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Reducing fear of pain associated with endodontic therapy

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Abstract

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Aim To provide subjects with positive information about endodontic treatment (ET) to reduce fear of pain associated with ET.

Methodology A large sample ($n = 437$) was randomly allocated to read one of five informative paragraphs and afterwards asked to complete two questionnaires (dental anxiety and fear of dental pain). The paragraphs consisted of dental information obtained from patient brochures. One (experimental) paragraph consisted of positive information about pain during ET. Analysis of variance followed by *post hoc* analysis was used to detect differences in mean score.

Results Subjects who were given the positive information regarding ET indicated they were less fearful of pain associated with ET.

Conclusions The clinical implication of this experiment is that patients should be accurately informed about pain associated with ET. In this way, the patient may be more at ease before and during treatment, decrease avoidance behaviour and make decisions regarding treatment choice, based on common sense rather than fearful expectations.

Keywords: dental anxiety, endodontic therapy, fear of dental pain, information, pain.

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Introduction

Within the dental context, anxiety and pain exist in a reciprocal relationship (Eli 1992, Litt 1996). Fear of dental pain (McNeil & Rainwater 1998, van Wijk & Hoogstraten 2003) is a concept that attempts to capture this complex interaction, and may be a highly relevant covariate in dental pain research. A recent study (van Wijk & Hoogstraten 2005) reported that fear of dental pain was associated with pain felt during periodontal probing (in a sample of periodontal patients) and that a reduction in dental anxiety was associated with lower levels of fear of dental pain (in a sample of highly anxious dental patients treated at a dental fear clinic). Although no causality can be assumed, these results suggest that at least part of fear of dental pain is associated with dental anxiety and/or pain experienced. As anxious people tend to overestimate pain (Arntz *et al.* 1990, Rachman & Arntz 1991, Arntz *et al.* 1994), and the prospect of pain can induce anxiety, some people are at risk of ending up in a vicious circle of fear and pain. It may be well that patients decide to avoid dental treatment because of the (overestimated) pain they anticipate or, in fact, experience more pain because of an attentional bias towards the painful stimulus (Rhudy & Meagher 2000). Anxiety can be seen as the anticipation of threat, and cognitive processes play a role in the evaluation of this threat (Eli 1992). Fear of dental pain can be seen as one parameter influencing these cognitive processes. Other variables such as knowledge, beliefs and feelings also have an influence on the evaluation of this threat.

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One dental procedure which is probably feared by most people is endodontic treatment (ET). It is claimed that some patients would even prefer having a tooth extracted than receiving ET. One study (Rousseau *et al.* 2002) concluded that this would be an unwise decision as subjects report more pain during extraction than during ET. It is therefore, not remarkable that anticipated pain for ET is commonly overestimated (Rousseau *et al.* 2002, Watkins *et al.* 2002). Apparently, some form of negative image surrounds ET. Indeed, a study commissioned by the American Association of Endodontists regarding beliefs and knowledge about ET (Public Communications Inc. 1984) found that respondents who experienced ET were four to five times more likely to describe the procedure as painless, compared with respondents who did not experience ET personally. In addition, LeClaire *et al.* (1998) found that approximately 96% of patients with a history of previous ET would be willing to have another root canal treatment when necessary. It is remarkable that patients with positive ET experiences apparently have much less impact on the general view on ET than patients who had a negative experience. These results make evident that patients in general have negative beliefs and knowledge about ET.

To summarize, anxiety can induce a vicious circle of overestimation of pain and increased anxiety. One dental procedure particularly subjected to this process of overestimation is ET. In the present study, it was tested whether this vicious circle can be interrupted by providing positive information, which affects the beliefs and knowledge of subjects concerning ET. The Fear of Dental Pain questionnaire (FDP; Wijk van & Hoogstraten 2003) contains one item that is particularly relevant here and concerns fear of pain associated with ET. It is hypothesized that confronting subjects with positive information concerning pain associated with ET will positively affect their beliefs and will reduce their fear of pain for that particular dental procedure.

Materials and methods

Subjects

Participants were psychology freshmen ($n = 460$) from the University of Amsterdam. The sample consisted of 320 female (mean age = 20.4, SD = 2.7) and 140 male (mean age = 20.5, SD = 2.2) students. The study was undertaken with the understanding and written consent of each subject and in accordance with ethical principles as described in the declaration of Helsinki.

Materials

Fear of dental pain

The FDP (Wijk van & Hoogstraten 2003), which was developed as a dental equivalent of the Fear of Pain Questionnaire (FPQ-III; McNeil & Rainwater 1998), consists of 18 items describing more or less painful dental experiences. Subjects are asked to think about the pain an event might cause and indicate the amount of fear they feel associated with that event. Answers are scored from 1 (no fear at all) to 5 (extreme fear) and summed to derive the FDP score (range 18–90). Examples of items are: 'Receiving an anaesthetic in the mouth' and 'Having a tooth pulled'. The crucial item in the present context is item number 6: 'Receiving a root canal treatment'.

Dental anxiety

The S-DAI is a short version of the Dental Anxiety Inventory (Stouthard 1989), which has shown to be reliable and valid (Aartman 1998). It contains nine items that are answered on a five-point Likert-type scale. An example is 'I become nervous when the dentist invites me to sit down into the chair'.

Information

Four informative paragraphs were extracted from brochures for patient education. One experimental paragraph was constructed to provide positive information about root canal therapy. Five versions of the questionnaire were constructed which consisted of instructions, one of five pieces of information, the S-DAI (Aartman 1998) and the FDP (Wijk van & Hoogstraten 2003). Subjects were instructed to carefully read the information. After reading the information they were instructed to fill out the questionnaire. A summary of the paragraphs and a complete translation of the experimental information are presented below. (A translation of all paragraphs is included as an Appendix for inspection.)

Information regarding implants (version I): A short description about implants in terms of material, length, thickness, functions, etc.

Information regarding bridges (version II): A short description about what a bridge is and how it works.

Information regarding implants (version III): A short description about implants in terms of the procedure (how are they placed).

Information regarding periodontal disease (version IV): A short description about gingivitis and periodontitis (cause and consequences).

Experimental information regarding ET (version V): Many people believe that a root canal treatment is a very painful procedure. Some people would even prefer to have the tooth extracted. However, research shows that pain during an extraction is much higher than pain during a root canal treatment. In fact, people who experienced root canal treatment personally are 4 to 5 times more likely to describe the procedure as painless than people who did not. In addition, 96.3% of patients with a history of previous root canal treatment would be willing to have another root canal procedure if it was indicated.

Procedure

Data were collected during a compulsory course for psychology freshmen. During this course, students fill out a large number of psychological tests. The five versions of the questionnaire were randomly distributed amongst the students.

Statistical analysis

One-way analysis of variance (ANOVA) and independent sample *t*-tests were performed to test for equality of means. Pearson's correlation coefficient was used as a measure of linear association. Cronbach's α was used as a measure of internal consistency.

Results

An initial sample of 460 students filled out the questionnaire. Only data from subjects with completed questionnaires were used for the analysis ($n = 437$). The final sample consisted of 131 male (mean age = 20.4, SD = 2.2) and 306 female (mean age = 20.3, SD = 2.6) subjects. The chi-squared test showed that the five versions of the questionnaire were distributed equally across gender ($\chi^2(4) = 2.51$, $P = 0.64$). Table 1 shows the mean score on the dependent variables between men and women. Internal consistency was excellent for both dental anxiety and fear of dental pain.

Independent samples *t*-test showed that female subjects score significantly higher values on dental anxiety [$t(435) = -3.10$, $P < 0.002$] and fear of dental pain [$t(435) = -4.07$, $P < 0.001$] than male subjects.

Table 1 Mean scores (SD) for the dependent variables

Variables (alpha)	Men	Women	Total
Age	20.4 (2.2)	20.3 (2.6)	20.3 (2.5)
S-DAI* (0.91)	18.7 (7.5)	21.3 (8.1)	20.5 (8.0)
FDP* (0.94)	48.1 (12.4)	53.4 (12.4)	51.8 (12.6)

S-DAI, short-version dental anxiety inventory; FDP, fear of dental pain.
*$P < 0.002$.

Table 2 Mean score on the sixth FDP item (receiving root canal treatment)

Information number	*n*	Mean item score (SD)
1	90	3.69 (0.98)
2	86	3.60 (0.99)
3	81	3.49 (1.06)
4	92	3.60 (0.98)
5 (entodontic therapy information)	88	3.11* (1.02)
Total	437	3.50 (1.02)

*$P < 0.001$, differs relative to all other samples.

A strong correlation was found between S-DAI and FDP total scores ($r = 0.72$, $P < 0.001$).

One-way ANOVA was used to test for an effect of the information. The result from this analysis on the total scores clearly shows that randomization of the information was successful. That is, no differences in mean score for dental anxiety or fear of dental pain could be detected between samples who read different versions of information. Another ANOVA was performed to test for an effect on fear of pain associated with root canal treatment (i.e. on item 6 of the FDP). The result from this analysis showed a significant main effect for samples [$F(4, 432) = 4.49$, $P < 0.001$]. Subsequent *post hoc* analysis showed that the main hypothesis was confirmed as the experimental sample differed significantly from all other samples (lower mean score), but all other samples did not differ relative to each other (again resulting from successful randomization). The result from this analysis is presented in Table 2. In addition, when comparing the five samples on all other items, no other significant differences could be detected, which strengthens our findings.

The mean score on item level in Table 2 shows that subjects in general feel a fair amount of fear to being very fearful for the pain associated with root canal treatment. When providing subjects with comforting information (aimed at disconfirming

negative beliefs and knowledge) the average amount of fear of that particular dental pain can be reduced.

Discussion

The present study investigated whether fear of pain associated with ET could be reduced by providing subjects with a short piece of written information. The information was aimed at dispelling negative beliefs and knowledge about ET by providing positive knowledge about the topic. Results showed that fear of pain for ET can be decreased significantly by providing positive information about ET. Clinical implications are that (i) patients can be accurately informed about pain associated with ET and, as a result, more compliant behaviour may occur (less avoidance); (ii) the patient may be more at ease before and during treatment and (iii) the patient can make a decision regarding treatment choice which is based on common sense rather than fearful expectations. Although other nonbehavioural techniques for reducing anxiety or fear exist (for instance Saxen & Newton 1999), these do not address the problem, but merely reduce the symptoms.

As stated in the introduction, the vicious circle of anxiety and pain may possibly lead to a heightened pain experience. As shown in the present study, this vicious circle may be interrupted (with respect to *fear* of pain) by providing patients with knowledge aimed at dispelling negative beliefs and knowledge about ET. Hopefully, such knowledge will also lead to a reduced pain experience as the patient should no longer be attentionally biased towards the (painful) stimulus. However, such an effect should be evaluated in a separate study. Preliminary results from an ongoing study (pain before, during and after ET) show that fear of dental pain is associated with pain felt during ET ($r = 0.41$). These results together suggest that it may be possible to influence pain felt with ET by providing patients with positive information prior to treatment. For future research, therefore, it is necessary to perform randomized clinical trials in which patients will be randomly allocated to conditions with or without information and compared on the pain felt during ET.

It may be clear that, even when the level of pain felt cannot be influenced directly by providing information, reducing the patient's fearful expectations with respect to ET will have beneficial effects for the patient. As performance on any complex task is reduced under stressful conditions, and an ET can be considered a complex task indeed, it is likely that the quality of the ET is influenced by the level of stress displayed by patients. That is, a patient who is highly anxious or stressed may affect the endodontist as well. The anxious patients' behaviour can distract the dentist during any phase of the ET. Indeed, if a patient is agitated, stressed or anxious, the dentist may (unconsciously) feel the tendency to finish treatment as fast as possible (to benefit the patients' feelings). All in all, interactions like these may reduce the survival rate of endodontically treated teeth or increase the incidence of postoperative pain after ET. However, the latter is purely hypothetical and needs to be explored in future studies all together.

Conclusions

Giving information aimed at dispelling negative beliefs and knowledge about ET reduces fear of pain associated with ET. As a result, the patient may be more at ease before and during treatment, avoidance behavior may be decreased and the patient can make a decision regarding treatment choice which is based on common sense rather than fearful expectations.

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Appendix

Translation of the five paragraphs with dental information

Information regarding implants (version I)

An implant can be seen as an artificial dental root, which is placed in the jaw like a screw at the location of a missing tooth or molar. An implant is made out of pure titanium and sometimes covered with a layer of ceramic. An implant is approximately 4-mm-thick and 10–16 mm long. An implant is placed in the jaw using local analgesics and provides a foundation for a crown, dental bridge or an over denture.

Information regarding dental bridges (version II)

A dental bridge can be constructed to replace one or more missing teeth or molars. A dental bridge is attached to the teeth adjacent to the gap. These teeth are reduced in miniature and dental crowns are made to cover them (abutment teeth). A false crown, called a pontic, is attached to the abutment teeth to cover the gap.

Information regarding implants (version III)

An implant can be compared with an artificial dental root. A dentist or an oral surgeon places the implant. First, a local anaesthetic is given. Next, the gums are opened in such a way that the jawbone becomes visible, and a small hole is drilled in the jawbone. Next, the implant is screwed or hammered into the jaw. The gums are closed using stitches. When you need more than one implant, these are usually placed during the same procedure.

Information regarding periodontal disease (version IV)

Plaque on teeth and molars causes an inflammation at the edge of the gums. Such an inflammation is called gingivitis. The inflammation can spread from the edge of the gums to the jawbone. As a result, jawbone around the teeth or molars is lost. Eventually, after sufficient loss of bone, teeth or molars become loose and will fall out. This form of inflammation is called periodontitis. Timely treatment can prevent the loss of teeth or molars.

Information regarding endodontic treatment (version V)

Many people believe that a root canal treatment is a very painful procedure. Some people would even prefer to have the tooth extracted. However, research shows that pain during an extraction is much higher than pain during a root canal treatment. In fact, people who experienced root canal treatment personally are four to five times more likely to describe the procedure as painless than people who did not. In addition, 96.3% of patients with a history of previous root canal treatment would be willing to have another root canal procedure if it was indicated.