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Prevalence of Work-Related Neck and Back Pain, Functional Disability, and Spinal Mobility among Dentists: A Cross-Sectional Study

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Abstract

Background: Dentists are prone to work related musculoskeletal disorders (WMSDs) due to the use of prolonged static positions, repetition and poor ergonomics. These factors often cause neck and back pain, disability and loss of spinal mobility.

Objective: The purpose of this study was to find out the prevalence of neck and back pain, the extent of disability and the assessment of cervical and lumbar mobility and to examine the relationship of these parameters with the various occupations of the dentists.

Methods: The methods include a cross sectional, an observational study of 50 dentists aged 25-40 years. Neck and back pain were measured using the Numeric Pain Rating Scale (NPRS), disability was measured using the Neck Disability Index (NDI) and Oswestry Disability Index (ODI), and spinal mobility was measured using standardized clinical measurements. Analysis of data was done by descriptive and inferential statistics and at the 5% significance level.

Results: 70% reported neck pain, 76% back pain. Most participants were minimally disabled (neck 66%, back 62%) and there was no severe disability. Less cervical mobility was noted and was significantly correlated with neck disability with the higher degree of disability correlating to less cervical mobility.

Conclusion: Dentists have high prevalence of work-related musculoskeletal disorders, but low rates of disability. Prevention of progression of musculoskeletal conditions and optimizing occupational health over the long term is a critical issue that requires early ergonomic interventions, posture correction, regular exercise, and workplace changes.

Keywords: Dentists; Musculoskeletal Disorders; Neck Pain; Low Back Pain; Occupational Health; Disability; Ergonomics; Cervical Mobility.

Introduction

Healthcare workers are exposed to a wide range of work-related musculoskeletal disorders (WMSDs) which are one of the most prevalent occupational health issues in the world. These injuries or failure of muscles, tendons, ligaments, joints, nerves, and other supporting soft tissues that develop or worsen with occupational activities are called disorders. Dentistry is known as one of the professions with the highest

ergonomic demands due to the static postures which are occupied for long periods, the repetitive movements of the upper part of the body, the need for precision-based clinical procedures and the necessity to concentrate on the visual fixation in a narrow working area. The nature of these occupations creates chronic mechanical stresses on the neck and back for dentists, which makes them especially susceptible to developing musculoskeletal disorders (MSDs) and functional disability (1–5).

Dentists have generally been found to have a high prevalence of MSD, studies showing that 60–90% of dental practitioners experienced at least one musculoskeletal symptom during their careers (3,6–8). Common areas of the body include the neck, lower back, shoulders and wrists. Despite the awareness of ergonomic practices, over 80% of dentists in India, reported with work related musculoskeletal symptoms (9-11). These disorders have a negative impact on physical health, productivity, clinical functioning, absenteeism, and can even lead to early retirement from professional practice (2,5).

Dentists may be exposed to multiple ergonomic risk factors such as a prolonged forward head posture, cervical flexion, trunk inclination, elevated shoulders, unsupported upper limbs, repetitive fine motor movements in restorative, endodontic, periodontal and surgical procedures. Prolonged static positions decrease the circulation of blood to the muscles, cause fatigue and induce tissue ischemia and metabolic waste products. The physiological changes over time lead to chronic pain, limitations in joint mobility, muscle imbalance and degenerative musculoskeletal conditions (4,5,12). The cervical and lumbar spine are especially vulnerable because long periods of mechanical loading, as well as trunk flexion, increase load on the intervertebral discs, paraspinal muscles and soft tissues, leading to pain and stiffness (4,13–15).

A number of occupational and personal factors are recognized as factors contributing to WMSDs among dentists, such as long working hours, lack of rest breaks, workstation ergonomics, repetitive instrumentation, improper positioning of the patient, increasing age, higher body mass index (BMI), physical inactivity, and a lack of ergonomic training (2,5,9,16,17). Epidemiological studies continue to show that dental workers have a high burden of MSD. 084.5% of pediatric dentists complained of at least one musculoskeletal symptom, as reported by Peedikayil et al. (18) and 86.9% of pediatric dentists reported with musculoskeletal symptoms, with neck pain being the most common symptom, as reported by Gopika et al. (19). The results of this study suggest that MSDs continue to present a serious occupational health problem even though recommendations designed to promote good oral health are available and dental equipment has improved.

In addition to pain, chronic musculoskeletal disorders can result in functional disability, limited cervical and lumbar mobility, reduced muscular endurance, manual dexterity and reduced work efficiency. This can have a negative impact on patient care, concentration and quality of life (3,6,14). The assessment of spinal mobility is important clinically because a decrease in cervical and lumbar mobility indicates tightness of the muscles, stiffness of the joints and long-term postural adaptations caused by occupational exposure. If there are mobility limitations, as soon as they are identified, the necessary modifications can be made, therapeutic exercises can be provided and preventive physiotherapy interventions can be implemented before irreversible changes take place (13,15).

While a number of studies have already reported the prevalence of musculoskeletal pain among dentists, few studies have explored musculoskeletal pain, functional disability and spinal mobility together among Indian dental practitioners. The purpose of the present study was thus to identify the prevalence of neck and back pain among dentists, and to explore the relationship between prevalence of this pain and the neck and back mobility, as well as functional disability. The findings will form the basis for the

development of ergonomic strategies, preventive rehabilitation programmes and interventions in the workplace in order to minimise the burden of work-related musculoskeletal disorders in dental practice.

Materials and Methods

Study Design and Setting

A cross-sectional observational study was conducted to determine the prevalence of work-related neck and back pain, associated disability, and spinal mobility among practicing dentists. The study was carried out in private and institutional dental clinics located in Ambala and Chandigarh, India.

Ethical Approval

Ethical approval was obtained from the Departmental Committee, Department of Physiotherapy, Guru Kashi University. All participants were informed about the study objectives and procedures, and written informed consent was obtained before participation. Confidentiality was maintained, and participants were free to withdraw at any stage without consequences.

Participants

A total of 50 practicing dentists (27 males and 23 females) were recruited using convenience sampling. Participants were screened according to predefined eligibility criteria before enrolment.

Inclusion criteria:

- Registered dentists aged 25–40 years
- Actively involved in clinical practice
- Minimum 3 years of professional experience
- Working at least 5 hours/day
- Willing to provide written informed consent

Exclusion criteria:

- Congenital musculoskeletal deformities
- Neurological disorders affecting posture or movement
- Acute musculoskeletal injuries during the study period
- Refusal or withdrawal of consent

Data Collection Procedure

Eligible participants completed a structured demographic questionnaire that included age, gender, height, weight, body mass index (BMI), working posture, daily working hours, and professional experience. Each participant then underwent a standardized musculoskeletal assessment conducted by the investigator. The assessment required approximately 20–30 minutes per participant.

Outcome Measures

Numeric Pain Rating Scale (NPRS):

Neck and back pain intensity was assessed using the 11-point NPRS, where 0 indicated no pain and 10 represented the worst imaginable pain.

Neck Disability Index (NDI):

Neck-related disability was measured using the 10-item Neck Disability Index. Each item was scored from 0 to 5, with higher scores indicating greater disability.

Oswestry Disability Index (ODI):

Back-related disability was evaluated using the Oswestry Disability Index, which assesses functional limitations related to low back pain across ten daily activity domains.

Cervical Range of Motion (ROM):

Cervical flexion, extension, lateral flexion, and rotation were measured in degrees using a universal goniometer following standardized procedures described by Norkin and White.

Lumbar Range of Motion (LROM):

Lumbar flexion and extension were measured using a flexible measuring tape according to standardized spinal mobility assessment procedures. Lumbar mobility was categorized as normal or hypomobile based on clinical reference values.

Instruments Used

- Universal goniometer
- Flexible measuring tape
- Numeric Pain Rating Scale (NPRS)
- Neck Disability Index (NDI)
- Oswestry Disability Index (ODI)
- Structured demographic questionnaire

Study Variables

Primary outcome variables:

- Prevalence of neck pain
- Prevalence of back pain
- Neck disability
- Back disability
- Cervical range of motion
- Lumbar range of motion

Secondary variables:

- Age
- Gender
- Body Mass Index (BMI)
- Professional experience
- Daily and weekly working hours
- Working posture (sitting/standing)

Statistical Analysis

Data were analysed using IBM SPSS Statistics version 26.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Associations between variables were evaluated using Pearson's correlation coefficient, and a p-value < 0.05 was considered statistically significant.

Results

50 dentists took part in the study, 27 male (54%) and 23 female (46%). Demographic factors, neck and back pain prevalence, disability and association between disability and occupational factors were considered.

Demographic Characteristics

Table 1. Demographic characteristics of study participants (N = 50)

Variable	Male (n = 27)	Female (n = 23)
Age (years), Mean ± SD	29.04 ± 2.03	31.85 ± 2.58
Height (cm), Mean ± SD	170.14 ± 5.00	162.83 ± 4.26
Weight (kg), Mean ± SD	73.51 ± 4.56	58.26 ± 7.48
BMI (kg/m²), Mean ± SD	25.46 ± 1.46	21.90 ± 2.11

The male participants demonstrated greater height, body weight, and BMI than females, whereas female participants had a slightly higher mean age.

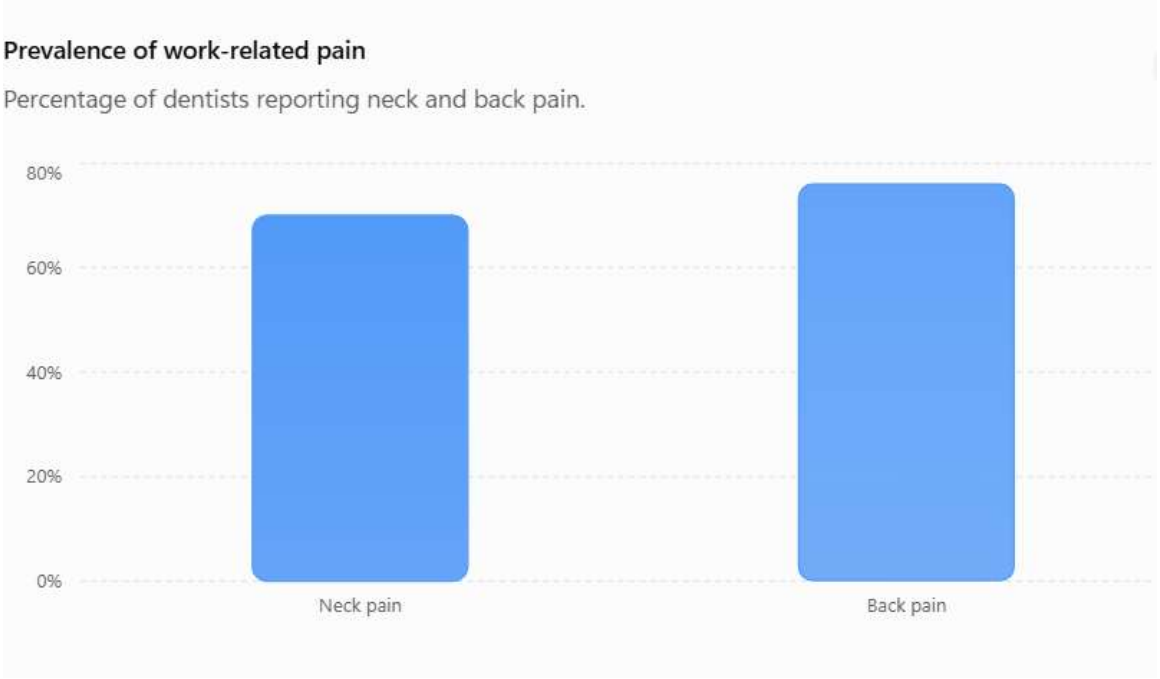
Prevalence of Work-Related Neck and Back Pain

Table 2. Prevalence of neck and back pain among dentists (N = 50)

Pain	Present n (%)	Absent n (%)
Neck pain	35 (70%)	15 (30%)
Back pain	38 (76%)	12 (24%)

The prevalence of work-related back pain (76%) was slightly higher than neck pain (70%), indicating that musculoskeletal symptoms were common among practicing dentists.

Graph 1. Prevalence of work-related pain



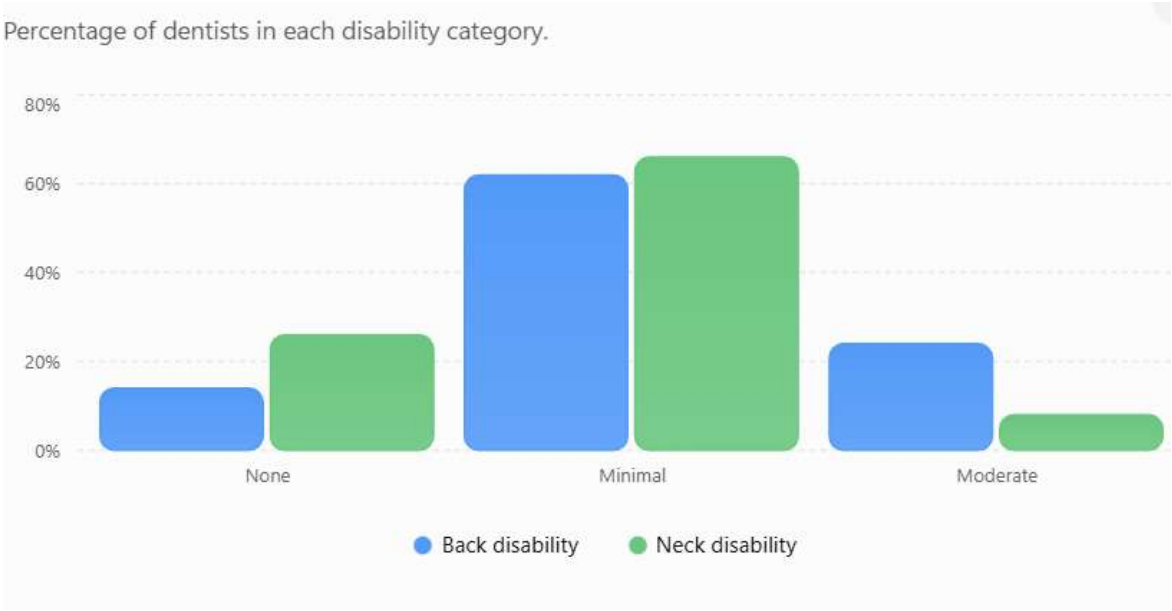
Distribution of Disability

Table 3. Distribution of neck and back disability (N = 50)

Disability Level	Back Disability n (%)	Neck Disability n (%)
None	7 (14%)	13 (26%)
Minimal	31 (62%)	33 (66%)
Moderate	12 (24%)	4 (8%)
Severe	0	0
Complete	0	0

Minimal disability was the predominant category for both neck (66%) and back (62%). Moderate disability was more common in the back (24%) than in the neck (8%). No participant exhibited severe or complete disability.

Graph 2. Distribution of disability



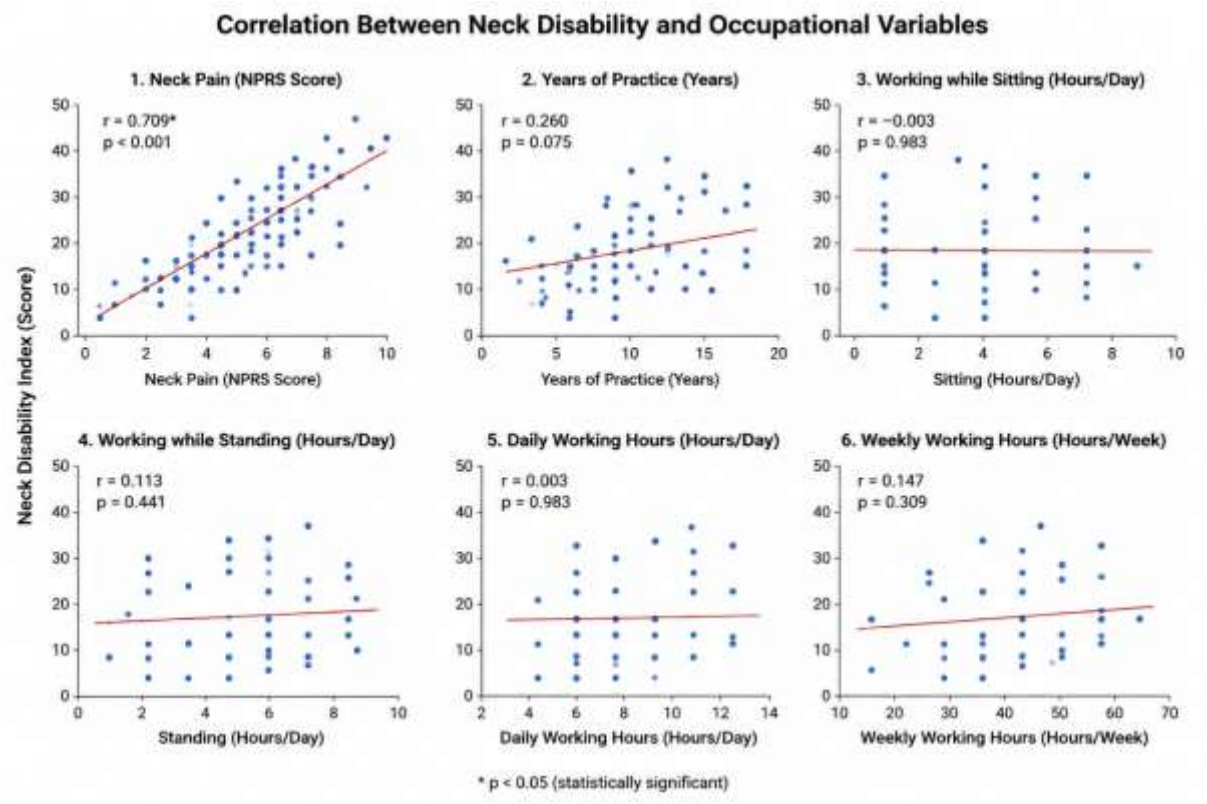
Correlation Between Neck Disability and Occupational Variables

Table 4. Correlation of neck disability with occupational variables

Variable	Correlation coefficient (r)
Neck pain	0.709*
Years of practice	0.260
Working while sitting	−0.003
Working while standing	0.113
Daily working hours	0.003
Weekly working hours	0.147

***p < 0.05**

Neck disability demonstrated a strong positive correlation with neck pain ($r = 0.709$, $p < 0.05$). Weak positive correlations were observed with years of professional experience and weekly working hours, while sitting posture showed virtually no association.



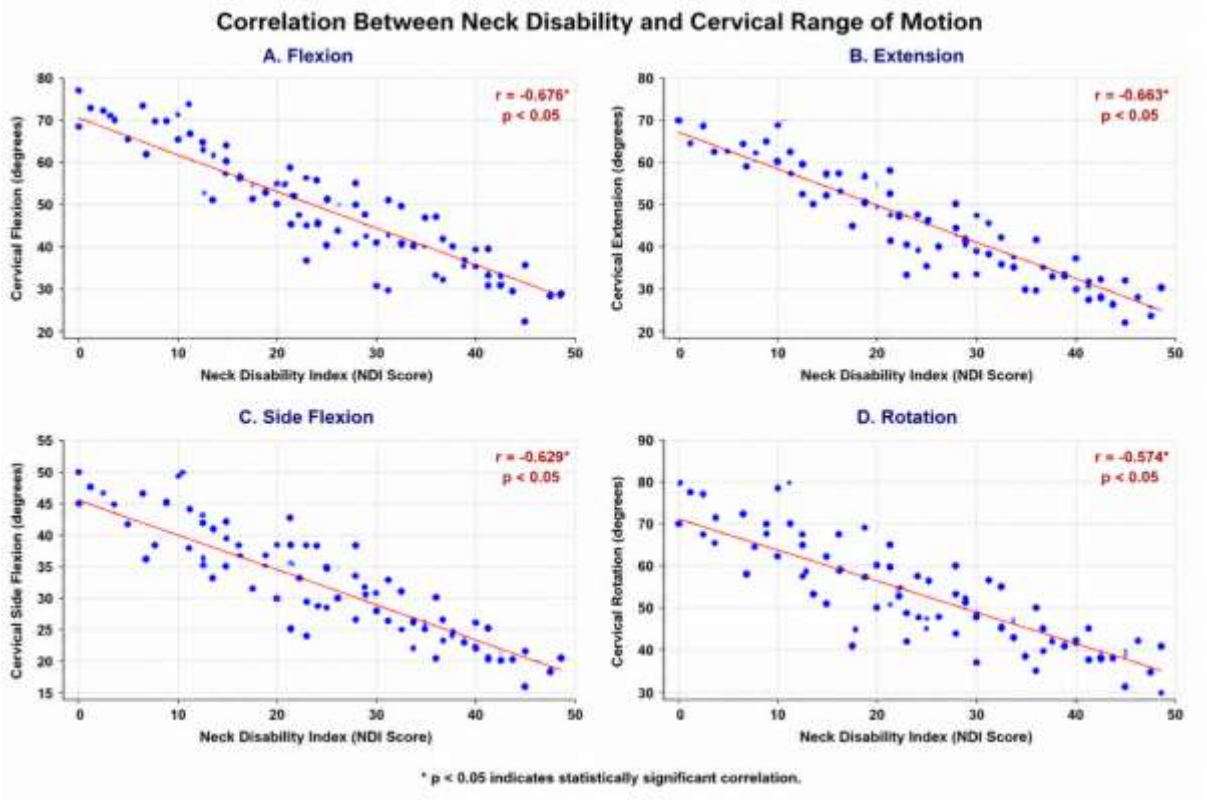
Correlation Between Neck Disability and Cervical Range of Motion

Table 5. Correlation between neck disability and cervical mobility

Cervical Movement	Correlation coefficient (r)
Flexion	−0.676*
Extension	−0.663*
Side flexion	−0.629*
Rotation	−0.574*

***p < 0.05**

All cervical movements demonstrated significant negative correlations with neck disability. Flexion showed the strongest inverse relationship, suggesting that greater disability was associated with greater restriction in cervical movement.



The prevalence of WMSDs in dentists was high in the study. Neck pain (70%) was slightly more common than back pain (76%). Participants had very little disability and no severe. There was a strong positive correlation between neck disability and pain intensity and significant negative correlation between neck disability and cervical range of motion, suggesting that higher levels of neck disability were related to less cervical mobility. The results of this study emphasize the job-related burden of extended static posture and repetitive clinical tasks of dental practitioners.

Discussion

This was a cross-sectional study aimed to examine the extent of neck and back pain, disability and cervical range of motion (ROM) amongst practicing dentists. The results indicated that there was a high level of musculoskeletal disorders (MSDs) with 70% reporting neck pain and 76% reporting back pain. In general, most of the participants had relatively limited levels of disability as measured by the Neck Disability Index (NDI) and Oswestry Disability Index (ODI) despite experiencing pain. Also, ROM at the cervical level had a significantly negative correlation with the neck disability, the more mobility at the cervical level, the more the disability at the cervical level.

The high prevalence of neck and back pain found in the present study corroborates previous research. Hayes et al. found that 64-93% of dentists have suffered from work-related musculoskeletal disorders, with the neck/low back region being the most affected and the clinical tasks being repetitive and the static postures being prolonged. In the same way, Gupta et al. noted that 68% of dentists suffered from neck pain, and 72% reported lower back pain, primarily due to poor ergonomics and long working hours. Similarly, Peedikayil et al. found more than 84% of the paediatric dentists experienced at least one musculoskeletal complaint, highlighting the significance of ergonomic training and frequent stretching exercises. The higher prevalence of back pain observed in the present study can be explained

by the following. Chair sitting, trunk flexion and unsupported postures during dental procedures are all increased, as previously reported by Valachi and Valachi.

Although pain was very common, the majority of participants had little disability (66% for neck and 62% for back). Sharma et al. also found that dentists tend to persist in clinical practice when they have persistent musculoskeletal symptoms and have low disability scores. Similarly, Das and Ghosh found that most healthcare workers suffer from pain without having much functional disability. Reddy et al. also found that, the pain among healthcare workers is also common without any significant functional disability. These results indicate that while it is often common to experience symptoms, early stages of occupational pain may not be immediately disabling to daily activities, but may worsen if preventative actions are not taken.

One of the most important results of the present study was that there was a significant negative correlation between neck disability and the cervical ROM. The strongest association was with cervical flexion ($r = -0.676$) followed by extension, side flexion, and rotation; these suggest that the more disabled the individual, the greater the restriction in cervical mobility. The results are consistent with those of Ylinen et al., who found that cervical mobility was decreased in patients with chronic neck pain, and Falla et al., who showed that cervical muscle function was impaired and that neuromuscular control was altered in patients with chronic neck pain. Likewise, Sharan et al. reported a reverse correlation between neck disability and mobility of the cervical spine, indicating that static positions for an extended period of time leads to muscle tightness and functional restrictions.

The study also revealed that neck pain ($r = 0.709$) and years of professional experience ($r = 0.248$) had a strong and moderate correlation with neck disability, respectively, while daily working hours had only a weak correlation. Similar results were shown by Gupta et al. and Kumar et al. where cumulative occupational exposure, poor ergonomics, and repetitive precision movements were found to be more significant factors that can make an impact on MSDs than daily workload.

The findings have important clinical implications. For the majority of dentists, their pain and disability were minimal, and implementing ergonomic education, posture correction, regular stretching, strengthening exercises, micro-breaks, and periodic physiotherapy screening may be early intervention to avoid progressing to chronic disability.

The advantages of the present study are that a standardized, comprehensive pain assessment was conducted by using the Numeric Pain Rating Scale, NDI, ODI and goniometric measurements, and that these measurements were conducted for cervical ROM, as well as for pain and disability. Some limitations were identified such as cross-sectional study design, convenience sampling, relatively small sample size, self-reported measures, and lack of psychosocial assessment and/or assessment of the workplace ergonics, which may reduce generalizability and limit causal conclusions.

Conclusion

The current study showed a high prevalence of WMSD among dentists, with 76% reporting back pain and 70% neck pain. The majority of participants were not very disabled even though they were in pain. Neck disability correlated negatively with cervical range of motion, suggesting that increased disability was linked to decreased cervical range of motion. Preventing disability and promoting occupational health involves early ergonomic interventions, posture correction, work site modifications and regular exercise.

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