ORIGINAL RESEARCH

Professional Musculoskeletal Morbidity and Ergonomic Enhancement in Pediatric Dental Practice: An Interventional Study

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Abstract

Background: Dentistry involves prolonged repetitive movements, sustained body postures, and stress, all of which can significantly contribute to the development of musculoskeletal disorders (MSDs), psychological stress, and fatigue. Pediatric dentists who frequently work with children face a heightened risk of MSDs affecting various parts of the body, including postural muscles and both upper and lower extremities. If left untreated, MSDs can lead to severe degenerative and inflammatory conditions.

Objective: This study aims to assist pediatric dental practitioners in addressing common musculoskeletal pain and disorders (MSDs), while exploring methods to alleviate symptoms.

Materials and methods: The study recruited 110 participants and utilized an electronic survey to collect information about their experiences with musculoskeletal pain. Participants were provided with clinically proven exercises to perform during patient intervals. Their responses were collected after 30 days.

Results: Participants who engaged in regular exercise reported significant improvements. These exercises effectively alleviated pain in the head, neck, and shoulders without requiring much time.

Conclusion: This short-term study demonstrates that targeted exercises can relieve pain for many working professionals. After 30 days, these exercises are likely to become habitual, helping maintain good posture, and empowering individuals to manage their own discomfort using simple techniques.

Keywords: Exercise, Musculoskeletal disorders, Pediatric dentists.

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Introduction

Dentistry is a demanding profession that requires a high level of concentration and precision. Dentists must possess excellent visual acuity, hearing, depth perception, psychomotor skills, and manual dexterity, as well as the ability to maintain specific postures for extended periods. A decline in any of these abilities can negatively impact a dentist's performance and productivity. Additionally, factors associated with the profession can predispose individuals to back and neck pain. The narrow visual field of the oral cavity, along with limited movement, increases the risk of developing such discomfort.[1,2]

Pediatric dentists, in particular, experience a higher incidence of musculoskeletal pain compared to their colleagues in other specialties. Work-related musculoskeletal disorders (WRMSD) are significant issues affecting the musculoskeletal system, leading to workplace challenges that impact occupational health, productivity, and career longevity. The World Health Organization defines musculoskeletal disorders (MSDs) as conditions that affect muscles, tendons, joints, intervertebral discs, peripheral nerves, and the vascular system.[2] Thus, effective ergonomic workplace design is essential for enhancing musculoskeletal health.

Ergonomics seeks to minimize or eliminate stress, injuries, and disorders by addressing ergonomic hazards and reducing worker exposure to risk factors associated with WRMSD. However, many of these risk factors cannot be entirely eliminated due to the inherent demands of dental practice, which often involve muscle overuse, repetitive and prolonged movements, and unbalanced postures.[2,3]

Ergonomic recommendations for sitting positions provide theoretical guidelines relevant to various dental activities. These guidelines address issues such as muscular stress and muscle overuse resulting from repetitive movements, forced maneuvers, mechanical compression, and extended exposure to vibrations. They also take into account factors like forward bending, twisting of the head and torso, uneven weight distribution on the hips, and discrepancies in shoulder height, among others.[3–5]

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Materials and Methods

The electronic knowledge, attitude, and practice (KAP) questionnaire was developed and distributed to 110 pediatric professionals.

Inclusion Criteria

- Participants included all pediatric dental professionals and postgraduate students who experienced pain and were willing to engage in exercises to alleviate their symptoms.
- Participants might have mild-to-moderate symptoms.

Exclusion Criteria

- Participants with preexisting spinal or neurological conditions.
- Participants with respiratory issues.
- Participants experiencing severe muscle pain.

Fig. 1: Upavistha dwikonasana (seated double-angle pose or seal pose) and jathara parivartanasana

Participants were informed about the study, and the questionnaire was sent to them electronically. They were asked to select the responses they deemed appropriate. Those interested were provided with clinically proven exercises to perform over a 30-day period (Figs 1 and 2). Responses were recorded at both the beginning and end of this period. After 30 days, a feedback form was sent to the participants, and their responses were recorded.

The knowledge-based questions included:

- Are you experiencing musculoskeletal or joint pain during clinical hours?
- Is the pain impacting your daily activities?
- Do you think this results from an uncomfortable working position in the clinical setting?
- Do you have a previously diagnosed neurological condition or spinal injury?

The attitude-based question included: Have you explored any remedies to alleviate the pain during your clinic visit?

The practice-based question included: Are you willing to try some clinically proven exercises that can help relieve your pain for a few days?

Asanas are positions that require you to be fully present with both your body and mind. Yoga connects, unites, and integrates these two aspects, harmonizing the mind and calming its fluctuations.[5] A team of physiotherapists, orthopedists, and ergonomists came together and prepared these exercises that are provided.

Results

Of the 110 participants, 105 responded and expressed a willingness to engage in yogic exercises for their health. Five participants were excluded for not meeting the inclusion criteria. The scores of neck, shoulder, and back pain before and after the exercises were analyzed using the Chi-squared test for categorical variables and the Student's *t*-test for continuous variables. The *p*-values below 0.05 were deemed statistically significant. Here we observed that after doing the exercises, the dental professionals were working much more efficiently than before (Figs 3 and 4).

Fig. 2: Parivrtta paschimottanasana (revolved seated forward bend pose) and jathara parivartanasana (belly twist A or seated spinal twist A)

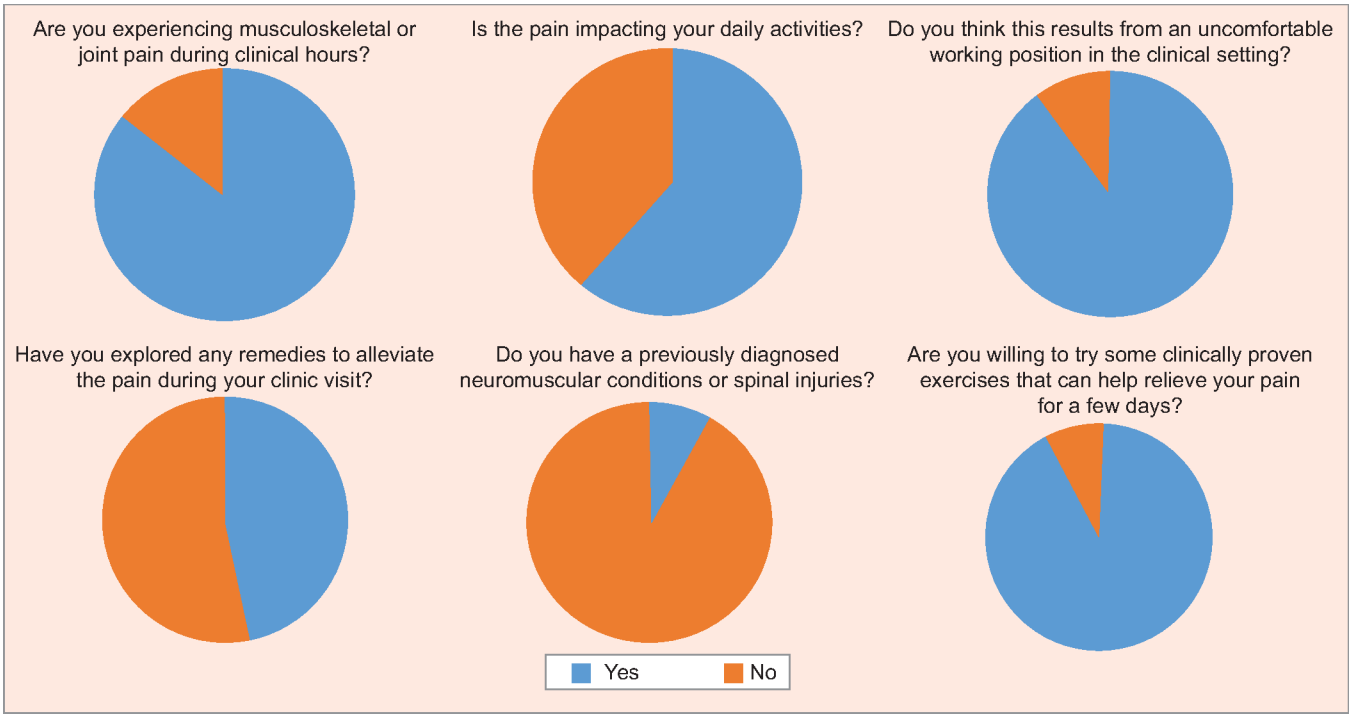

Fig. 3: Result analysis of the KAP questionnaire

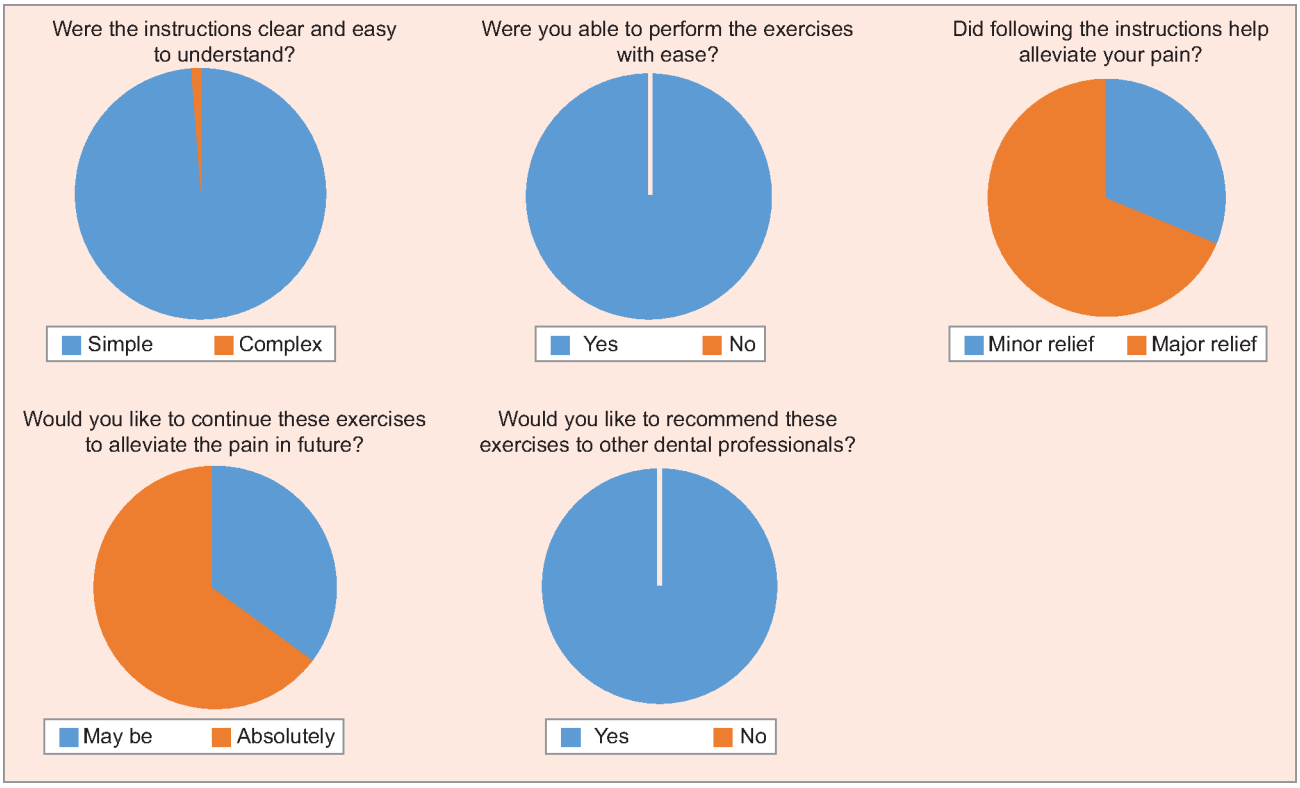

Fig. 4: Result analysis after 30 days of exercises

Discussion

Dentistry has become a vital aspect of modern self-care, offering numerous benefits while also being recognized as a physically demanding profession. The limited visual field of the oral cavity and restricted movement can lead to significant risks for low back and neck pain. Research has shown that maintaining a tense, asymmetric posture increases the likelihood of developing low back pain (LBP), while prolonged static neck positions and repetitive motions further exacerbate this risk.[4,5]

In 2015, Shetty et al. examined the risk factors linked to lower back and neck pain in pediatric dentistry. They found that pediatric dentists experience a higher incidence of neck and lower back pain

compared to the general population. The authors suggested that while dentistry does not directly cause these pains, it accelerates their onset and intensifies the symptoms due to poor working posture.[1]

Lai et al. reported in 2013 that self-reported MSDs among dental personnel are prevalent. They identified several work-related factors associated with musculoskeletal symptoms in different body regions.[6]

Good ergonomic practices are crucial for maintaining work capability, efficiency, and high-quality patient care throughout the careers of dental practitioners. The scope of ergonomics in dentistry is broad, covering various elements such as team dynamics and environmental factors, including lighting, noise, and odor.[4]

In 2014, Gupta et al. reviewed the importance of ergonomics in dentistry, concluding that dental professionals are vulnerable to specific muscle imbalances and require targeted exercises and ergonomic interventions to maintain optimal health throughout their careers. Understanding which interventions are effective and the sequence for their implementation is critical.[7–10]

Gandolfi et al. in 2023 aimed to establish a yoga protocol for dental professionals to prevent or treat MSDs from a preventive medicine perspective. This yoga-based guideline serves as a self-care and prevention strategy for musculoskeletal issues. Involving 60 participants, the study provided detailed guidelines for asanas aimed at relieving low back discomfort, hip joint distress, neck and shoulder pain, and enhancing spinopelvic mobility. They concluded that the designed yogasana protocol serves as an effective tool for dental professionals to alleviate tension in stiff muscles and restore balance in the musculoskeletal structures of the lower body.[9]

Conclusion

Dental professionals are susceptible to specific muscle imbalances and necessitate tailored exercise and ergonomic interventions to sustain optimal health throughout their careers. It is essential to not only identify effective interventions but also to understand the appropriate sequence for their implementation. Using the clinically proven exercise protocol showed significant effectiveness in reducing musculoskeletal pain in the pediatric dental professionals. Through this study, we understood the importance of relieving musculoskeletal pain. It is time we, as a community, come forward and invest in self-care and protect ourselves from professional hazards.

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