Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Anatomy

Anthropometric Variables and Lower Back Pain in Student Population: Implications for Ergonomic and Lifestyle Interventions

Willy Barinem Vidona[1], Benita Ojoneke Ammeh[1], John Nwolim Paul[2]*, Idawarifa Frank Cookey-Gam[3], Minini Odimabo[4], Deborah Akinola Umogbai[5], Anelechi Kenneth Madume[6], Simeon Chijioke Amadi[7], Confidence Waribo Ihua[8], Mercy Kelechi Azumah[9], Ime Matthias Ubom[10]

[1]Department of Anatomy, Ambrose Alli University Ekpoma, Edo State, Nigeria
[2]Department of Human Anatomy, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University, Nkpolu-Oroworukwo, Port Harcourt, Rivers State, Nigeria
[3]Department of Public Health Sciences, Faculty of Basic Medical Sciences, Rivers State University, Nkpolu Oroworukwo, Port Harcourt, Rivers State, Nigeria
[4]Department of Human Physiology, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University
[5]World Health Organization, Rivers State, Nigeria
[6]Department of Physiotherapy, Faculty of Basic Medical Sciences, Nkpolu-Oroworukwo, Port Harcourt, River's state University, Rivers State, Nigeria
[7]Department of Obstetrics and Gynaecology, Rivers State University/Rivers State University Teaching Hospital, Port Harcourt, Rivers State
[8]Department of Human Physiology, Faculty of Basic Medical Sciences, College of Medicine, David Umahi University of Health Sciences, Uburu, Ebonyi State, Nigeria
[9]Department of Nursing Science, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University Nkpolu-Oroworukwo, Port Harcourt Rivers State, Nigeria
[10]Department of Physiotherapy, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State

DOI: https://doi.org/10.36347/sjams.2025.v13i11.026 | **Received:** 02.10.2025 | **Accepted:** 23.11.2025 | **Published:** 27.11.2025

***Corresponding author:** John Nwolim Paul
Department of Human Anatomy, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University, Nkpolu-Oroworukwo, Port Harcourt, Rivers State, Nigeria

Abstract **Original Research Article**

Background: Lower back pain is a prevalent musculoskeletal disorder among young adults, with potential implications for academic performance and quality of life. This study explored the relationship between anthropometric parameters, lifestyle behaviors, and the prevalence of low back pain among the student population. ***Methods:*** A cross-sectional descriptive survey was conducted among 193 randomly selected University students aged 18–30 years. Data were collected using structured questionnaires and anthropometric measurements, including body weight, height, body mass index, waist circumference, hip circumference, and waist-to-hip ratio. Descriptive statistics, chi-square tests, independent t-tests, Pearson correlations, and logistic regression analysis were employed to analyze the data. ***Results:*** The prevalence of low back pain among participants was 75.1%, with a higher proportion of females (61.1%) affected. Pain was most commonly reported at night (62.2%), and 95.3% managed it with painkillers. Anthropometric analysis showed a mean body mass index of 23.71 ± 4.95, with no significant differences between participants with and without low back pain. Behavioral factors, including academic stress, physical activity, and carrying heavy backpacks, were not significantly associated with low back pain occurrence ($p > 0.05$). Similarly, demographic and anthropometric parameters showed no significant correlation with low back pain prevalence. ***Conclusion:*** Lower back pain is highly prevalent among university students, but its occurrence was not significantly associated with demographic, anthropometric, or behavioral variables in this study.

Keywords: Lower back pain, university students, anthropometric parameters, demographic factors, waist circumference, body mass index.

INTRODUCTION

Lower back pain (LBP), characterized by discomfort or pain in the lumbar and sacral regions of the spine, is a significant public health issue that affects millions of people worldwide. It is especially prevalent among young adults, including university students, who are increasingly experiencing musculoskeletal problems due to lifestyle factors such as sedentary behavior, poor

posture, and lack of physical activity. The lumbar spine is particularly vulnerable to stress because it supports much of the body's weight, making it a common site for injury or strain. While lower back pain is often considered a problem of older adults, there is growing evidence to suggest that it affects a considerable proportion of younger populations, particularly students in higher education [1].

Students are a unique demographic when it comes to back pain because of the physical and psychological demands of academic life. Students often spend long hours seated during lectures, study sessions, or while using computers, contributing to poor spinal health. These prolonged periods of sitting can place significant strain on the lumbar spine, increasing the risk of lower back pain [2]. Furthermore, carrying heavy backpacks, improper lifting techniques, and a lack of proper ergonomic support when sitting or working at desks can exacerbate the risk [3]. Additionally, students are often under significant academic stress, which can manifest physically and contribute to muscle tension and pain [4].

Anthropometric parameters, which include measurements of the human body such as height, weight, waist-hip ratio, and body mass index (BMI), have been linked to the development of lower back pain [5]. BMI, in particular, has been identified as a potential risk factor for LBP, with individuals who have higher BMI scores at increased risk of developing back pain due to the additional weight burden on the spine [6]. University students with elevated BMI may be more prone to back pain because the excess body weight places greater strain on the lower back. Similarly, the distribution of body fat, especially around the abdomen and hips, has been shown to affect spinal alignment and posture, potentially leading to back pain [7]. Waist-hip ratio is an important anthropometric measure that reflects fat distribution and is often used as an indicator of risk for various health issues, including musculoskeletal problems like LBP [8].

The relationship between height and lower back pain is another area of interest. Taller individuals may experience greater mechanical stress on the spine due to their longer vertebral columns, which could make them more susceptible to LBP [9]. In students, this factor is particularly relevant as growth spurts that occur during late adolescence can lead to imbalances in body proportions and posture, further increasing the likelihood of back pain [10]. Height and body proportions can also influence the way individuals sit and move, impacting their posture and spinal health. Taller individuals may have difficulty finding appropriate seating or workspaces that accommodate their height, leading to poor posture and increased strain on the lower back [11].

Despite the growing awareness of LBP among young adults, there is a lack of targeted research focusing specifically on university students. Most studies on LBP tend to focus on adult populations, particularly those in work environments where physical labor or repetitive movements are common. While these studies provide valuable insights, they often overlook the specific challenges faced by university students [12]. Students, as a group, are distinct in their behaviors and experiences, characterized by a mix of sedentary activities, sporadic physical exertion, and psychological stress. The combination of these factors, along with the demands of academic life, creates a unique risk profile for LBP that merits further exploration. Furthermore, students are at an age where they may be developing lifelong habits regarding physical activity and posture. Many students do not engage in regular exercise due to time constraints or lack of interest, which can weaken the muscles that support the spine [4]. The muscles of the core, including the abdominal, back, and pelvic muscles, are particularly important for maintaining spinal stability and when these muscles are weak or imbalanced, the spine is more vulnerable to injury and pain [5]. In contrast, students who engage in regular physical activity, particularly exercises that strengthen the core, may be better protected against LBP [6]. In addition to physical factors, psychological/academic stress is another important consideration in the development of LBP among university students and when combined with social pressures and the demands of adjusting to university life, can lead to increased muscle tension, particularly in the back and neck [8, 9, 10].

Another consideration is the role of gender in the relationship between anthropometric factors and LBP. Studies have suggested that there may be differences in how men and women experience lower back pain, possibly due to variations in body composition, fat distribution, and hormonal influences [11]. Women, for instance, may be more likely to develop LBP due to changes in the pelvis and spine during menstruation, pregnancy, or as a result of hormonal fluctuations. Additionally, women may have a higher proportion of body fat distributed around the hips and thighs, which could affect spinal alignment and posture. In contrast, men are more likely to accumulate fat around the abdomen, which can increase the risk of lumbar strain [12].

Addressing the association between anthropometric parameters and LBP could provide valuable insights into preventive measures that can be implemented early in life to avoid chronic issues.

The aim of this study is to investigate the relationship between anthropometric parameters and lower back pain among university students, with the goal of identifying significant risk factors and informing prevention strategies, investigate the relationship between demographic factors (age, gender, height, weight, BMI, waist circumference, and hip circumference) and the Understanding the link between these parameters and lower back pain (LBP) can help

identify at-risk populations within the university demographic, leading to informed health promotion strategies that reduce the incidence of LBP and improve overall well-being.

METHODS

Study Design

This study used a cross-sectional descriptive survey to assess the relationship between anthropometric parameters utilized both quantitative and qualitative data collection methods, including the measurement of specific anthropometric parameters and a structured questionnaire assessing the prevalence of LBP and related factors among university students within our institution State, among 18 to 30 years male and female students. Participants were randomly selected, and 193 students met the study's criteria.

Inclusion criteria:

Students aged between 18 and 30 years, Students enrolled in any faculty at our institution, and Students willing to participate and provide consent.

Exclusion Criteria:

Students with a known medical condition affecting their posture or back pain, Students on long-term medication for musculoskeletal disorders, and Pregnant students.

Anthropometric Measurements

The following anthropometric parameters were measured:

i. Body weight (kg): Measured using a digital scale.
ii. Height (cm): Measured using a stadiometer.
iii. Body Mass Index (BMI): Calculated as weight (kg) divided by height (m^2).
iv. Waist circumference (cm): Measured at the midpoint between the lowest rib and the iliac crest using a measuring tape.
v. Hip circumference (cm): Measured around the widest part of the hips.
vi. Waist-to-hip ratio (WHR): Calculated by dividing waist circumference by hip circumference.

All measurements were taken by trained personnel following standard procedures to ensure accuracy and consistency.

Data Collection

A structured questionnaire was designed to collect data on the prevalence of lower back pain among students, including its frequency, duration, and associated factors (e.g., physical activity, posture, and study habits). The questionnaire also included sections on demographic data (age, gender, faculty) and measured weight and height. Participants completed the questionnaire prior to undergoing anthropometric measurements.

Data Analysis

Data was analyzed with IBM SPSS version 26.0, utilizing descriptive statistics to summarize demographic, lifestyle, and anthropometric variables, including frequencies and percentages; chi-square tests to assess associations between categorical variables and the occurrence of low back pain; independent t-tests to compare anthropometric parameters between participants with and without low back pain; Pearson correlation to examine relationships between demographic, anthropometric, and behavioral factors; and logistic regression analysis to evaluate behavioral and perceptual factors as predictors of low back pain, with significance set at $p < 0.05$ for all analyses.

Ethical Considerations

Ethical approval for the study was obtained from the Ambrose Alli University ethics review board. The approval number was 034/25. Informed consent was sought from all participants, ensuring that their participation was voluntary. Confidentiality was maintained throughout the study, with participants' data anonymized.

RESULTS

The majority of respondents (80.8%) were under 25 years old, with a higher proportion of females (61.1%) than males (38.9%). Most participants had a normal BMI (46.1%), while 28.0% were overweight. Low back pain (LBP) was reported by 75.1% of respondents, with 73.6% agreeing that it is common among medical students. Pain was most frequently experienced at night (62.2%), and 95.3% managed LBP using painkillers. Additionally, 58.5% attributed LBP to academic stress, and 73.6% believed carrying a heavy backpack contributed to its occurrence.

Table 1: Descriptive Statistics for Anthropometric and Demographic Parameters

Parameters	N	Minimum	Maximum	Mean	SD
Age	193	20.00	31.00	22.95	1.86
Height (cm)	193	144.00	200.00	169.38	9.47
Weight (kg)	193	37.00	130.00	67.85	14.56
BMI	193	12.96	39.40	23.71	4.95
Waist circumference (cm)	193	50.00	125.00	76.64	12.14
Hip circumference (cm)	193	63.00	132.00	96.21	11.49
Waist-to-Hip Ratio	193	0.49	1.17	0.80	0.13

Association Between Participant Characteristics and the Occurrence of Low Back Pain

There was no significant association between age (p = 0.054), gender (p = 0.077), or BMI class (p = 0.402) and the occurrence of LBP. Although not statistically significant, younger respondents (<25 years) reported higher LBP prevalence (72.4%) compared to older respondents (86.5%).

Table 2: Association Between Participant Characteristics and the Occurrence of Low Back Pain

Characteristics	Do you experience Low back pain?		Total	Chi-square	P-value
	Yes	No			
Age					
Less than 25 years	113	43	156	3.160	**0.054***
25 years and above	32	5	37		
Gender					
Male	61	14	75	2.527	0.077
Female	84	34	118		
BMI class					
Underweight	23	7	30	2.931	0.402
Normal weight	64	25	89		
Over weight	40	14	54		
Obese	18	2	20		

Comparison of Anthropometric and Demographic Parameters Between Students with and Without Low Back Pain

T-test comparisons of demographic and anthropometric variables between those with and without LBP showed no significant differences in age (p = 0.118), height (p = 0.994), weight (p = 0.425), BMI (p = 0.495), waist circumference (p = 0.479), hip circumference (p = 0.566), or waist-to-hip ratio (p = 0.295). This suggests that these factors were not significantly related to LBP occurrence.

Table 3: Comparison of Anthropometric and Demographic Parameters Between Students with and Without Low Back Pain

Characteristics	LBP	N	Mean (SD)	T-test	P-value	Inference
Age	Yes	145	23.07 (1.95)	1.572	0.118	NS
	No	48	22.58 (1.53)			
Height (cm)	Yes	145	169.39 (9.49)	0.007	0.994	NS
	No	48	169.38 (9.50)			
Weight (kg)	Yes	145	68.34 (15.09)	0.800	0.425	NS
	No	48	66.40 (12.86)			
BMI	Yes	145	23.85 (5.00)	0.683	0.495	NS
	No	48	23.29 (4.82)			
Waist circumference (cm)	Yes	145	77.00 (12.87)	0.710	0.479	NS
	No	48	75.56 (9.66)			
Hip circumference (cm)	Yes	145	95.94 (12.32)	-0.575	0.566	NS
	No	48	97.04 (8.59)			
Waist-to-Hip Ratio	Yes	145	0.81 (0.13)	1.050	0.295	NS
	No	48	0.78 (0.11)			

LBP: Low back pain; NS: Not significant

Pearson Correlations Between Demographic, Anthropometric Parameters, and Low Back Pain

Pearson correlation analysis revealed significant positive relationships between weight and BMI (r = 0.843, p < 0.01), waist circumference and hip circumference (r = 0.420, p < 0.01), and waist-to-hip ratio and waist circumference (r = 0.603, p < 0.01). However, no significant correlation was found between LBP and any demographic or anthropometric variable

Table 4: Pearson Correlations Between Demographic, Anthropometric Parameters, and Low Back Pain

Correlations									
		Age	**Height (cm)**	**Weight (kg)**	**BMI**	**Waist circumference (cm)**	**Hip circumference (cm)**	**Waist-to-Hip Ratio**	**Do you experience Low back pain?**
Age	**Pearson Correlation**	1							
	Sig. (2-tailed)								
	N	193							
Height (cm)	**Pearson Correlation**	.087	1						
	Sig. (2-tailed)	.232							
	N	193	193						
Weight (kg)	**Pearson Correlation**	.049	.261**	1					
	Sig. (2-tailed)	.499	.000						
	N	193	193	193					
BMI	**Pearson Correlation**	-.003	-.281**	.843**	1				
	Sig. (2-tailed)	.966	.000	.000					
	N	193	193	193	193				
Waist circumference (cm)	**Pearson Correlation**	.111	.013	.250**	.199**	1			
	Sig. (2-tailed)	.125	.853	.000	.006				
	N	193	193	193	193	193			
Hip circumference (cm)	**Pearson Correlation**	.135	.129	.251**	.157*	.420**	1		
	Sig. (2-tailed)	.062	.073	.000	.029	.000			
	N	193	193	193	193	193	193		
Waist-to-Hip Ratio	**Pearson Correlation**	.055	-.100	.020	.049	.603**	-.411**	1	
	Sig. (2-tailed)	.451	.168	.779	.497	.000	.000		
	N	193	193	193	193	193	193	193	
Do you experience Low back pain?	**Pearson Correlation**	-.113	-.001	-.058	-.049	-.051	.042	-.076	1
	Sig. (2-tailed)	.118	.994	.425	.495	.479	.566	.295	
	N	193	193	193	193	193	193	193	193
**. Correlation is significant at the 0.01 level (2-tailed).									
*. Correlation is significant at the 0.05 level (2-tailed).									

ABBREVIATIONS:
Low back pain - LBP
Body mass index - BMI
Waist circumference - WC
Waist-to-hip ratio - WHR

DISCUSSION

The study aimed to explore the relationship between anthropometric parameters and lower back pain (LBP) among students, considering demographic, lifestyle, and perceptual factors. As observed, 4.1, 75.1% of respondents reported experiencing LBP, with the majority (73.6%) attributing its occurrence to academic stress and carrying heavy backpacks. This prevalence aligns with findings [13], who noted that LBP is a common health issue among students, often associated with prolonged sitting, studying postures, and carrying heavy loads. Similarly, Umeonwuka *et al*. [14] reported a high prevalence of LBP among Nigerian university students, highlighting academic demands as a potential contributing factor.

The findings in this study further showed that most participants managed LBP using painkillers (95.3%) and experienced pain predominantly at night (62.2%). The reliance on painkillers is consistent with earlier studies, which identified over-the-counter medications as a common management strategy for LBP among young adults [15]. However, such practices may mask the underlying causes of pain rather than address them effectively.

Table 3 compared anthropometric variables such as height, weight, BMI, waist circumference, hip circumference, and waist-to-hip ratio between students with and without LBP. The results indicated no significant differences across these parameters. Additionally, Table 4 confirmed no significant correlations between LBP and anthropometric variables. These findings contradict some earlier studies that identified links between body weight, BMI, and LBP. For instance, Heuch *et al*. [16] reported that overweight and obesity were significant risk factors for LBP, possibly due to increased mechanical stress on the lumbar spine. However, the present study's findings are

consistent with those of Ghafouri *et al*. [17], who found no significant association between BMI and LBP among Iranian university students. This discrepancy in findings may be due to variations in sample size, population characteristics, and the methods used to assess LBP and anthropometric parameters.

Age and gender were not significantly associated with LBP occurrence, as shown in Table 2. However, younger participants (<25 years) reported a slightly higher prevalence of LBP (72.4%) compared to older participants (86.5%), although this difference was not statistically significant. This finding aligns with the work of Zhang *et al*. [18], which suggested that LBP prevalence peaks during young adulthood due to high physical activity levels and occupational or academic demands. Gender differences in LBP prevalence have been reported in previous studies, with females generally experiencing higher rates of LBP [19]. While this study observed a higher proportion of female respondents with LBP, the association was not statistically significant. This may be attributed to the homogeneity of the study population or cultural differences influencing pain perception and reporting.

Behavioral factors, including academic stress, physical activity, and carrying heavy backpacks, were not significantly associated with LBP occurrence. A previous study [20] have emphasized the role of ergonomic factors, such as poor sitting posture and prolonged computer use, in the development of LBP. Although these factors were not directly assessed in this study, they may warrant further investigation to better understand their impact on LBP among students.

Significant positive correlations were observed between weight and BMI ($r = 0.843$, $p < 0.01$), waist circumference and hip circumference ($r = 0.420$, $p < 0.01$), and waist-to-hip ratio and waist circumference ($r = 0.603$, $p < 0.01$), as shown in Table 4. These findings are consistent with previous research [16] which highlighted the interdependence of anthropometric measures. However, their lack of significant correlation with LBP suggests that these parameters alone may not adequately explain the occurrence of LBP among students.

The findings indicate that anthropometric, demographic, behavioral, and perceptual variables do not significantly predict LBP occurrence among students. This highlights the need for a more holistic approach to understanding LBP, incorporating factors such as ergonomics, psychological stress, and genetic predisposition. Future studies should consider longitudinal designs to examine the cumulative impact of these factors over time.

Additionally, interventions aimed at reducing LBP prevalence among students should focus on promoting ergonomic practices, such as proper sitting and backpack carrying techniques, rather than solely targeting anthropometric factors. Health education programs emphasizing posture correction, regular physical activity, and stress management may help mitigate LBP's impact on students' academic performance and overall well-being.

CONCLUSION

The study highlights the high prevalence of LBP among students, emphasizing the perceived role of academic stress and heavy backpack use. However, anthropometric, demographic, behavioral, and perceptual variables were not significantly associated with LBP occurrence. These findings challenge the conventional understanding of LBP risk factors and underscore the need for further research to identify other potential contributors. Interventions should focus on ergonomic practices and stress management to reduce the burden of LBP among students.

RECOMMENDATIONS

Educational programs must focus on promoting ergonomic practices, such as maintaining proper posture during study and carrying backpacks safely, to help reduce the risk of LBP among students. Regular physical activity and stress management strategies should be encouraged to improve overall musculoskeletal health and reduce susceptibility to LBP.

Conflict of Interests

The authors declare that there is no competing interest.

REFERENCES

1. Calvo-Muñoz I, Kovacs FM, Roqué M, Fernández IG, Calvo JS. Risk factors for low back pain in childhood and adolescence: a systematic review. The Clinical journal of pain. 2018;34(5):468-84.
2. Scarabottolo CC, Pinto RZ, Oliveira CB, Zanuto EF, Cardoso JR, Christofaro DG. Back and neck pain prevalence and their association with physical inactivity domains in adolescents. European Spine Journal. 2017:2274-80.
3. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, Williams G, Smith E, Vos T, Barendregt J, Murray C. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Annals of the rheumatic diseases. 2014;73(6):968-74.
4. Wirth B, Potthoff T, Rosser S, Humphreys BK, de Bruin ED. Physical risk factors for adolescent neck and mid back pain: a systematic review. Chiropractic & manual therapies. 2018; 26:1-0.
5. Blanco-Morales M, Abuín-Porras V, Romero-Morales C, de La Cueva-Reguera M, De-La-Cruz-Torres B, Rodríguez-Costa I. Implementation of a classroom program of physiotherapy among spanish adolescents with back pain: A collaborative study.

International journal of environmental research and public health. 2020;17(13):4806.
6. González-Gálvez N, Marcos-Pardo PJ, Carrasco-Poyatos M. Functional improvements after a pilates program in adolescents with a history of back pain: A randomised controlled trial. Complementary therapies in clinical practice. 2019; 35:1-7.
7. González-Gálvez N, Marcos-Pardo PJ, Trejo-Alfaro H, Vaquero-Cristóbal R. Effect of 9-month Pilates program on sagittal spinal curvatures and hamstring extensibility in adolescents: randomised controlled trial. Scientific reports. 2020;10(1):9977.
8. Rodríguez-Oviedo P, Santiago-Pérez MI, Pérez-Ríos M, Gómez-Fernández D, Fernández-Alonso A, Carreira-Núñez I, García-Pacios P, Ruano-Ravina A. Backpack weight and back pain reduction: effect of an intervention in adolescents. Pediatric research. 2018;84(1):34-40.
9. Steenholt CB, Pisinger VS, Danquah IH, Tolstrup JS. School and class-level variations and patterns of physical activity: a multilevel analysis of Danish high school students. BMC Public Health. 2018; 18:1-1.
10. Sainz de Baranda P, Cejudo A, Martínez-Romero MT, Aparicio-Sarmiento A, Rodríguez-Ferrán O, Collazo-Diéguez M, Hurtado-Avilés J, Andújar P, Santonja-Medina F. Sitting posture, sagittal spinal curvatures and back pain in 8 to 12-year-old children from the region of murcia (Spain): ISQUIOS programme. International journal of environmental research and public health. 2020;17(7):2578.
11. Amorim AB, Simic M, Pappas E, Zadro JR, Carrillo E, Ordonana JR, Ferreira PH. Is occupational or leisure physical activity associated with low back pain? Insights from a cross-sectional study of 1059 participants. Brazilian Journal of Physical Therapy. 2019;23(3):257-65.
12. Husky MM, Ferdous Farin F, Compagnone P, Fermanian C, Kovess-Masfety V. Chronic back pain and its association with quality of life in a large French population survey. Health and quality of life outcomes. 2018; 16:1-9.
13. Alshehri MM, Alqhtani AM, Gharawi SH, Sharahily RA, Fathi WA, Alnamy SG, Alothman SA, Alshehri YS, Alhowimel AS, Alqahtani BA, Alenazi AM. Prevalence of lower back pain and its associations with lifestyle behaviors among college students in Saudi Arabia. BMC Musculoskeletal Disorders. 2023;24(1):646.
14. Vincent-Onabajo GO, Nweze E, Kachalla Gujba F, Ali Masta M, Usman Ali M, Alhaji Modu A, Umeonwuka C. Prevalence of low back pain among undergraduate physiotherapy students in Nigeria. Pain research and treatment. 2016;2016(1):1230384.
15. Stinson J, Harris L, Garofalo E, Lalloo C, Isaac L, Brown S, Tyrrell J, Ruskin D, Campbell F. Understanding the use of over-the-counter pain treatments in adolescents with chronic pain. Canadian Journal of Pain. 2017;1(1):84-93.
16. Heuch I, Heuch I, Hagen K, Zwart JA. Overweight and obesity as risk factors for chronic low back pain: a new follow-up in the HUNT Study. BMC Public Health. 2024;24(1):2618.
17. Ghafouri M, Teymourzadeh A, Nakhostin-Ansari A, Sepanlou SG, Dalvand S, Moradpour F, Bavarsad AH, Boogar SS, Dehghan M, Ostadrahimi A, Aghazadeh-Attari J. Prevalence and predictors of low back pain among the Iranian population: Results from the Persian cohort study. Annals of Medicine and Surgery. 2022;1; 74:103243.
18. Zhang C, Qin L, Yin F, Chen Q, Zhang S. Global, regional, and national burden and trends of Low back pain in middle-aged adults: analysis of GBD 1990–2021 with projections to 2050. BMC Musculoskeletal Disorders. 2024;25(1):886.
19. Bizzoca D, Solarino G, Pulcrano A, Brunetti G, Moretti AM, Moretti L, Piazzolla A, Moretti B. Gender-related issues in the management of low-back pain: A current concepts review. Clinics and Practice. 2023;13(6):1360-8.
20. Markova V, Markov M, Petrova Z, Filkova S. Assessing the impact of prolonged sitting and poor posture on lower back pain: A photogrammetric and machine learning approach. Computers. 2024;13(9):231.