Site Predilection of Occupational Musculoskeletal Complaints among Dental Practitioners in Chennai City

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Abstract

Dentists are at high risk for musculoskeletal disorders due to occupational health hazards. In India, even though the population is high, there is still a lack of awareness about the prevalence of work-related musculoskeletal disorders among dentists in this rapidly growing occupational sector. Identifying the common sites of ailment and comparing them with the contributing factors associated with these musculoskeletal symptoms can help to develop ergonomic recommendations for the dental profession in Chennai city. This study was aimed at investigating the common sites of ailments among dentists in the city. Using stratified sampling method, 297 dentists were selected and given questionnaire based on the type of ailments, common sites of ailments, duration of ailments, treatment modalities, and effectiveness of therapy. The dentists reported that the most common sites of ailments were shoulder (n = 106/297) neck (n = 78/297), and lower back (n = 67/297). This study revealed the prevalence of musculoskeletal complaints among the various age groups of dentists is common in the shoulder and neck regions. Dentists should implement ergonomic designs in their dental clinics along with regular exercise and relaxation techniques, which help them to combat stress, thus improving the quality of life, resulting in consistent long-lasting work efficiency.

Keywords: Musculoskeletal disorders; Ailment; Occupational hazards; Dentists

Introduction

Musculoskeletal disorders (MSDs) represent an important occupational health issue in dentistry. Musculoskeletal pain, particularly back pain, has been found to be a major health problem for dental practitioners [1,2]. Musculoskeletal disorders affect the physical, psychological, and social aspects of dentists. This, in turn, has an impact on their productivity and ultimately reduces their quality of life [3].

Musculoskeletal disorders are known to be of multifactorial etiology [4]. These disorders are due to excessive, long-term unilateral stress on muscles, tendons, joints, and nerves [5,6]. An article by Valachi and Valachi [7] cited a flowchart of muscle activity and pain leading to musculoskeletal disorders: Prolonged static posture → muscle fatigue and muscle imbalance → muscle ischemia/necrosis, trigger points, and muscle substitution → pain → protective muscle contraction → nerve compression, spinal disk degeneration → musculoskeletal disorder.

It has been suggested that injuries caused by work-related musculoskeletal disorders or similar cumulative trauma disorders can be reduced or prevented by applying ergonomic principles in dental equipment and instrument design [8]. Recommendations on how to decrease musculoskeletal disorders are often only partially implemented even by relatively motivated group of dentists [9,10]. Dentists require good visual acuity, hearing, depth perception, psychomotor skills, manual dexterity, and ability to maintain occupational postures over long periods [3].

Studies related to the musculoskeletal disorders among dental professionals have already been published in many countries. In a previous study (unpublished data) the various contributing factors for musculoskeletal disorders among the dentists in Chennai city were evaluated. Therefore the aim of this study is to reveal the common sites of ailments and to compare them with the contributing factors obtained from the previous study among the dentists in Chennai city by distributing questionnaires pertaining to it.

Aims

1. To evaluate site predilection of musculoskeletal disorders among the dentists in Chennai city.
2. To analyze the interrelationship between the contributing factors and different regions of ailments among the dentists surveyed.

Materials and Methods

Using stratified sampling method, 297 dentists were selected and given questionnaire based on work-related musculoskeletal disorders as diagnosed in the previous study (unpublished data). In this study, questions related to the types of ailments, common sites of ailments, duration of ailments, treatment modalities, and effectiveness of therapy for musculoskeletal disorders were prepared and given to the same set of dentists so as to compare the contributing factors with the ailments experienced by the dentists.

Pretesting of questionnaire was performed prior to the survey. Similar to the previous study, this study was also approved by the ethical...
committee of the institution and an informed consent was obtained from each dentist prior to the distribution of questionnaire.

Prevalence of musculoskeletal disorder complaints was analyzed using chi-square test (95% significance level [ \( p > 0.005 \) ]). Statistical analysis was performed using SPSS software (16.0 version Windows XP).

### Sampling Chart

Totally 450 questionnaires were given

- **Chennai city population**: 105 questionnaires
  - **North**: 74-MSD (119 questionnaires)
  - **South**: 75-MSD (125 questionnaires)
  - **East**: 75-MSD (98 questionnaires)
  - **West**: 73-MSD (50 questionnaires)
- **30-no complaints**: 44-no complaints
- **5-no complaints**: 34/297
- **1-missing data**: 21-no complaints
- **2-missing data**: 21-no complaints

Finally 297 questionnaires were considered in the study.

### Results

Among the dentists surveyed, 43.10% (\( n = 128/297 \)) of dentists reported with pain as the musculoskeletal complaint; 31.65% (\( n = 94/297 \)) of dentists had pain accompanied with stiffness and fatigue. The sites of ailment that the dentists experienced were shoulder (69.36%), neck (61.28%), wrist/hands (40.40%), lower back (28.28%), upper back (21.21%), knees (17.50%), elbows (13.47%), and foot (10.10%); 13.4% of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 12.12% (\( n = 36/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.78% (\( n = 36/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 12.12% (\( n = 36/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure; 11.41% (\( n = 34/297 \)) of dentists reported a musculoskeletal complaint after performing complete denture and impaction procedure.

Male dentists reported that the most common sites of ailment were shoulder (\( n = 106/297 \)), neck (\( n = 78/297 \)), and lower back (\( n = 67/297 \)), whereas in female dentists the regions were neck (\( n = 104/297 \)), shoulder (\( n = 100/297 \)), and wrist (\( n = 70/297 \)) (Figure 1). This study revealed that the shoulder and neck region is the most common site of musculoskeletal ailment among the dentists of various age groups in Chennai city (Figure 2). Dentists with a height ranging from 150 to 180 cm had greater prevalence of musculoskeletal symptoms. Dentists with a height ranging from 151 to 160 cm had greater prevalence in shoulder (20.8% \( n = 62/297 \)), neck (18.18% \( n = 54/297 \)), and lower back (11.45% \( n = 34/297 \)); dentists with a height ranging from 161 to 170 cm had greater prevalence in shoulder (21.88% \( n = 65/297 \)), neck (19.87% \( n = 59/297 \)), and wrist

### Table 1: Type (pain, stiffness, fatigue, and others), duration of ailments (hours, days, months, and years), region of symptoms, and influence of work-related procedures

<table>
<thead>
<tr>
<th>Musculoskeletal complaints</th>
<th>Subtype</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of ailments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td></td>
<td>128</td>
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<tr>
<td>Stiffness</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Mixed (pain, stiffness, fatigue)</td>
<td></td>
<td>94</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Duration of ailments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours</td>
<td></td>
<td>89</td>
</tr>
<tr>
<td>Days</td>
<td></td>
<td>124</td>
</tr>
<tr>
<td>Months</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>Years</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Region of symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck</td>
<td></td>
<td>182</td>
</tr>
<tr>
<td>Shoulder</td>
<td></td>
<td>206</td>
</tr>
<tr>
<td>Upper back</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Lower back</td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>Elbows</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>Wrist/hands</td>
<td></td>
<td>117</td>
</tr>
<tr>
<td>Knees</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>Foot</td>
<td></td>
<td>29</td>
</tr>
</tbody>
</table>

### Table 2: Prevalence of musculoskeletal symptoms in different body regions among dentists and work-related procedures

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Number</th>
<th>Neck</th>
<th>Shoulder</th>
<th>Upper back</th>
<th>Lower back</th>
<th>Elbows</th>
<th>Wrist/hand</th>
<th>Knees</th>
<th>Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling</td>
<td>36</td>
<td>24</td>
<td>32</td>
<td>11</td>
<td>05</td>
<td>09</td>
<td>06</td>
<td>16</td>
<td>04</td>
</tr>
<tr>
<td>Extraction</td>
<td>32</td>
<td>11</td>
<td>37</td>
<td>09</td>
<td>11</td>
<td>04</td>
<td>10</td>
<td>03</td>
<td>01</td>
</tr>
<tr>
<td>RCT</td>
<td>35</td>
<td>37</td>
<td>32</td>
<td>08</td>
<td>12</td>
<td>04</td>
<td>17</td>
<td>08</td>
<td>05</td>
</tr>
<tr>
<td>FPD</td>
<td>26</td>
<td>32</td>
<td>31</td>
<td>05</td>
<td>11</td>
<td>05</td>
<td>13</td>
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<td>06</td>
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<tr>
<td>RPD</td>
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<td>9</td>
<td>5</td>
<td>03</td>
<td>07</td>
<td>05</td>
<td>11</td>
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<td>15</td>
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<td>05</td>
<td>11</td>
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<td>19</td>
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<td>00</td>
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<td>Ortho treatment</td>
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<td>18</td>
<td>05</td>
<td>06</td>
<td>04</td>
<td>14</td>
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<td>33</td>
<td>14</td>
<td>06</td>
<td>06</td>
<td>15</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>Implantation</td>
<td>20</td>
<td>12</td>
<td>08</td>
<td>02</td>
<td>07</td>
<td>01</td>
<td>08</td>
<td>07</td>
<td>05</td>
</tr>
<tr>
<td>Maxillofacial surgeries</td>
<td>6</td>
<td>07</td>
<td>03</td>
<td>01</td>
<td>04</td>
<td>01</td>
<td>04</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>Total</td>
<td>297</td>
<td>182</td>
<td>206</td>
<td>63</td>
<td>84</td>
<td>40</td>
<td>120</td>
<td>52</td>
<td>30</td>
</tr>
</tbody>
</table>
Comparative evaluation between anthropometric characteristics and prevalence of musculoskeletal complaints

*statistically significant between males and females (p < 0.05).

Figure 1: Prevalence of musculoskeletal symptoms in different body regions among male and female dentists

*statistically significant within the four age groups (p < 0.05).

Figure 2: Prevalence of musculoskeletal symptoms in different body regions among four age groups of dentists

*statistically significant within the weight groups (p < 0.05).

Figure 4: Prevalence of musculoskeletal symptoms in different body regions between four categories of body mass index

*statistically significant among the work categories.

Figure 5: Prevalence of musculoskeletal symptoms in different body regions among undergraduate and postgraduate dentists

Figure 6: Prevalence of musculoskeletal symptoms in different body regions among privately practicing and institution dentists
Figure 7: Prevalence of musculoskeletal symptoms in different body regions among clinically experienced dentists

Figure 8: Prevalence of musculoskeletal symptoms in different body regions based on dentists' working hours per day

Figure 9: Prevalence of musculoskeletal symptoms in different body regions based on the number of patients treated per day by dentists

Figure 10: Prevalence of musculoskeletal symptoms in different body regions based on treatment time taken by dentists for each patient

Figure 11: Prevalence of musculoskeletal symptoms in different body regions among dentists based on the time spent as rest periods

*statistically significant.
Problems in regions like shoulder (31.99% [n = 45/297]), and dentists working for a period of less than 5 h per day had more prevalence of musculoskeletal symptoms in regions like shoulder (37.04% [n = 110/297]), neck (32.66% [n = 97/297]), wrist (22.90% [n = 68/297]), and lower back (16.16% [n = 48/297]). Dentists working for about 6 to 10 h per day had more prevalence of musculoskeletal ailments in regions like shoulder (n = 25.25% [75/297]), neck (n = 23.23% [69/297]), wrist (n = 14.14% [42/297]), and lower back (n = 10.10% [30/297]). Dentists working for more than 11 h per day had more symptoms of ailment in regions like shoulder (n = 7.07% [21/297]), neck (n = 5.39% [16/297]), lower back (n = 5.05% [15/297]), and wrist (n = 2.36% [7/297]) (Figure 8). On analyzing the data from Figure 9 to 13, the comparative evaluation between work-related physical load and prevalence of musculoskeletal complaints revealed that the most common sites of ailment were shoulder, neck, wrist, and lower back.

Discussion

The prevalence of musculoskeletal symptoms among female dentists surveyed in this study was greater in regions like neck (n = 104), shoulder (n = 100), and wrist (n = 70). In male dentists the
common sites of ailment were shoulder (n = 106), neck (n = 78), and lower back (n = 67). In most of the studies back pain was the most commonly reported work-related musculoskeletal disorder with its prevalence ranging from 37 to 55% (14-16). A similar study conducted among Indian dentists population revealed that the sites of ailment were neck (75.74%), wrist/hand (73.13%), lower back (72.01%), and shoulder (69.40%) [11]. In our study, the most common sites of ailment were shoulder (n = 206), neck (n = 182), wrist/hand (n = 117), and lower back (n = 102) (Table 1).

Many dentists do not tilt their patients’ head enough or adjust the sitting angle, which might result in awkward positioning thereby contributing to musculoskeletal symptoms. Several ergonomic investigations conclude that the least strained sitting position features an inclined backrest (130°), lumbar support, and arm rests. However, others claim a detrimental effect from arm support due to strain on the shoulder joint.

Hand and wrist disorders, which are less common, are getting more consideration by dental workers than the symptoms of neck and/or back disorders [12]. The uncomfortable working posture elevated the risk of neck pain, waist pain, and sleep disorders [13]. Long working hours without breaks can increase the operators’ pain [14]. Scheduling of micro breaks regularly shows less discomfort among the operators as it replenishes and nourishes the stressed structures [15].

Prolonged use of small dental instruments is likely to be a special occupational hazard for work-related musculoskeletal disorders in dentists [16]. In clinical practice, dental scaling and endodontic treatment tasks require dentists to pull and/or rotate instrumental tools, which requires precision in hand/finger movement and a high level of pinch force [17]. Moreover, they have to hold the patient’s wrist in an awkward position in order to get and maintain access to different areas within the mouth [17].

In this study, irrespective of the age, weight, and the various contributing factors, the common sites of ailment among dentists in Chennai city are shoulder, neck, wrist, and lower back. The authors attribute the high frequency of symptoms of neck, shoulder, and upper extremities among the dentists to be probably connected with their difficult work positions—cervical flexion and rotation, elevated arms, and repetitive precision demanding handgrips [7].

**Study Limitation**

The musculoskeletal symptoms mentioned by the dentists were self-reported measures (symptoms may not be associated with occupation). Therefore future studies should be based on objective measures for validating the musculoskeletal symptoms of the dentists.

**Clinical Implication**

Irrespective of the various contributing factors of musculoskeletal disorders like clinical experience, number of working hours per day, number of patients treated per day, and working procedures, majority of the dentists in Chennai city experienced ailments in shoulder, neck, and wrist. Therefore dentists must perform regular stretching exercises and concentrate on strengthening their upper body muscles.

**Future Scope for Research**

Further investigations are required to evaluate the risk levels of musculoskeletal disorders among the dentists in Chennai city.

**Conclusion**

This study highlights the fact that among the dentists surveyed in Chennai city, the common sites of ailment were shoulder, neck, and wrist. Further the prevalence of musculoskeletal disorders can be minimized among budding dentists by implementing ergonomic principles in their respective institutions, so as to lead an extended career in their profession.

**References**