Musculoskeletal disorders among female dental personnel – clinical examination and a 5-year follow-up study of symptoms

Abstract Objectives: To explore the natural course of musculoskeletal disorders during a 5-year period among dental personnel, to survey findings and diagnoses according to a standardized protocol, and to compare and evaluate different methods for the detection of musculoskeletal disorders in a population. Methods: In a 5-year follow-up study, dental personnel (n = 90) and referents (n = 30) were studied. The Nordic questionnaire (years 0 and 5), the present pain rating according to the Borg category ratio scale, and physical examination (year 5) were used. Results: In year 0 the prevalence of symptoms in the shoulders, the wrists/hands, and, unexpectedly, the hips was higher in the dental personnel as compared with the referents. Furthermore, those (16%) who had left the dental profession during the observation period showed a higher prevalence of and, often, combined symptoms from several body regions in year 0 than did those who stayed. Dental personnel who remained in the profession tended to have an increased risk of developing more symptoms in the shoulders and the elbows/wrists/hands in year 5 as compared with year 0 and at year 5 were in more pain and had received more diagnoses for the neck/shoulder region relative to the referents. Furthermore, there was a considerable variation in symptoms during the follow-up period. The sensitivity of the pain rating and of the Nordic questionnaire in detecting musculoskeletal disorders was high for the neck and shoulders but was not as high for the elbow, wrists/hands, or hips. The association was better for diagnoses than for findings. The opposite patterns were observed for specificity. Conclusions: Dental personnel had an increased risk of developing musculoskeletal disorders as verified by symptoms and diagnoses and more painful or persistent conditions. This led to a selection out of work. The questionnaire and the present pain rating gave a relatively good picture of the prevalence of musculoskeletal disorders arising from the neck, shoulders, and hips and would be useful as screening tools. Their sensitivity in detecting disorders was higher for diagnoses than for findings. However, these methods were not as sensitive for disorders involving the elbows/wrists/hands. Physical examinations gave more detailed information.

Key words Musculoskeletal system · Signs and symptoms · Diagnosis · Dentist · Dental hygienist

Introduction

Work-related musculoskeletal disorders, especially of the neck and upper extremities, are common among dentists, dental hygienists, and, to some extent, dental assistants (Milerad and Ekenvall 1990; Osborn et al. 1990b; Rundcrantz et al. 1990; Öberg and Öberg 1993; Åkesson et al. 1995; Finsen 1995). In addition, a tendency toward a higher frequency of hip symptoms as compared with referents has been found (Åkesson et al. 1995). The disorders cause long periods of work disability, and treatment is often needed. Dental work, a vision-demanding precision task, is characterized by work postures involving a prolonged static work load for the neck, shoulders, and arms (Åkesson et al. 1997).

The frequent work-related disorders are a great problem, since there are very limited possibilities for changing the work situations within the same profession for the different categories in dentistry. Furthermore, the education requires a considerable amount of time and is often expensive, which makes a decision to quit work very hard. There are also few possibilities for increasing the work contents through work enlargements to change
the total work load over time, to achieve more variation, and to increase the break periods during a day.

However, further investigations are needed to provide a better view of the specific medical problems these groups really suffer from. This might result in ideas as to how these problems might be solved by preventive intervention. Thus, very little is known about the specific anatomical tissues that are affected and the specific diagnoses that can be reached among dental personnel. The development over time of musculoskeletal disorders is also unknown, as longitudinal studies investigating the natural course of these problems are rare (Takala et al. 1992; Rekola et al. 1997). Therefore, studies are needed to examine whether the disorders develop into permanent ones or whether there is a possibility for recovery despite continued work in the same profession or after a change in occupation or retirement.

The aim of the present study was to explore the natural course and the variation of musculoskeletal disorders in the neck, upper extremities, and hips over a 5-year period in different groups of dental personnel engaged in public dental care; to describe more closely the symptoms and signs and to set diagnoses that would contribute to a better understanding of the factors underlying the development of such disorders among these groups; and to compare different methods (data sources) for use in the surveillance of musculoskeletal disorders as indicators of ergonomic problems in a group.

### Subjects and methods

**Subjects**

**Dental personnel**

Originally (year 0) the groups studied consisted of 30 dentists and 30 dental assistants in general practice as well as 30 dental hygienists, all of whom were female (Åkesson et al. 1995). The mean age of the dentists was 40 (range 28–57) years, and the mean duration of employment was 7.5 (2.8–17.7) years. The dental hygienists were also selected to match the dentists by age. All invited subjects participated.

**Referent group**

The referent group consisted of 30 female medical nurses aged a mean of 41.7 (26–60) years; they had been employed for 8.2 (0.3–28) years at the blood centers at two hospitals and at some occupational health service centers in the same area. The referent group was chosen on the basis of a varied and physically light work load (Åkesson et al. 1995).

**Nonparticipants in year 5**

One dental assistant and one referent had died of diseases other than those investigated in the present study. Others who either did not participate or participated only partly in year 5 had moved to far distant places outside the geographic region. One subject participated only partly because of delivery and parental leave.

**Methods**

**Questionnaire**

For data collection for year 0 and year 5 a standardized form, the Nordic questionnaire (NMQ; the general questionnaire and specific ones for the neck and shoulders; Kuorinka et al. 1987), was used in interviews of the participants by a physiotherapist. Symptoms (ache, pain, and discomfort) arising from nine anatomical regions over the last 12 months and the previous 7 days and sick leave taken because of these symptoms over the past 12 months were recorded. The NMQs do not allow any conclusion with respect to diagnosis. Data from five body regions were analyzed. With regard to neck and shoulder symptoms, the duration of pain and the effects on work and/or leisure-time activities were also queried. The questionnaire also included issues about some individual factors, such as age, duration of employment, and weekly working hours as well as body weight, height, hand dominance, and smoking habits.

### Table 1  Number of participants among dental personnel groups and referents in two surveys 5 years apart (year 0 and year 5, respectively)

<table>
<thead>
<tr>
<th>Year</th>
<th>Examinations</th>
<th>Dental personnel</th>
<th>Referents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Dentists</td>
<td>Dental hygienists</td>
</tr>
<tr>
<td>0</td>
<td>Nordic questionnaire</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>5a</td>
<td>Nordic questionnaire</td>
<td>29 (26)</td>
<td>32 (22) 8</td>
</tr>
<tr>
<td></td>
<td>Borg’s pain rating</td>
<td>28 (25)</td>
<td>30 (22) 8</td>
</tr>
<tr>
<td></td>
<td>Physical examination</td>
<td>27 (25)</td>
<td>29 (21) 8</td>
</tr>
</tbody>
</table>

*a Within parentheses are shown the numbers of participants active in the same profession as they were in year 0. In all, 8 dental hygienists, 3 dentists, and 3 dental assistants among the participants in year 0 had left the profession, but some nonetheless participated in year 5 (in *italics*)