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ORIGINAL ARTICLE

# Comparison of the oral health-related quality of life and dental pain in symptomatic irreversible pulpitis and pericoronitis

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**KEYWORDS**
dental pain;
pericoronitis;
quality of life;
symptomatic irreversible pulpitis;
VAS

**Abstract** *Background/purpose:* The oral health-related quality of life (OHRQoL) reveals important information about a patient's perceptions in clinical practice, and pain is a critical point when evaluating OHRQoL in clinical practice. The aim of the study was to compare pain patterns by means of the Dental Pain-Screening Questionnaire (DePaQ) and an OHRQoL evaluation between symptomatic irreversible pulpitis and pericoronitis.
*Materials and methods:* In this cross-sectional study, 50 patients with symptomatic irreversible pulpitis (with a female:male ratio of 22:28 and a mean age of $35.6 \pm 11.8$ years) and 38 patients with pericoronitis (with a female:male ratio of 21:17 and a mean age of $26.3 \pm 9.08$ years) were selected. In addition to a visual analogue scale (VAS, 0—100 mm), dental pain was evaluated by means of a Dental Pain Questionnaire (DePaQ). The Oral Health Impact Profile-14 (OHIP-14) was used to examine the OHRQoL status.
*Results:* Scores of the OHIP-14 and VAS were significantly higher in patients with irreversible pulpitis ($29.9 \pm 11.8$ and $91.80 \pm 10.03$, respectively) compared to those suffering from pericoronitis ($18.6 \pm 8.7$ and $51.05 \pm 36.67$, respectively; $P < 0.001$). According to the DePaQ, the presence of continuous pain, pain radiating to the surrounding area, pain when chewing or eating on the side of the mouth with the affected teeth, pain experienced as an electric shock, and difficulty sleeping were related to a poor OHIP-14 score in symptomatic irreversible pulpitis ($33.5 \pm 10.57$, $30.82 \pm 11.4$, $30.30 \pm 11.55$, $33.92 \pm 10.28$, and $27.53 \pm 11.77$, respectively) compared with those with pericoronitis ($20.09 \pm 11.27$, $20.37 \pm 7.85$, $19.64 \pm 7.87$, $20.56 \pm 9.69$, and $19.88 \pm 7.9$, respectively; $P = 0.003$, $<0.001$, $<0.001$, $<0.001$, and 0.005, respectively). VAS scores significantly differed between groups according to all DePaQ items ($P < 0.05$).

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*Conclusion:* The DePaQ gives detailed information about clinical conditions related to pain and the OHRQoL status in both symptomatic irreversible pulpitis and pericoronitis. VAS scores differed between the groups according to the DePaQ items.


## Introduction

Pain in the orofacial region originates from mucosal tissues, dental sources such as pulp tissue and periodontal tissues, and non-dental sources, including myofascial inflammation, migraine headaches, maxillary sinusitis, nasal tissues, ears, the temporomandibular joint, and neuralgias. The critical point is to recognize the pain patterns of each cause and correctly diagnose patients in clinical practice.[1–4]

Traditionally, objective measurements and symptoms are crucial parts of the decision-making process by dentists in clinical practice. However, the oral health-relate quality of life (OHRQoL) gives important information about patients' perceptions, feelings, and perceived oral health status. Therefore, the use of OHRQoL is increasing in clinical studies.[5–7]

The Dental Pain-Screening Questionnaire (DePaQ) is a 16-item questionnaire developed to discriminate between pain patterns of different dental pain-related conditions. Because pain can be evaluated systematically by the DePaQ, it can be used in diagnosing pain-related conditions.[8] Pulpitis is a common pain-related clinical condition in dentistry. Symptomatic irreversible pulpitis originating from pulpal inflammation leads to severe, spontaneous, and poorly localized pain that lasts for a few seconds, recurs at unpredictable times, and is exacerbated with thermal changes.[4,9,10] One of the most commonly performed dentoalveolar procedures in oral and maxillofacial surgery is the surgical removal of impacted mandibular third molars.[11] Pericoronitis is a condition characterized by inflammation of the oral soft tissues surrounding the crown of an erupted or partially erupted tooth.[12] Pain, trismus, and swelling are the most common postoperative complaints that affect patients' quality of life during the postoperative period.[11]

Evaluation of pain is a critical point in the diagnosis of clinical cases in endodontics. A visual analogue scale (VAS) is commonly used to better understand the clinical condition of patients in clinical practice in endodontics.[10] In addition, the presence of pain is an important part of a poor OHRQoL. This is a new concept that focuses on the effects of oral disorders on functional, social, and psychological wellbeing in dentistry.

The aim of this study was to examine relationships of the OHRQoL status with pain patterns by means of the DePaQ in symptomatic irreversible pulpitis and pericoronitis.

## Materials and methods

### Patients and controls

In this cross-sectional study, 50 patients with symptomatic irreversible pulpitis (with a female:male ratio of 22:28 and a mean age of $35.6 \pm 11.8$ years) were selected from the Department of Endodontics, Marmara University, as the study group. Thirty-eight patients with pericoronitis (with a female:male ratio of 21:17 and a mean age of $26.3 \pm 9.08$ years) who were referred to the Department of Oral and Maxillofacial Surgery of Gulhane Military Medical Academy for third molar removal were also included. Both patient groups consisted of healthy individuals with no systemic, mucosal, or periodontal diseases. In addition, 30 healthy subjects with no pain-related problems were also included as a healthy control group (HC, with a female:ratio of 18: 12 and a mean age of $36.93 \pm 8.38$ years) to evaluate the discriminant validity.

Inclusion criteria were the presence of either symptomatic irreversible pulpitis or pericoronitis in patients aged over 18 years who had no systemic diseases. The criteria for exclusion from the study were the presence of more than one dental or non-dental pain-related clinical condition, the use of analgesics within the previous 12 hours, pregnancy and lactation, and any chronic diseases, psychiatric disorders, cancer, and other painful orofacial disorders.

### Examination protocols

Data were collected by means of clinical and radiologic examinations, the questionnaire examining DePaQ,[8] VAS,[10] and the Oral Health Impact Profile (OHIP)-14 as the OHRQoL questionnaire.[6,7] Following initial instructions, patients filled out these questionnaires 60 minutes before treatment began. A trained interviewer, who was not involved in any dental assessment or treatment, helped individuals with visual impairment or who were illiterate to fill out the questionnaires.

In the clinical examination, dental and non-dental pain sources were examined. Orthopantomograms were taken of patients to determine pain-related conditions. Periapical radiographs were taken to obtain detailed information about their clinical condition.

### Symptomatic irreversible pulpitis

Patients with only one tooth diagnosed as having symptomatic irreversible pulpitis were selected for the study to eliminate confounding factors. No or only minimal changes in the radiographic appearance of the periradicular bone were seen in radiographs of these patients. Pain and percussion sensitivity were the predominant conditions of patients with symptomatic irreversible pulpitis. Pain is described as being intermittent or spontaneous, and as having a sharp or dull localized form by patients with symptomatic irreversible pulpitis.[4] The canals of these

teeth were prepared and filled with step-back and lateral condensation techniques in a single-visit treatment.

### Pericoronitis

Patients with pericoronitis had vertical partially impacted third molars. In addition to pericoronitis, there were no pain-related conditions in the group. Patients with more than one tooth with pericoronitis were not enrolled in the study group. Spontaneous pain and localized swelling and drainage affecting one lower third molar were the main clinical findings for patients with pericoronitis. In a surgical procedure, a vestibular mucoperiosteal flap was raised with a distal incision and vestibular release. An osteotomy was performed during the surgical procedure under local anesthesia.[13,14]

### DePaQ

The DePaQ was completed by patients about 60 minutes before their treatment. The DePaQ, a 16-item questionnaire, was developed by Pau[8] to screen for dental pain conditions. Forward and backwards translations of the items were performed by a small group of bilingual (English and Turkish) translators, including two professional translators (one of whom is a native speaker of English) and three dentists. Two dentists (HC and UK) were trained and calibrated against a consultant (GM) in the questionnaire design and validation protocol. The questionnaire was given to 30 patients with dental-related pain in a pilot study. The final version of the questionnaire was used in the present study. Patients had difficulty expressing the degree of their clinical conditions according to the options of some items. After this stage, results of the DePaQ were recoded to better understand patients' conditions and easily analyze their OHRQoL status. According to this protocol, some items (items 5, 6, 8, 9, 10, 11, and 12) of the DePaQ were coded as present (different degree or extent) or absent (not at all). In addition, responses were coded as painful (1), no effect (0), or better (2) in item 7. The other items (1–4, 13a–d) were used as in original form in the study. According to the sensitivity, specificity, and positive and negative predictive values, the DePaQ was found to be a reliable instrument for evaluating pain in our study groups (Table 1).

### OHRQoL

A short version of the OHIP-14, developed and validated by Slade,[6] was used in this study. According to the structure of the OHIP-14, patients were asked how frequently they had experienced pain in the last month. Answers were from "never" to "very often" for each item. The overall OHIP-14 score ranges 0–56, according to item responses. A score of 0 reflects the best OHRQoL levels, whereas higher scores indicate impairment of the OHRQoL status.[6] The Turkish version was found to have good reliability and validity in a previous study by Mumcu and colleagues.[7]

The study was approved by the Marmara University local ethics committee, and informed consent was obtained.

**Table 1** Definition of the performance of the dental pain-screening questionnaire in the three groups.

| | Symptomatic irreversible pulpitis | Pericoronitis | Healthy control |
|---|---|---|---|
| True positive | 43 | 26 | 0 |
| True negative | 7 | 12 | 30 |
| Sensitivity | 86 | 68.4 | |
| Specificity | 100 | 100 | |

### Statistical analysies

Chi-squared and Mann-Whitney U tests were used in the analysis of both groups. A P value of $< 0.05$ was accepted as statistically significant.

## Results

In symptomatic irreversible pulpitis, 66% of teeth ($n = 33$) were single-rooted, and the others ($n = 17$, 34%) had more than one canal. Patients with pericoronitis had vertical partially impacted third molars.

### OHIP-14

Scores of the OHIP-14 were significantly higher in patients with irreversible pulpitis ($29.9 \pm 11.8$) compared to those suffering from pericoronitis ($18.6 \pm 8.7$; $P < 0.001$). This is shown in Fig. 1. Moreover, the OHIP-14 score was significantly lower in the HC ($10.10 \pm 8.01$) than in the groups with symptomatic irreversible pulpitis and pericoronitis ($P < 0.001$).

### VAS

The VAS score for the global pain intensity was higher in symptomatic irreversible pulpitis ($91.8 \pm 10.03$) than in pericoronitis ($51.05 \pm 36.67$; $P < 0.001$). This is shown in Fig. 1. The OHIP-14 score was correlated with the global pain score evaluated by the VAS ($r = 0.55$ $P = 0.001$) in patients with symptomatic irreversible pulpitis (Fig. 2). A similar relationship was not seen in pericoronitis patients. Because pain-related conditions were not present in the HC, no data were obtained from the VAS or DePaQ.

### DePaQ

The pain experience was examined by means of a dental pain questionnaire in both groups (Table 2). The majority of patients with symptomatic irreversible pulpitis had pain in the teeth (100%), difficulty sleeping (64%), a numb type of pain (100%), pain radiating to the surrounding area (92%), pain when chewing or eating on the side of the mouth with the affected teeth (90%), and pain stimulation from cold (76%). Over half of the patients with pericoronitis had pain in the tooth/teeth and gums (68.4%), pain radiating to surrounding teeth (71.1%), pain when chewing or eating on the side of the mouth with the affected teeth (89.4%),

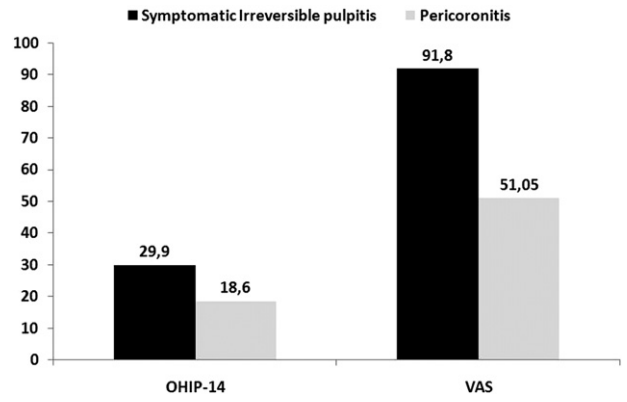


**Figure 1** Oral Health Impact Profile-14 and visual analog scale scores in symptomatic irreversible pulpitis and pericoronitis.

swollen gums (71.1%), and difficulty sleeping (81.6%). These are shown in Table 2.

## Symptomatic irreversible pulpitis vs. pericoronitis

The pain experience was compared according to the patient groups using the DePaQ. Percentages of patients experiencing pain around the teeth, pain radiating to the surrounding area, pain stimulated by cold foods/beverages, difficulty swallowing, and the presence of pain as numbness were significantly higher with symptomatic irreversible pulpitis than with pericoronitis ($P < 0.05$).

However, a higher percentage of swollen gums was seen in patients with pericoronitis compared to those with symptomatic irreversible pulpitis ($P = 0.002$). In addition, no significant difference was seen between patient groups according to the other DePaQ items regarding pain

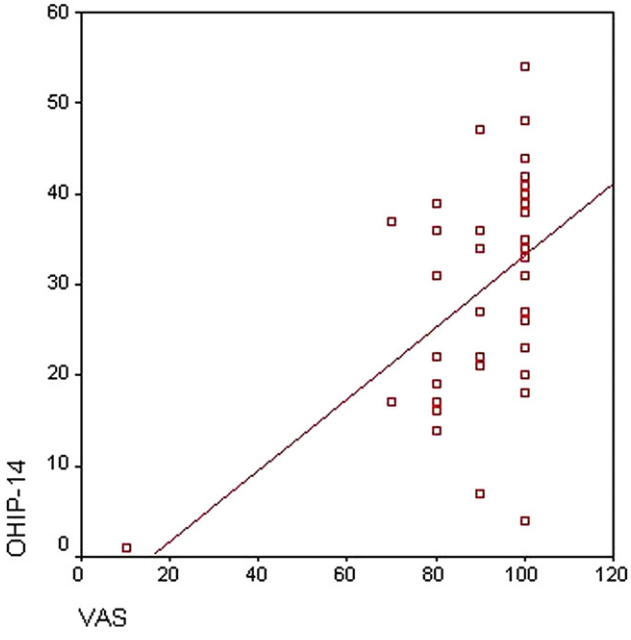


**Figure 2** Relationship between Oral Health Impact Profile-14 and visual analog scale scores in symptomatic irreversible pulpitis.

chronicity, pain intensity, pain patterns, pain when chewing and eating, the feeling that the painful teeth was loose or sticking out, difficulty sleeping, or the pain experience described as pulling, exhausting, or an electric shock ($P > 0.005$). See Table 2 and Fig. 3.

## DePaQ and OHIP-14

OHIP-14 scores were analyzed in both groups according to the DePaQ items (Table 3). The important point was that OHIP-14 scores of patients with symptomatic irreversible pulpitis were significantly higher than those of patients with pulpitis for the same items of the DePaQ.

These items were pain experience around the teeth, pain chronicity between a week and month, a distressing level of pain intensity, an episodic or continuous pain pattern, pain radiating to the surrounding area, pain when chewing and eating on the affected side, pain when eating or drinking cold foods, swollen gums, the feeling that the painful teeth were loose or sticking out, difficulty sleeping, and pain that felt like pulling or an electric shock ($p < 0.05$; Fig. 4).

## DePaQ and VAS

VAS scores were significantly higher in patients with symptomatic irreversible pulpitis than pericoronitis according to all DePaQ items ($P < 0.05$). See Table 4 and Fig. 5.

# Discussion

The OHRQoL, as a subjective measure, evaluates how dental problems and oral disorders interfere with the normal functioning of an individual's life. The OHRQoL reveals important information about patients' perceptions, feelings, and perceived oral health status. Therefore, the use of the OHRQoL is increasing in clinical studies in dentistry.[5–7] Pain is an important part of a poor OHRQoL.[5–7,15,16] Patients with symptomatic irreversible pulpitis and pericoronitis were examined by the DePaQ and VAS for pain and by the OHIP-14 for the OHRQoL status in the present study. Dentists diagnose, prevent, and treat diseases, and use objective clinical indices in clinical practice. In endodontics, because localization of the pain may be difficult, the results of pulp tests, a patient's history, and clinical and radiological examinations give information for a correct diagnosis.[3,4,9,10] Because a systematic evaluation of dental pain is an important part of the diagnosis, the DePaQ may be an evaluation method for symptomatic irreversible pulpitis and pericoronitis.[8]

The pain score evaluated by the VAS was higher in patients with symptomatic irreversible pulpitis than those with pericoronitis. The VAS is a valid and reliable method in both endodontic and surgical practice.[10,17,18] Although symptomatic irreversible pulpitis and pericoronitis are common painful clinical conditions in dentistry, differences between pain patterns can be predicted. In addition, pain conditions examined by the DePaQ were found to differ between patients with symptomatic irreversible pulpitis and those with pericoronitis. According to the DePaQ, pain

**Table 2** Distribution of dental pain-screening questionnaire scores in patients with pulpitis and pericoronitis.

| | DePaQ | Symptomatic irreversible pulpitis | | Pericoronitis | | P* |
|---|---|---|---|---|---|---|
| | | *n* | % | *n* | % | |
| 1. | Pain experience in the past month | | | | | |
| | Tooth/teeth | 50 | 100 | 12 | 31.6 | <0.001 |
| | Tooth/teeth + gums | 0 | — | 26 | 68.4 | |
| | Total | 50 | 100 | 38 | 100 | |
| 2. | Chronicity of current pain | | | | | |
| | Less than 1 wk | 13 | 26 | 17 | 44.7 | 0.114 |
| | From 1 wk to less than 1 mo | 26 | 52 | 12 | 31.6 | |
| | From 1 mo to less than 6 mo | 11 | 22 | 9 | 23.7 | |
| | From 6 mo to less than 1 yr | — | — | — | — | |
| | ≥1 yr | — | — | — | — | |
| | Total | 50 | 100 | 38 | 100 | |
| 3. | Worst pain intensity | | | | | |
| | Mild | 5 | 10 | 2 | 5.3 | 0.217 |
| | Discomforting | 6 | 12 | 9 | 23.7 | |
| | Distressing | 12 | 24 | 12 | 31.6 | |
| | Horrible | 5 | 10 | 6 | 15.8 | |
| | Excruciating | 22 | 44 | 9 | 23.7 | |
| | Total | 50 | 100 | 38 | 100 | |
| 4. | Pattern of pain | | | | | |
| | Episodic | 31 | 62 | 25 | 65.8 | 0.714 |
| | Continuous | 19 | 38 | 13 | 34.2 | |
| | Total | 50 | 100 | 38 | 100 | |
| 5. | Pain radiates to the surrounding area | | | | | |
| | Not at all | 4 | 8 | 11 | 28.9 | 0.010 |
| | Small/moderate/large/complete extent | 46 | 92 | 27 | 71.1 | |
| | Total | 50 | 100 | 38 | 100 | |
| 6. | Worse when chewing or eating on the side of the mouth with the pain | | | | | |
| | Not at all | 5 | 10 | 4 | 10.5 | 0.644 |
| | Small/moderate/large/complete extent | 45 | 90 | 34 | 89.4 | |
| | Total | 50 | 100 | 38 | 100 | |
| 7. | Effect of eating or drinking something cold | | | | | |
| | Makes it a lot/little more painful | 38 | 76 | 18 | 47.4 | 0.012 |
| | No effect | 10 | 20 | 13 | 34.2 | |
| | Makes it a lot/little better | 2 | 4 | 7 | 18.4 | |
| | Total | 50 | 100 | 38 | 100 | |
| 8. | Gums are swollen | | | | | |
| | Not at all | 31 | 62 | 11 | 28.9 | 0.002 |
| | Small/moderate/large/full extent | 19 | 38 | 27 | 71.1 | |
| | Total | 50 | 100 | 38 | 100 | |
| 9. | Painful tooth feels loose | | | | | |
| | Not at all | 35 | 70 | 30 | 78.9 | 0.214 |
| | Small/moderate/large/full extent | 15 | 30 | 8 | 21.1 | |
| | Total | 50 | 100 | 38 | 100 | |
| 10. | Difficulty swallowing | | | | | |
| | Not at all | 44 | 88 | 25 | 65.8 | 0.012 |
| | Small/moderate/large/full extent | 6 | 12 | 13 | 34.2 | |
| | Total | 50 | 100 | 38 | 100 | |
| 11. | Painful tooth feels like it is sticking out | | | | | |
| | Not at all | 39 | 78 | 24 | 63.2 | 0.126 |
| | Small/moderate/large/full extent | 11 | 22 | 14 | 36.8 | |
| | Total | 50 | 100 | 38 | 100 | |
| 12. | Difficulty sleeping | | | | | |
| | Not at all | 18 | 36 | 7 | 18.4 | 0.07 |
| | Small/moderate/large/full extent | 32 | 64 | 31 | 81.6 | |
| | Total | 50 | 100 | 38 | 100 | |

**Table 2** (*continued*)

| | DePaQ | Symptomatic irreversible pulpitis | | Pericoronitis | | P* |
|---|---|---|---|---|---|---|
| | | *n* | % | *n* | % | |
| 13. | Pain experienced in the past month | | | | | |
| | Pulling: present | 14 | 28 | 4 | 28.6 | 1.0 |
| | Pulling: absent | 36 | 72 | 14 | 71.4 | |
| | Total | 50 | 100 | 28 | 100 | |
| | Numb: present | 50 | 100 | 4 | 10.5 | <0.001 |
| | Numb: absent | 0 | 0 | 34 | 89.5 | |
| | Total | 50 | 100 | 38 | 100 | |
| | Exhausting: present | 19 | 38 | 3 | 7.9 | 0.230 |
| | Exhausting: absent | 31 | 62 | 35 | 92.1 | |
| | Total | 50 | 100 | 38 | 100 | |
| | Electric shocks: present | 27 | 54 | 21 | 55.3 | 0.90 |
| | Electric shocks: absent | 23 | 46 | 17 | 44.7 | |
| | Total | 50 | 100 | 38 | 100 | |

*A chi-squared test was used for the analysis.

experienced in the teeth, pain stimulated by cold foods and beverages, and pain experienced as numbness were found to be significant items in symptomatic irreversible pulpitis. These items were in accordance with the clinical presentation of symptomatic irreversible pulpitis.[9] Severe pain is a characteristic finding of pulpal infections in patients with symptomatic irreversible pulpitis. The pain tendency to cold, an initial sharp- then dull-type pain, spontaneous pain, difficulty chewing, and waking at night are characteristic clinical conditions.[4,14,19]

However, swollen gums and difficulty swallowing are crucial items related to clinical findings of pericoronitis.[14] These are not specific symptoms for irreversible pulpitis. Therefore, some pain-related items of the DePaQ were suitable to evaluate symptomatic irreversible pulpitis. Moreover, VAS scores were significantly higher for

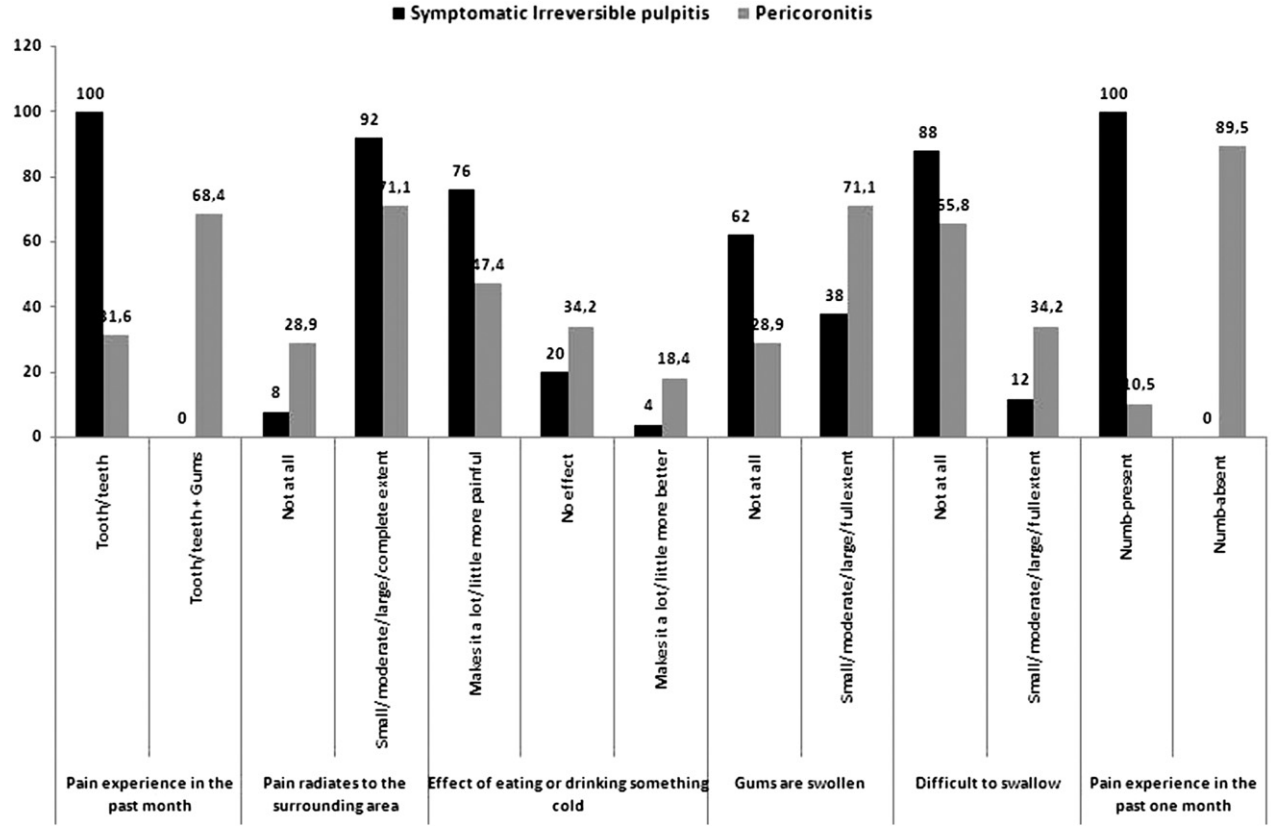


**Figure 3** Some Dental Pain-Screening Questionnaire items in symptomatic irreversible pulpitis and pericoronitis.

**Table 3** Oral health impact profile-14 (OHIP-14) Scores in patients with symptomatic irreversible pulpitis and pericoronitis according to dental pain-screening questionnaire items.

| | DePaQ | OHIP-14 | | | | P* |
|---|---|---|---|---|---|---|
| | | Symptomatic irreversible pulpitis | | Pericoronitis | | |
| | | Mean | Standard deviation (SD) | Mean | SD | |
| 1. | Pain experience in the past month | | | | | |
| | Tooth/teeth | 28.81 | 11.77 | 22.08 | 8.79 | 0.037 |
| | Tooth/teeth + gums | — | — | 16.45 | 8.17 | |
| 2. | Chronicity of current pain | | | | | |
| | Less than 1 wk | 23.25 | 10.41 | 19.87 | 7.01 | 0.314 |
| | From 1 wk to less than 1 mo | 31.88 | 12.63 | 20.2 | 9.89 | 0.013 |
| | From 1 mo to less than 6 mo | 12.09 | 8.89 | 12.33 | 9.43 | 0.102 |
| | From 6 mo to less than 1 yr | | | | | |
| | ≥1 yr | | | | | |
| 3. | Worst pain intensity | | | | | |
| | Mild[a] | 18.2 | 19.56 | 12.5 | 2.12 | — |
| | Discomforting | 26.62 | 10.44 | 15.14 | 6.66 | 0.051 |
| | Distressing | 29.5 | 10.17 | 14.5 | 8.48 | 0.004 |
| | Horrible | 32.4 | 10.92 | 20.4 | 4.56 | 0.151 |
| | Excruciating | 33.04 | 9.94 | 27 | 7.94 | 0.136 |
| 4. | Pattern of pain | | | | | |
| | Episodic | 27.67 | 12.07 | 17.76 | 7.21 | 0.001 |
| | Continuous | 33.5 | 10.57 | 20.09 | 11.27 | 0.003 |
| 5. | Pain radiates to the surrounding area | | | | | |
| | Not at all[a] | 18.5 | 11.26 | 13.12 | 9.38 | — |
| | Small/moderate/large/complete extent | 30.82 | 11.4 | 20.37 | 7.85 | <0.001 |
| 6. | Worse when chewing or eating on the side of the mouth with the pain | | | | | |
| | Not at all[a] | 25.2 | 11.16 | 11.01 | 11.74 | — |
| | Small/moderate/large/complete extent | 30.34 | 11.55 | 19.64 | 7.87 | <0.001 |
| 7. | Effect of eating or drinking something cold | | | | | |
| | Makes it a lot/little more painful | 28.28 | 11.9 | 11.46 | 7.27 | 0.002 |
| | No effect | 32.22 | 24.18 | 16.91 | 10.14 | 0.006 |
| | Makes it a lot/little more better[a] | 40.01 | 8.48 | 19.8 | 10.3 | — |
| 8. | Gums are swollen | | | | | |
| | Not at all | 28.16 | 11.94 | 18.01 | 10.4 | 0.020 |
| | Small/moderate/large/full extent | 32.66 | 11.24 | 18.78 | 8.2 | <0.001 |
| | Total | | | | | |
| 9. | Painful tooth feels loose | | | | | |
| | Not at all | 26.54 | 11.02 | 18.48 | 8.2 | 0.002 |
| | Small/moderate/large/full extent | 38.01 | 9.66 | 19.01 | 12.26 | 0.010 |
| 10. | Difficulty swallowing | | | | | |
| | Not at all | 28.56 | 11.3 | 17.04 | 8.33 | <0.001 |
| | Small/moderate/large/full extent | 40.8 | 11.09 | 22.44 | 8.9 | 0.012 |
| 11. | Painful tooth feels like it is sticking out | | | | | |
| | Not at all | 28.35 | 11.37 | 18.04 | 7.36 | <0.001 |
| | Small/moderate/large/full extent | 35.5 | 12.2 | 19.7 | 11.51 | 0.009 |
| 12. | Difficulty sleeping | | | | | |
| | Not at all | 34.11 | 10.83 | 11.4 | 10.26 | 0.001 |
| | Small/moderate/large/full extent | 27.53 | 11.77 | 19.88 | 7.9 | 0.005 |
| 13. | Pain experience in the past month | | | | | |
| | Pulling: present[a] | 33.05 | 10.03 | 20.15 | 8.33 | — |
| | Pulling: absent | 21.71 | 12.24 | 18.91 | 8.17 | 0.176 |
| | Numb: present[a] | 29.81 | 11.77 | 24.3 | 8.4 | — |
| | Numb: absent | | | 15.95 | 7.67 | — |
| | Exhausting: present[a] | 33.7 | 9.44 | 19.16 | 8.22 | — |
| | Exhausting: absent | 23.68 | 12.71 | 16.75 | 10.41 | 0.217 |
| | Electric shocks: present | 33.92 | 10.28 | 20.56 | 9.69 | <0.001 |
| | Electric shocks: absent | 25.17 | 11.83 | 16.56 | 7.6 | 0.217 |

*The Mann-Whitney U test was used for the analysis.
[a] Data were not analyzed due to an insufficient number of patients.

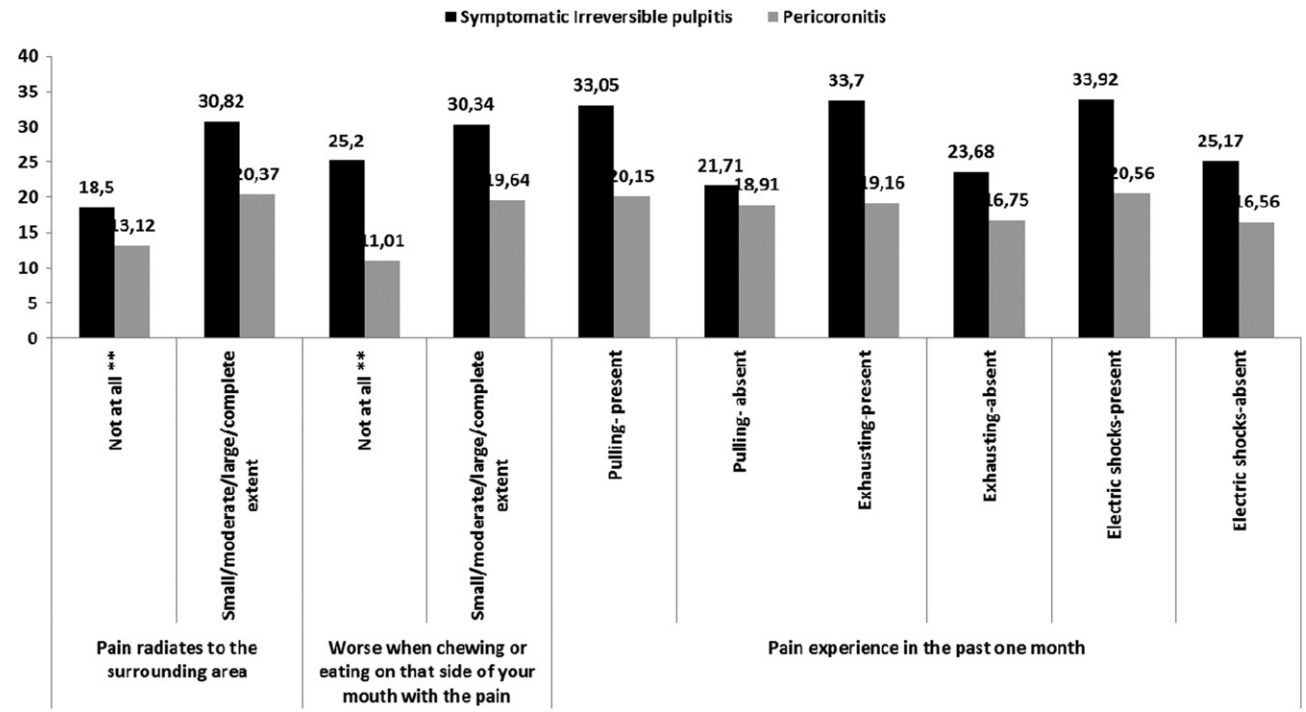


**Figure 4** Some Dental Pain-Screening Questionaire items and Oral Health Impact Profile-14 scores in symptomatic irreversible pulpitis and pericoronitis. ** Data were not analyzed due to insufficient number of patients.

symptomatic irreversible pulpitis than pericoronitis according to all DePaQ items.

Symptomatic irreversible pulpitis is characterized by intermittent or spontaneous pain caused by rapid exposure to dramatic temperature changes, especially cold stimuli.[9,14] The pain may be sharp or dull, localized or referred.[4] Therefore, it is expected that severe pain is a characteristic finding for pulpal infection in patients with symptomatic irreversible pulpitis.[19] However, pericoronitis is characterized by inflammation of the oral soft tissues surrounding the crown of an erupted or partially erupted tooth accompanied by pain.[11,13,20]

Pain and swollen gums are predominant symptoms among patients who are in the active stage. Moreover, pain-related conditions were more severe in symptomatic irreversible pulpitis than in pericoronitis. This can be explained by the patterns of the diseases. From this aspect, different clinical presentations could be predicted according to the DePaQ. Another important finding was that symptomatic irreversible pulpitis and pericoronitis were evaluated as separate entities by the DePaQ questionnaire's discriminative ability. Therefore, it may be a valid and appreciated tool in endodontic practice since evaluating pain patterns is critical in endodontics.

In the present study, the OHRQoL as an indicator of oral health was assessed with the OHIP-14. This scale measures negative impacts of problems related to the teeth, mouth, and dentures on physical, psychological, and social dimensions of oral wellbeing. Higher scores indicate greater negative impacts, reflecting a poorer OHRQoL.[6,7] The OHRQoL status was observed to be very poor in patients with symptomatic irreversible pulpitis compared to those with pericoronitis, according to the pain experience, pain chronicity at 1 week to 1 month, the worst pain intensity being distressing, both episodic and continuous pain patterns, pain radiating to the surrounding area, worse pain experienced when chewing or eating with the affected teeth, pain stimulated by cold foods and beverages, swollen gums, the feeling that the painful tooth is loose or sticking out, difficulty sleeping, pain experienced as pulling, exhausting, or as an electric shock, and no difficulty swallowing.

In symptomatic irreversible pulpitis, a pain tendency to cold, initially sharp- then dull-type pain, spontaneous pain, and waking at night are characteristic clinical conditions.[4,9] Therefore, these clinical conditions were seen in symptomatic irreversible pulpitis as severe pain-related conditions and a cause for a poor OHRQoL. Moreover, these findings are important clues in getting detailed information from a patient's perspective in endodontic practice, since no information is available on the OHRQoL in the endodontic literature.

From a surgical perspective, chewing, talking, sleeping, daily routines, and working performance are evaluated according to two different surgical procedures.[17] Because pain and swelling are common clinical findings of an impacted third molar, the patient's quality of life can be influenced by these symptoms according to the literature.[11,14,21–24] Symptoms of pain and swelling are related to a poor OHRQoL. Moreover, the OHIP-14 score was lower in the presence of swelling in these patients; yet, the critical difference between pericoronitis and symptomatic irreversible pulpitis was that poor OHIP-14 scores were seen in symptomatic irreversible pulpitis compared to pericoronitis on the DePaQ items. Since this condition could be related to disease symptoms that originate from pulp tissues, an impaired OHRQoL was predicted for the symptomatic irreversible pulpitis study group.

**Table 4** Visual analog scale (VAS) Scores in patients with symptomatic irreversible pulpitis and pericoronitis according to the dental pain-screening questionnaire (DePaQ) items.

| | DePaQ | VAS score | | | | P* |
|---|---|---|---|---|---|---|
| | | Symptomatic irreversible pulpitis | | Pericoronitis | | |
| | | Mean | Standard deviation (SD) | Mean | SD | |
| 1. | Pain experience in the past month | | | | | |
| | Tooth/teeth | 91.00 | 15.28 | 52.50 | 43.09 | 0.010 |
| | Tooth/teeth + gums | | | 50.38 | 34.23 | — |
| 2. | Chronicity of current pain | | | | | |
| | Less than 1 wk | 87.69 | 11.65 | 50.58 | 37.16 | 0.003 |
| | From 1 wk to less than 1 mo | 92.69 | 18.23 | 55.83 | 37.04 | 0.002 |
| | From 1 mo to less than 6 mo | 90.90 | 11.36 | 52.00 | 37.01 | 0.027 |
| | From 6 months to less than 1 yr | | | | | |
| | 1 yr | | | | | |
| 3. | Worst pain intensity | | | | | |
| | Mild* | 80.00 | 39.37 | 40.00 | 14.14 | — |
| | Discomforting | 91.66 | 9.83 | 18.88 | 24.72 | <0.001 |
| | Distressing | 91.16 | 7.92 | 45.83 | 35.79 | <0.001 |
| | Horrible | 94.00 | 13.41 | 75.00 | 39.87 | 0.429 |
| | Excruciating | 90.90 | 11.08 | 76.66 | 20.61 | 0.086 |
| 4. | Pattern of pain | | | | | |
| | Episodic | 90.64 | 17.30 | 48.40 | 35.19 | <0.001 |
| | Continuous | 91.57 | 11.67 | 56.15 | 40.31 | 0.005 |
| 5. | Pain radiates to the surrounding area | | | | | |
| | Not at all[a] | 92.50 | 9.57 | 33.63 | 36.40 | — |
| | Small/moderate/large/complete extent | 90.86 | 15.75 | 58.14 | 34.97 | <0.001 |
| 6. | Worse when chewing or eating on the side of the mouth with the pain | | | | | |
| | Not at all[a] | 96.00 | 8.94 | 0.00 | 0.00 | — |
| | Small/moderate/large/complete extent | 90.44 | 15.80 | 58.78 | 32.95 | <0.001 |
| 7. | Effect of eating or drinking something cold | | | | | |
| | Makes it a lot/little more painful | 89.73 | 16.51 | 55.00 | 36.66 | <0.001 |
| | No effect | 94.00 | 10.74 | 43.07 | 37.72 | 0.002 |
| | Makes it a lot/little more better[a] | 100.00 | — | 66.00 | 35.07 | |
| 8. | Gums are swollen | | | | | |
| | Not at all | 90.32 | 17.60 | 39.09 | 33.01 | <0.001 |
| | Small/moderate/large/full extent | 90.10 | 10.84 | 55.92 | 37.54 | <0.001 |
| | Total | | | | | |
| 9. | Painful tooth feels loose | | | | | |
| | Not at all | 90.00 | 16.80 | 51.29 | 34.61 | <0.001 |
| | Small/moderate/large/full extent | 93.33 | 11.12 | 50.00 | 47.95 | 0.039 |
| 10. | Difficulty swallowing | | | | | |
| | Not at all | 90.45 | 15.69 | 41.60 | 34.11 | <0.001 |
| | Small/moderate/large/full extent | 95.01 | 12.24 | 69.23 | 35.69 | 0.030 |
| 11. | Painful tooth feels like it is sticking out | | | | | |
| | Not at all | 91.53 | 15.81 | 49.16 | 38.88 | <0.001 |
| | Small/moderate/large/full extent | 89.09 | 13.75 | 54.28 | 33.65 | 0.003 |
| 12. | Difficulty sleeping | | | | | |
| | Not at all | 92.77 | 11.27 | 21.42 | 29.11 | <0.001 |
| | Small/moderate/large/full extent | 90.01 | 17.22 | 57.74 | 35.18 | <0.001 |
| 13. | Pain experience in the past month | | | | | |
| | Pulling: present[a] | 92.85 | 9.87 | 71.33 | 25.59 | |
| | Pulling: absent | 85.71 | 24.08 | 36.46 | 41.60 | 0.003 |
| | Numb: present[a] | 90.81 | 15.38 | 67.00 | 38.60 | — |
| | Numb: absent | — | — | 45.62 | 37.23 | — |
| | Exhausting: present[a] | 93.66 | 8.89 | 61.50 | 34.83 | — |
| | Exhausting: absent | 86.31 | 21.65 | 37.77 | 40.24 | 0.002 |
| | Electric shocks: present | 91.92 | 10.59 | 61.66 | 32.98 | 0.002 |
| | Electric shocks: absent | 89.56 | 19.65 | 45.88 | 39.69 | <0.001 |

*The Mann-Whitney U test was used for the analysis.
[a] Data were not analyzed due to an insufficient number of patients.

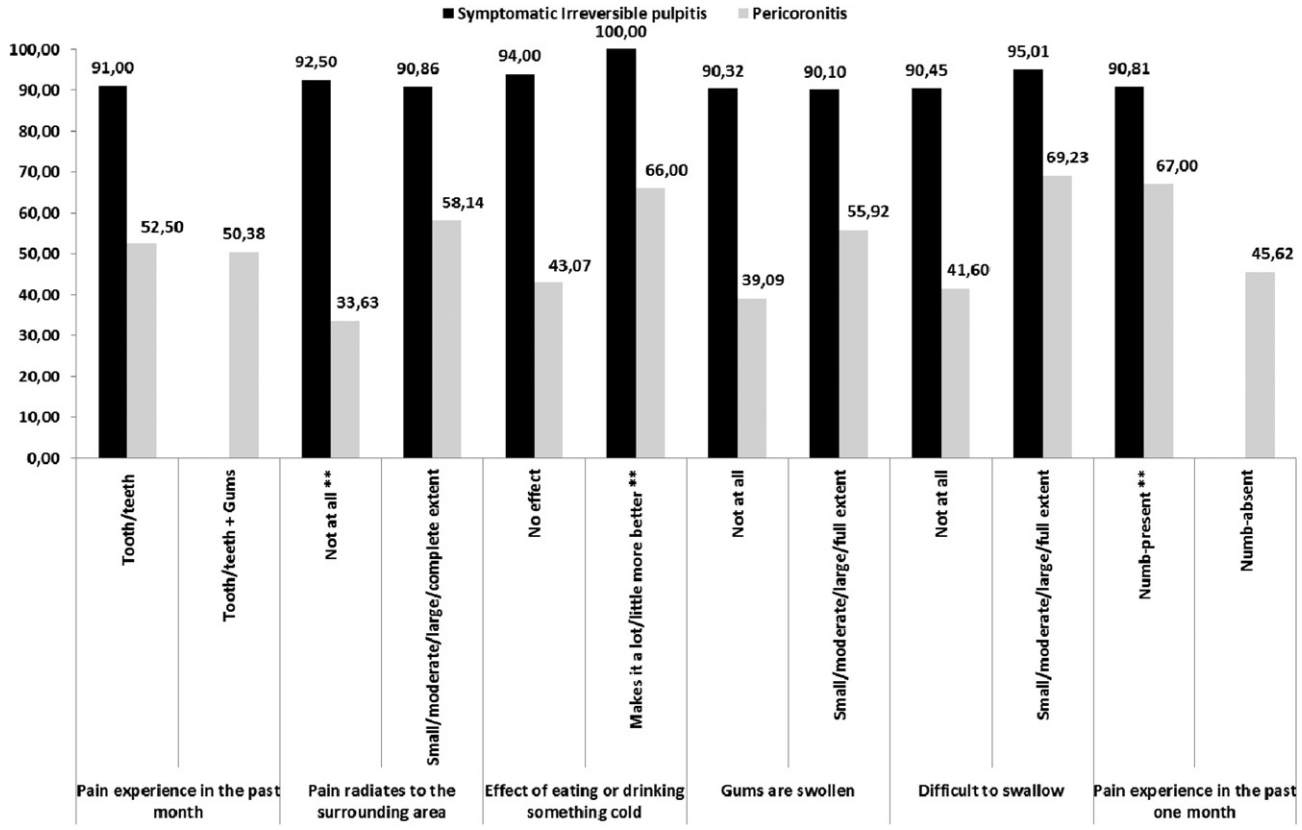


**Figure 5** Some Dental Pain-Screening Questionaire items and visual analog scale scores in symptomatic irreversible pulpitis and pericoronitis. ** Data were not analyzed due to insufficient number of patients.

Finally, the OHRQoL, as a subjective measure, evaluates how dental problems and oral disorders interfere with the normal functioning of an individual's life. Pain is an important part of a poor OHRQoL.[5–7,15,16] Therefore, combining clinical and subjective indicators relating to oral health can be used to define a multi-dimensional assessment of a patient's oral health condition.

Symptomatic irreversible pulpitis can be treated by a single-visit root-canal treatment protocol because these teeth are vital, and there is no periapical damage around the affected teeth.[4,25–27] Therefore, the study design was carried out using single-visit therapy according to appropriate guidelines.

The main problem with the methodology of this study was the patient selection procedure from the clinics. Patients were not using analgesics and had only one symptomatic pain-related condition. According to the sensitivity, specificity, true positivity, and positive predictive results, the DePaQ was observed to be a more-sensitive tool for symptomatic irreversible pulpitis compared to pericoronitis. In addition, a test-retest was not carried out in these patients with pain before treatment. Cronbach's $\alpha$ value was not calculated in the DePaQ, because scoring differed among the various items. These were the main shortcomings of the present study.

Symptomatic irreversible pulpitis was found to be a more-painful clinical condition and impaired the OHRQoL to a greater extent compared to pericoronitis. Since the DePaQ is a generic questionnaire for evaluating various dental pain patterns, some items were related to symptomatic irreversible pulpitis, while others were related to pericoronitis.

These findings may be helpful to clinicians in understanding the pain status and determining treatment protocols to eliminate pain in patients with symptomatic irreversible pulpitis. Since quality of life measures are important clinical outcome measures, this tool could help from the patient's perspective according to clinical signs. Because the DePaQ asks about various pain-related symptoms, its their application before a clinic visit could help clinicians better understand a patient's condition in a busy clinical setting.

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