, including exercise frequency and body mass index (BMI). Prior to participation, all respondents were provided with a written consent form outlining the purpose of the study, voluntary participation, and confidentiality of responses.

IV. Statistical Analysis

Collected data were compiled and analysed using descriptive statistics. Categorical variables, including pain intensity level and age distribution, were summarised as frequencies and percentages and are presented using tables and charts. Given the descriptive nature of the current data extract, formal inferential statistical testing (e.g., chi-square analysis or correlation/regression modelling) of the association between musculoskeletal pain and physical fitness indicators was not performed in this analysis and is identified as a priority for further work.

V. RESULTS

A total of 99 collegiate students from Kota City participated in the study. Most participants were between 19 and 23 years of age, with a smaller number of respondents extending up to the early thirties (Figure 2).

Prevalence and Severity of Musculoskeletal Pain

Table 1 and Figure 1 summarise the distribution of self-reported musculoskeletal pain intensity among the 99 participants. Forty-one students (41.41%) reported no pain, while 58 students (58.59%) reported some degree of musculoskeletal discomfort, ranging from slight to very severe. Twenty-seven students (27.27%) reported slight pain, 19 (19.19%) reported moderate pain, 8 (8.08%) reported fairly severe pain, and 4 (4.04%) reported very severe pain. Combining the moderate, fairly severe, and very severe categories, 31 students (31.32%) experienced moderate-to-severe musculoskeletal pain.

Table 1. Distribution of self-reported musculoskeletal pain intensity among collegiate students (n = 99)

Pain Intensity Level	Number of Students (n)	Percentage (%)
No pain	41	41.41
Slight pain	27	27.27
Moderate pain	19	19.19
Fairly severe pain	8	8.08
Very severe pain	4	4.04
Total	99	100.00

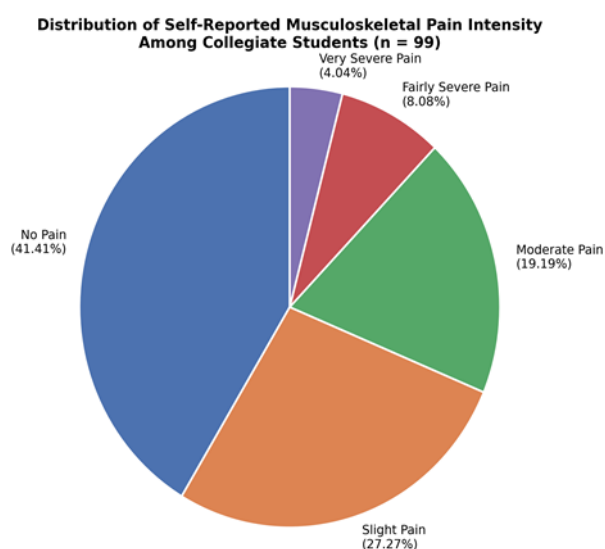


Figure 1. Distribution of self-reported musculoskeletal pain intensity among collegiate students (n = 99).

Age Distribution of Participants

The age of participants ranged from approximately 18 to 33 years, with the highest concentration of respondents in the 19–23-year age band, consistent with a predominantly undergraduate sample (Figure 2).

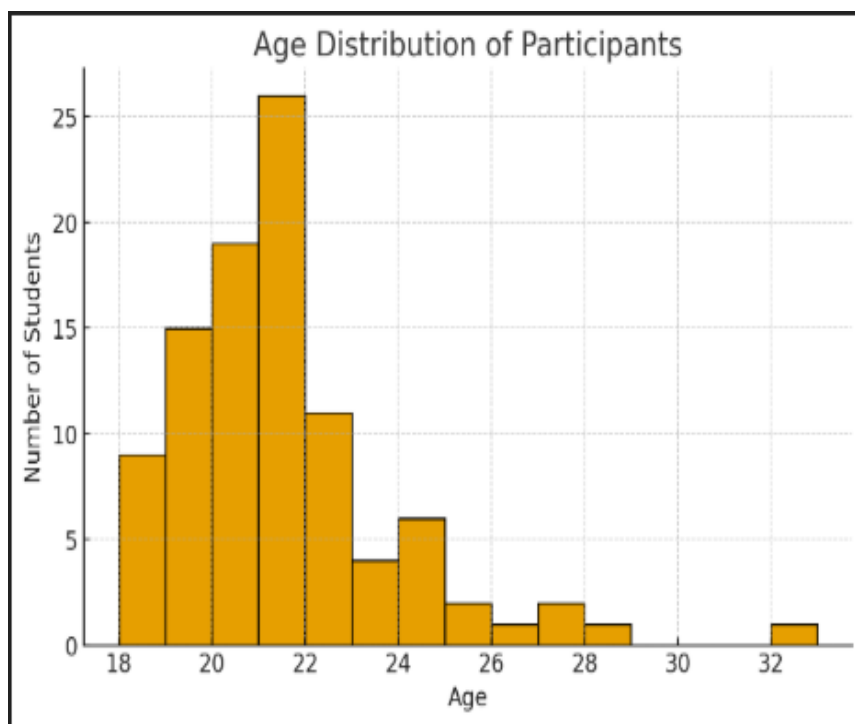


Figure 2. Age distribution of study participants (n = 99).

VI. DISCUSSION

This study examined the self-reported prevalence of musculoskeletal pain among 99 collegiate students in Kota City. Although a substantial proportion of students (41.41%) reported being pain-free, well over half (58.59%) reported some degree of musculoskeletal discomfort, and nearly one-third (31.32%) reported moderate-to-severe symptoms. These findings indicate that musculoskeletal pain is a common, and potentially under-recognised, health concern in this student population.

The prevalence observed here is broadly consistent with the international literature on musculoskeletal pain in student populations, although reported rates vary considerably depending on case definition, assessment tool, and population characteristics. Kandasamy et al. reported that 41.6% of undergraduate students at King Khalid University, Saudi Arabia, had a history of musculoskeletal disorders — a figure remarkably close to the pain-free proportion identified in the present study [1]. Gogoi et al. reported an overall MSK pain prevalence of 38.28% among school students in Guwahati, with all students in the 18–25-year age band affected, underscoring the vulnerability of this specific age group [2]. Kojić et al. similarly highlighted that long hours of sitting, poor posture, heavy backpacks, and low physical activity are recurring contributors to musculoskeletal disorders in student populations across educational levels [3].

Several studies point to physical inactivity and sedentary behaviour as central to the development of musculoskeletal pain in students. Rojas and Orozco-Chavez found that individuals with neck pain reported significantly lower total physical activity and reduced upper- and lower-limb strength compared with pain-free peers, and attributed this, in part, to central sensitisation processes that heighten pain sensitivity and encourage avoidance of physical activity [4]. Roggio et al. observed that COVID-19-related restrictions and the associated shift to sedentary, distance learning were linked to increased musculoskeletal pain and fatigue among Italian university students, reinforcing the role of reduced activity in symptom onset [8]. Consistent with these findings, Alsulaihebi et al. reported a significant prevalence of musculoskeletal disorders among medical students, with an apparent correlation between higher stress levels and musculoskeletal pain, while Ogunlana et al. described comparable patterns of pain among occupational therapy and physiotherapy students in South Africa, most commonly affecting the low back [7,10].

Load-related and biomechanical factors have also been implicated. Ahmed et al. found that carrying backpacks exceeding 10% of body weight was common among schoolchildren and was associated with widespread musculoskeletal discomfort, particularly among girls, with pain distribution differing by sex and school type [5]. Jakobsen et al., in a study of healthcare workers, demonstrated that structured physical exercise interventions could reduce musculoskeletal pain across multiple body regions, supporting the therapeutic role of targeted exercise programmes that may be similarly applicable to student populations [6].

Taken together, the present findings and the wider literature suggest a consistent pattern: musculoskeletal pain is common among students, disproportionately affects those with sedentary habits and poor postural

practices, and is amenable to prevention through ergonomic and physical-activity-based interventions [9,11,12]. Within the specific context of Kota City—an academic hub characterised by intensive, examination-oriented study schedules—students may face compounded risk from prolonged sitting, high psychological stress, and limited time for physical activity.

Implications for Practice

These findings support the integration of ergonomic awareness, structured physical activity, and posture-correction education within college and hostel settings in Kota City. Potential interventions include regular movement breaks during study sessions, ergonomic redesign of classroom and hostel furniture, guidance on backpack and bag-loading limits, and accessible fitness programming tailored to student schedules.

Limitations

- The sample size ($n = 99$) was modest and drawn using convenience sampling from a single city, which may limit the generalisability of the findings to other student populations.
- Musculoskeletal pain was self-reported and not corroborated by clinical examination or a validated diagnostic instrument, which may introduce reporting bias.
- Although physical-fitness-related items (exercise frequency, BMI) were collected as part of the questionnaire, the results reported here are limited to the descriptive prevalence of pain intensity and age distribution. Formal inferential analysis of the association between musculoskeletal pain and physical fitness — the study's stated secondary aim — was not completed in the available dataset and should be prioritised in follow-up analysis or a dedicated future study.
- The cross-sectional design precludes causal inference between physical inactivity and musculoskeletal pain; longitudinal or interventional designs would strengthen causal claims.
- Data collection combined in-person and online modes, which may have introduced mode-related response differences that were not formally assessed.

VII. CONCLUSION

Musculoskeletal pain is highly prevalent among collegiate students in Kota City, with more than half of surveyed students reporting some degree of discomfort and nearly one-third reporting moderate-to-severe symptoms. These findings are consistent with international evidence linking musculoskeletal pain in student populations to prolonged sitting, poor posture, heavy academic workload, and reduced physical activity. The results support the alternate hypothesis that physical inactivity is associated with a higher burden of musculoskeletal pain, although this association requires formal statistical confirmation in future work. Preventive interventions — including posture-correction programmes, structured fitness education, and ergonomic improvements to classroom and hostel design — are recommended to reduce the burden of musculoskeletal pain and support student well-being in Kota City and similar academic settings.

ACKNOWLEDGEMENTS

The authors thank the students of Career Point University and other participating institutions in Kota City for their voluntary participation in this study, and the Department of Physiotherapy, Career Point University, for institutional support.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

DATA AVAILABILITY

The dataset generated and analysed during the current study is available from the corresponding author on reasonable request.

REFERENCES

- [1]. Kandasamy G, Almanasef M, Almeleebia T, Orayj K, Shorog E, Alshahrani AM, et al. Prevalence of musculoskeletal pain among undergraduate students. *Front Med (Lausanne)*. 2024;11:1403267.
- [2]. Gogoi P, Bhattacharyya NC, Saikia KC. The prevalence of musculoskeletal pain among school students and its association with physical fitness in Guwahati urban society: a cross-sectional study. *Bull Fac Phys Ther*. 2024;29:49.
- [3]. Kojić S, Katana B, Zlatičanin R, Vranešić AE, Bajić G, Kaljić E. Prevalence of musculoskeletal diseases in the student population. *Knowledge Int J*. 2023;60(4):663–670.
- [4]. Rojas G, Orozco-Chavez I. Physical activity level and physical fitness in subjects with chronic musculoskeletal pain: a cross-sectional study. *PeerJ*. 2024;12:e16880.

- [5]. Ahmed NA, Ahmed MM, Ahmed NA, Shahid A, Mittal G. Schoolchildren's musculoskeletal pain and backpack weight impact on posture: a short-term study. *J Pharm Bioallied Sci.* 2024;16(Suppl 3):S2497–S2499.
- [6]. Jakobsen MD, Sundstrup E, Brandt M, Andersen LL. Effect of physical exercise on musculoskeletal pain in multiple body regions among healthcare workers: secondary analysis of a cluster randomized controlled trial. *Musculoskelet Sci Pract.* 2018;34:89–96.
- [7]. Alsulaihebi HS, Alsulaihebi AS, Alsaedi ZK, Alsharif SY, Mahamid AW, Babateen OM. Musculoskeletal disorder prevalence and its correlation with stress in medical students: a cross-sectional survey. *J Family Med Prim Care.* 2024;13(4):1524–1529.
- [8]. Roggio F, Trovato B, Ravalli S, Di Rosa M, Maugeri G, Bianco A, et al. One year of COVID-19 pandemic in Italy: effect of sedentary behavior on physical activity levels and musculoskeletal pain among university students. *Int J Environ Res Public Health.* 2021;18(16):8680.
- [9]. James CE, Schmid A, Nguyen-Danse DA, Bruyneel AV. Identifying physical and psychological risk factors for musculoskeletal pain in student musicians to tailor the curriculum: a cross-sectional study protocol. *BMJ Open.* 2023;13(8):e073294.
- [10]. Ogunlana MO, Govender P, Oyewole OO. Prevalence and patterns of musculoskeletal pain among undergraduate students of occupational therapy and physiotherapy in a South African university. *Hong Kong Physiother J.* 2021;41(1):35–43.
- [11]. Prajapati SP, Purohit A. Prevalence of musculoskeletal disorder among college students in times of COVID-19 pandemic — an observational study. *Int J Health Sci Res.* 2021;11:214–218.
- [12]. Senarath MK, Thalwaththe ST, Tennakoon S. Prevalence of selected musculoskeletal disorders among the students of Faculty of Allied Health Sciences, University of Peradeniya. *J Musculoskelet Disord Treat.* 2021;7(2):1–5.
- [13]. Polaski AM, Phelps AL, Kostek MC, Szucs KA, Kolber BJ. Exercise-induced hypoalgesia: a meta-analysis of exercise dosing for the treatment of chronic pain. *PLoS One.* 2019;14(1):e0210418.
- [14]. Callaghan JP, Patla AE, McGill SM. Low back three-dimensional joint forces, kinematics, and kinetics during walking. *Clin Biomech.* 1999;14(3):203–216.
- [15]. Ribaud A, Tavares I, Viollet E, Julia M, Hérisson C, Dupeyron A. Which physical activities and sports can be recommended to chronic low back pain patients after rehabilitation? *Ann Phys Rehabil Med.* 2013;56(8):576–594.
- [16]. Dinger MK, Behrens TK, Han JL. Validity and reliability of the International Physical Activity Questionnaire in college students. *Am J Health Educ.* 2006;37(6):337–343.
- [17]. Srirug P, Jongjit K, Muansri O, Somton Y, Kongbankhong N, Sengsoon P. Prevalence and factors associated with work-related musculoskeletal disorders of students in virtual classrooms. *Heliyon.* 2023;9(8):e18813.
- [18]. Substance Abuse and Mental Health Services Administration. Risk and protective factors [Internet]. Rockville (MD): SAMHSA; 2019 [cited 2023 Sep 28]. Available from: <https://www.samhsa.gov/sites/default/files/20190718-samhsa-risk-protective-factors.pdf>
- [19]. Benham G. Stress and sleep in college students prior to and during the COVID-19 pandemic. *Stress Health.* 2021;37(3):504–515.
- [20]. Lewis KD, Bear BJ. *Manual of School Health.* 2nd ed. St. Louis (MO): Elsevier Health Sciences; 2002. p. 614.