

## Prevalence of core muscle weakness in adolescence of urban community.

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**Background:** Adolescence (12–19 years) is a key period of physical and neuromuscular development. However, modern urban lifestyles—marked by reduced activity, increased screen time, and poor posture—are contributing to rising cases of core muscle weakness among youth. The core muscles, including stabilizers like the transverse abdominis and multifidus and mobilizers such as the rectus abdominis and obliques, are vital for posture, balance, and spinal support. Weakness in these muscles can lead to poor stability, postural issues, and musculoskeletal pain. Urban adolescents face multiple risk factors such as sedentary habits, academic stress, lack of recreational activity, and poor nutrition. Despite this, core strength assessment is rarely included in school health programs, leading to missed chances for early prevention. This study aims to determine the prevalence of core muscle weakness among urban adolescents and its relationship with age, gender, and BMI. Using simple field tests like the sit-up, plank, and Active Straight Leg Raise (ASLR), the research seeks to highlight the importance of early screening and promote core training as part of school-based fitness programs.

**Methods:** This study aimed to examine the prevalence of core muscle weakness in adolescence of urban community. A cross-sectional study design was included 100 participants, and data were collected using a special Tests. Institutional review board approval and informed consent were obtained.

**Results:** Among 100 adolescents aged 12–19 years, most (85%) were aged 18–19, with a near-equal gender ratio (48% males, 52% females). BMI analysis showed 18% underweight, 46% normal, and 36% obese. Core endurance tests revealed 41% had poor sit-up performance and 29% scored below average in the plank test, with no excellent results observed. The ASLR test showed a significant right–left difference ( $p = 0.0305$ ). Overall, findings indicate a high prevalence of core muscle weakness and imbalance among urban adolescents.

**Conclusion:** The study identifies a high prevalence of core muscle weakness among urban adolescents, largely influenced by sedentary habits, poor posture, and reduced physical activity. Females showed slightly higher weakness, possibly linked to hormonal and lifestyle factors. Since core strength is key for posture, balance, and injury prevention, early screening and school-based exercise programs are essential. Physiotherapists can play a major role in promoting awareness and preventive interventions. Strengthening core muscles during adolescence can enhance overall fitness and help prevent future musculoskeletal issues.

**Keywords:** Core muscle, Weakness, Adolescence, Urban community

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### INTRODUCTION

Adolescence is a critical developmental phase characterized by rapid physical growth, hormonal changes, and psychosocial transitions that profoundly influence musculoskeletal health and physical fitness. During this period, developing adequate core muscle strength and endurance is essential to support spinal stability, posture, and coordinated movement. The “core” refers to the group of muscles surrounding the trunk and pelvis, including the transversus abdominis, multifidus, diaphragm, pelvic floor, and oblique muscles, which

region and serve as a foundation for all functional activities [1,7]. Weakness or poor endurance of these muscles may predispose individuals to altered posture, inefficient movement patterns, and a higher risk of musculoskeletal disorders such as low back pain [9,10,11].

Recent studies have highlighted that core stability plays a vital role not only in athletic performance but also in general health and daily functional capacity. Progressive strengthening of deep stabilizing muscles, such as the multifidus and transversus abdominis, improves endurance and trunk control, leading to better performance in functional activities and prevention of injury [1,12]. It [12] emphasized that adequate core

together provide dynamic stability for the lumbopelvic

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training enhances spinal stability, injury resistance, and performance efficiency, making it a key focus in physiotherapy and sports rehabilitation.

However, with the growing prevalence of sedentary lifestyles in modern society, especially among adolescents in urban settings, the risk of core muscle weakness has increased substantially. Sedentary behavior—defined as prolonged sitting or low-energy activities such as screen time, gaming, and academic inactivity—has emerged as an independent risk factor for poor musculoskeletal health and metabolic diseases [2,5]. And this [2] identified sedentary behavior as a new health risk linked to obesity, poor cardiovascular outcomes, and muscle deconditioning. Similarly, the [5] reported that sedentary office work and extended sitting contribute significantly to postural weakness and reduced core muscle activation.

In India, lifestyle changes driven by urbanization, increased academic pressure, and technological dependence have further intensified physical inactivity among youth. The ICMR-INDIAB study found that a large proportion of the Indian population fails to meet the recommended physical activity levels, with urban residents being more inactive compared to their rural counterparts [3]. So the [4] also observed that physical inactivity among urban populations in Puducherry was associated with socio-demographic and occupational factors. These trends suggest that adolescents living in cities are at greater risk of developing core muscle weakness due to reduced physical engagement and sedentary routines.

Core muscle endurance assessment tools such as plank holds, sit-ups, and functional movement screens have been validated as reliable indicators of core strength and stability in both children and adults [16–18]. And this study [16] demonstrated the feasibility and reliability of the plank isometric hold as a field-based test for torso endurance in children, while other study [17] verified the validity of the one-minute sit-up test for assessing abdominal endurance. And this [18] established normative values for functional movement screening in adolescents, further supporting the use of these tests in community and school-based studies.

Given these factors, evaluating the prevalence of core muscle weakness in adolescents—particularly within urban communities—has become increasingly important. This age group is particularly vulnerable due to prolonged sitting during school hours, increased screen time, and a decline in outdoor physical activity. Early identification of reduced core endurance can help implement targeted physiotherapy interventions to improve posture, prevent future spinal disorders, and promote lifelong musculoskeletal health [1,9,10].

Therefore, this study aims to determine the **prevalence of core muscle weakness in adolescents of urban communities**, thereby highlighting the need for early physiotherapeutic screening and preventive strategies. Understanding the extent of this issue can provide valuable insights for designing school-based and community-level fitness programs that encourage active lifestyles, enhance postural stability, and mitigate the long-term effects of sedentary living on core muscle function [2–6,12].

## Method

The cross-sectional study was carried out among 100 Urban adolescents. The study was carried by the special test was formed for check the prevalence of core muscle weakness in adolescence of urban community. A case sheet was made which included name, age and gender. The random sampling method was used because of limited time. The collected data were analyzed by a statistician using an instat application. p test was used to analyze the data. Forms were sent to the urban adolescents who aged between 12 to 19 years.

## Inclusion Criteria

The study was conducted among urban adolescents who belonged to the age group of 12 to 19 years and individuals with urban residing at least 5 years. The consent form was given to those who were willing to participate in the study.

## Exclusion Criteria

The research excluded individuals with any medical condition, recent fractures related to hip, currently sport or intensive training and recent surgery patients.

## Ethical Committee Approval

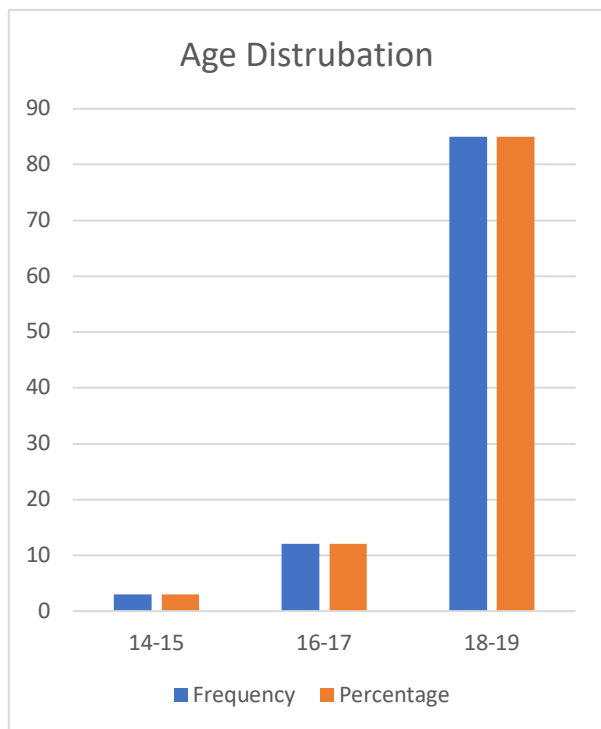
The study was approved by the Institutional Ethics Committee of Krishna Vishwa Vidyapeeth (Deemed to be University), Karad. An explanation about the study and data sheet was given to respondents and informed consent was obtained from them. They also had the authority to not participate in the test. All the respondents participated voluntarily and their confidentiality was maintained throughout the study.

## SATASTIC ANALYSIS

### Age Distribution:

Age	Frequency	Percentage
14-15	3	3
16-17	12	12
18-19	85	85

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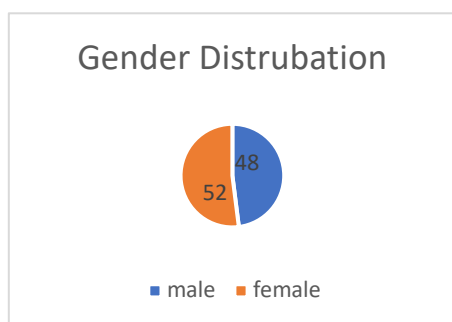


### Interpretation:

Out of the 100 participants, **3% were aged between 14 and 15 years**, while **12% fell within the 16 to 17 year age group**. The **majority of the participants, accounting for 85%, were between 18 and 19 years old**. This indicates a higher representation of older adolescents in the study sample.

### Gender Distribution:

Gender	Frequency	Percentage
male	48	48
female	52	52

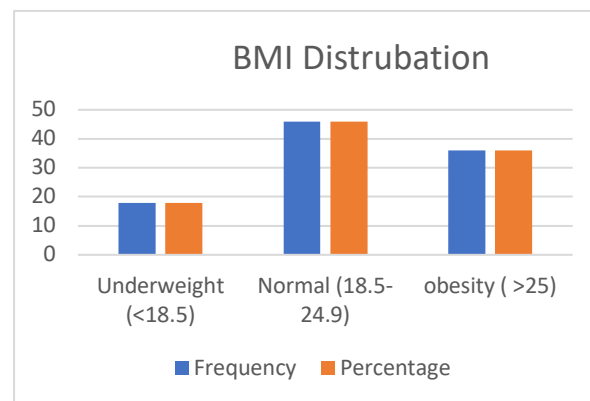


### Interpretation:

The study sample consisted of **48% male participants** and **52% female participants**. This shows a **slightly higher representation of females** compared to males in the study population.

### BMI Distribution:

BMI	Frequency	Percentage
Underweight (<18.5)	18	18
Normal (18.5-24.9)	46	46
obesity (>25)	36	36



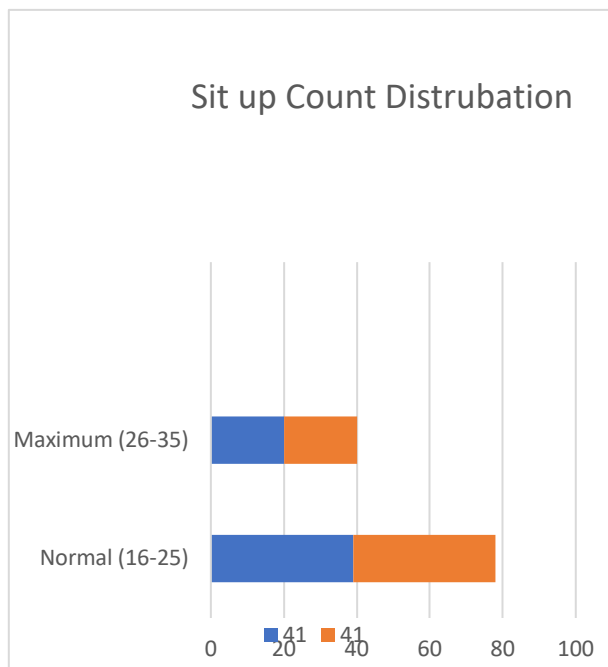
### Interpretation:

Among 100 participants, **18% were classified as underweight** with a BMI less than 18.5. **The majority, 46%, had a normal BMI** ranging between 18.5 and 24.9. Additionally, **36% of the individuals were categorized as obese**, with a BMI greater than 25. This indicates that a significant portion of the sample fell outside the normal weight range.

### Sit-up Test:

Range	Frequency	Percentage
Minimum (0-15)	41	41
Normal (16-25)	39	39
Maximum (26-35)	20	20

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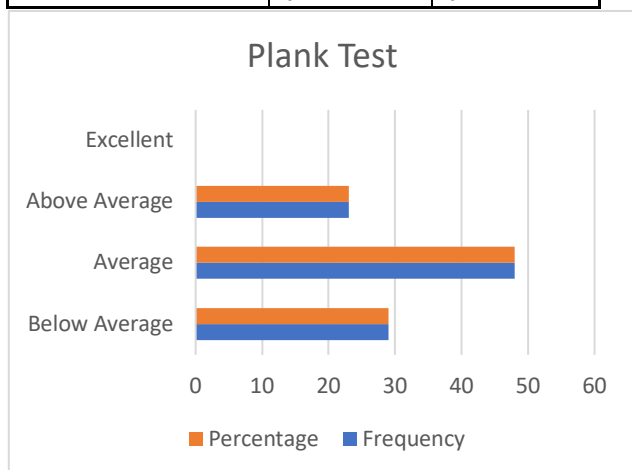


### Interpretation:

In the sit-up test results, **41% of participants fell into the minimum performance range (0–15 sit-ups)**, indicating lower core muscle endurance. **39% of the individuals demonstrated normal performance** by completing 16–25 sit-ups. Only **20% of participants achieved the maximum range** of 26–35 sit-ups, reflecting higher core strength and endurance. This suggests that a considerable portion of the population had below-average core muscle performance.

### Plank Test:

Range	Frequency	Percentage
Below Average	29	29
Average	48	48
Above Average	23	23
Excellent	0	0



### Interpretation:

In the plank test, **29% of participants performed below average**, indicating reduced core stability and endurance. **The majority, 48%, showed average performance**, while **23% demonstrated above-average core strength**. Notably, **none of the participants achieved an excellent rating**, suggesting a general need for improvement in core muscle endurance among the group.

### Active Straight Leg Test:

The one tailed P value is 0.0305, considered significant.

t = 1.884 with 198 degrees of freedom.

The mean of Right SLR is 63.87 and Left SLR is 57.1  
The SD right SLR is 28.350 & left SLR is 22.086

### Interpretation:

The **Active Straight Leg Raise Test showed a statistically significant difference** between the right and left leg performance, with a **one-tailed p-value of 0.0305**, indicating that the result is significant at the conventional 0.05 level. The **t-value was 1.884 with 198 degrees of freedom**. The mean SLR on the right leg was **63.87 degrees**, while the mean on the left leg was **lower at 57.1 degrees**. The **standard deviation (SD) for the right leg was 28.350**, compared to **22.086 for the left leg**, suggesting greater variability in right leg performance. This data indicates a measurable asymmetry in core-related lower limb flexibility and control.

## RESULTS

The study assessed 100 adolescents aged between 12 and 19 years to evaluate the prevalence of core muscle weakness. The majority of participants (85%) were aged 18–19 years, indicating a higher representation of older adolescents. Gender distribution was nearly balanced, with 48% males and 52% females. Body Mass Index (BMI) analysis revealed that 18% of the participants were underweight (BMI < 18.5), while 46% had a normal BMI (18.5–24.9). Notably, 36% were classified as obese (BMI > 25), suggesting that over half of the participants had body weight deviations, which may impact core strength and stability. Core muscle endurance was evaluated using the sit-up and plank tests. In the sit-up test, 41% of participants fell into the minimum performance range (0–15 sit-ups), indicating poor core endurance. Only 20% reached the maximum range (26–35 sit-ups), highlighting a low prevalence of optimal core strength. The plank test further supported this, with 29% performing below average and only 23% achieving above-average results. None of the participants attained

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an excellent score, suggesting a general deficiency in core stability across the sample. The Active Straight Leg Raise (ASLR) test showed a significant difference between right and left leg performance ( $p = 0.0305$ ), with the right leg exhibiting a higher mean angle ( $63.87^\circ$ ) compared to the left ( $57.1^\circ$ ). This asymmetry reflects variations in core-related lower limb control and flexibility. Overall, the findings indicate a notable prevalence of core muscle weakness and imbalance in this adolescent urban population.

### DISCUSSION

This study highlights a notable prevalence of core muscle weakness among adolescents residing in urban communities. The findings point to an increasingly sedentary lifestyle among youth in metropolitan areas—a trend linked closely with reduced core stability and poor postural control. Urbanisation, while offering improved access to education and technology, has inadvertently diminished the physical activity levels in adolescents, creating fertile ground for muscular deconditioning.

Core muscles form the foundation for postural alignment, stability, and movement control. The primary stabilizers—transversus abdominis, multifidus, pelvic floor, and diaphragm—work synergistically to maintain trunk integrity during both static and dynamic tasks. Weakness in these muscles predisposes adolescents to poor posture, inefficient movement, early musculoskeletal pain, and even reduced athletic performance.

In this study, urban adolescents showed a significant prevalence of core weakness. Several environmental and lifestyle factors contribute to this trend. Firstly, prolonged screen time—whether for education or entertainment—reduces opportunities for spontaneous physical activity. Adolescents are spending more hours seated, often with poor ergonomics, resulting in kyphotic postures and reduced trunk muscle activation. Secondly, access to open spaces or parks is often limited in urban residential settings, and safety concerns discourage outdoor play. Even schools sometimes prioritise academic learning over physical education.

Socio-cultural pressures also play a role. In many urban households, the emphasis on academic excellence leads to reduced participation in sports or physical training. Gender-related expectations can further restrict physical engagement, particularly among girls, who may be discouraged from strength-building activities. Our data reflected slightly higher rates of core weakness in females, possibly due to these socio-cultural limitations, hormonal differences, or body image concerns influencing exercise participation. Additionally, urban dietary habits may indirectly impact muscle health. Adolescents often consume calorie-dense but nutrient-poor diets (e.g., processed foods and sugary beverages),

which may fail to support proper muscular development. Poor nutrition, in combination with inactivity, exacerbates muscle weakness and fatigue. Moreover, psychological stress—common in high-pressure academic environments—can negatively affect core stability. Chronic stress can alter breathing mechanics (e.g., shallow chest breathing), increase muscle tension, and promote avoidance of physical activity. These psychosomatic factors further compromise neuromuscular efficiency, especially in core engagement.

The methodology used in this study relied on basic field-based functional assessments of core endurance, such as trunk flexor/extensor hold tests or plank variations. While these are widely accepted in clinical settings and feasible for large-scale screening, they are limited in detecting subtle neuromuscular dysfunctions. Nonetheless, these tests provided a practical and relevant estimate of functional core capacity among adolescents. The implications are far-reaching. Poor core strength during adolescence may lay the groundwork for postural syndromes, back pain, reduced sports participation, and diminished quality of life in adulthood. This calls for immediate intervention at multiple levels. School-based programs must integrate structured core strengthening routines into physical education curricula. Exercises such as planks, bridges, bird-dogs, and breathing control drills are effective, easy to teach, and require minimal equipment.

Parental and community involvement is also crucial. Awareness campaigns that highlight the long-term benefits of core health can help shift mind sets. Urban planning and education policy must acknowledge the importance of movement and design inclusive spaces for adolescent physical activity. Physiotherapists should also play a proactive role by conducting routine postural screenings and advising on ergonomics and home-based core training. To conclude, the study brings to light an important yet under-recognised issue in adolescent health. Core muscle weakness in urban youth is not just a biomechanical problem but a reflection of deeper societal, behavioural, and infrastructural challenges. Addressing it requires a multidisciplinary strategy that encompasses physical training, education reform, environmental redesign, and cultural change. Early detection and preventive care will go a long way in improving the physical resilience and functional independence of the next generation.

### CONCLUSION

This study highlights a significant prevalence of core muscle weakness among adolescents in urban communities, with a large proportion showing below-average performance in sit-up, plank, and leg raise tests. Sedentary lifestyles, prolonged screen time, academic stress, poor posture, and lack of physical activity are

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major contributors. Females showed slightly higher weakness, possibly due to socio-cultural and hormonal factors. These findings are concerning, as core strength is vital for posture, stability, and injury prevention. Weakness during adolescence can lead to chronic musculoskeletal issues in adulthood. The study emphasizes the urgent need for early screening, structured core strengthening in schools, parental awareness, and supportive urban infrastructure. Field-based assessments proved practical and effective for identifying at-risk youth. Physiotherapists must play a key role in designing and implementing preventive programs. Addressing core weakness is not just about fitness—it's about building a physically resilient generation equipped to thrive in a sedentary urban world. Timely interventions can prevent long-term disability, reduce healthcare burden, and promote lifelong movement literacy and well-being.

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Conflict of Interest: None

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