Assessment of Postural Abnormalities among Students in Yazd Province

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Abstract

Background: The rate of postural abnormalities, particularly in young individuals, is increasing. Therefore, the present study focused on examining the extent of postural structure abnormalities among sixth-grade students in Yazd province and the factors associated with it.

Methods: This descriptive correlational study was conducted through a field approach. A total of 2001 sixth-grade students from Yazd province (1000 boys and 1001 girls) were randomly selected using cluster sampling, following the Morgan table. To conduct the study, the necessary data were collected through a questionnaire to gather anthropometric information about the subjects, such as age, height, weight, gender, and the prevalence of postural abnormalities, including forward head, kyphosis, lordosis, neck tilt, knock knees, bowlegs, flat feet, hallux valgus, asymmetric pelvis, scoliosis, drooping shoulders, raised shoulders, and inward rotated shoulders. The questionnaire also assessed the participants' consent to participate in the study and included the inclusion and exclusion criteria. A form was used to record measurements (sample questionnaires are provided in the appendix).

Results: The results of this study showed a positive correlation between weight and winged scapula, bowlegs, and inward rotated shoulders. On the other hand, there was a negative correlation between weight and knock knees, flat feet, and lumbar lordosis ($p < 0.01$). A positive correlation was observed between height and winged scapula, sway back ($p < 0.01$), and inward rotated shoulders ($p < 0.05$). Moreover, a negative correlation was found between the level of physical activity and winged scapula, knock knees, bowlegs, flat feet, inward rotated shoulders, and lumbar lordosis ($p < 0.01$).

Conclusion: Schools should increase the amount of structured physical activity during the school day. This could include exercises aimed at strengthening core muscles, improving flexibility, and promoting proper posture. By incorporating daily physical education classes, schools can help students build the muscle strength necessary to maintain proper posture.

Key Words: Abnormality, Postural Structure, Students, Yazd Province.

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1- INTRODUCTION

Research evidence shows that the rate of postural abnormalities, especially among young people, is increasing. The spine, known as the body's central axis, plays a crucial role because any damage or deformation can disrupt bodily functions (1). Posture has been a topic of interest to human societies from the past to the present, particularly after the Industrial Revolution, and has always been a concern for physical education specialists (2). With industrial advancements and the mechanization of daily life, physical ailments, muscular weaknesses, and disorders have risen, particularly among adolescents (3). This growing concern has led specialists and researchers in medical sciences, rehabilitation, physiotherapy, and physical education to investigate the prevalence of these abnormalities in different societies and identify their causes and factors (4). The goal is to provide prevention, correction, and improvement methods based on the collected data (5).

Research in this area has examined the issue from various perspectives, with all studies unfortunately indicating a high prevalence of physical abnormalities among different age groups, including both boys and girls (6). Several studies conducted in Iran on posture and abnormalities have yielded varied results, but they all highlight the significant prevalence of postural abnormalities among students (7). Among these, spinal curvatures, particularly kyphosis and lumbar lordosis, have received more attention due to their high prevalence and associated problems (8). Researchers agree on the definition of kyphosis and lumbar lordosis as postural abnormalities, and they consider excessive curvatures as signs of these abnormalities (9).

Despite extensive research on the mentioned curvatures and a general consensus on the definition of lordosis and kyphosis, there are still many contradictory findings regarding normal and natural degrees of curvature (10). For example,

Balińska et al. (2025) assessed the occurrence of postural abnormalities in children aged 10-12 who are physically active and practice various types of sports. Their research showed that volleyball had the highest percentage of postural abnormalities, accounting for 33% of all postural irregularities in this group, while the lowest percentage was observed in children who practiced swimming, at 7% (11). Adamesque et al. (2025) investigated the relationship between low back pain severity and standing body posture in students of the Faculty of Medicine, Universitas Airlangga. The results of the study revealed a p-value of 0.053, indicating no significant difference in the severity of low back pain between subjects with normal and abnormal standing posture (12). Ashraf et al. (2024) explored the association between body composition, physical activity profile, and the occurrence of knee and foot postural alterations among young healthy adults. Results showed that the most common foot deformity was pes planus, while genu recurvatum was the most common knee deformity among the individuals. Physical activity level was negatively associated with knee and foot deformities. Conversely, body composition differed with the presence of genu recurvatum (13). Nowak et al. (2024) assessed the relationship between antero-posterior dental malocclusions, body posture abnormalities, and selected static foot parameters in adults. Significant differences were demonstrated in the positioning of the head, cervical spine, and lumbar spine in the sagittal plane among individuals with the analyzed occlusal classes (p < 0.05). Individuals with Angle's Class II exhibited significantly greater forward head positions and greater depths of cervical and lumbar lordosis compared to individuals with Class III or

Class I. Those with overbites had higher forefoot loading. Class III individuals exhibited greater left-right (L-R) displacement, indicating a larger angle of displacement of the centers of the right and left feet relative to the lower edge of the measurement platform, suggesting pelvic rotation (14).

These differences are partly due to degree of spinal curvature depending on the lifestyle and activities of each individual (15, 16, 17, 18). They are also related to sample conditions (such as gender, age, geographical area, etc.), measurement tools, and research conditions (such as limitations or research methods) (19).

The issue of lumbar curvature or lordosis is similar, with few researchers reaching a general consensus on the normal and natural range of this curvature among people in different societies (20). Numerous studies have been conducted to evaluate postural structure and examine the prevalence of postural deviations, However, none of them mentioned an average or a range for the normal angles of curvature. It remains unclear whether the alarming statistics mentioned actually measured abnormalities, as many used tools such as plumb lines and New York posture charts in their studies. Therefore, one cannot fully trust the results of these studies when compared with quantitative tools like flexible rulers and X-rays (5).

One of the most important indicators of public health is having proper posture or, in other words, a proper postural structure (12). In developed countries, comprehensive and accurate plans have been devised to educate the public about proper posture (8). Every person's physical activity throughout their life may be influenced by internal and external factors, causing abnormal deformations in their skeletal structure (16). These factors have a significant impact during growth and adolescence, as the body's shape forms during this stage. If a child's and

adolescent's skeletal framework does not form correctly during this time, they may face physical and mental challenges throughout their life.

The spine is one of the most vital parts of the body, protecting the spinal cord, and being one of the most sensitive parts of the human body. Additionally, the lower limbs are essential for movement and mobility. Therefore, musculoskeletal abnormalities in these areas not only create physical problems but may also lead to psychological issues such as depression, low self-esteem, and feelings of inferiority, particularly among adolescents and young adults (7). As you know, abnormalities arise from both genetic and acquired factors. Most abnormalities, however, are acquired and non-hereditary, and if identified in time, proper treatment and corrective movements can prevent them (4).

In this regard, one of the most important fields of physical activity and sports is corrective exercises, whose main objective is to identify, prevent, and correct functional deformities and strengthen psychological aspects, eliminating deficiencies caused by lack of physical activity, improper clothing, non-standard equipment, and poor posture habits (19). It can be said that a lack of movement is one of the most important causes of weakness and disorder. According to research, a lack of movement in a healthy person with moderate skills reduces their physical capacity by at least 30% and at most 50% (3 ,7).

The main causes of skeletal abnormalities in upper and lower limbs among students include poor sleeping, standing, walking, and sitting habits, carrying heavy objects, injuries, lack of movement, improper movements, wearing inappropriate shoes, and a lack of developmental stimuli (15 , 17). Therefore, the key question is : to what extent do sixth-grade students in

Yazd province experience postural abnormalities?

2- MATERIALS AND METHODS

This descriptive-correlational research was conducted in the field, where the researcher collected data on a relatively large scale. Schools from each educational district were randomly selected, and then a certain number of sixth-grade students from each school were systematically chosen from class lists. This study falls under descriptive-field research, where the researcher aims only to describe the characteristics of postural abnormalities without manipulating any variables. The statistical population consisted of all sixth-grade students in Yazd province in the 2019-2020 academic year, approximately 19,000 students. Based on Cochran's sample size formula, the required sample size was 376; however, due to the importance of the study, 2,000 students were selected, including 1,000 girls and 1,000 boys from the sixth grade in Yazd province.

The sampling method used in this study was cluster random sampling. Schools were randomly selected from each educational district, and from each school, several sixth-grade students were systematically chosen from the class lists. A total of 2,000 students participated in the study according to the Morgan table.

The primary examiner participated in a practical training session to learn how to use the flexible ruler. After ensuring the accuracy and reliability of the measurements, official letters were issued by the education authorities for the selected schools. The examiner, with permission from the education authorities, visited the schools and coordinated with the school principal and teachers to gather the selected students. After explaining the measurement procedures and obtaining their consent, the measurements were taken on-site.

2-1. Data Collection Tools

1. Flexible ruler: A flexible ruler (30, 40, 60 cm, brand Aideo, made in Thailand) was used to measure lumbar lordosis and thoracic kyphosis. It is capable of bending and straightening, allowing it to accurately follow the curvature of the back. This ruler has a precision of one-tenth of a degree with a reliability coefficient of 97% (Daneshmandi, Sardar, & Taghizadeh, 2005).

2. Tape measure: A 200 cm tape measure was mounted on the wall, and the participants were positioned with their backs against the wall. A ruler was placed horizontally on top of their heads to record their height (without shoes) in centimeters.

3. Home scale: Used to measure body weight in kilograms.

4. Non-permanent marker: Used to mark the spinous processes of specific vertebrae and to transfer these points to the flexible ruler and paper.

5. Graph paper (100 cm x 70 cm): Used to draw the measured curves from the flexible ruler onto the paper.

6. Questionnaire: Gathered anthropometric data such as age, height, weight, gender, and consent to participate in the study. It also included a form for recording measurements (a sample questionnaire is provided in the appendix).

7. Caliper: A precision tool used to measure knee deformities, such as bowlegs and knock knees, with an accuracy of one-tenth of a millimeter.

8. Talcum powder: A natural mineral composed of magnesium silicate, used to detect flat feet and arches.

9. Goniometer set: A complete set used to measure joint angles and ranges of motion. This set contains six stainless steel goniometers stored in a durable and portable case.

2-2. Methods for Evaluating Postural Abnormalities

This section of the study explains how postural abnormalities (kyphosis, lordosis, bowlegs, and knock knees) were evaluated using the aforementioned tools.

2-3. New York Test and Evaluation Method

The New York test, developed by the New York State Department of Education, was initially designed to assess the posture of students over a nine-year period, from fourth grade to twelfth grade. This test evaluates 13 different body postures, 11 of which assess the spine. The results are recorded on a grid where three images are provided for each body posture. The image on the left represents a normal posture and is given a score of 5, the middle image represents mild abnormality with a score of 3, and the right image represents severe abnormality with a score of 1. The examiner assigns the score closest to the participant's posture. The total score for each body posture reflects the individual's overall posture. Using the New York test in conjunction with the grid improves diagnostic accuracy and measurement precision, which is why these two methods are often used together, particularly in screening phases.

2-4. Kyphosis

Kyphosis, or "round back," refers to a noticeable forward curvature of the spine, with the convex side facing the back. The condition may present as a round back or angular back , also known as hump back.

2-5. Lordosis

Lumbar lordosis is another condition that can be diagnosed using the New York test. The severity of this condition is determined by the degree of curvature which is the forward deviation of the lumbar region. Compensatory mechanisms in other parts of the body often increase lumbar curvature, exacerbating lordosis.

2-6. Plumb Line Test

In this method, the position of the plumb line in relation to anatomical landmarks is evaluated to identify the presence of abnormalities. The plumb line represents a line where the torque in different parts of the body is zero or at its minimum. The individual is evaluated from three views: lateral, posterior, and anterior.

- *Lateral view:* The plumb line passes through the ear lobe, clavicle, iliac crest, greater trochanter, behind the patella, and in front of the ankle.

- *Posterior view:* The plumb line passes through the center of the occipital bone, T12, C7, L5, sacrum, and between the feet.

- *Anterior view:* The plumb line passes through the forehead, sternum, navel, and between the feet (4).

2-7. Measurement of Lumbar Lordosis Using a Flexible Ruler

The participant stands barefoot in a neutral posture with equal weight distribution on both feet. The spinous processes of S2 and L3 are palpated and marked with a non-permanent marker. The flexible ruler is then placed along the lumbar and sacral spine, and the points corresponding to S2 and L3 are marked on the ruler. The curvature of the ruler is then transferred to paper, and the points marked on the paper are connected to form a line (L), which is measured using a caliper. Another line (H), perpendicular to L and running from the midpoint to the apex of the curve, is also measured. The lordosis angle (θ) is calculated using the formula :

$$\theta = 2 \times \arctan(H/L)$$

This method is simple, inexpensive, and safe, with high reliability and validity. Studies have shown that the flexible ruler provides a reliability of 97% when measuring lumbar lordosis in a natural standing posture (12).

2-8. Measurement of Kyphosis Using a Flexible Ruler

To calculate the kyphosis angle, the spinous processes of T4 and T12 are marked. The flexible ruler is placed along the spine, following the curvature of the back. The curvature is then transferred to paper, and two lines, L and H, are drawn as described above. The kyphosis angle (θ) is calculated using the formula:

$$\theta = 2 \times \arctan(H/L)$$

Kyphosis is considered abnormal if the angle exceeds 40 degrees (Walker, 1986).

2-9. SPSS Analysis

The data obtained from the measurements were analyzed using SPSS software version 21 to provide descriptive statistics, including means and central tendencies. Excel was used to create the necessary graphs, and Pearson's correlation test and a one-sample t-test were used to assess the relationships between the data.

3- RESULTS

In this section, the research findings are presented, including the descriptive characteristics of the research variables.

3-1. Gender Distribution

The sample is almost evenly distributed between boys and girls, with 50.03% boys and 49.97% girls, ensuring a balanced representation in the study.

3-1-1. Postural Abnormalities Analysis

1. *Neck Tilt:*
   - Severe cases: 0.20%
   - Mild cases: 7.40%
   - Normal: 92.40%
   - Observation: The majority of students (92.40%) had a normal neck posture, with very few showing severe (0.20%) or mild (7.40%) abnormalities.

2. *Asymmetric Shoulders:*
   - Severe cases: 2.25%
   - Mild cases: 35.38%
   - Normal: 62.37%
   - Observation: A relatively higher percentage (35.38%) exhibited mild asymmetry in shoulder height, but severe cases remained low (2.25%).

3. *Winged Scapula:*
   - Severe cases: 0.45%
   - Mild cases: 14%
   - Normal: 85.55%
   - Observation: Winged scapula is present in 14% of students with mild severity, with only 0.45% showing severe symptoms.

4. *Scoliosis (Curved Spine):*
   - Severe cases: 0.25%
   - Mild cases: 5%
   - Normal: 94.75%
   - Observation: The prevalence of scoliosis is relatively low, with 5% mild and 0.25% severe cases.

5. *Knock Knees:*
   - Severe cases: 1.95%
   - Mild cases: 16.19%
   - Normal: 81.81%
   - Observation: Mild cases of knock knees are more common (16.19%), but severe cases remain low at 1.95%.

6. *Lumbar Lordosis (Excessive Lower Back Curve):*
   - Severe cases: 1.60%
   - Mild cases: 27.87%

Table-1. Merged Postural Abnormalities Data.

Condition	Frequency	Percentage (%)
Gender Distribution	Boys: 1001, Girls: 1000	Boys: 50.03%, Girls: 49.97%
Neck Tilt	Severe: 4, Mild: 148, Normal: 1849	Severe: 0.20%, Mild: 7.40%, Normal: 92.40%
Asymmetric Shoulders	Severe: 45, Mild: 708, Normal: 1248	Severe: 2.25%, Mild: 35.38%, Normal: 62.37%
Winged Scapula	Severe: 9, Mild: 280, Normal: 1712	Severe: 0.45%, Mild: 14%, Normal: 85.55%
Scoliosis	Severe: 5, Mild: 100, Normal: 1896	Severe: 0.25%, Mild: 5%, Normal: 94.75%
Asymmetric Pelvis	Severe: 4, Mild: 75, Normal: 1922	Severe: 0.20%, Mild: 3.75%, Normal: 96.05%
Knock Knees	Severe: 39, Mild: 324, Normal: 1637	Severe: 1.95%, Mild: 16.19%, Normal: 81.81%
Inward Rotated Feet	Severe: 2, Mild: 48, Normal: 1951	Severe: 0.10%, Mild: 2.39%, Normal: 97.50%
Bowlegs	Severe: 22, Mild: 257, Normal: 1721	Severe: 1.10%, Mild: 2.40%, Normal: 97.50%
Outward Rotated Feet	Severe: 4, Mild: 167, Normal: 1900	Severe: 0.20%, Mild: 8.35%, Normal: 91.45%
Hallux Valgus (Crooked Thumb)	Severe: 8, Mild: 274, Normal: 1719	Severe: 0.40%, Mild: 13.70%, Normal: 85.90%
Flat Feet	Severe: 68, Mild: 498, Normal: 1435	Severe: 3.40%, Mild: 24.90%, Normal: 71.70%
High Arches (Pes Cavus)	Severe: 3, Mild: 53, Normal: 1945	Severe: 0.15%, Mild: 2.65%, Normal: 97.20%
Forward Head Posture	Severe: 31, Mild: 695, Normal: 1275	Severe: 1.55%, Mild: 34.73%, Normal: 63.72%
Kyphosis (Hunchback)	Severe: 8, Mild: 252, Normal: 1741	Severe: 0.40%, Mild: 12.60%, Normal: 87%
Inward Rotated Shoulders	Severe: 9, Mild: 340, Normal: 1652	Severe: 0.45%, Mild: 17%, Normal: 82.55%
Flat Back	Severe: 6, Mild: 70, Normal: 1925	Severe: 0.30%, Mild: 3.50%, Normal: 96.20%
Lumbar Lordosis	Severe: 32, Mild: 558, Normal: 1411	Severe: 1.60%, Mild: 27.87%, Normal: 70.43%
Sway Back	Severe: 2, Mild: 35, Normal: 1964	Severe: 0.10%, Mild: 1.75%, Normal: 98.15%
Hyperextended Knees	Severe: 2, Mild: 29, Normal: 1970	Severe: 0.10%, Mild: 1.45%, Normal: 98.45%
Physical Activity	None: 21, Rarely: 101, Moderate: 214, Often: 188, Always: 74	None: 3.51%, Rarely: 16.89%, Moderate: 35.78%, Often: 31.44%, Always: 12.37%
Research Variables (Height)	Height Mean: 1.51m	Mean: 1.51m
Research Variables (Weight)	Weight Mean: 44.66kg	Mean: 44.66kg
Research Variables (BMI)	BMI Mean: 19.34	Mean: 19.34
Research Variables (Physical Activity)	Activity Mean: 2.32	Mean: 2.32

- Normal: 70.43%
- Observation: Around 27.87% of the students exhibit mild lumbar lordosis, with 1.60% having a severe curvature.

Physical Activity Analysis

- None: 3.51%

- Rarely: 16.89%

- Moderate: 35.78%

- Often: 31.44%

- Always: 12.37%

- Observation: The majority of students engage in moderate (35.78%) or frequent (31.44%) physical activity, while a small percentage (3.51%) do not engage in any physical activity.

This analysis shows that while most students have normal postural structures, mild abnormalities are prevalent in areas like shoulder asymmetry, knock knees, flat feet, and lumbar lordosis. Physical activity levels seem to correlate with better posture, suggesting a possible area for intervention to prevent postural issues

4- DISCUSSION

4-1.Summary of Key Findings

This study aimed to examine the prevalence of postural abnormalities in sixth-grade students in Yazd Province. The findings revealed that most students had normal postural structures; however, mild abnormalities such as asymmetric shoulders (35.38%), knock knees (16.19%), and lumbar lordosis (27.87%) were prevalent. These results are significant as they suggest the need for early detection and interventions to address these issues before they progress into adulthood, potentially causing more severe health problems.

4-1. Factors Contributing to Postural Abnormalities

The prevalence of postural abnormalities can be attributed to several factors, such as:

o Sedentary Lifestyles and Reduced Physical Activity:

o In modern society, students spend a significant amount of time sitting in classrooms, often in improper positions. This sedentary lifestyle can lead to muscle imbalances and weakened postural muscles. The data showed that 35.78% of students engaged in moderate physical activity, while 16.89% reported minimal physical activity. The lack of consistent, high-quality exercise is likely a contributing factor to the high incidence of postural issues like lumbar lordosis and asymmetric shoulders.

o Improper Posture During Daily Activities:

o Many students develop poor postural habits, such as slouching while sitting, hunching over desks, or carrying heavy backpacks improperly. This contributes to the development of abnormalities such as kyphosis (12.60%) and forward head posture (34.73%), both of which are associated with excessive time spent in suboptimal positions.

o Footwear and External Factors:

o Incorrect footwear, such as shoes with inadequate arch support, can contribute to abnormalities like flat feet (24.90%) and knock knees (16.19%). These issues can exacerbate postural misalignments, as the body compensates for poor foot mechanics.

o Growth and Development:

o Adolescence is a period of rapid growth, during which imbalances

between muscle strength and flexibility may occur. This can lead to postural abnormalities as the musculoskeletal system struggles to adapt to these rapid changes. Growth spurts, in particular, can contribute to conditions like scoliosis (5%) and winged scapula (14%).

4-2. Comparison with Previous Studies in Iran

When comparing the results of this study with those conducted in other Iranian cities, several similarities and differences emerge, reflecting both regional variations and common national trends:

- o **Tehran (Shamsoddini et al., 2012):**

  In Tehran, a study reported that 40% of students had postural abnormalities, with the most common issues being forward head posture and kyphosis. This is comparable to the findings in Yazd, where forward head posture was observed in 34.73% of students, and kyphosis in 12.60%. The slightly higher prevalence in Tehran could be linked to urban lifestyle factors such as higher rates of screen time and less physical activity, exacerbating postural issues (21).

- o **Isfahan (Shaheen et al., 2012):**

  The Isfahan study found that 25% of students had flat feet, which is slightly higher than the 24.90% observed in Yazd. The discrepancy may be due to regional variations in the types of footwear commonly used or differences in school physical activity programs. Severe cases of flat feet in Isfahan were higher, suggesting that preventive interventions might be more

effectively implemented in Yazd (22).

- o **Shiraz (Hasani et al., 2018):**

  The prevalence of scoliosis in Shiraz was 6%, slightly higher than the 5% found in Yazd. This may be related to the level of physical activity and lifestyle habits unique to Shiraz. However, both cities reflect a relatively low incidence of scoliosis, which may indicate that this particular postural abnormality is not a widespread issue in Iran (23).

- o **Mashhad (Abdollahi et al., 2022):**

  In Mashhad, the prevalence of lumbar lordosis was 29%, very similar to the 27.87% found in Yazd. This consistency across regions suggests that lumbar lordosis is a common issue in students, possibly due to a lack of core muscle strength and improper posture during sitting, a common activity in schools (24).

Why Do These Results Occur?

- ➤ Environmental Factors:
- ➤ In cities across Iran, including Yazd, many schools are not equipped with ergonomically designed furniture, contributing to poor posture during long periods of sitting. Additionally, heavy backpacks carried by students may lead to conditions like asymmetric shoulders and kyphosis.

- ➤ Cultural Factors:
- ➤ Iranian students, like many others worldwide, are increasingly spending their leisure time on sedentary activities such as using smartphones, playing video games, or watching television. This lack of physical activity contributes significantly to postural issues such

as forward head posture and lumbar lordosis.

➢ Lack of Awareness and Screening Programs:

➢ Many schools in Iran lack regular screening programs to identify postural abnormalities early. As a result, conditions like flat feet or winged scapula may go unnoticed until they become more severe.

➢ Rapid Growth and Lack of Physical Conditioning:

➢ During adolescence, students experience rapid growth spurts, which can create imbalances between bone growth and muscle flexibility. Without sufficient physical conditioning and corrective exercises, postural abnormalities like knock knees and scoliosis can develop.

4-3. Practical Solutions

1. **Introduce Comprehensive Physical Activity Programs in Schools:**

   Schools should increase the amount of structured physical activity during the school day. This could include exercises aimed at strengthening core muscles, improving flexibility, and promoting proper posture. By incorporating daily physical education classes, schools can help students build the muscle strength necessary to maintain proper posture.

2. **Postural Education:**

   Awareness campaigns should be introduced to teach students the importance of maintaining good posture during sitting, standing, and carrying backpacks. Workshops for both students and teachers can focus on correcting common postural errors. Additionally, ensuring that classroom furniture is ergonomically designed to support students' posture is crucial.

3. **Regular Postural Screenings:**

   Schools should implement annual postural screenings to detect any abnormalities early. These screenings can identify students at risk for developing more severe postural issues, allowing for timely interventions such as physical therapy or corrective exercises. Early detection of issues like flat feet or lumbar lordosis can prevent these problems from becoming chronic conditions.

4. **Proper Footwear and Backpack Usage:**

   Schools should encourage students to wear proper footwear, particularly shoes with adequate arch support, to prevent conditions such as flat feet and knock knees. Additionally, schools should promote proper backpack usage, including recommendations for lighter loads and using both shoulder straps to evenly distribute weight.

5- CONCLUSION

The results of this study in Yazd Province indicate that postural abnormalities, although mostly mild, are common among students. The comparison with other cities in Iran shows that similar trends exist nationwide, with certain regions exhibiting slightly higher rates of specific abnormalities, such as forward head posture in Tehran and flat feet in Isfahan. These findings emphasize the

importance of proactive measures, including increased physical activity, education on proper posture, and regular screenings, to reduce the prevalence of postural abnormalities in students. Implementing these solutions will improve students' overall health and prevent the progression of these conditions into adulthood.

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