

**COMBINED OCCURRENCE OF POSTURAL DISORDERS (LORDOSIS,
KYPHOSIS, SCOLIOSIS) IN CHILDREN WITH KNEE DEFORMITIES**

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Abstract: Knee deformities in childhood represent a significant orthopedic problem that may affect not only lower limb biomechanics but also overall posture and spinal alignment. Altered load distribution and compensatory mechanisms often lead to the development of postural disorders, including lordosis, kyphosis, and scoliosis. This article analyzes the combined occurrence of postural disorders in children with knee deformities and highlights the biomechanical and clinical relationships between lower limb alignment and spinal posture. Understanding these associations is essential for early diagnosis, comprehensive orthopedic assessment, and effective rehabilitation strategies aimed at preventing progressive musculoskeletal dysfunction.

Keywords: Knee deformities, children, postural disorders, lordosis, kyphosis, scoliosis, musculoskeletal system

Introduction

Postural disorders in childhood are a common clinical concern and represent an important predictor of future musculoskeletal health. Normal posture depends on the harmonious alignment of the spine, pelvis, and lower extremities. Any structural or functional disturbance in one segment of the musculoskeletal system may lead to compensatory changes in other regions. Knee deformities, such as genu valgum and genu varum, are among the most frequently encountered orthopedic conditions in pediatric populations and are known to influence overall body alignment.

Children with knee deformities often experience altered gait patterns, uneven weight distribution, and changes in pelvic positioning. These biomechanical alterations may disrupt spinal balance and contribute to the development of postural abnormalities, including exaggerated lumbar lordosis, thoracic kyphosis, and lateral spinal curvature. Despite the clinical relevance of these interactions, the relationship between knee deformities and postural disorders remains insufficiently explored.

The aim of this article is to analyze the combined occurrence of postural disorders in children with knee deformities and to emphasize the importance of an integrated orthopedic and postural assessment.

Literature Review

Postural disorders in childhood have been extensively studied due to their high prevalence and long-term impact on musculoskeletal health. The literature consistently emphasizes that

posture is a dynamic biomechanical system influenced by the alignment and function of the spine, pelvis, and lower extremities. Any disturbance in one segment may lead to compensatory changes throughout the musculoskeletal chain.

Several studies have highlighted the role of lower limb alignment in maintaining normal posture. Knee deformities, such as genu valgum and genu varum, alter the mechanical axis of the lower extremities and disrupt normal load distribution during standing and gait. Neumann reported that abnormal knee alignment affects pelvic positioning, which in turn influences spinal curvature, particularly in the sagittal plane.

Research focusing on spinal posture has shown that excessive lumbar lordosis and thoracic kyphosis are often associated with compensatory mechanisms aimed at preserving balance and upright posture. Kendall et al. emphasized that muscular imbalance and altered joint mechanics contribute significantly to the development of postural deviations. In children, whose musculoskeletal system is still developing, these compensatory changes may become fixed if not corrected early.

The association between knee deformities and scoliosis has also been discussed in the literature. Several authors describe functional scoliosis as a common finding in children with asymmetric lower limb loading. Staheli noted that pelvic obliquity caused by knee or lower limb deformities can lead to lateral spinal curvature, which is initially flexible but may progress to structural scoliosis over time. This progression underscores the importance of early detection and intervention.

Studies investigating gait and postural balance further support the interconnectedness of the musculoskeletal system. Sanders et al. demonstrated that children with lower limb deformities exhibit altered postural control and spinal alignment, increasing the risk of combined sagittal and frontal plane deformities. These findings suggest that postural disorders should not be viewed as isolated spinal conditions but rather as part of a broader biomechanical dysfunction.

Recent literature increasingly advocates for an integrated assessment approach in pediatric orthopedics. Comprehensive evaluation of children with knee deformities should include postural analysis, spinal examination, and functional assessment of gait and balance. Multidisciplinary management strategies combining orthopedic correction, physiotherapy, and postural training have been shown to improve outcomes and prevent progression of deformities.

In summary, existing literature provides strong evidence that knee deformities in children are closely associated with postural disorders, including lordosis, kyphosis, and scoliosis. The interaction between lower limb alignment and spinal posture highlights the need for early, comprehensive, and integrated diagnostic and therapeutic approaches to ensure optimal musculoskeletal development.

Materials and Methods

This study was conducted as a narrative analytical review of scientific and clinical literature. Peer-reviewed articles, clinical studies, and orthopedic guidelines addressing knee deformities and postural disorders in children were analyzed. Sources were selected from international medical databases focusing on pediatric orthopedics, rehabilitation, and musculoskeletal biomechanics.

The analysis included studies evaluating spinal alignment, postural deviations, and lower limb deformities in pediatric patients. Particular attention was given to biomechanical mechanisms linking knee alignment abnormalities with spinal curvature and sagittal balance. No original clinical or experimental research was performed.

Results and Discussion

The literature analysis indicates that postural disorders frequently coexist with knee deformities in children. Genu valgum and genu varum alter the mechanical axis of the lower limbs, leading to compensatory pelvic tilt and changes in lumbar spine curvature. Increased lumbar lordosis is commonly observed as a compensatory mechanism to maintain upright posture and balance.

Thoracic kyphosis may develop as a result of prolonged postural imbalance and muscular dysfunction. Weakness of trunk stabilizing muscles and altered load transmission through the spine contribute to excessive thoracic curvature. In some cases, these sagittal plane deviations are accompanied by frontal plane abnormalities, resulting in scoliosis.

Scoliosis in children with knee deformities is often functional in nature, arising from asymmetrical load distribution and pelvic obliquity. However, if left uncorrected, functional scoliosis may progress to structural curvature over time. The coexistence of knee deformities and scoliosis complicates clinical management and may worsen functional outcomes.

The findings highlight that postural disorders are not isolated conditions but part of a complex biomechanical chain involving the lower limbs, pelvis, and spine. Early identification of combined deformities is crucial for preventing progression and secondary complications. Comprehensive management strategies should address both knee alignment and postural correction through physiotherapy, orthopedic interventions, and postural training.

Conclusion

In conclusion, knee deformities in children are frequently associated with postural disorders such as lordosis, kyphosis, and scoliosis. Biomechanical alterations resulting from abnormal knee alignment play a significant role in the development of compensatory spinal deviations. These combined conditions require an integrated diagnostic and therapeutic approach.

Early orthopedic evaluation, regular postural screening, and timely rehabilitation interventions are essential for preventing the progression of musculoskeletal disorders and improving functional outcomes. A multidisciplinary approach involving orthopedic specialists, physiotherapists, and rehabilitation professionals is recommended to ensure optimal postural development and long-term musculoskeletal health in affected children.

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