

COMPARISON OF EROSION AND PERIODONTAL INDICES IN PATIENTS WITH AND WITHOUT GASTROESOPHAGEAL REFLUX DISEASE

A. Khorsand¹, M. Farahwash², S. Mirmomen³ and S. Razavi³

1) Department of Periodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

2) Department of Gastroenterology, Imam Khomeini Hospital, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

3) Resident in Department of Pedodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract- Gastroesophageal reflux disease (GERD) is a systemic disease with intraoral manifestations. The aim of this study was to compare erosion (Loss of tooth structure due to a chemical process without bacterial cause) and periodontal indices including: calculus index (CI), plaque index (PI), gingival index (GI), clinical attachment level (CAL) and probing pocket depth (PPD) in patients with GERD and in non GERD subjects that was done in 2002 in Imam Khomeini Hospital, 35 Patients with GERD (test group) and 35 subjects without GERD (Control group) were selected randomly for this study. Statistical analysis for comparing differences between the test and Control groups were Performed using chi square and Fisher exact test. The results showed that the prevalence of erosion was significantly higher in test group (14.3% GERD, 62.9% non GERD). There was also a significant difference in GI, PI, CI and PPD between test and control groups. CAL did not show any significant difference between the two groups. Also *Helicobacter pylori* was significantly higher in test group (80% test, 54% control group). According to the results, communication between dentist and internist leads to diagnosis and control of GERD, and prevents changes of teeth and periodontal structures.

Acta Medica Iranica, 43(6): 422-424; 2005

Key words: Erosion, periodontal indices, gastroesophageal reflux disease

INTRODUCTION

The term "reflux esophagitis" was first described in 1946 to explain the reflux of irritant fluids from stomach to esophagus. The term gastroesophageal reflux disease (GERD) used to describe persons with clinical signs or histopathologic changes due to repeated course of GERD (1).

Relation between gastrointestinal disorders and erosion of teeth was reported for the first time by

Bargon and Austin in 1973 in a patient with chronic vomiting. Reflux and acid mainly affect the palatal aspect of maxillary incisors but repeated reflux can lead to involvement of other teeth (2). Prevalence of erosion [loss of tooth structure during a chemical process without bacterial intervention (3)] has been reported to be from 5 to 42% in healthy populations but prevalence of erosion in patients with bulimia is higher (69%) (4, 5). All of the studies showed erosion in maxillary anterior teeth. There is not any report about soft tissue changes related to GERD (6). Only one study reported significant gingival changes in patients with GERD (7). The purpose of the present study is to compare the erosion and periodontal indices between patients with and without GERD.

Received: 7 Feb. 2004, Revised: 21 Nov. 2004, Accepted: 21 Aug. 2004

*** Corresponding Author:**

A. Khorsand, Department of Periodontics, School of Dental, Tehran University of Medical Sciences, Tehran, Iran
Tel: +98 21 66402640-2211
Fax: +98 21 88986688
E-mail: a_afshin_khorsand@yahoo.com

MATERIALS AND METHODS

A total of 70 subjects who attended the Gastroenterology Department of Imam Khomeini Hospital were included in this study. According to the internist's diagnosis based on patients' signs and symptoms, clinical examination and endoscopy, 35 subjects with GERD (test group) and 35 subjects without GERD (control group) were selected. Factors such as age, sex, tooth brushing and the frequency of eating sour foods were matched in test and control groups.

Exclusion criteria for selecting subjects in this study were: pregnancy, systemic diseases (epilepsy, anemia, diabetes mellitus, hepatitis), intake of alcohol, smoking and using drugs such as antibiotics and corticosteroids that could interfere with the condition of periodontal tissues. All of subjects were examined for *Helicobacter pylori* during endoscopy and all of the subjects must have had a minimum of 8 teeth in mouth. Presence or absence of erosion and the plaque index [(PI) (Silness and loe)], gingival index [(GI) (Silness and loe)], calculus index [(CI) (Ramfjord)], probing pocket depth (PPD) and clinical attachment level (CAL) in first molars and incisors of upper and lower jaw were measured by means of mouth mirror and William's periodontal probe (8). In the absence of above mentioned teeth, neighboring tooth was examined.

Statistical analysis for comparing differences between the test and control groups was performed using Chi square and Fisher's exact test.

RESULTS

In present study prevalence of erosion in test group was higher (62.9%) than the control group (14.3%) (Table 1). There was a statistically significant difference in CI, PI, GI and PPD between test and control groups, but CAL showed no difference between the two groups (Table 2).

Table 1. Prevalence of erosion in test and control groups*

Erosion	Case	Control	Total
No	13 (37.1)	30 (85.7)	43 (61.4)
Yes	22 (62.9)	5 (14.3)	27 (38.6)
Total	35 (100)	35 (100)	70 (100)

*Significant was obtained from χ^2 and Fisher's exact test $P = 0.000$.

Table 2. Periodontal indices in test and control groups

Index	Control	Test	P value
GI	0.5067±0.2657	0.7485±0.8600	0.000*
PI	0.4938±0.7900	0.6380±1.5057	0.000*
CI	0.6427±0.3057	0.8539±1.1271	0.000*
CAL	0.3138±2.0514	0.5397±2.1629	0.295
PPD	0.5488±1.9629	0.4785±2.2571	0.000*

Abbreviations: GI, gingival index; PI, plaque index; CI, calculus index; CAL, clinical attachment level; PPD, probing pocket depth.
* Significant.

Evaluation of *H. pylori* in test and control groups revealed higher prevalence of this organism in the stomach of test group (80%) in comparison to control group (54%) (Table 3).

DISCUSSION

Prevalence of GERD in developed countries is much more than what had been believed in the past. It is estimated that near 70% of adults suffer from GERD every day and more than 30% suffer from GERD every now and then.

All of the patients do not have any sign but sometimes erosion may be the first sign of GRED (9). Palatal aspect of maxillary teeth has been most severely affected area in all of the studies (4) but evaluation of oral mucosa has revealed only non specific symptoms such as sensitivity of tongue or other oral mucosa, burning sensation of mouth and oral ulcers (10).

Only one study reported periodontal findings. In that study, calculus was greater in healthy individuals but the difference was not statistically significant. The author suggested that lower calculus in GRED subjects is related to better oral hygiene in GRED group due to foul and acidic taste of mouth in relation to reflux (7).

Table 3. Prevalence of *H. Pylori* in test and control group*

<i>H. Pylori</i>	Control	Test	Total
No	19 (46)	7 (20)	26 (37)
Yes	16 (54)	28 (80)	44 (63)
Total	35 (100)	35 (100)	70 (100)

*Significant was obtained from χ^2 test (P value=0.003).

Periodontal indices in patients with GERD

One of the major findings of our study is that the test and control groups were matched for tooth brushing, age, sex and frequency of taking sour foods, but PI, CI, GI and PPD were significantly higher in test (GRED) group.

CAL showed no significant difference between test and control groups. Higher prevalence of erosion in test group is in accordance with previous studies (1, 4, 6, 8). Another important finding of our study is higher prevalence of *H. pylori* in test group. According to possible relation between periodontal infection and *H. pylori* (11) and higher periodontal indices in our study it is possible that recurrence of reflux to the oral cavity that contains *H. pylori* leads to reaction with oral flora and in the presence of local factors such as plaque acts as a predisposing factor for periodontal disease.

To confirm the relationship between GRED and periodontal changes additional long term studies with greater number of subjects need to be performed to verify the real impact of GRED in the initiation and development of periodontal changes. Direct communication between dentist and internist is very important for diagnosis and treatment of GERD and periodontal changes.

REFERENCES

1. Feldman M, Friedman LS, Sleisenger MH, Scharschmidt BF, editors. Sleisenger and Fordtran's Gastrointestinal disease. 7th edition. Philadelphia: Saunders; 2002.
2. Bartlett DW, Evans DF, Smith BG. The relationship between gastro-oesophageal reflux disease and dental erosion. *J Oral Rehabil.* 1996 May; 23(5):289-297.
3. Shaw L, Smith AJ. Dental erosion--the problem and some practical solutions. *Br Dent J.* 1999 Feb 13; 186(3):115-118.
4. Gregory-Head BL, Curtis DA, Kim L, Cello J. Evaluation of dental erosion in patients with gastroesophageal reflux disease. *J Prosthet Dent.* 2000 Jun; 83(6): 675-680.
5. Gudmundsson K, Kristleifsson G, Theodors A, Holbrook WP. Tooth erosion, gastroesophageal reflux, and salivary buffer capacity. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1995 Feb; 79(2):185-189.
6. Meurman JH, Toskala J, Nuutinen P, Klemetti E. Oral and dental manifestations in gastroesophageal reflux disease. *Oral Surg Oral Med Oral Pathol.* 1994 Nov; 78(5):583-589.
7. Katunarić M, Jukić S, Staudt-Skaljac G, Mehulic K, Komar D. Some periodontological parameters in patients with oesophagogastric passage insufficiency. *Coll Antropol.* 1998 Dec; 22 Suppl:199-203.
8. Carranza FA, Newman MG. Clinical periodontology. 8th Ed. Philadelphia: W.B Saunders Com; 1996. p. 61-70.
9. Dodds AP, King D. Gastroesophageal reflux and dental erosion: case report. *Pediatr Dent.* 1997 Sep-Oct; 19(6): 409-412.
10. Lazarehik DA, Filler SJ. Dental erosion: predominant oral lesion in gastroesophageal reflux disease. *Am J Gastroenterol.* 2000 Aug; 95(8 Suppl):S33-38.
11. Dye BA, Kruszon-Moran D, McQuillan G. The relationship between periodontal disease attributes and *Helicobacter pylori* infection among adults in the United States. *Am J Public Health.* 2002 Nov; 92(11):1809-1815.

VALIDATION OF THE PERSIAN VERSION OF THE BRIEF PAIN INVENTORY

S. M. Mirzamani¹, A. Sadidi², S. H. Salimi¹ and M. A. Besharat²

1) Department of Psychology, Baqiyatallah Medical Sciences University, School of Medicine, Tehran, Iran

2) Department of Neurosurgery, Baqiyatallah Medical Sciences University, School of Medicine, Tehran, Iran

Abstract- Any pain relief program must include adequate measurement and assessment of pain. The brief pain inventory is a comprehensive instrument for pain assessment in different countries. The Persian version of the brief pain inventory (BPI-P) is the first pain related questionnaire that is validated in Iran. Aim of this study was to validate BPI-P. From October 2001 to September 2002 a total of 118 pain outpatients completed the BPI-P. Similar to the original version of the BPI, factor analysis for the Persian version showed a common factor for pain intensity and a second factor for pain-related interference with a function comparative fit index of 0.86 confirming this model. Comparing the validity and reliability of the BPI-P with the original one confirmed that the BPI-P had the appropriate psychometric data.

Acta Medica Iranica, 43(6): 425-428; 2005

Key words: Brief pain inventory, pain assessment, pain intensity

INTRODUCTION

In Diagnostic and Statistical Manual of mental Disorders, 4th ed. (DSM-IV) pain disorder is classified under somatoform disorders (1). In DSM-IV it is mentioned that "the essential feature of pain disorder is pain that is the predominant focus of the clinical presentation and is of sufficient severity to warrant clinical attention (Criterion A)".

The pain is often severe enough to impair ability to function (2, 3). Pain is a subjective sensation, and pain assessment ideally should not rely on a single question. Questionnaires for a comprehensive evaluation of pain syndromes have been developed, but patients with severe pain may not be able to use these instruments. To meet the need for an instrument

to obtain estimates of pain prevalence and severity, the brief pain inventory (BPI) was developed to be easily administered to large numbers of patients (4, 5).

The brief pain questionnaire was first developed by Duat *et al.* (6) and then it was revised by Cleland (5).

It was constructed as a compromise between the desire to assess as much as possible and the need to limit respondent burden. It is brief, self-administered and easily understood. The BPI contains questions on pain intensity and on pain-related interference with function. Validation of the BPI in different languages consistently demonstrated these two common factors (7, 8). In addition, the patient enters his pain localization on a body drawing and can give details of his current medication. The BPI has been validated in several languages and has become established as a standardized instrument for multinational studies (9-12). Up to now, no validated Persian version has been published. Aim of this study was to validate Persian version of the BPI (BPI-P).

Received: 22 Dec. 2004 Revised: 25 Kam' 2005, Accepted: 14 Feb. 2005

*** Corresponding Author:**

M. Mirzamani, Department of Psychology, Baqiyatallah Medical Sciences, School of Medicine, Tehran, Iran
Tel: +98 9121169771
Fax: +98 21 88037561
E-mail: mirzamani2003@yahoo.co.uk

MATERIALS AND METHODS

Subjects

From a total of 122 eligible patients, 118 were available for evaluation in this study. They had referred to Baqiyatallah hospital to make an appointment with us. Among the 4 excluded patients, 2 were too ill to be interviewed and 2 refused to be interviewed. Among those participated in the study who had pain disorder and were seeking treatment, 60 (51%) were female and 58 (49%) were male. They were aged from 15 to 70 years (mean, 36.5; SD, 9.82). The patients were interviewed during the period from Oct 2001 to Sep 2002 at Baqiyatalla Hospital, Tehran.

Instrument

The original version of the BPI was translated to Persian and then back to English by another translator, who had not seen the original version. This retranslated version was compared to the original, and minor modifications made. After the second retranslation, an almost complete agreement was reached. The final version was established in consultation with the translators.

Brief Pain Inventory

The BPI-P measures both pain intensity and interference of pain with the patient's life. It also queries the patient about pain relief, pain quality, and patient perception of the cause of pain. In the BPI, 0-10 scales are used for subject ratings. These scales have demonstrated their utility across cultures (13), and are easy to understand. Eleven-point rating scales maximize the trade-off between subject's ease of responding and increasing reliability with longer scales (14). The BPI takes only about 15 minutes to complete and results are comparable whether self administered or administered by an interviewer. The BPI was designed to be easily understood and required minimal explanation so that it could be used with large number of patients.

The pain severity items on the BPI are presented as horizontal lines of numbers, with 0 means no pain, and 10 means pain as bad as you can imagine. The BPI requires patients to rate their pain at the time of responding to the questionnaire (pain now),

and also at its worst, least, and average ratings over the previous week. The ratings can also be made for the last 24 hours. The design of the study will dictate the most appropriate time period to rate. For analysis, the pain worst rating can be chosen to be the primary response variability. Alternatively, these ratings can be combined to give a composite index of pain severity (8).

The BPI also includes 7 items on which patients separately rate, using the same type of scales, how their pain interferes with enjoyment of life, activity, walking, mood, sleep, work and relations with others. These items are bounded by 0 = does not interfere and 10 = interferes completely with the other. The mean of these scores can be used as a pain interference score. Median time for completion of the BPI is 10 minutes.

Procedure

At the time of making an appointment to see a doctor, the subjects have been asked to point to the number in the pain severity and interference scale. At the time of visiting the doctor (about 7 to 10 days later), again they have been asked to point to the number in the pain severity and interference scale to assess test-retest reliability.

Statistics

Validity of the BPI was established with factor analysis, using a principal axis factor (PAF) solution with direct oblimin rotation. In assessing convergent validity correlation coefficient calculated between pain had interference of pain in their life.

Test-retest reliabilities of each of the 2 scales of BPI-P were evaluated by calculating the intraclass correlation coefficient (ICC) for ordinal measures (15, 16). $ICC \geq 0.70$ were considered to support acceptable test-retest reliability (16).

RESULTS

To assess the test-retest reliability, the ICC for each item and each scale were calculated separately. The test-retest reliability was acceptable for two scales (0.89). In terms of individual items, all items were acceptable (between 0.75-0.87). Also,

Coefficient alphas were calculated separately for the four pain intensities and the seven interference items. Coefficient alphas for the pain interference and intensity shows coefficient alphas of 0.89 for the interference scale and 0.88 for the severity scale. These coefficients are comparable to other language versions of the BPI (5, 9-13). In assessing convergent validity, we found that patients with more pain had more interference of pain in their life (correlation coefficient = 0.63, $P < 0.01$). Confirmatory factor analysis was primarily used to examine construct validity. This was examined by a PAF solution with direct oblimin rotation. The result of the factor loadings of the 11 items on these two factors showed that seven pain interference items and "most severe pain" item made up the first factors which were extracted.

DISCUSSION

Compared to other instruments, the BPI offers many advantages. It is short and simple, has been validated in several languages, and contains few descriptive words, so translation is facilitated. The McGill Pain Questionnaire (MPQ) has been translated to more languages than the BPI, but translation of the descriptive words of the MPQ is not without pitfalls (10). The BPI does not need complicated procedures for evaluation. Single items such as worst pain intensity provide valuable information that is easily accessible for the concerned physician (10). A validated Persian version of the BPI had not been available until now.

The data from our validation fit in with those of other countries. Correlation coefficients of the factors did not differ from those of other countries (5, 9-16).

Reliability of a test instrument depends not only on correlation coefficients, but also on test-retest stability. In our study, patients completed the BPI before and after consultation in our outpatient clinic, with at least 7 days between test and retest. Correlation coefficients for pain intensity and interference did not change. It may be assumed that the BPI shows sufficient reliability and validity for clinical practice.

As content validity was predefined by the original version of the BPI, we looked more closely at other aspects of validity. Construct validity was confirmed with the factor analysis, as discussed above.

We did not use the BPI for longitudinal evaluation in our study, and therefore cannot offer conclusions about the sensitivity of the BPI to changes of the analgesic or to long-term stability of the instrument. We also did not use the pain management index (PMI) in our study. This index is derived from pain severity and analgesic medication and has been proposed as a measure for the adequacy of the analgesic therapy (8, 17). The PMI can be used to measure the health care providers' response to the patients' pain. It has been criticized recently (10), as it is not suited to evaluate the adequacy of the analgesic therapy of individual patients. The PMI considers only the type of analgesic, but not dosage or application. As the use of the PMI has been described extensively for developed countries and in pain management units (10), we did not calculate the PMI for our patients.

In summary, validity and reliability of the Persian version of the BPI was comparable to the original version. Test-retest stability was high. Patients found the BPI easy to complete and took only a short time for completion. Further research is needed to differentiate the impact of pain-related and disease-related interference with function on the items of the BPI, and to evaluate the usefulness of the BPI for longitudinal evaluation and for patients with cognitive impairment. For clinical practice, an algorithm for the evaluation of questionnaires with missing values for single items would be useful.

REFERENCES

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders, 4th ed. Washington DC: American Psychiat Association; 1994. p. 445.
2. Daut RL, Cleeland CS. The prevalence and severity of pain in cancer. *Cancer*. 1982 Nov 1; 50(9):1913-1918.
3. Cleeland CS, Gonin R, Hatfield AK, Edmonson JH, Blum RH, Stewart JA, Pandya KJ. Pain and its treatment in outpatients with metastatic cancer. *N Engl J Med*. 1994 Mar 3; 330(9):592-596.

Validation of the BPI-P

4. Cleeland CS. Pain assessment in cancer. In: Osoba D, editor. *Effect of cancer on quality of life*. Boca Raton: CRC Press; 1991.
5. Cleeland CS, Ladinsky JL, Serlin RC, Nguyen CT. Multidimensional measurement of cancer pain: comparisons of US and Vietnamese patients. *J Pain Symptom Manage*. 1988 Winter; 3(1):23-27.
6. Daut RL, Cleeland CS, Flanery RC. Development of the Wisconsin Brief Pain Questionnaire to assess pain in cancer and other diseases. *Pain*. 1983 Oct; 17(2):197-210.
7. Cleeland CS, Nakamura Y, Mendoza TR, Edwards KR, Douglas J, Serlin RC. Dimensions of the impact of cancer pain in a four country sample: new information from multidimensional scaling. *Pain*. 1996 Oct; 67(2-3):267-73.
8. Cleeland CS, Ryan KM. Pain assessment: global use of the Brief Pain Inventory. *Ann Acad Med Singapore*. 1994 Mar; 23(2):129-138.
9. Ger LP, Ho ST, Sun WZ, Wang MS, Cleeland CS. Validation of the Brief Pain Inventory in a Taiwanese population. *J Pain Symptom Manage*. 1999 Nov; 18(5):316-322.
10. Radbruch L, Loick G, Kiencke P, Lindena G, Sabatowski R, Grond S, Lehmann KA, Cleeland CS. Validation of the German version of the Brief Pain Inventory. *J Pain Symptom Manage*. 1999 Sep; 18(3):180-187.
11. Wang XS, Mendoza TR, Gao SZ, Cleeland CS. The Chinese version of the Brief Pain Inventory (BPI-C): its development and use in a study of cancer pain. *Pain*. 1996 Oct; 67(2-3):407-416.
12. Caraceni A, Mendoza TR, Mencaglia E, Baratella C, Edwards K, Forjaz MJ, Martini C, Serlin RC, de Conno F, Cleeland CS. A validation study of an Italian version of the Brief Pain Inventory (Breve Questionario per la Valutazione del Dolore). *Pain*. 1996 Apr; 65(1):87-92.
13. Cleeland CS. Assessment of pain in cancer: measurement issues. In: Foley KM, editor. *Advances in pain research and therapy*. New York: Raven Press; 1990. p. 47-55.
14. Nunnally JC, Bernstein I. *Psychometric Theory*. 3rd ed. New York: McGraw-Hill; 1994.
15. Deyo RA, Diehr P, Patrick DL. Reproducibility and responsiveness of health status measures. Statistics and strategies for evaluation. *Control Clin Trials*. 1991 Aug; 12(4 Suppl):142S-158S.
16. Shrout PE, Fleiss JL. Intraclass correlation: uses in assessing rater reliability. *Psychol Bull*. 1979; 86: 420-428.
17. Zelman DC, Cleeland CS, Howland EW. Factors in appropriate pharmacological management of cancer pain: across-institutional investigation. *Pain*. 1987; (suppl):S136.