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Dental Occlusion and Spinal Posture: Experience from the Physical Medicine and Rehabilitation (PMR) and Dental Prosthetics Departments, Mustapha University Hospital, Algiers Algeria

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Abstract

Objective: *This study aims to investigate the relationship between dental occlusion and spinal posture in pediatric patients presenting with spinal deviations.*

Materials and Methods: *Thirteen children aged 8–14 years, consulting at the Physical Medicine and Rehabilitation (PMR) department of Mustapha University Hospital, Algiers, were examined. Spinal evaluation was performed by a PMR specialist, and dental examination by a dental prosthetics specialist. Data collected included skeletal Angle classification, molar class, type of spinal deformity, lower limb static disorders, and radiographic findings.*

Results: *Among the 13 children, 9 were girls and 4 boys, with a mean age of 11.23 years. Spinal deformities included scoliosis (10 cases), hyperlordosis (1 case), and dorsal kyphosis (2 cases). Skeletal dental classes included Class I (6 cases), Class II (4 cases), and Class III (3 cases). More than 50% of patients presented with pathological occlusion. Orthopedic management included Cheneau-type braces and corrective or compensatory insoles.*

Discussion: *The findings suggest a potential association between malocclusion and spinal posture, consistent with previous studies. However, the small sample size limits the ability to draw definitive conclusions. Clinical evaluation of scoliotic children should consider the possible influence of occlusion on posture and vice versa. Current literature suffers from methodological limitations, and causal relationships remain unclear.*

Conclusion: *While a clinical correlation between dental occlusion and spinal posture appears evident, no direct cause-effect relationship has been established. Multidisciplinary approaches and further research are needed to better understand potential interactions and inform therapeutic strategies.*

Keywords: *Dental occlusion, spinal posture, malocclusion, scoliosis, pediatric dentistry, physical medicine and rehabilitation.*

Introduction

The relationship between dental occlusion and spinal posture is a topic regularly addressed by dental scientific societies, such as the National College of Occlusodontology. It remains a subject of constant interest for all healthcare professionals.

Positive correlations have been identified between cranio-cervical posture and Angle's skeletal classes. Children with skeletal Class II malocclusion exhibit a significant increase in cervical lordosis compared to children in Class I or III, with a forward-projected head posture being more frequent (1). Conversely, children with skeletal Class III show significantly reduced cervical lordosis relative to those in skeletal Class I or II (1,2).

A study using a posturography platform demonstrated that subjects with Class II occlusion present an anteriorly displaced body posture, whereas those with Class III occlusion exhibit a posteriorly displaced posture (3).

Gresser, through various studies, observed that occlusion influences both craniofacial and overall body posture.

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Conversely, craniofacial posture plays a crucial role in facial development and growth. Clinically, these findings support a close and undeniable interrelation between posture and occlusion (4).

Kamberi et al. (5) examined adolescents with idiopathic scoliosis compared to a control group without scoliosis. Both groups were assessed for occlusal characteristics. Results indicated that patients with scoliosis presented significantly more occlusal asymmetries, including midline deviations, posterior occlusion asymmetry, and transverse imbalance of the dental arch. No direct causal relationship was demonstrated between scoliosis severity and type of malocclusion. The authors emphasized that scoliosis, as an asymmetric pathology, is often associated with morphological or functional imbalances in the mandibular apparatus (5).
The aim of this study is to evaluate dental occlusion in newly referred pediatric patients consulting our PMR department for spinal deviation over one month and to explore the relationship between dental malocclusion and spinal posture.

Materials and Methods

Clinical spinal examinations were conducted on 13 children by a PMR specialist, and dental examinations were performed by a specialist dentist. Patients were seen in March 2024 at the PMR department of Mustapha University Hospital, Algiers.

- **Reason for consultation:** spinal deformation
- **Age:** 8–14 years
- **Recorded parameters:** age, medical history, familial cases, height, weight
- **Type of deformation:** scoliosis, dorsal hyperkyphosis, lumbar hyperlordosis
- **Lower limb static disorders:** genu valgum, genu varum, assessed using a podoscope
- **Radiological examination:**
  - Spine (13 cases)
  - Skull, frontal and lateral views (6 cases)
- **Dental examination:**
  - Skeletal Angle classification (Class I, II, III)
  - Molar class

Results

Our study, conducted on 13 childrens, shows the following results as shown in the table1

- **Gender:** 9 girls / 4 boys (F/M ratio = 2.25)**Age:** 8–14 years, mean 11.23 years
- **Height:** 135 cm
- **Weight:** 37 kg (2 cases of overweight)
- **Medical history:** 3 cases of bronchial asthma, 2 siblings
- **Spinal deformities:**
  - 10 scolioses (3 dorsolumbar, 4 lumbar, 2 dorsal, 1 minor cervico-dorso-lumbar)
  - 1 hyperlordosis / flat back
  - 2 dorsal kyphoses
- **Skeletal class:** 6 Class I, 4 Class II, 3 Class III
- **Treatment:** 2 wore Cheneau-type braces, 3 wore compensatory insoles, 3 wore corrective orthopedic insoles

Table 1 : Result of the clinical experience

patients sex	age (year)	Type of spinal deformity	Type d'occlusion	Lower limb static disorders
Boy	13	dorso-lumbar scoliosis 18°	Class 3 skeletal	genu valgum, bilateral flat feet
Girl	12	dorso-lumbar scoliosis 35°	Class 3 skeletal, class 3 molar	genu varum, normal feet
Girl	11	lumbar scoliosis 13°	Class 1 skeletal and molar	bilateral cavus feet
Girl	08	dorso-lumbar kyphosis	Class 2 skeletal, end-to-end molar	normal feet
Boy	14	dorso-lumbar scoliosis 24°	Class 1 skeletal; Class 1 molar right, Class 3 molar left	normal feet
Girl	11	minimal lumbar scoliosis 8°	class 1 skeletal, class 1 molar	inequality of lower-limb7 mm
Girl	08	lumbar hyperlordosis / flat back	class 1 skeletal, class 2 molar	pieds en rotation interne
Girl	09	dorsal kyphosis	Class 2 skeletal, class 2 molar	flat feet grade 1
Boy	13	dorso-lumbar scoliosis 18°	classe 1 squel, classe 2 molaire	normal feet
Girl	12	scoliose lombaire 10°	class 2 skeletal, class 2 molar	cavus feet grade 2
Girl	12	dorso-lumbar scoliosis 19°	anterior supraclusion, Class 3 molar	genu varum, feet in internal rotation
Boy	11	dorsal scoliosis 17°	Class 1 skeletal, end-to-end molar	bilateral talus valgus
Girl	12	cervico-dorso-lumbar scoliosis 23°	Class 3 skeletal, Class 3 molar	normal feet

Pic 1 : spinaldeformity of a girl (a 9 years old) (Personal collection)

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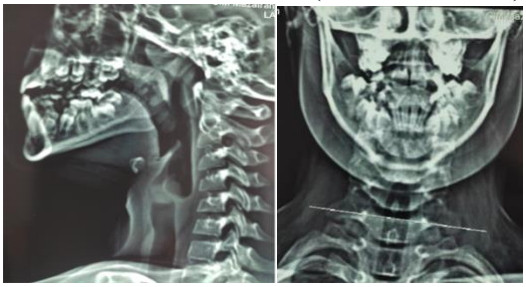
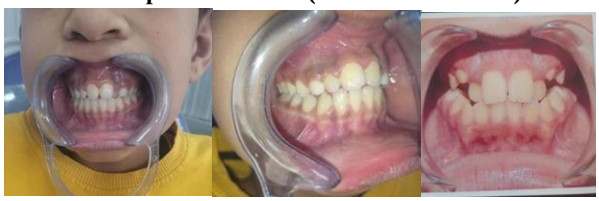
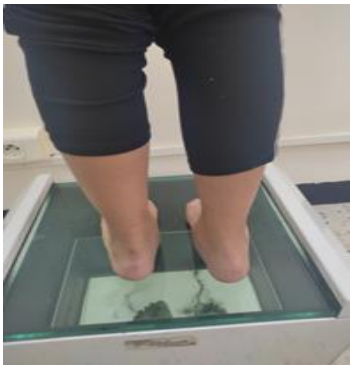
Pic2:Thoraco-lombar scoliosis(Personal collection)



Pic3: X-ray of cervical spine and mandible, latéral and anteroposterior views.(Personal collection)



Pic 4 a,b,c : Dental occlusion (Personal collection)



Pic 5: Podoscope examination (Personal collection)

Discussion

Thoracolumbar scoliosis, with angles ranging between 18° and 24°, represents the most frequent deformity in our sample. These scolioses are often associated with skeletal Class III and molar Class III.

Several studies indicate a frequent association between malocclusion and postural alterations in children, but emphasize that most of the evidence comes from cross sectional studies, which do not confirm a direct correlation between the two conditions (8,9). Różańska-Perlińska et al. (10), in a recent systematic review, concluded that there is strong-quality evidence for an association between malocclusion, body posture, and the podal system.

This suggests that there may be a postural link between cranio-cervico-mandibular alignment and spinal alignment. Skeletal Class III (prognathism) appears particularly associated with thoracic or thoracolumbar scoliosis.

This reinforces the relationship between forward head posture, advanced mandible, and spinal inclinations (8,10).

In our sample, several children with scoliosis presented static disorders at the feet, such as flat feet, high arches (bilateral cavus), talus valgus, and internal foot rotation. This shows that spinal deformities are rarely isolated and are often accompanied by imbalances in the lower postural chain (legs and feet). This reflects an ascending and descending interaction between the jaw, the spine, and the lower limbs. The literature confirms that plantar alterations and gait parameters often differ in scoliotic subjects compared to controls; podal indices and certain spatiotemporal gait parameters may be altered depending on the severity of scoliosis (7-9). The study by Zhu et al. (8) shows significant differences in arch index and certain gait measures in adolescents compared to controls, with variations according to the severity of the spinal deformity.

Published studies often show heterogeneous methods, mostly cross-sectional, with variable sample sizes. Różańska-Perlińska (10) emphasizes this heterogeneity and calls for standardized prospective studies. These limitations explain why our small series reveals a clinical observation but is insufficient to establish causal links. The need for further studies with a larger sample size becomes imperative (10).
There are several questions that we must ask during the clinical examination of a scoliotic child:

What attitude should we adopt when faced with a patient presenting idiopathic scoliosis?

Can scoliosis treatment influence occlusion?

Can orthodontic therapy improve or worsen posture?

Have we observed the worsening or stabilization of such scoliosis in a patient undergoing orthodontic treatment?
Many studies have established the relationship with malocclusion, but the way in which these factors interact remains unclear.

Scientific studies (5,6) dedicated to the relationship between occlusion and posture suffer from numerous biases:

- non-random distribution of patients among studied groups,
- absence of control groups or failure to consider all patients included at the end of the study,
- poorly defined inclusion and exclusion criteria,
- patient groups of insufficient size,
- poorly defined validity criteria for the tests used (sensitivity, specificity, reproducibility).

The weakness of published findings, the limited methodological value previously mentioned, and the large number of studies consisting of case series offering a low level of evidence, prevent us from giving a clear answer to these questions (6).

The scientific link remains undetermined today. While it is difficult to deny that a clinical link between these two disciplines exists, it is not a direct cause-and-effect relationship. Many other factors come into play, such as other postural sensors (6,7,1).

Conclusion

No scientific consensus currently exists regarding the link between occlusion and posture. Some authors recognize an

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obvious clinical link: the body functions as a single structural unit, so pathology in one area may affect other regions.

Compensatory mechanisms vary between individuals, with thresholds unique to each patient (6,7). While a clinical link appears evident, it is not a direct cause-effect relationship. Other factors, including additional postural sensors, also play a role (6,7,1).

To provide holistic care for patients, interdisciplinary collaboration is essential. There is a need to strengthen communication among healthcare professionals and to implement fundamental and clinical research programs that may help establish potential causal links, which inform therapeutic indications.

Ultimately, global patient management is challenged by the specialization of medical knowledge. Effective care requires collaboration, open-mindedness, pragmatism, and scientific rigor.

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