ABSTRACT. We have evaluated two kinds of physiotherapy treatment for dentists with occupational cervico-brachial disorders. Group A received treatment with a psychosomatic approach and individual ergonomic instruction and group B received ergonomic instruction only. A reduction of the cervico-brachial disorders after the intervention was observed in both groups. In group A there was a significant decrease of pain and discomfort in the neck (p<0.05), and a significant improvement was also found concerning the experience of well-being (p<0.05). Five weeks after the intervention the feeling of self-confidence had increased significantly in group A (p<0.05). Both groups of dentists experienced that their control over the work had decreased (p<0.01 in group A and p<0.05 in group B). In group B it was also found that the dentists’ confidence in the future had decreased, compared with the answers given a year before.

Key words: cervical pain, dentists, psychosocial problems, psychosomatic problems, physiotherapy, ergonomics.

Considerable research has been performed to prevent musculoskeletal disorders. Dentists and dental nurses with special training in ergonomics have instructed and helped the dental service staff with various ergonomic problems, and also physiotherapists have been asked to handle their ergonomic problems (22). In spite of these measures, the prevalence of pain and discomfort among dentists is still remarkably high. In an investigation comprising 359 dentists in Malmö in Southern Sweden it was found that 72% reported cervico-brachial disorders during the past year (16). In an investigation concerning cervico-brachial disorders among dentists was found differences in the way of working between dentists with and those without pain and discomfort in the neck and shoulders (17). Significant differences were found, for example, with respect to the use of a wedge cushion to improve the direct view into the mouth during the work. Further, it was shown that dentists with cervico-brachial disorders when working kept their head bent sideways and/or rotated, to a greater extent than those without symptoms.

Dentists with cervico-brachial pain and discomfort compared with those without, experienced less satisfaction with their psychosocial work environment, and less personal harmony, e.g., less self-confidence, reported more anxiety and had less trust in the future. Furthermore, they had poorer psychosomatic health compared to those without pain and discomfort, and could suffer, for example, from insomnia, palpitation of the heart and uneasiness (18).

It has been shown that patients with pain and discomfort in the neck, receiving physiotherapy combined with information about psychosomatic reactions, reported less pain after the therapeutic intervention compared with a group of patients who received physiotherapy only (19). Through the discussion about psychosomatic reactions the physiotherapist might help the patient to gain a deeper insight into the interrelation between somatic symptoms and emotional phenomena and how the body reacts to situations of stress and conflict (19).

Some investigations have been performed to evaluate the effect of physiotherapy treatment on cervico-brachial disorders with respect to mobility and pain in the neck and shoulders (2, 3, 5, 12, 13). No definite conclusion can be drawn from the studies as to the effectiveness of the treatment models used. Previous studies indicate that there is a need of a more global intervention programme, including not only individually adjusted ergonomic intervention, but also specific physiotherapy treatment and a psychosomatic approach.

The aim of the present investigation was to compare two different kinds of physiotherapeutic intervention among dentists with occupational cervico-brachial disorders. One model comprised individual adjusted therapeutic treatment and ergonomic instruction. The other model consisted of individually adjusted ergonomic instruction only.
Table I. Background data of the dentists in group A and group B, n=22 in both groups

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>42.5</td>
</tr>
<tr>
<td>SD</td>
<td>1.2</td>
</tr>
<tr>
<td>Range</td>
<td>33-58</td>
</tr>
<tr>
<td>Work hours/week</td>
<td>30-53</td>
</tr>
<tr>
<td>Mean</td>
<td>38.1</td>
</tr>
<tr>
<td>SD</td>
<td>4.5</td>
</tr>
<tr>
<td>Range</td>
<td>20-40</td>
</tr>
<tr>
<td>Years in profession</td>
<td>5-35</td>
</tr>
<tr>
<td>Mean</td>
<td>15</td>
</tr>
<tr>
<td>SD</td>
<td>2.3</td>
</tr>
<tr>
<td>Range</td>
<td>3-32</td>
</tr>
</tbody>
</table>

**MATERIAL AND METHODS**

**Subject**

In this investigation 45 official dentists (government employed) in the Malmöhus District and the Municipality of Malmö in the southern part of Sweden took part. These dentists are a part of the study group that participated in the investigation undertaken in 1987, when 359 dentists answered a questionnaire concerning musculoskeletal symptoms in different parts of the body (16). In this study 120 unsampled dentists who were called who in the questionnaire had reported headache, pain and discomfort in the neck and shoulders. Ninety-six dentists with symptoms accepted the invitation and were examined about six months after the questionnaire had been answered (17). These 96 dentists were invited to take part in the present study six months later. However, 37 dentists reported to be free from cervico-thoracic pain and discomfort at that time and were therefore excluded.

Furthermore, 14 specialist dentists were excluded, as their working situation is not comparable with that of the other dentists. The remaining 45 dentists who took part in this project had repeatedly symptoms of headache, pain and discomfort in the neck and shoulders from 12 to 24 months. The most common symptom was pain, often described as an ache in the back of the head and pain in the neck radiating towards the shoulders. Pain and discomfort in the shoulders was mostly described as pain in the shoulder joint or pain when the arm was moved. Headache means pain in the crown, forehead or eye.

The dentists were divided into two groups. Those who worked near to the physiotherapy reception were offered adjusted physiotherapy treatment, including information based on a psychosomatic approach and individually adjusted ergonomic instruction. The individually adjusted ergonomic instruction was given at the dentists workplaces. This group, further called group A, consisted of 13 men and 9 women.

The remaining dentists, further called group B, consisted of 14 men and 9 women, were given individually adjusted ergonomic instruction as their workplace. One dentist in the ergonomic group did not answer the questionnaire in the follow-up, thus making 22 dentists in both groups.

**Background data of the dentists in the two groups**

- **Age:** Mean 42.5 ± 1.2, Range 33-58
- **Working hours/week:** Mean 38.1 ± 4.5, Range 20-40
- **Years in profession:** Mean 15 ± 2.3, Range 3-32

**Ergonomic instruction**

The ergonomic instruction was based on an interview and ergonomic tests reported previously (17). It was adjusted to the present symptoms experienced by the dentist and to his needs and wishes first of all with respect to neck and shoulder problem. The ergonomic instruction for both groups was given at the workplace to make the instruction as realistic as possible. The instruction was given in one session during the dentists treatment of one to two patients.

**Physiotherapy treatment**

The physiotherapy treatment consisted of treatment to reduce pain and discomfort and information based on a psychosomatic approach. The information was intended to draw the dentists' attention to how the body may react with pain and tension in situations of stress and conflict and to provide an understanding of the interplay between physical and psychosomatic phenomena.

The physiotherapy treatment was based on the symptoms experienced such as pain on palpation and shortened upper part of the trapezius. Other findings were, for example, tendinitis in the tendons of the shoulder joint muscles, restrictions of the mobility of the cervical and the upper thoracic spine, weakness of the small muscles of the neck, muscle spasms, and weakness of the neck muscles passing. The treatment was thus entirely individual, and therefore the programme as well as the number of treatment sessions varied. The treatments included measures to reduce the pain such as soft tissue mobilisation and cervical traction. To increase mobility, stretching of tight muscles was performed, especially concerning the upper part of the trapezius, levator scapulae and n. pectoralis major. Other parts of the treatment were the training of endurance of the prevertebral neck muscles and of muscles acting on the scapula such as the lower part of n. trapezius, n. latissimus dorsi, n. serratus anterior and the rhomboid muscles. The treatment also included exercises in order to correct faulty posture and to facilitate relaxation. Further, home exercises aiming at improving physical fitness, strength and endurance were given. Finally, ergonomic problems which had been observed during the ergonomic instruction were discussed and corrections practiced.

The 22 dentists making up group A received 1-8 treatments, as shown in Table II.

<table>
<thead>
<tr>
<th>Number of treatments</th>
<th>3-8</th>
<th>3-4</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of dentists</td>
<td>8</td>
<td>4</td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table III. Data in groups A and B before and after the intervention on in mm on VAS measured at 8 a.m., noon, and 6 p.m.**

<table>
<thead>
<tr>
<th></th>
<th>Headache</th>
<th>Neck</th>
<th>Shoulder</th>
<th>Well-being</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (mm)</td>
<td>SD</td>
<td>Mean (mm)</td>
<td>SD</td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>Before</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 a.m.</td>
<td>11.2</td>
<td>9</td>
<td>22.7</td>
<td></td>
</tr>
<tr>
<td>Noon</td>
<td>11.4</td>
<td>8</td>
<td>20.1</td>
<td></td>
</tr>
<tr>
<td>6 p.m.</td>
<td>11.6</td>
<td>6</td>
<td>24.1</td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Before</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 a.m.</td>
<td>9.2</td>
<td>6</td>
<td>21.1</td>
<td></td>
</tr>
<tr>
<td>Noon</td>
<td>9.4</td>
<td>6</td>
<td>23.9</td>
<td></td>
</tr>
<tr>
<td>6 p.m.</td>
<td>9.6</td>
<td>7</td>
<td>26.9</td>
<td></td>
</tr>
</tbody>
</table>

**Psychosocial survey**

The dentists answered two questionnaires five weeks after the intervention. The questionnaires measure psychosocial factors in the work environment and personal harmony. The results were compared with those obtained six months before the present study. Each questionnaire consists of different variables, described below, which contain several items. Each item has fixed alternative answers which are given points (14).

The questionnaires measure the psychosocial factors in the work environment comprised the following variables: personal influence on decision-making at the workplace, the relation between staff and management, the stimulation experienced from the work, the feeling of solidarity with colleagues, and how the work load is experienced. The evaluation of the answers in the survey of the psychosocial work environment is done according to a scale on which 5 is the mean value. According to Rubenowitz, values below 15 are considered as unsatisfactory and values below 10 indicate that measures for improvement should be undertaken (14, 15).

The second questionnaire measures personal harmony, comprising the variables: self-confidence, freedom from anxiety, psychosomatic health and confidence in the future. By psychosomatic health Rubenowitz means that one to great extent does not suffer from insomnia, palpitation of the heart, neurasthenia, headache, stomach trouble or a deeply depressed state of mind. The questionnaire is evaluated according to the change scale on which 5 is the mean value (8), which is called the reference value (14). Values below 5 are unsatisfactory.

**Statistical methods**

The statistical analysis is made with repeated measurements within the ANOVA concept. A technique often used when data are measured by the Visual Analog Scale. The analyses of the questionnaires are based on Student's t-test. A check with a correspondent non-parametric method has been made. A probability level of p<0.05 has been accepted as statistically significant.

**RESULTS**

**Rating according to the VAS: Improvement or deterioration?**

The analysis of the mean values from the VAS showed that pain increased during the day. This was most obvious for pain and discomfort in the neck which was experienced most intensively at the end of the working-day, at 6 p.m. (p<0.001) (Table III). In cases with remaining pain or reduced pain the same increase was found. However, in both groups the feeling of well-being did not vary, but was constant during the day (Table III).

Sven J Rebak Med 23

**Table II. Number of therapeutic treatments in group A (n=22)**

<table>
<thead>
<tr>
<th>Number of treatments</th>
<th>3-8</th>
<th>3-4</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of dentists</td>
<td>8</td>
<td>4</td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 1. Background data of the dentists in group A and group B, n=22 in both groups.

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean: 42.5, SD: 5.9</td>
</tr>
<tr>
<td>Range: 33-58</td>
<td></td>
</tr>
<tr>
<td>Work hours/week</td>
<td>Mean: 36.1, SD: 6.2</td>
</tr>
<tr>
<td>Range: 20-40</td>
<td></td>
</tr>
<tr>
<td>Years in profession</td>
<td>Mean: 15, SD: 3.2</td>
</tr>
<tr>
<td>Range: 6-30</td>
<td></td>
</tr>
</tbody>
</table>

**Ergonomic instruction**

The ergonomic instruction was based on an interview and ergonomics tests reported previously (17). It was adjusted to the present symptoms experienced by the dentist and to his needs and wishes first of all with respect to neck and shoulder problem. The ergonomic instruction for both groups was given at the workplace to make the instruction as realistic as possible. The instruction was given in one session during the dentists treatment of one to two patients.

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The physiotherapy treatment was based on the symptoms experienced such as pain on palpation and shortened upper part of the trapezius. Other findings were, for example, tendinitis in the tendons of the shoulder joint muscles, restrictions of the mobility of the cervical and the upper thoracic spine, weakness of the neck and shoulders muscles due to weak cervical prevertebral muscles. The treatment was thus entirely individual, and therefore the programme as well as the number of treatment sessions varied. The components included measures to reduce the pain such as soft tissue mobilisation and cervical traction. To increase mobilisation, stretching of tight muscles was performed, especially concerning the upper part of the trapezius, levator scapulae and n. pectoralis major. Other parts of the treatment were the training of endurance of the prevertebral neck muscles and of muscles acting on the scapula such as the lower part of n. trapezius, n. latissimus dorsi, n. serratus anterior and the rhombohoid muscles. The treatment also included exercises in order to correct faulty posture and to facilitate relaxation. Further, home exercises aiming at improving physical fitness, strength and endurance were given. Finally, ergonomic problems which had been observed during the ergonomic instruction were discussed and corrections practiced.

The 22 dentists making up group A received 1-8 treatments, as shown in Table II.

**Table II. Number of therapeutic treatments in group A (n=22)**

<table>
<thead>
<tr>
<th>Number of treatments</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of dentists</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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These 96 dentists were invited to take part in the present study six months later. However, 37 dentists reported to be free from cervico-thoracic pain and discomfort at that time and were therefore excluded.

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The dentists were divided into two groups. Those who worked near to the physiotherapy reception were offered adjusted physiotherapy treatment, including information based on a psychosomatic approach and individually-adjusted ergonomic instruction. The individually adjusted ergonomic instruction was given at the dentists workplaces. This group, further called group A, consisted of 13 men and 9 women.

The remaining dentists, further called group B, consisted of 14 men and 9 women, were given individually adjusted ergonomic instruction at their workplace. One dentist in the ergonomic group did not answer the questionnaire in the follow-up, thus making 22 dentists in both groups.

Background data of the dentists in the two groups are shown in Table I. From the table it can be concluded that the groups are comparable with respect to age, working hours/week and years in the profession.

**Psychosocial survey.** The dentists answered two questionnaires five weeks after the intervention. The questionnaires measure psychosocial factors in the work environment and personal harmony. The results were compared with those obtained six months before the present study. Each question-naire consists of different variables, described below, which contain several items. Each item has fixed alternative answers which are given points (14).

The questionnaire measuring the psychosocial factors in the work environment comprised the following variables: personal influence on decisions-making at the workplace, the relation between staff and management, the stimulation experienced from the work, the feeling of solidarity with colleagues, and how the work load is experienced. The evaluation of the answers in the survey of the psychosocial work environment is done according to a scale on which 15 is the mean value. According to Rubenowits, values below 15 are considered as unsatisfactory and values below 20 indicate that measures for improvement should be undertaken (14, 15).

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The statistical analysis is made with repeated measurements within the ANOVA concept. A technique often used when data are measured by the Visual Analogue Scale. The analysis of the questionnaires are based on Student’s t-test. A check with a corresponding non-parametric method have been made. A probability level of p<0.001 has been accepted as statistically significant.

**RESULTS**

Rating according to the VAS: Improvement or deterioration?

The analysis of the mean values from the VAS showed that pain increased during the day. This was most obvious for pain and discomfort in the neck which was experienced most intensively at the end of the working-day, at 6 p.m. (p<0.001) (Table III). In cases with remaining pain or reduced pain the same patients is in successor before the intervention. The visual anaologue pain scale (100 mm) has as endpoints "no pain and discomfort" and "unbearable pain". The scale of well-being has at its endpoints "bad" and "excellent", respectively. The ratings were performed three times a day (at 8 a.m., noon, and 6 p.m.) and were repeated five weeks after the treatment and/or ergonomic instruction in both groups.

**Table III. Data in groups A and B before and after the intervention in mm on VAS measured at 8 a.m., noon, and 6 p.m.**

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (mm)</td>
<td>Mean (mm)</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
</tr>
<tr>
<td>8 a.m.</td>
<td>11.2</td>
</tr>
<tr>
<td>6 p.m.</td>
<td>14.6</td>
</tr>
<tr>
<td>8 a.m.</td>
<td>11.6</td>
</tr>
<tr>
<td>6 p.m.</td>
<td>18.8</td>
</tr>
<tr>
<td>6 p.m.</td>
<td>20.1</td>
</tr>
<tr>
<td>6 p.m.</td>
<td>24.1</td>
</tr>
<tr>
<td>8 a.m.</td>
<td>13.7</td>
</tr>
<tr>
<td>6 p.m.</td>
<td>17.2</td>
</tr>
<tr>
<td>6 p.m.</td>
<td>22.5</td>
</tr>
<tr>
<td>6 p.m.</td>
<td>24.1</td>
</tr>
</tbody>
</table>

**Rating of pain, discomfort and general psychic well-being.** The rating of pain, discomfort and general psychic well-being was done by means of the VAS (Visual Analogue Scale) (10 mm). One hundred, 100 mm unbearable pain. Well-being: 0 bad well-being: 100 good well-being.
No significant differences between the mean values of the two groups were found in the ratings over three days before the intervention, with regard to headache, pain and discomfort in the neck and shoulders. No significant difference was found concerning the feeling of well-being between the groups either (Table III).

In the second measurement, five weeks after the contact, the ergonomics information and treatment, a significant decrease within group A (p<0.01) in the intensity of the neck symptoms and an increase of the feeling of well-being (p<0.05) was found. A corresponding change could not be observed for group B. Compared with the first measurement there was a tendency towards reduction of headache and of pain in the shoulder.

![Diagram](image)

**Fig. 2.** Profiles of mean values of the psychosocial factors in the work environment (personal control over the work, the relation between management and staff, the satisfaction from the work, solidarity among the staff, experience of the work load) in group A six months before (solid line) and five weeks after (dotted line) the intervention (n=22). **p<0.01**

In the second measurement, five weeks after the intervention, no significant differences were found concerning the feeling of well-being between the groups either (Table III).

Improvement or deterioration was also calculated for each individual dentist (Fig. 1). No significant improvement could be noted after giving the ergonomic information to the dentists in group B. However, the dentists in group A experienced less pain and discomfort in the neck and the well-being had increased. The confidence intervals for headache, pain and discomfort in the neck and shoulders in groups A and B with respect to well-being were calculated (Fig. 1). Confidence intervals concerning pain and discomfort in the neck and well-being in group A showed that these dentists experienced a significant improvement after the treatment.

**Psychosocial factors in the work environment**

Figs. 2 and 3 show the profiles of the mean values in the two groups over five weeks after the intervention as compared to the analysis six months before. In comparison with the first investigation concerning personal control over the work (Figs. 2 and 3) a significant deterioration was found in both groups (p<0.01 in group A and p<0.05 in group B). The experience of solidarity among the staff had decreased for group B compared with the first measurement (p<0.01) (Fig. 3). The remaining items showed no significant differences. All values, except the experience of the work load were still above the reference values, which was also found in the first analysis undertaken six months before.

Between group A and group B there were no significant differences with respect to psychosocial factors in the second measurement, but these differences were not significant (Table III).

In the work environment before the investigation.

However, after the intervention a significant difference was found between the two groups concerning the experience of solidarity among the staff (p<0.05), due to the deterioration in group B.

**Personal harmony**

All values, except psychosomatic health, had increased in group A five weeks after the intervention. However, the difference was significant only with respect to the feeling of self-confidence (p<0.05) (Fig. 4). The new value was just below the reference value. In group B all values had decreased except freedom from anxiety compared with the values before the intervention. However, the difference was significant only concerning confidence in the future (p<0.05) (Fig. 5).

Between the two groups there was a significant difference concerning self-confidence before the intervention (p<0.05). After the intervention a significant difference between the two groups concerning self-confidence remained (p<0.05). With respect to personal harmony (summarized index) the values in group B had further decreased. The difference was significant between the two groups (p<0.05).

**DISCUSSION**

The physiotherapy treatment was most effective with respect to the pain and discomfort in the neck. One reason why the results on the shoulder pain was less successful may be that the ergonomic unsatisfactory state still remained after the ergonomic intervention. The instrument tray was for example still kept on the left-hand side, with a faulty loading as a consequence, even when no assistance was being given by the nurse (B). Further, when the dentists changes instruments, his right arm has to reach far to the left. Working in this way the shoulder joint is loaded in the extreme range of movement and pain may result. This could possibly be one reason for the high frequency of arthritis in the shoulder joint among dentists reported by Katoevo (11).

Headache may have more psychological causes, which take a considerable time to influence. To get better results is possible that physiotherapy should be given for a longer period of time and with greater attention attached to a treatment of body awareness with the aim of avoiding unfavourable muscle strain (9).

Three ratings a day with respect to pain with the VAS during three days were asked for, firstly so as to study whether the intensity of the pain changed during the day and secondly to give a more representative value.

General psychological well-being rated on the VAS was, however, found not to change during the day. Consequently incidents in the working situation during the day did not influence the experience of well-being in either direction. Well-being measured with the VAS was significantly improved after the treatment of the dentists in group A. Also, according to the questionnaire of Rubenowitz, a change in the positive
No significant differences between the mean values of the two groups were found in the ratings over three days before the intervention, with regard to headache, pain and discomfort in the neck and shoulders. No significant difference was found concerning the feeling of well-being between the groups either (Table III).

In the second measurement, five weeks after the intervention, no significant change in the ergonomics information and treatment, a significant decrease within group A (p < 0.01) in the intensity of the neck symptoms and an increase of the feeling of well-being (p < 0.05) was found. A corresponding change could not be observed for group B. Compared with the first measurement there was a tendency towards reduction of headache and of pain in the shoul-

ders in the second measurement, but these differences were not significant (Table III).

Improvement or deterioration was also calculated for each individual dentist (Fig. 1). No significant improvement could be noted after giving the ergonomic information to the dentists in group B. However, the dentists in group A experienced less pain and discomfort in the neck and the well-being had increased. The confidence interval for headache, pain and discomfort in the neck and shoulders in groups A and B with respect to well-being were calculated (Fig. 1). Confidence intervals concerning pain and discomfort in the neck and well-being in group A showed that these dentists experienced a significant improvement after the treatment.

Psychosocial factors in the work environment

Figs. 2 and 3 show the profiles of the mean values in the two groups five weeks after the intervention as compared to the analysis six months before. In comparison with the first investigation concerning personal control over the work (Figs. 2 and 3) a significant deterioration was found in both groups (p < 0.01) in group A and p < 0.01 in group B). The experience of solidarity among the staff had decreased for group B compared with the first measurement (p < 0.01) (Fig. 3). The remaining items showed no significant differences. All values, except the experience of the work load were still above the reference values, which was also found in the first analysis undertaken six months before (Fig. 3).

Between group A and group B there were no significant differences with respect to psychosocial factors in the work environment (personal control over the work, the relation between management and staff, the stimulation from the work, solidarity among the staff, experience of the work load) in group A six months before (solid line) and five weeks after (dotted line) the intervention (n = 22). ** p < 0.01.

in the work environment before the investigation. However, after the intervention a significant difference was found between the two groups concerning the experience of solidarity among the staff (p < 0.05), due to the deterioration in group B.

Personal harmony

All values, except psychosomatic health, had increased in group A five weeks after the intervention. However, the difference was significant only with respect to the feeling of self-confidence (p < 0.05) (Fig. 4). The new value was just below the reference value. In group B all values had decreased except freedom from anxiety compared with the values before the intervention. However, the difference was significant only concerning confidence in the future (p < 0.05) (Fig. 5).

Between the two groups there was a significant difference concerning self-confidence before the intervention (p < 0.05). After the intervention a significant difference between the two groups concerning self-confidence remained (p < 0.05). With respect to personal harmony (summarized index) the values in group B had further decreased. The difference was significant between the two groups (p < 0.05).

DISCUSSION

The physiotherapy treatment was most effective with respect to the pain and discomfort in the neck. One reason why the results on the shoulder pain was less successful may be that the ergonomic unsatisfactory state still remained after the ergonomic intervention. The instrument tray was for example still kept on the left-hand side, with a faulty loading as a consequence, even when no assistance was being given by the nurse (B). Further, when the dentist changes instruments, his right arm has to reach far to the left. Working in this way the shoulder joint is loaded in the extreme range of movement and pain may result. This could perhaps be one reason for the high frequency of arthritis in the shoulder joint among dentists reported by Katesow (11).

Headache may have more psychological causes, which take a considerable time to influence. To get better results it is possible that physiotherapy should be given for a longer period of time and with greater attention attached to a treatment of body awareness with the aim of avoiding unfavourable muscle strain (9).

Three ratings a day with respect to pain with the VAS during three days were asked for, firstly so as to study whether the intensity of the pain changed during the day and secondly to give a more representative value.

General psychological well-being rated on the VAS was, however, found not to change during the day. Consequently incidents in the working situation during the day did not influence the experience of well-being in either direction. Well-being measured with the VAS was significantly improved after the treatment of the dentists in group A. Also, according to the questionnaire of Rubenowitz, a change in the positive

![Image](https://example.com/image.png)

Fig. 3. Profiles of mean values of the psychosocial factors in the work environment (personal control over the work, the relation between management and staff, the stimulation from the work, solidarity among the staff, experience of the work load) for group A six months before (solid line) and five weeks after (dotted line) the intervention (n = 22). ** p < 0.01.

![Image](https://example.com/image.png)

Fig. 4. Profiles of mean values of personal harmony in group A (summarized index and the variables self-confidence, freedom from anxiety, psychosomatic health and confidence in the future) six months before (solid line) and five weeks after (dotted line) the intervention (n = 22). * p < 0.05, ** p < 0.01.

![Image](https://example.com/image.png)

Fig. 5. Profiles of mean values of personal harmony in group B (summarized index and the variables self-confidence, freedom from anxiety, psychosomatic health and confidence in the future) six months before (solid line) and five weeks after (dotted line) the intervention (n = 22). * p < 0.05, ** p < 0.01.
REFERENCES


14. Rabenowitz, S.: The questionnaire PSYV, PAK. Department of Psychology, Gothenburg University, Gothenburg, Sweden, (In Swedish.)


REFERENCES


