Italian Version of Corah's Dental Anxiety Scale: Normative Data in Patients Undergoing Oral Surgery and Relationship With the ASA Physical Status Classification

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To test the Italian translation of Corah's Dental Anxiety Scale (DAS) and to check the relationship between dental anxiety and the American Society of Anesthesiologists (ASA) physical status classification (ASA-PS), the DAS was translated into Italian and administered to 1072 Italian patients (620 male and 452 female patients, ages 14–85 years) undergoing oral surgery. Patients' conditions were checked and rated according to the ASA-PS. The DAS ranged from 4 to 20 (modus = 8, median = 10); 59.5% of patients had a DAS of 7–12, 26.1% had a DAS >12, and 10.3% had a DAS >15. The mean DAS was 10.29 (95% confidence limit = 0.19); female patients were more anxious than male patients ($P < .001$), while patients older than 60 years showed a significant decrease in the level of anxiety. Five hundred two patients were rated as ASA-PS class P1, 502 as ASA-PS class P2, and 68 as ASA-PS class P3, with a mean DAS score of 9.69, 10.78, and 11.09, respectively: the DAS difference between groups was significant ($P < .001$).

Key Words: Anxiety; Dentistry; Dental anxiety scale; Visual analogue scale; Psychological tests; Methods; Dental phobia; Physical status.

The relevance of psychology and behavioral sciences is ever increasing both in dental education and in clinical practice. A high percentage of patients are so fearful of dental care as to delay or avoid attendance. Other than avoidance behavior, dental anxiety has a wide-ranging and dynamic impact on a person's life. Therefore, careful assessment of anxiety and treatment is an essential step for appropriate patient management and overall quality of care.

The evaluation of dental anxiety can be performed with a wide range of approaches, including several psychologic tests able to explore general aspects of anxiety and/or dental anxiety. A comprehensive review of main tests for anxiety and pain evaluation in dentistry has been published by Newton and Buck in 2000.[9] Out of 15 tests mentioned in this review, the Corah Dental Anxiety Scale (DAS)[10–12] results are the most widely used. The Corah DAS shapes 4 dentally related situations, each including 5 responses of increasing anxiety; the sum of responses ranges between 4 and 20, where scores higher than 12 indicate anxious patients,[13–18] and scores higher than 15 indicate phobic levels of anxiety.[9]

The DAS diffusion in clinical practice depends on the fact that it is well validated, reproducible, focused on dental fear, fast, and simple. It has been used in both adults[15,19–26] and children,[27–31] showing a high internal consistency and test-retest reliability,[10] and is available in 4 European languages (German, Norwegian, Dutch, and Hungarian).[24,32–34] In Italy there is a surprising shortage of Italian-language tests for dental fear. To our knowledge, only 1 paper has been published so far in the literature on the use of DAS in Italian patients.[35,36] However, the paper deals with adolescents only, while the Italian translation of the test

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they used has not been published. As far as studies from other countries are concerned, the largest series available in the literature deal with normal subjects, such as university students and soldiers, while most studies on patients include a smaller number of cases: it is to be considered that patients who are going to be operated on might be more anxious and, thus, have a higher DAS score than the normal population.

The aims of this study are to check: (a) the Italian translation of the DAS and its reliability in a large sample of adult patients undergoing oral surgery and (b) the relationship between the American Society of Anesthesiologists (ASA) physical status classification and dental anxiety.

MATERIALS AND METHODS

The Corah DAS was translated from English into Italian by each of the authors, and the draft versions were discussed in order to reach an agreement. Then, the final version was back-translated into English by an interpreter, and tested for inconsistencies. The study was approved by our local ethical committee, and all the patients gave their informed consent.

In our department, the anesthesiologic examination is part of routine preoperative assessment for patients submitted to major oral surgery (eg, implantology, multiple teeth extraction), patients with increased perioperative risk due to coexisting diseases, and fearful patients; conscious sedation is routinely available for all of these patients. One thousand seventy-two consecutive patients, 620 male (57.8%) and 452 female (42.2%), ranging between the age of 14 and 85 years (mean ± SD = 53.8 ± 14.0), filled out the Italian version of the Corah DAS (Figure 1) at the beginning of the preoperative examination, before any other evaluation of patients' physical conditions and information about sedation. Patients who were unwilling or unable to fill out the DAS, due to their clinical conditions (eg, neurologic or psychiatric disorders) or foreign nationality were discarded from the study. The patients were asked to select the option that best represented their experience in the DAS, and the total score was then calculated by summing the values of each selected option. After DAS administration, the clinical conditions were checked and rated according to the ASA physical status classification[37] (Table 1). Conscious sedation during the operation was proposed to all patients and planned at the end of the visit, after assessment of their physical condition. The statistical analysis was conducted with Cronbach alpha, *t* test, and 1-way ANOVA with post-hoc test according to Bonferroni, using the SPSS 13.0 for Windows program (SPSS Inc, Chicago, Ill), for a significance level of $P < .05$.

RESULTS

Five hundred two patients (46.8%) belonged to class P1, 502 (46.8%) to class P2, and 68 (6.4%) to class P3. The type of intervention is shown in Table 2. Figure 2 shows the distribution of DAS scores in our sample: the DAS score ranged from 4 to 20 with modus = 8 and median = 10. About 60% of patients had a score ranging between 7 and 12, while 26.1% had scores higher than 12, and 10.3% reached phobic levels of anxiety (that is, DAS>15). The Italian version of the DAS also showed a very good internal consistency with Cronbach alpha = .883. The distribution of DAS scores in female patients was shifted toward right, when compared with male patients, showing a higher level of anxiety (Figure 3).

The mean scores and SD of male and female patients and both combined, together with the results of other previous reports, are shown in Table 3. The mean DAS score of the whole sample was 10.29, with a 95% confidence limit of 0.19, with a highly significant difference between male and female patients ($t = 7.338$; $P < .001$). Our mean and SD were similar to those reported by other studies dealing with patients, while studies on students and community showed a lower DAS score; in the former, the range of the mean DAS score was 7.29–11.40, while in the latter it was 7.87–9.08. The DAS was significantly related to the age as well (Table 4), with a level of anxiety significantly lower in patients older than 60 years of age ($P = .003$).

The level of anxiety was significantly related to the physical status as well (Table 5). Patients belonging to ASA class P2 and P3 (that is, patients with mild and severe systemic disease, respectively) showed a significantly higher DAS score than patients belonging to ASA class P1 (healthy subjects).

DISCUSSION

Dental fear is a universal phenomenon, since all over the world, approximately 25% of patients avoid visits and treatments, and approximately 10% reach phobic levels of anxiety. It has manifold endogenous and exogenous causes[38]: the latter include conditioned fear (yielded by previous bad experiences), distrust of dental professionals, and somatic intraoperative reactions, which may change in function of dental experience.

METTA UNA CROCETTA SULLA RISPOSTA CHE LEI SCEGLIERA' DOPO OGNI DOMANDA

Se lei dovesse andare dal dentista, come si sentirebbe il giorno precedente?

1. Mi sentirei come chi deve affrontare una esperienza ragionevolmente piacevole
2. Non mi preoccuperei molto degli eventi che dovrei affrontare
3. Mi sentirei un po' a disagio
4. Sarei timoroso perché l'esperienza potrebbe essere spiacevole e dolorosa
5. Sarei molto impaurito di quello che potrebbe farmi il dentista

Durante la permanenza in sala d'attesa, come si sente?

1. Rilassato
2. Un po' a disagio
3. Teso
4. Ansioso
5. Così ansioso che talvolta mi inondo di sudore e mi sento fisicamente spossato

Quando lei si trova seduto sulla poltrona operatoria, in attesa che il dentista prepari il trapano per iniziare il lavoro nella sua bocca, come si sente?

1. Rilassato
2. Un po' a disagio
3. Teso
4. Ansioso
5. Così ansioso che talvolta mi inondo di sudore e mi sento fisicamente spossato

Se si trova sulla poltrona operatoria per la pulizia dei suoi denti, come si sente mentre il dentista prepara gli strumenti che userà per raschiare i suoi denti tutto intorno alle gengive?

1. Rilassato
2. Un po' a disagio
3. Teso
4. Ansioso
5. Così ansioso che talvolta mi inondo di sudore e mi sento fisicamente spossato

Figure 1. The Italian translation of the Dental Anxiety Scale by Corah.

Table 1. American Society of Anesthesiologists Physical Status Classification[37]

Status	*Disease State*
P1	A normal, healthy patient
P2	A patient with mild systemic disease
P3	A patient with severe systemic disease
P4	A patient with severe systemic disease that is in a constant threat to life
P5	Moribund patient who is not expected to survive without the operation
P6	A declared brain-dead patient whose organs are being removed for donor purposes

Table 2. Interventions in 1072 Patients Submitted to Oral Surgery

Intervention	*No. of cases (%)*
Implants	753 (70.2%)
Bone augmentation	72 (6.7%)
Extractions + implants	47 (4.4%)
Bone augmentation + implants	44 (4.1%)
Cystectomy	30 (2.8%)
Third molar extraction	27 (2.5%)
Extractions (excluding third molar)	23 (2.1%)
Other	76 (7.2%)

The problem is of paramount importance for several reasons: (a) avoidance causes worse oral health and quality of life; (b) high levels of anxiety and phobia may impinge on the dentist/patient relationship, may prevent proper dental treatment, and be a cause of intraoperative complications; and (c) the sympathetic response to stress caused by anxiety may yield harmful reactions, such as vasovagal syncope, hypertension, tachycardia, and cardiovascular accidents. The latter is of paramount importance in patients with increased risk (namely ASA class P2 and higher), where the diagnosis and treatment of dental anxiety becomes essential for patient's safety.

The DAS is the most widely used and validated test for dental anxiety and is available in several European languages. No Italian versions of the DAS are available yet, and, in general, there is a surprising lack of Italian versions of anxiety tests, even though there is no reason to expect a lower anxiety in our patients. It probably depends on 2 different factors: (a) underestimation of the relevance of anxiety assessment in clinical practice; and (b) use of self-made, untested individual translations. Consequently, there is an increasing need

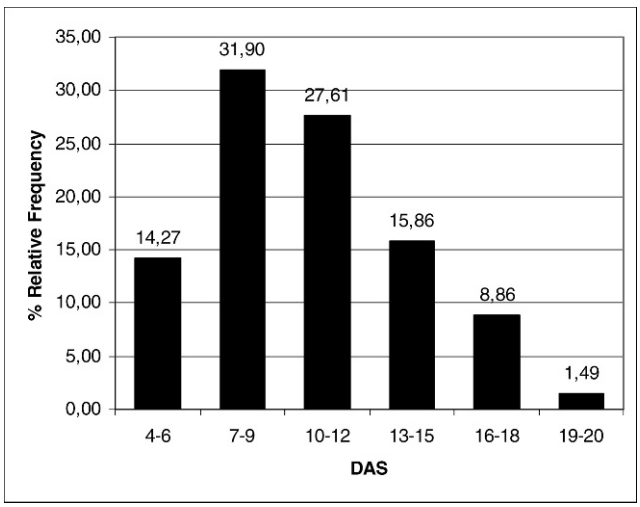

Figure 2. Distribution of Dental Anxiety Scale (DAS) scores in 1072 patients undergoing oral surgery.

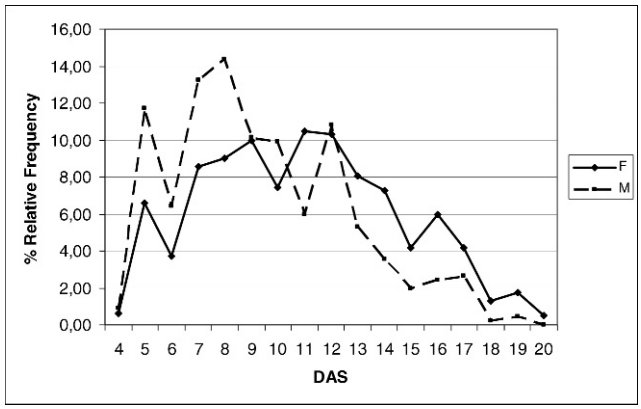

Figure 3. Distribution of Dental Anxiety Scale (DAS) scores in both sexes: female patients show higher levels of anxiety, as defined by the DAS.

for validating Italian translations and adopting standard validated versions, in order to assure comparability of data. Only 1 study on the DAS has been published so far in Italian patients, regarding adolescents only,[35] while no data are available in adults. In this study, several aspects of anxiety (ie, fear as a general reaction to life, dental fear, and anxiety as a personal characteristic) as well as the level of oral hygiene were evaluated in adolescent patients and in high school students, in order to check how dental care affected state and dental anxiety. The patients showed a higher level of anxiety than students (yielded by dental care), with girls significantly more anxious than boys, while a better knowledge of dental hygiene was not enough to decrease anxiety, suggesting the need for specific preventive anxiety care. The Spielberger State Trait Anxiety Test, showed a close correlation with DAS and showed a high level of both state and trait anxiety in this series. The approximate figures of DAS from this study are reported in Table 3 (the exact numbers were not available, since the results were only plotted as a bar graph) and suggest the following remarks: (a) the values of patients look much higher than those reported by Peretz and Efrat[28]; (b) these values reach phobic levels in girls; and (c) the high DAS scores, being associated with a high level of both state and trait anxiety, suggest that the patients were referred to the University hospital because of their anxiety and do not represent a casual sample. Unfortunately, the Italian translation of the DAS was not reported in the study by Daini et al.[35]

The aim of our study was to check the Italian translation of the DAS in a large sample of patients undergoing oral surgery. Our results show that the mean DAS score in an Italian population is in the range of the one reported by published papers from other countries, dealing with patients attending dental clinics; however, it looks slightly higher than the one re-

Table 3. Mean Dental Anxiety Scale Scores in 1072 Italian Patients, Compared With Data From Other Previous Studies in Other Countries

	Year	*Sample*	*Age*	*No. of Cases*	*Men, Mean (SD)*	*Women, Mean (SD)*	*Total (SD)*
Present study		Patients	14–85	1072	9.38 (3.24)	10.96 (3.64)	10.29 (3.55)
Corah[12]	1969	Students		1232			8.89 (2.99)
Corah et al[10]	1978	Students		871	8.76	9.99	9.07
Cohen et al[19]	1982	Students		846	8.44 (2.55)	9.10 (2.87)	8.77 (2.73)
Luyk et al[23]	1987	Patients	Adults	45	8.83 (0.59)	9.50 (0.29)	9.16 (0.47)
Neverlien[24]	1990	Community	15–79	1351	7.23 (3.21)	8.49 (3.68)	7.87 (3.51)
Bedi and McGrath[15]	2000	Community	≥60	973	7.6 (2.90)	9.0 (3.70)	
Peretz and Efrat[28]	2000	Patients	12–18	104	8.64 (3.47)	10.07 (2.89)	9.49 (3.20)
Daini et al[35]*	2005	Students	16–20	84	8	12	10
		Patients			14	18	16
Hagglin et al[21]	2000	Community	65.4†	1008		7.2 0 (3.30)	
Klages et al[22]	2004	Patients	16–62	97			11.40 (4.04)
Udoye et al[25]	2005	Patients	Adults	160	7.16 (3.44)	7.49 (2.96)	
Klages et al[39]	2006	Patients	14–65	90			7.29 (1.45)
Eitner et al[20]	2006	Soldiers	19–54	374	9.08 (NA)‡		9.08 (NA)‡
Erten et al[26]	2006	Patients	>16	1437	7.96 (3.30)	9.52 (4.08)	8.76 (3.80)

* No numeric values were available in this study; therefore, the values of DAS reported here are approximate, being drawn from Figure 4 of the paper.
† Only mean value available.
‡ NA indicates not available.

ported in studies on community. The differences may reflect sample variability, cultural differences across nations, and the likely increase of anxiety when waiting for surgical treatment. According to other reports, the anxiety is higher in female patients and lower in the elderly, while about 25% have high levels of anxiety (DAS>12) and 10% reach phobic levels (DAS>15).

The significant relationship between anxiety and ASA physical status classification shows a new factor involved in dental anxiety, which, to our knowledge, has not yet been identified. Since anxiety may change as a function of experience,[38] dental anxiety may be affected by medical, besides dental, experiences. In fact, patients suffering from chronic systemic diseases are to face the concern for their illness and experience more or less invasive diagnostic and therapeutic medical interventions. All these factors, likewise dental treatments, may increase anxiety. This is a relevant aspect of patient assessment since patients with coexisting systemic diseases are more likely to undergo perioperative complications, which, in turn, may be fostered by somatic reactions yielded by disease-related anxiety. Moreover, the close relationship between ASA physical status classification and the DAS discloses the mutual impact of systemic diseases on dental anxiety and of dental anxiety on systemic diseases, along with the relevance of anxiety assessment in patients belonging to ASA class P2 and P3.

The good consistency between our data and those reported in the literature shows the comparability of data and the reliability of the Italian version of the DAS, supporting its use in the assessment of dental anxiety in Italian patients. The close relationship between DAS and ASA classification of physical status suggests that dental anxiety is affected by medical as well as dental experiences, emphasizing the relevance of anxiety assessment in patients belonging to ASA-PS class P2 and P3. Further studies on the role of coexisting systemic diseases in dental anxiety are required.

Table 4. Relationship Between Dental Anxiety Scale and Age

Age	*No. of Cases*	*Mean*	*SD*	*ANOVA*
14–39	172	10.25	3.01	$F = 5.771$; $P = .003$
40–59	499	10.68	3.54	
>59	401	9.89	3.54	$P = .003$*

* Post-hoc analysis according to Bonferroni tested for age 40–59 vs >59.

CONCLUSIONS

Our data show the reliability of the Italian version of the DAS and support its use in Italian patients. The re-

Table 5. Relationship Between ASA Physical Status Classification and Dental Anxiety Scale Scores

ASA Status	*No. of Cases*	*Mean*	*SD*	*Statistical Analysis*
P1	502	9.69	3.20	
P2	502	10.78	3.70	$F = 14.09$ $P < .001$
P3	68	11.09	4.04	

lationship between DAS and ASA-PS show that dental anxiety is affected by medical, besides dental, experiences, where an increased intraoperative risk is paralleled by increased anxiety.

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