International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Impact of Sedentary Lifestyle on Core Muscles in Young Adults

Dr. Shakshi Naithani (PT)[1], Dr. Barkha Khurana[2], Anjali Pundir[3], Yashsavi Singh[4]

[1]Assistant Professor, PhD Scholar, NIMS College of Physiotherapy and Occupational Therapy, Jaipur

[2]Principal & Professor, School of Healthcare Professions, DIT University, Dehradun

[3]Uttaranchal College of Biomedical Science and Hospital, Dehradun

[4]Uttaranchal College of Biomedical Science and Hospital, Dehradun

Abstract: ***Sustained sitting and lack of physical activity led to a sedentary lifestyle that all young adults are going through. The pattern of a sedentary lifestyle hurts the musculoskeletal health, especially the core muscles, which play a vital role in posture, balance, and functional activities. The relationship between core muscle strength and sedentary behaviour is directly shown by this research. This study aims to develop and validate questionnaire and evaluate the relationship between sedentary behaviours and reduced core muscle strength by measuring physical activity levels and trunk muscle endurance through questionnaire. To avoid the chronic functional impairments in the particular age group, the findings may help in increasing awareness and encouraging early physiotherapy support.***

Keywords: Sedentary lifestyle, musculoskeletal health, functional activities, sustained sitting, muscle endurance, and physiotherapy

1. Introduction

According to today's modern world, it's all about convenience, which results in a sedentary lifestyle. Convenience is progressively elevating, from ordering groceries to attending lectures with a single click, without even leaving bed. The silent rise of sedentary lifestyles leads to countless health issues. Activities that used to require movements are now completed with a simple screen interaction.

We sit to work, we sit to study, we sit to meditate, we sit to eat, & we sit for longer than we realize. Sitting is the new smoking and has an equally harmful effect. Sitting for longer periods has variable disadvantages. The musculoskeletal system is affected by prolonged sitting with poor postural habits, which consists of reduced core muscle strength and endurance and increases the risk of chronic low back pain.

Physical appearance or aesthetics can't be core muscle strength; it means proper function, supporting posture, efficient breathing, and increased cognitive functions.

Recent research shows that young adults are particularly affected by these issues in several ways: Reduced core muscle endurance, Heightened risk of back pain, More than 6 hours of daily sitting.

Not arms, not legs- it's the core under threat. The strength of the powerhouse, and the foundation of posture, balance, and spinal support is affected by a sedentary lifestyle. This questionnaire is not just a survey. It serves as an imperative alert. A diagnostic assessment. An opportunity to reflect on:

1) Am I aware of my core health?
2) Is prolonged sitting silently undermining my strength?
3) Can I undertake a minor but impactful action to rectify this?

Through this questionnaire, this study aspire to uncover:

1) How much sitting is too much?
2) To what extent are young adults aware of their core health?

2. Review of Literature

1) Baruch Vainshelboim, Gabrielle M. Brennan, Stephen LoRusso, Patricia Fitzgerald, and Kristofer S. Wisniewski (2019), (Physiology & Behaviour. 2019 May 15:204:277-282. doi:10.1016/j.physbeh.2019.02.041. Epub 2019 Mar 1), Sedentary behaviour and physiological health determinants in male and female college students. This study showed that more than 6 hours per day of sitting correlated with significantly lower lean body mass in females and reduced upper body strength in males. The results highlighted how sedentary lifestyles negatively impact young adults' body composition and muscle strength.
2) Hilal Telli & Filiz Ozel Cakir (2024), (Selcuk University Press) Effects of physical activity level and sedentary behaviour on the musculoskeletal system in young adults. This study demonstrated a strong negative correlation between sedentary time and musculoskeletal function, particularly in the lower back and core areas. This study highlighted the need for regular exercise in preventing young people' postural problems and muscular deconditioning.
3) Hyunwoo Lee, Chanki Kim, Seungho An, and Kyoungkyu Jeon (2022), [Applied Sciences (Switzerland), Volume 12, Issue 5, Article 2501], Effects of core stabilization exercise programs on changes in erector spinae contractile properties and isokinetic muscle function of adult females with a sedentary lifestyle. According to their study, a 7-week core stabilization exercise program effectively decreased erector spinae muscle stiffness. It also improved isokinetic trunk muscle function and increased contraction velocity by activating the neuromuscular control of the erector spinae muscle.

4) Hatice Yakut and Burcu Talu (2021), Baltic Journal of Health and physical Activity, Vol. 13, no. 4, pp. 89-97, 2021, The effect of core strength training on flexibility and balance in sedentary healthy young individuals. The study demonstrated that a six-week core stability training (CST) program enhanced sedentary student's flexibility and dynamic balance, particularly in the areas of lateral movement and lower back. According to the study, CST strengthens core muscles, improved postural control and reduced the risk of injury.
5) Verner Marijancic, Tanja Grubic Kezele, Stanislav Peharec, Natasa Dragas-Zubalj, Sandra Pavicic Zezelj, and Gordana Starcevic-Klasan (2023), [International Journal of Environmental Research and Public Health, Volume 20(20), Article 6938 (MDPI)], Relationship between physical activity and sedentary behaviour, spinal curvature, endurance, and balance of the trunk muscles: extended physical health analysis in young adults. According to the study, college students who engaged in less physical activity (PA) and spent more time sitting down had lower quality of life (QoL), decreased respiratory function, and inadequate trunk muscle endurance. It highlighted how important it was to encourage young people to lead active lifestyles in order to avert future health problems and enhance general well-being.
6) Banafsheh Amiri, David G. Behm, and Erika Zemkova (2025), [Sports Medicine – Open (article published in 2025, Volume 11, Issue 1)], On the role of core exercises in alleviating muscular fatigue induced by prolonged sitting. According to the study, core workouts lessened the muscle fatigue brought on by extended sitting. For sedentary people, these workouts reduced musculoskeletal problems, improved posture, and increased trunk muscle endurance.
7) Wilson de Oliveira Gil, (2021), [Journal of Bodywork and Movement Therapy] Acute effect of core stability and sensory-motor exercises on postural control during sitting and standing positions in young adults. The study found that core stability and sensory-motor exercises improved postural control in young adults during sitting and standing. These exercises helped prevent injuries and aided in rehabilitation of postural deficits.
8) Banafsheh Amiri and Erika Zemvoka (2024), [Frontiers in Physiology] Fatigue and recovery-related changes in postural and core stability in sedentary employees. They observed that prolonged sitting led to slumped posture, indirectly affected spinal curvature, and increased low-back and hamstring stiffness. Active recovery proved more effective than passive recovery.
9) Amitav Banerjee and Swati Khatri (July 2010), [Indian Journal of Community Medicine] A study of physical activity habits of young adults. The study found that most young medical students had low physical activity levels. Stair climbing was common due to college infrastructure. Only 9.4% did vigorous exercise. Many were overweight or underweight, showing a trend of sedentary lifestyles.
10) Anupama Pathak Sushma Shrestha desar and Kuldeep Kumar Yadav (2023) [Indian Journal of Research] They found that higher BMI in adults is associated with lower core muscle endurance. This means that excess body weight can weaken core strength, highlighting the importance of maintaining a healthy weight.

Research Methodology

- Study Design: descriptive cross-sectional survey.
- Target population: young adults in the Dehradun area.
- Sampling techniques: convenience sampling.
- Sample size: 200-220

Inclusion criteria:

- Young adults aged 18-36 years,
- Living In Dehradun for at least 6 months,
- Normal BMI,
- Willing to give consent,
- Not taking part in regular core exercises (less than 2 times per week),
- Physically fit for the basic core test will be included.

Exclusion criteria:

- Participants, if they have any musculoskeletal or neurological disorders,
- If they are undergoing treatment for back or core issues,
- If they had recent abdominal or spinal surgery,
- If they suffer from chronic illnesses like uncontrolled diabetes,
- If they are pregnant.

3. Result

Content validation of the questionnaire was established using the Delphi Method. A panel of physiotherapist was invited to evaluate the relevance, clarity, and appropriateness of each item included in the questionnaire. The Delphi method was chosen as it is a systematic and structured technique for achieving consensus among experts. A single-round Delphi process was conducted, as adequate consensus was achieved in the initial round. Experts rated each item using a Likert scale. Responses were collected anonymously to avoid dominance bias and to ensure independent judgment.

A total of 7 subject experts participated in the Delphi validation process. All experts were faculty members in physiotherapy with clinical and academic experience ranging from 1 to 18 years, representing diverse specializations including cardiopulmonary, neurological, musculoskeletal, and sports physiotherapy.

Table 1: Descriptive statistics of Delphi method

Parameter	Value
Number of Experts	7
Number of Items	21
Mean Score (Overall)	4.0
Median Score	4
Standard Deviation	Low
Level of Agreement	High

The overall mean score of 4 suggests that experts considered the items to be relevant and appropriate for the intended construct. The low variability in scores indicates consistency in expert opinion. As consensus was achieved in the first round, additional Delphi rounds were not required.

Table 2: Kendall's W was calculated to assess the degree of agreement among experts

Statistics	Value
Kendall's W	0.72
X^2(Chi Square)	Significant
p- Value	< 0.05

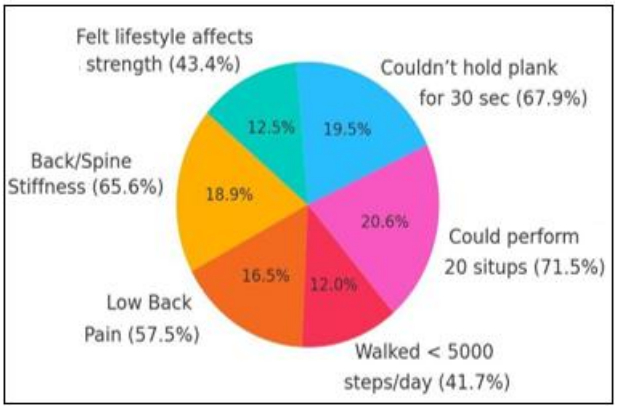
A Kendall's W value of 0.72 indicates strong agreement among experts. The statistically significant p-value confirms that the observed agreement did not occur by chance, establishing content validity of the tool.

The single-round Delphi process demonstrated strong expert consensus regarding the relevance of the tool items. The overall mean score of 4 and a Kendall's W of 0.72 indicate a high level of agreement among experts. Therefore, the tool was considered content valid and suitable for further use in clinical and research settings.

This study includes all genders with 221 participants, with an average age of 21 years. Many respondents are shown participating in regular physical activities, but stretching and strengthening is not commonly seen. Low back pain and spinal stiffness are some common complaints with indicates poor postural and core health.

Core strength is not even enough but particular movements are generally shown. Lot of people struggles with basic activities such as holding a plank position and even climbing stairs.

Many respondents confessed that their current lifestyle is affecting their physical strength and health of musculoskeletal system, which indicates clear relationship between sedentary lifestyle and core muscle strength.



4. Discussion

The Delphi approach was used to establish content validity of the questionnaire through expert consensus. Consensus was achieved in a single round, supported by a high overall mean score and strong inter-expert agreement. This indicates that the questionnaire items were relevant, clearly structured, and appropriately aligned with the study objectives. The use of a statistically supported Delphi process strengthens the methodological rigor and credibility of the tool.

The study population consisted average age of 21 years. The key findings was a progressive decline in the strength of core muscles, which has strong correlation with a sedentary lifestyle.

Transverse abdominis, obliques, multifidus, and pelvic floor are collectively called core muscles. It plays a vital role in providing stability, transferring force, and acts as protective cushion for the spine from excessive force. Improper posture, back discomfort-pain, difficulty in balancing are the result of core muscle weakness.

During core muscle evaluation, many participants performed very poorly-67.9% could not hold a plank for 30 seconds, 71.5% could not perform 20 sit-ups, and many had difficulty in balancing on one leg—that indicates compromised neuromuscular control and stability.

Young adults are generally shown in the pattern of sedentary behaviour that includes long screen time, physical inactivity. This pattern directly deconditions the muscle, particularly the core muscles, which is important for maintain posture and spinal alignment.

The result indicates the chronic musculoskeletal issues of sedentary lifestyle, such as elevated risk of spinal discomfort, poor posture and diminished functional activities. Therefore, the most important thing is to elevate the physical activity levels with core strengthening programmes, to protect the postural health and reduce the early onset of musculoskeletal issues in young adults.

5. Future Scope

Even though, the study provides useful information, it's result could be clearer with larger sample size and advanced technologies, that allows stronger statistical significance and applicability. Advanced technologies such as posture analysis systems, wearable motion sensors, or muscular activity monitors may also provide real-time importance of physical activity patterns. Future research should aim to use these components to achieve more focused and preventive physiotherapy strategies for young adults.

6. Limitations

The study has limitations although it provides valuable knowledge. The broader applicability of the findings across varied populations are limited by small sample size. Furthermore, self-reported questionnaires indicate the potential for response bias, as participants may have elevated or reduced their functional activity and physical capacity. The lack of measurement tools such as electromyography (EMG), digital posture analysis, or wearable trackers results in restriction of the accuracy and depth of physiological assessment. Additionally, the cross-sectional study concludes the chronic issues between sedentary behaviour and decreased core muscle strength. It was noted that other significant components such as sleep quality, nutrition, and psychological stress had not been assessed, which could have indirectly affected the musculoskeletal outcomes.

Questionnaire on Impact of Sedentary Lifestyle on Core Muscles in Young Adults:

Demographic Details
- Name –
- Age –
- Gender –
- BMI –

Sedentary Lifestyle Habits

1) On average, how many hours do you sit in a day?
- <4hours
- 4-7 hours
- >7 hours

2) Do you participate in regular physical activities?
- Yes
- No

3) If yes, how often do you exercise per week?
- 1-2 days
- 3-4 days
- 5-7 days
- Rarely/never

4) How would you describe your daily screentime?
- <2 hours
- 2-4 hours
- 4-6 hours
- >6 hours

5) Do you take regular breaks when sitting for extended periods?
- Every 30 minutes
- Ever 1 hour
- Occasionally
- Never

6) What is the most frequent sitting posture?
- Upright
- Slouched
- Reclined
- Cross-leg

7) Do you feel stiffness in your back after sitting for long time?
- Yes
- No

8) How many steps (APPROX) do you work regularly?
- <2000
- 2000-5000
- 5000-8000
- >8000

Core Strength Awareness & Perception:

1) Are you aware of term 'CORE MUSCLE STRENGTH'?
- Yes
- No

2) How would you rate your core strength?
- 1
- 2
- 3
- 4
- 5

3) Do you often experience low back pain?
- Yes
- No

4) Do you feel fatigue after minor physical task, such as walking uphill or climbing stairs?
- Yes
- No

5) Have you ever been assessed by a physiotherapist for posture or core issues?
- Yes
- No

Lifestyle & Physical Fitness:

1) How many hours do you sleep per night?
- <4 hours
- 4-6 hours
- 6-8 hours
- >8 hours

2) Do you consume junk food more than 3 times a week?
- Yes
- No

3) Do you drink enough water daily (at least 2 litres)?
- Yes
- No

4) Do you include stretching in your daily routine?
- Yes
- No

Functional & Physical Task Ability (Self- Reported)

1) Can you hold a plank more than 30 seconds?
- Yes
- No
- Never tried

2) Can you perform 20 sit-ups without fatigue?
- Yes
- No
- Never tried

3) Do you feel stable while standing on one leg for 30 seconds?
- Yes
- No

4) Do you think your current lifestyle is affecting your physical strength and posture?
- Yes, significantly
- Slightly
- Not at all
- Not sure

References

[1] Baruch Vainshelboim, Gabrielle M. Brennan, Stephen LoRusso, Patricia Fitzgerald, and Kristofer S. Wisniewski (2019), Sedentary behaviour and physiological health determinants in male and female college students. (Physiology & Behaviour. 2019 May

15:204:277-282. doi: 10.1016/j.physbeh.2019.02.041. Epub 2019 Mar 1)

[2] C. Bouchard, S.N. Blair, P.T. Katzmarzyk, less sitting, more physical activity, or higher fitness? [Mayo Clin. Proc. 90 (2015) 1533-1540.]

[3] L.F. de Rezende, M Rodrigues Lopes, J.P. Rey-Lopez, V.K. Matsuda, C. Luiz Odo, Sedentary behavior and health outcomes: an overview of systematic reviews. [PLoS One 9 (2014) e105620.]

[4] J.P. Thyfault, M. Du, W.E. Kraus, J.A. Levine, F.W. Booth, Physiology of sedentary behavior and its relationship to health outcomes. [Med. Sci. Sports Exerc. 47 (2015) 1301-1305.]

[5] O. Castro, J. Bennie, I. Vergeer, G. Bosselut, S.J.H. Biddle, Correlates of sedentary behavior in university students: a systematic review. [Prev. Med. 116 (2018) 194-202.]

[6] Hilal Telli & Filiz Ozel Cakir (2024), Effects of physical activity level and sedentary behaviour on the musculoskeletal system in young adults. [Selcuk University Press] [Telli & Cakir,2024]

[7] Celis-Morales CA, Perez-Bravo F, Ibanez L, Salas C, Bailey MES, Gill JMR. Objective vs self-reported physical activity and sedentary time: effects of measurement method on relationships with risk biomarkers. [PLoS One.2012;7(5): e36345.https://doi.org/10.1371/journal.pone.0036345

[8] Carson V, Hunter S, Kuzik N, Gray CE, Poitras VJ, Chaput JP, et al. Systematic review of sedentary behavior and health indicators in school-aged children and youth: an update. Appl Physio Nutr Metab. 2016;41(6):240-265. https://doi.org/10.1139/apnm-2015-0630

[9] Mansoubi M, Pearson N, Biddle SJH, Clemes S. The relationship between sedentary behaviour and physical activity in adults: A systematic review. Prev Med. 2014; 69:28-35.https://doi.org/10.1016/j.ypmed.2014.08.028

[10] Hyungwoo Lee, Chanki Kim, Seungho An, and Kyoungkyu Jeon (2022), Effects of core stabilization exercise programs on changes in erector spinae contractile properties and isokinetic muscle function of adult females with a sedentary lifestyle. [Applied Sciences (Switzerland), Volume 12, Issue 5, Article 2501], [Lee et al.,2022]

[11] Owen, N; Healy, G.N; Matthews, C.E.; Dunstan, D.W. Too much sitting: The Population-Health Science of Sedentary Behavior. Exerc. Sport Sci. Rev. 2010, 38, 105-113.

[12] Kuster, R.P.; Bauer, C.M.; Baumgartner, D. Is active sitting on a dynamic office chair controlled by the trunk muscles? PLos ONE 2020, 15, e0242854.

[13] Mengistab D. Sedentariness, productivity, perception and long-term health effects of sit-stand workstation at work: a literature review. 2019.[https://digitalcommons.njit.edu/theses/1657.]

[14] Šagát P, Bartik P, Prieto González P, Tohănean DI, Knjaz D. Impact of COVID-19quarantine on low back pain intensity, prevalence, and associated risk factors among adult citizens residing in riyadh (Saudi Arabia): a cross-sectional study. Int J Environ Res Public Health. 2020. [https://doi.org/10.3390/ijerph17197302.]

[15] Frizziero A, Pellizzon G, Vittadini F, Bigliardi D, Costantino C. Efficacy of core stability in non-specific chronic low back pain. J Funct Morphol Kinesiol. 2021.[https://doi.org/10.3390/jfmk6020037.]

[16] Jia B. The application of EMG-based methods in evaluating the impact of prolonged sitting on people's health. Sedentary Behav a Contemp View IntechOpen. 2020. [https://doi.org/10.5772/intechopen.9525]

[17] Suresh A, Kashyap D, Behera TP, Wilson E. Comparison of isometric endurance of abdominal and back extensor muscles in manual and sedentary males in the age group of 20–40 years. J Aging Sci. 2021;9(254):1–7. [Google Scholar]

[18] Šagát P, Bartik P, Prieto González P, Tohănean DI, Knjaz D. Impact of COVID-19quarantine on low back pain intensity, prevalence, and associated risk factors among adult citizens residing in riyadh (Saudi Arabia): a cross-sectional study. Int J Environ Res Public Health. 2020. 10.3390/ijerph17197302. [DOI] [PMC free article] [PubMed] [Google Scholar]

[19] Frizziero A, Pellizzon G, Vittadini F, Bigliardi D, Costantino C. Efficacy of core stability in non-specific chronic low back pain. J Funct Morphol Kinesiol. 2021. 10.3390/jfmk6020037.[DOI] [PMC free article] [PubMed] [Google Scholar]

[20] Jung KS, Jung JH, In TS, Cho HY. Effects of prolonged sitting with slumped posture on trunk muscular fatigue in adolescents with and without chronic lower back pain. Medicina. 2020. 10.3390/medicina57010003. [DOI] [PMC free article] [PubMed] [Google Scholar]

[21] Owen, N.; Healy, G.N.; Matthews, C.E.; Dunstan, D.W. Too Much Sitting: The Population-Health Science of Sedentary Behavior. Exerc. Sport Sci. Rev. 2010, 38, 105–113. [Google Scholar] [CrossRef] [PubMed]

[22] omero-Blanco, C.; Rodríguez-Almagro, J.; Onieva-Zafra, M.D.; Parra-Fernández, M.L.; Prado-Laguna, M.D.C.; Hernández-Martínez, A. Physical Activity and Sedentary Lifestyle in University Students: Changes during Confinement Due to the COVID-19 Pandemic. Int. J. Environ. Res. Public Health 2020, 17, 6567.

[23] Heneweer, H.; Vanhees, L.; Picavet, H.S.J. Physical activity and low back pain: A U-shaped relation? Pain 2009, 143, 21–25

[24] Cho, K.H.; Beom, J.W.; Lee, T.S.; Lim, J.H.; Lee, T.H.; Yuk, J.H. Trunk Muscles Strength as a Risk Factor for Nonspecific Low Back Pain: A Pilot Study. Ann. Rehabil. Med. 2014, 38, 234–240. [Google Scholar] [CrossRef] [Green Version]

[25] Kett, A.R.; Sichting, F.; Milani, T.L. The Effect of Sitting Posture and Postural Activity on Low Back Muscle Stiffness. Biomechanics 2021, 1, 214–224. [Google Scholar] [CrossRef]

[26] Hatice Yakut and Burcu Talu (2021), , The effect of core strength training on flexibility and balance in sedentary healthy young individuals. [Baltic Journal of Health and physical Activity, Vol. 13, no. 4, pp. 89-97, 2021] [Yakut & Talu,2021]

[27] Verner Marijancic, Tanja Grubic Kezele, Stanislav Peharec, Natasa Dragas-Zubalj, Sandra Pavicic Zezelj, and Gordana Starcevic-Klasan (2023), Relationship between physical activity and sedentary behavior, spinal curvature, endurance, and balance of the trunk muscles: extended physical health analysis in young adults. [International Journal of Environmental Research and Public Health, Volume 20(20), Article 6938 (MDPI)]

[Marijancic, Kezele, Peharec, Zubali, Zezelj & Klasan,2023]
[28] Wilson de Oliveira Gil, (2021). Acute effect of core stability and sensory-motor exercises on postural control during sitting and standing positions in young adults. Journal of bodywork and movement therapy. [de Oliveira Gil,2021]
[29] Banafsheh Amiri and Erika Zemvoka (2024). Fatigue and recovery-related changes in postural and core stability in sedentary employees. [Frontiers in Physiology]. [Amiri & Zemvoka,2024]
[30] Amitav Banerjee and Swati Khatri (July 2010), A study of physical activity habits of young adults. [Indian Journal of Community Medicine] [Banerjee & Khatri, 2010]
[31] Anupama Pathak, Sushma Shrestha desar and Kuldeep Kumar Yadav (2023) They found that higher BMI in adults is associated with lower core muscle endurance. [Indian Journal of Research] [Pathak, Shrestha & YaSdav, 2023].