Reliability and validity of a Swedish version of the Oral Health Impact Profile (OHIP-S)

Pernilla Larsson, Thomas List, Inger Lundström, Agneta Marcusson and Richard Ohrbach

Specialistcentrum Oral Rehabilitering, Linköping, Sweden; Department of Stomatognathic Physiology, Malmö University, Sweden; Department of Oral Medicine, University Hospital, Linköping, Sweden; Department of Dentofacial Orthopedics, University Hospital, Linköping, Sweden; Department of Oral Sciences, University at Buffalo, N.Y., USA

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The aim of this study was to translate the Oral Health Impact Profile (OHIP) into Swedish and evaluate the reliability and validity of the Swedish version (OHIP-S). The OHIP is a 49-item, self-administered questionnaire divided into 7 different subscales. The original version in English was translated into Swedish, accompanied by back-translation into English, after which the Swedish version was revised. A total of 145 consecutive patients participated and answered a questionnaire. The patients comprised five clinically separate groups: temporomandibular dysfunction (TMD) ($n = 30$), Primary Sjögren's Syndrome (SS) ($n = 30$), burning sensation and pain in the oral mucosa (oral mucosal pain, OMP) ($n = 28$), skeletal malocclusion (malocclusion) ($n = 27$), and healthy dental recall patients (controls) ($n = 30$). The TMD group and the control group participated in a test–retest procedure. The internal reliability of each subscale was calculated with Cronbach's alpha and found to be high and to range from 0.83–0.91. The stability (test–retest) of the instrument, calculated using the intraclass correlation coefficient, ranged from 0.87 to 0.98. The construct validity of OHIP-S was compared with subscales of the Symptom Check List (SCL-90) (rho 0.65) and the Jaw Function Limitation Scale (JFLS) (rho 0.76) and analyzed with Spearman's correlation coefficient. Convergent validity was evaluated by comparing OHIP with self-reported health using Spearman's correlation coefficient and was found to be acceptable (rho 0.61). In the evaluation of the discriminative ability of the instrument, significant differences were found in the total OHIP-S score between the controls and the other four groups ($P < 0.001$). We conclude that the reliability and validity of OHIP-S is excellent. The instrument can be recommended for assessing the impact of oral health on masticatory ability and psychosocial function. ☐ *Orofacial function; oral health; oral-health-related quality of life; reliability; validity*

Pernilla Larsson, Specialistcentrum Oral Rehabilitering, Torkelbergsgatan 11, SE-581 85 Linköping, Sweden. Tel. +46 13 228850, fax. +46 13 228847, e-mail. Pernilla.Larsson@lio.se

Orofacial function and health are important aspects of an individual's general health and quality of life (1). Instruments for measuring levels of oral-health-related dysfunction, disability, and discomfort have been developed (2).

Orofacial function and health are important aspects of a person's well-being; any impairment will influence not only masticatory function but also psychosocial functioning. Pathophysiologic changes in the system lead to impairment and limitation in function, which appear in different ways depending on the underlying causal link. For example, speech difficulties are a known problem among xerostomic patients. So also are difficulties in chewing among edentulous denture wearers with seriously resorbed jaws, or limited jaw opening among patients with pain from the temporomandibular joint.

Problems in opening and chewing are functional limitations that commonly lead to psychosocial limitations such as avoiding having dinner with the family or difficulty in feeling comfortable with other people. In other words, disturbances in the masticatory system lead to reduction in the quality of life (1–4).

Several self-report scales have been developed and used in studies to measure limitation in orofacial function (5, 6) and orofacial quality of life (7). One problem with these instruments is the structure and formulation of the questions, e.g. the items do not fully cover the domains they represent, which means that poor content validity or data on reliability have not been presented.

The Jaw Function Limitation Scale (JFLS) was recently developed to address these problems (8). In contrast to the other scales, it focuses only on limitation in orofacial function, and reliability was found to be excellent. The items are related to behaviors, for example chewing tough food and opening the mouth wide enough to talk, and is scaled according to the Rasch measurement model. The scale is tailored to daily activities, so that functional limitation can be related to normal jaw function in everyday life.

In other research, attempts have been made to develop measures of quality of life that are specific for a certain illness or disease and that can be used to evaluate the effects of oral illnesses and diseases. Of the several instruments developed, each has its own profile. Strauss & Hunt (9) designed the Dental Impact Profile, which contains 25 items regarding how patients evaluate their oral health.

The General Oral Health Assessment Index (GOHAI),

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originally named Geriatric Oral Health Assessment Index, was developed for use in older adult populations (10). It measures patient-reported oral functional issues and includes psychosocial impacts (11). The Dental Impact on Daily Living (DIDL) includes five subscales with items associated with daily activity (12).

Locker (13) created an explanatory model linking oral illnesses and diseases with biological, behavioral, and psychosocial consequences. This conceptual model is based on the World Health Organization (WHO) document 'the WHO International Classification of Impairments, Disabilities, and Handicaps' (14). Many subsequent specific measures of oral health refer to Locker's work (13).

With Locker's conceptual model (13) as a base, Slade & Spencer created and validated the OHIP (2). Based on interviews with 64 Australian dental recall patients, 535 statements describing the consequences of different oral diseases and conditions were constructed. After further analysis, 49 items divided into 7 subscales were selected. The subscales are functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The validity and reliability of the original English version of the OHIP has been evaluated in epidemiological and cross-cultural studies (2, 15–17).

The aim of this project was to translate the Oral Health Impact Profile instrument into Swedish and to evaluate the reliability and validity of the Swedish version of the OHIP.

Materials and methods

Subjects

One-hundred-and-forty-seven consecutive patients were recruited on the basis of five diagnostic categories: temporomandibular dysfunction (TMD) ($n = 30$), primary Sjögren's syndrome (SS) ($n = 30$), burning sensation and pain in the oral mucosa with or without lesions (oral mucosal pain) (OMP) ($n = 28$), skeletal malocclusion (malocclusion) ($n = 27$), and healthy recall patients (controls) ($n = 30$).

This study was performed between November 2001 and April 2002 at the Departments of Oral Medicine and Dentofacial Orthopedics of the University Hospital in Linköping and the Specialist Centre for Oral Rehabilitation and the Public Dental Service (PDS) clinic at Torkelberg in Linköping, Sweden. The local ethics committee approved the study and all individuals gave their informed consent in accordance with the Helsinki Declaration.

Inclusion criteria: The patients with primary SS fulfilled the Copenhagen (18) and San Diego (19) classification criteria for primary SS as well as the criteria recently proposed by the American–European Consensus Group (20). The patients in the OMP group had pain and burning symptoms in the oral mucous membrane, with or without a diagnosis of oral Lichen Planus of either atrophic or erosive type. The patients in the Malocclusion group had severe skeletal malocclusions, composed mostly of anterior open bite, and had been referred for either orthognathic surgery or a combination of surgical and orthodontic treatment. The TMD patients had received a TMD pain diagnosis according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) (6). In the healthy patient group, all were enrolled as recall patients at the same PDS clinic.

Exclusion criterion: For all patient groups besides the TMD group, a TMD pain diagnosis excluded study participation.

Design

The original English version of the OHIP was translated by a researcher with experience in the subject field. The Swedish and English versions were reviewed by three researchers, independently of each other, concerning understanding and semantics. Subsequently, a back-translation—from Swedish to English—was done by a translator who had no knowledge of the instrument or access to the original version in English. The back-translation was independently reviewed and corrections in the Swedish translation were made after consensus had been reached on each item. In the Swedish version, the basic item was modified so that the masticatory system was also a part of the wording. This change was approved by the authors of the original version. The OHIP-S is available from the authors.

Following a clinical investigation at their home clinic, consecutive patients were asked to answer the self-administered questionnaire. A dental surgery assistant was available to help if any item was unclear. The TMD group and the healthy control group completed the OHIP questionnaire on 2 occasions with a 1–2-week interval in a test–retest process to evaluate the reliability.

Variables

Oral Health Impact Profile: The OHIP was specifically designed to measure the oral health effects on psychosocial well-being (2). This instrument was used to quantify the quality of life. OHIP is a questionnaire that contains 49 statements organized in seven domains. These are: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap.

The initial statement in the English version is as follows: 'How often in the last year have you experienced the following situations because of problems with your teeth, mouth or dentures?' The question was slightly modified in this study so that the masticatory system was also involved: 'How often in the last year have you experienced the following situations because of problems with your teeth, mouth, dentures, *or jaws*?' Response options are 0 = never, 1 = hardly ever, 2 = occasionally, 3 = fairly often, 4 = very

often, or not applicable. Higher scores presumably indicate a more serious problem.

Jaw Function Limitation Scale (JFLS): This scale comprises nine items tailored to reflect daily activities related to normal jaw function: for example, chewing hard bread and opening the mouth to bite into an apple. The degree of pain and discomfort in carrying out the activity was scored on a 0–3-point scale for this study with the endpoints 'no limitation' and 'extreme limitation'. Excellent reliability has previously been reported for the scale (8).

The Symptom Check List (SCL-90): This self-administered questionnaire is used to assess psychosocial health. In this study, a shorter version of the SCL-90 was used, comprising 32 items, 20 of which are related to depression and 12 to somatization (6). Subscales in the SCL-90 are created as summary scores of the respective item, and that score is often construed to represent a subscale in the measure of psychopathology.

Self-reported health: The patients were asked to rate their current overall health on a 4-point scale: poor, fair, good, and excellent.

Statistical analyses

A mean and standard deviation was calculated for each variable. The internal consistency reliability of the OHIP-S was calculated with Cronbach's alpha and test–retest reliability with the intraclass coefficient (ICC). Validity between subscales in the OHIP, the SCL-90, and the JFLS was made using Spearman's correlation coefficient rho. Convergent validity was evaluated with Spearman's correlation coefficient by compairing OHIP and self-reported health. Comparisons between groups were made using analysis of variance (ANOVA).

Results

One-hundred-and-forty-seven consecutive patients were included in the project. Two dropped out, one in the TMD group and one in the SS group. The TMD patient did not return the questionnaire within the stipulated time and the SS patient was unable to complete the tasks in the study because of serious illness.

Table 1 illustrates the distribution of the subjects according to number, gender, and age in each group. The patients in the malocclusion group are younger than in the other groups. In the TMD, SS, and OMP groups a majority of the patients were female, whereas in the other groups the distribution between the genders was more even.

The internal reliability within the subscales of the OHIP-S was calculated with Cronbach's alpha and varies between 0.83 and 0.91 (Table 2). The subjects in the TMD and the control groups completed their questionnaire on two occasions with an interval of 1–2 weeks. The test–retest reliability was evaluated with the ICC and the results varied between 0.87 and 0.98 (Table 2).

Mean values and standard deviations for the diagnostic groups are presented for each of the subscales in Table 3. Overall, the TMD group, followed by the OMP group, exhibited most limitations in the subscales in OHIP-S. The TMD and OMP patients exhibited higher scores for the subscale physical pain compared with the other groups. In the analysis of the discriminate validity of the instrument, we found significant differences ($P < 0.001$) between the total OHIP scores in the control group and the TMD, the SS, and the OMP groups. The difference between the control group and the Malocclusion group was also significant ($P = 0.003$).

Construct, which includes convergent validity, was analyzed using a correlation analysis with Spearman's rho. The subscales psychological discomfort and psychological disability in the OHIP-S were correlated (rho = 0.65) with the subscale of depression and somatization in the SCL-90. Concerning masticatory function, the OHIP-S subscale of functional limitation was compared with the JFLS (rho = 0.59). When the items that are more specifically associated with aspects of masticatory function were separated out from the OHIP-S and analyzed for correlations with the JFLS, the rho increased to 0.76. A correlation of 0.61 was found between the total score of OHIP-S and self-reported health.

Discussion

The patients in the study were consecutive participants from dental specialist clinics or a PDS clinic. The five different treatment groups were selected to represent varying orofacial dysfunctions in the masticatory system. The age and gender distribution in the different groups in

Table 1. Distribution of participants according to gender and age in the five groups

	TMD	SS	BMS	Mal-occlusion	Controls
No. of individuals	29	29	28	27	30
Gender					
Men	6	3	9	12	16
Women	23	26	19	15	14
Age					
Mean	42.4	61.0	56.7	28.3	44.4
SD	15.0	12.6	14.0	11.4	14.0

Table 2. Internal reliability/internal consistency reliability and test–retest reliability for each of the seven domains in the OHIP-S

Subscale	Internal reliability (α)	Test–retest (ICC)
Functional limitation	0.87	0.95
Physical pain	0.90	0.96
Psychological discomfort	0.88	0.94
Physical disability	0.89	0.97
Psychological disability	0.91	0.93
Social disability	0.83	0.87
Handicap	0.89	0.98

Table 3. Mean and *s* for each group in the seven subscales of OHIP-S

Domain	TMD	SS	OMP	Malocclusion	Controls
Functional limitation	8.3 ± 7.0	9.6 ± 6.7	10.8 ± 7.3	10.8 ± 6.7	2.6 ± 3.1
Physical pain	15.4 ± 5.8	9.8 ± 7.7	15.6 ± 7.3	8.0 ± 5.6	3.3 ± 4.2
Psychological discomfort	7.4 ± 4.2	5.6 ± 5.3	7.4 ± 5.4	6.9 ± 4.7	1.0 ± 1.4
Physical disability	6.4 ± 6.4	5.4 ± 5.2	8.9 ± 6.5	5.3 ± 4.1	0.6 ± 1.7
Psychological disability	10.3 ± 5.6	5.9 ± 5.4	8.0 ± 6.4	5.2 ± 4.7	0.6 ± 1.6
Social disability	5.6 ± 4.2	3.2 ± 2.8	3.5 ± 3.0	2.4 ± 2.7	0.6 ± 1.4
Handicap	7.6 ± 6.7	5.1 ± 4.7	5.8 ± 4.7	2.5 ± 3.3	0.6 ± 1.8

s = standard deviation.

this study correspond to the distributions reported in other studies (21–23). The patient groups SS, OMP, and TMD contained more women than men, which is in accordance with other population- and clinical-based studies (22, 23). Severe malocclusions are usually treated in young adult age after growth is finished, which explains why the mean age in this group was substantially lower than in the other groups (24). Two drop-outs in a study population of 145 is low and will not affect the results of the statistical analysis.

Several studies discuss linguistic and cross-cultural adaptation of tools that measure self-reported oral health (16, 17). A rigorous translation procedure is necessary before the translation of an oral health-related quality of life instrument can be used in a scientific study.

The translation of the original English version of the OHIP, in our study, was done according to the guidelines proposed by Guillemin et al. in 1993 (25). The process aimed not only to translate the words in the questionnaire but also to ensure semantic and conceptual agreement between the original and the translated versions. Different linguistic and social cultures may give the same words different meanings and values.

Allison et al. (16) describe how the OHIP was translated into French and used in a cross-cultural, comparative study between a French-speaking population in Quebec, Canada and an English-speaking one in Ontario, Canada. Almost the same translation procedure was used in this study, and they reported a reasonable degree of cross-cultural consistency between the two versions of the OHIP. Recently, a German version of the Oral Health Impact Profile (OHIP-G) was developed and tested for discriminative and evaluative psychometric properties (17). The authors propose this version to be suitable for cross-sectional and longitudinal studies.

Although the items of the OHIP are a result of interviews with dental recall patients, most of the items are of prosthodontic concern. In our translation, the basic instruction was modified to include jaw function. This was done to broaden the OHIP-S instrument to target issues not just related to mouth and teeth but also to include the jaw and thereby overall masticatory function.

Previously published clinical studies in which the OHIP was used have investigated patients with prosthetic problems—such as how edentulousness affects the individual (26) or how implant placement changes the individual's health-related quality of life compared with conventional denture treatment (27, 28). When our study was planned, we were unable to create a homogeneous subgroup of patients with a need for prosthetic treatment. Our focus in this study was to evaluate if OHIP-S could be used reliably in patients with different pathophysiological mechanisms underlying their disorder.

Slade et al. (29) have proposed that a disease-specific scale can be used to advantage in combination with a generic measuring instrument; for example the 36-item short form (SF36) in the quantification of health-related quality of life. This was examined by Allen et al. (15), who compared the validity of the generic quality of life meaure (SF-36) with the validity of the disease-specific one (OHIP) in an evaluation of oral health-related quality of life. The ability of the SF36 to discriminate between clinically separate patient groups was found to be low. OHIP, on the other hand, was found to have good discriminant validity, which underlined the need to use a disease-specific quality of life as well as a generic quality of life measure.

Recently, another comparative study was published where a short version of the Oral Health Impact Profile (OHIP-14) was compared with the GOHAI as a measuring instrument for health-related quality of life (30). The study population comprised medically compromised older individuals whose predominant oral problems were tooth loss and xerostomia. Both instruments were found to have good discriminative validity. GOHAI places more emphasis on functional limitations, pain, and discomfort, while OHIP-14 focuses more on the psychological and social aspects of oral health.

A Chinese version of the OHIP developed for use among elderly people in Hong Kong has been reported. Good construct validity was found for this version by comparison OHIP-49 with perceived oral health status and subject's perceived dental treatment need (31).

In our study, where the subject material comprised five separate groups, we chose to use two disease-specific measures and a self-reported oral health measure to evaluate the validity of the OHIP-S. Since there is no 'gold standard' for measuring orofacial functional limitation, we did not have one instrument with which to compare all the domains of the OHIP-S. The difficulty in this validation process is a limitation of the study.

The JFLS is a specific measure of oral function that very concretely relates items based on common behaviours, such as opening the mouth wide to eat an apple and chewing tough food (8). The questions in the OHIP-S concerning jaw function showed a moderate correlation with the JFLS. When the OHIP-S questions that specifically concerned opening the mouth wide, chewing, and closing the mouth were extracted from the instrument and compared with the JFLS, the correlation improved. An explanation for this improvement could be that the OHIP-S items are more associated with prosthetic problems than with TMD.

The two OHIP-S subscales that cover the psychological constructs—psychological discomfort and psychological disability—were compared with the SCL-90 subscales Depression and Somatization. A moderate correlation was found, which indicates that OHIP-S has acceptable convergent validity concerning these domains of the instrument. SCL-90 is broadly used in psychiatry and has been shown to have good validity (32).

Good validity has been found between OHIP and self-reported oral health (17, 30). In our study, the convergent validity of all subscales of the OHIP-S showed moderate correlation to the patients' self-reported health.

The reliability of the first version of the OHIP was evaluated in two ways (2). The reliable internal consistency was calculated with Cronbach's α in an interview survey of a cohort of randomly sampled non-institutionalized individuals over 60 years in South Australia. The stability of the instrument was calculated using an ICC based on a repeated administration of the OHIP in a subgroup of the senior cohort. The stability in the pattern of response was found to be good or excellent, except in the social disability domain.

In the same study, Slade & Spencer (2) demonstrated that the original version of the OHIP had good internal reliability in six of the seven subscales. The handicap subscale had a substantially lower Cronbach α. Our results indicate that all the subscales in the OHIP-S have good internal reliability when used with individuals with orofacial functional limitations of different sorts. In the TMD group, and in the control group, the stability of the instrument was evaluated in a test–retest process. The high ICC's for all the OHIP-S subscales indicate that the instrument is reliable.

All groups differed significantly from the healthy group, which implies that the OHIP-S has discriminant validity. Overall, the TMD and the OMP groups showed more limitations in the different subscales. The characteristic symptom of both groups is pain. This is in line with other studies where TMD was found to be a diagnostic group which exhibited most impact on quality of life (1). The finding in this study, as well as in others, suggests that pain per se has a profound influence not only on oral function but also on the individual's well-being (4, 6).

The reliability of the OHIP-S appears to be good and the validity acceptable. The instrument can differentiate between groups of patients with different kinds of functional limitation and healthy individuals. We recommend use of the OHIP-S in future studies.

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