A Visual Analogue Scale in the Assessment of Dental Anxiety

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The purpose of this study is to determine the validity of the visual analogue scale (VAS) in the assessment of changing levels of dental anxiety, through correlation with the dental anxiety scale (DAS) and the state portion (A-state) of the state-trait anxiety inventory (STAI). Forty-five adult patients attending an oral surgery clinic for a routine dental extraction participated. Before any treatment, each patient completed the DAS, the STAI, and a 100mm VAS. The order of administration was randomly determined. Following completion of the dental extraction under local anesthesia and just before discharge, the patients were once more asked to complete the DAS, the A-State, and a VAS which were again randomly ordered. All three measures demonstrate a significant reduction in mean anxiety scores from presurgery to postsurgery. There are significant correlations among the three measures both pre- and postsurgery. The VAS appears to correlate well with both the DAS and the A-State under changing levels of anxiety.

A nxiety before dental treatment is a well recognized problem that may result in 6–14% of the population avoiding dental care.[1,2] In fact, even for patients who seek dental care, anxiety is considered the major reason for broken appointments.[1] Tense and anxious patients disrupt scheduling, make treatment difficult, and arouse uncomfortable feelings in the dentist.[3] Anxious patients typically expect more pain than they experience.

On the other hand, when they experience less pain than expected, there is not a commensurate reduction in pain expectation.[4]

There are three general categories of methods that have been evaluated as measures of human anxiety in children and adults: direct self-report measures, behavioral measures, and physiological measures.[5] Two of the most commonly used self-report measures in dentistry are the dental anxiety scale (DAS)[3,6–13] and the state-trait anxiety inventory (STAI).[14–20] The STAI is divided into two portions, each consisting of 20 questions: an anxiety-trait portion and an anxiety-state (A-State) portion. According to Corah,[21] trait anxiety may be conceptualized as a generalized tendency toward anxiety proneness or as a response to a variety of situations as if they were dangerous or threatening. State anxiety, on the other hand, is the transitory affective response to an anxiety-provoking situation. Although originally designed to measure trait anxiety,[21] the DAS has also been used extensively to measure state anxiety.[10–12] One reported comparative study between the DAS and STAI demonstrated that the DAS correlated well for state anxiety but not for trait anxiety.[17]

The visual analogue scales have been used extensively to measure pain levels and changes in pain levels,[3,22] in the evaluation of sleep and hypnotic drugs; and to a limited extent, in the evaluation of benzodiazepine anxiolytic agents in dental outpatients.[23]

This study determined the validity of the visual analogue scale (VAS), in the assessment of changing levels of dental anxiety state, through correlation with the DAS and STAI.

MATERIALS AND METHODS

Forty-five adult patients attending the oral and maxillofacial surgery clinic for a routine dental extraction under local anesthesia participated in this study. None of the patients were taking any sedative, hypnotic, or anti-

Please mark your current level of anxiety or nervousness with a cross (X) on the dotted line.

I.......................................I
(100 mm)

Totally calm
and relaxed
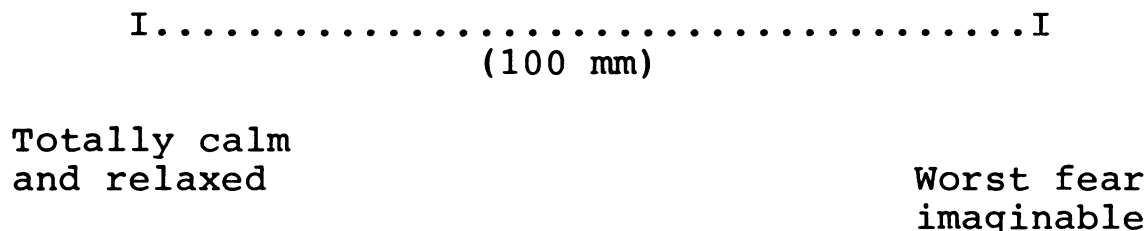
Worst fear
imaginable

Figure 1. Visual analogue scale used in this study.

psychotic drugs, or had received any medication other than local anesthesia during the surgery.

While sitting in the dental chair awaiting surgery, each patient was asked to fill out a DAS, the A-state portion of the STAI, and a 100 mm VAS (Figure 1). The order of completion was randomly determined. The patients then underwent one or more extractions under local anesthesia. Immediately before discharge, the patient was asked to complete another DAS, A-state, and a VAS.

Mean DAS, A-state, and VAS scores were analyzed using a two-factor ANOVA with sex as one factor and time of testing (i.e., pre- or postsurgery, using a repeated measures design) as the other factor. Correlations among the three measures were assessed using the Pearson, product-moment correlation coefficient.

RESULTS

The sample consisted of 23 males and 22 females with a mean age of 32.8 years and a range from 16 to 69 years.

The mean anxiety values are shown in Table 1. All three measures demonstrated a significant reduction in anxiety following oral surgery. In addition, the A-state scale showed significantly higher levels for female patients. However, there were no other significant sex differences or sex and time interactions.

Presurgically, the VAS revealed a positive correlation with the DAS ($r = 0.50$, $p < .001$) and the A-state ($r = 0.76$, $p < .001$). The DAS also showed a positive correlation with the A-state ($r = 0.53$, $p < .001$). Postsurgical results were similar with the VAS being positively correlated with the DAS ($r = 0.58$, $p < .01$) and the A-state ($r = 0.46$, $p < .01$). Again, the DAS and A-state scores were also correlated ($r = 0.46$, $p < .01$).

DISCUSSION

The present study demonstrates levels of anxiety, as measured by the presurgery A-state scale, that are consistent with these obtained by previous investigators. For example, Speilberger[14] reported that mean A-state scores for working adults when not under any stress were 35.7 for males and 35.2 for females. These values lie midway between the mean postsurgical scores of 30.8 for males and 38.1 for females in the present study. Lamb and Plant[15] reported mean scores of 34.1 for males and 40.8 for females while sitting in the dental chair, while Weisenberg et al[17] reported a mean level of 42.3 in adult patients in the waiting room. Finally, Baker et al[20] reported a

Table 1. Mean anxiety scores (±S.E.) for the visual analogue scale (VAS), the dental anxiety scale (DAS, and the state scale of the state-trait anxiety inventory (A-state).

Variable	N	Time 1: presurgery	Time 2: postsurgery
VAS(female)	22	37.9 ± 4.60	25.6 ± 5.82
VAS(male	23	31.9 ± 4.45	16.9 ± 3.50
VAS(total)	45	34.8 ± 3.20	21.1 ± 3.39*
DAS(female)	22	9.50 ± 0.290	8.77 ± 0.740
DAS(male)	23	8.83 ± 0.590	8.04 ± 0.610
DAS(total)	45	9.16 ± 0.470	8.40 ± 0.490†
A-state(female)	22	43.4 ± 2.17	38.1 ± 2.12
A-state(male)	23	39.0 ± 2.35	30.8 ± 2.03
A-state(total)	45	41.1 ± 1.66	34.4 ± 1.60‡

* ANOVA revealed a significant effect for time ($p < .002$) but no significant effect ($p > .10$) for sex or sex and time interaction;

† ANOVA revealed a significant effect for time ($p < .05$) but no significant effect ($p > .40$) for sex or sex and time interaction;

‡ ANOVA revealed a significant effect for time ($p < .001$) and sex ($p < .05$) but not for the sex and time interaction ($p > .60$).

mean anxiety level of 41.5 before routine dentistry in adult patients.

Corah,[6] using the DAS in college students, reported mean anxiety levels of 8.39 in males and 9.28 in females (mean of total = 8.89). This was not significantly different from the levels he reported again in 1978[7] where males scored 8.76 and females 9.99. It must be stressed that these measures were obtained away from the dental environment, but show remarkable similarity to the results obtained in this study. Weisenberg et al[17] reported a mean DAS score of 10.5 for patients awaiting dental treatment. He also noted that the DAS had a significant correlation ($r = 0.48$, $p < .001$) with the A-state scale of the STAI.

An assessment of reproducibility and measurement of absolute anxiety was not undertaken in this study. Maxwell[24] examined these features of the VAS in twenty-seven adult volunteers in a classroom experiment on two occasions to assess subjectively, ordinally related volumes of sound (offered in random sequence). He was able to draw some interesting conclusions. The VAS was simple to use and largely acceptable. Within subject comparisons were more accurate and more sensitive than those between subjects. However, scoring between sessions was not accurate so that reproducibility over time might not be very reliable using the VAS.

The results of the present study are consistent with Maxwell's study.[24] It appears that anxiety VAS correlate well with recognized measures of dental anxiety under changing levels of anxiety. They are simple and quick to use, which is especially helpful in pharmacological studies where the patient may be sedated and have difficulty with complicated questionnaires.

The VAS can be recommended as the self-report part of anxiety measurement in trials which are assessing changes in anxiety levels under different circumstances within the one session. The present study did not attempt to demonstrate reproducibility of the VAS over time nor did it attempt to show the VAS is a reliable measure of absolute anxiety.

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