

The significance of motivation in periodontal treatment: The influence of adult patients' motivation on the clinical periodontal status

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Motivation plays an important role in the treatment process of chronic diseases, as treatment requires behavioural change and lifelong adherence to medical recommendations. Periodontitis is a good example of such health condition as to maintain good periodontal health patients have to adhere to a strict oral hygiene regimen. **Objective:** To examine whether the motivation of patients suffering from chronic periodontitis influences their clinical periodontal condition. **Basic research design:** Cross sectional study. **Clinical setting:** Department of Periodontology and Oral Medicine, Dental University Clinic, Jagiellonian University, Krakow, Poland. **Participants:** 199 adult periodontal patients, aged 20–78 years. **Interventions:** Questionnaire concerning patients' medical and dental history, modified Żychliński motivation assessment questionnaire, clinical periodontal examination. **Main outcome measures:** The extent of motivation. Periodontal status evaluated with the use of periodontal indices (API, BOP, CPITN). **Results:** The mean motivation score was 57.4. The mean API and BOP values were 55.7% and 46.4%, respectively. For most of the patients the recorded CPITN value was 3. Correlations were observed between motivation and both API and BOP, and between API and BOP. **Conclusion:** Periodontal patients with greater motivation having better oral health (lower API and BOP) suggests an influence on the quality of their self-management of the disease (i.e. adherence to their oral hygiene regimen).

Key words: motivation, periodontal disease, chronic disease, Poland

Introduction

Chronic periodontitis is an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment and bone loss and is characterised by the formation of pockets and/or gingival recessions (Glossary of Periodontal Terms, American Academy of Periodontology, 2001). It is a major cause of a tooth loss (Bahrami *et al.*, 2008). Considering the harmful impact of periodontal disease on the quality of life, function and general health, its effective treatment is important. The success of this treatment relies on the patients' compliance with daily dental self-care (Philippot *et al.*, 2005). Compliance (also called adherence) is defined as the extent to which a person's behaviour coincides with medical or health advice (Wilson, 1996). For individuals treated for periodontal disease, compliance can be described as the extent to which patients follow the recommendations for the frequency of tooth brushing, interdental cleaning and dental visits (Jönsson *et al.*, 2006). However, few patients comply completely with professional suggestions. This is mainly because periodontal disease is chronic and patients do not perceive it as particularly threatening (Wilson, 1996). Oral hygiene educational programs are usually very effective in the first stage, contributing to significant improvement in plaque control, but without constant re-education and reinforcement, compliance diminishes over time (Ciancio, 2003; Kakudate *et al.*, 2010; Wilson, 1996). Many patients are noncompliers because

they do not want to acknowledge the disease and to be an active participant in the treatment process. In fact, they want the dental professional to take responsibility for it (Wilson, 1996).

The extent to which a patient complies reflects their state of motivation to perform daily oral self-care behaviours (Hancock and Newell, 2001). According to Bandura's social cognitive theory (SCT) the motivation to engage in a health behaviour is a result of three types of expectations: 1, *situation-outcome expectations*, the degree to which a patient perceives a personal risk of being affected by the illness (e.g. periodontal disease) if no action is taken; 2, *outcome expectations*, beliefs about the consequences (both positive and negative) of performing preventive self-care behaviour; and, 3, *self-efficacy*, patient's subjective perception of his/her capability to perform preventive behaviour properly and regularly (Bandura, 1998; Schütz *et al.*, 2006).

According to SCT, knowledge of the risk creates the precondition for change. However, even if patients are informed about the need of changing oral hygiene habits, it does not guarantee that they will adhere to the recommendations (Schütz *et al.*, 2006). They will adhere to the treatment - even if it requires daily tedious action - only if they believe that this treatment will have a positive effect on their periodontal condition and that they have the ability to perform the action as required (self-efficacy) (Philippot *et al.*, 2005). Motivation toward lifestyle change

requires that a person perceives the advantages as being greater than the disadvantages (Norcross *et al.*, 2011).

Motivation plays a crucial role in the treatment of all chronic diseases, because this type of treatment process must focus on self-management of physical conditions and life-style changes (Bandura 1998; Dent *et al.*, 2010). Motivational enhancement proved effective in changing compliant behaviour among diabetes and kidney disease patients, the obese and those with chronic low back pain besides others (Korkiakangas *et al.*, 2011; Martino, 2011; Schelling *et al.*, 2009; Vong *et al.*, 2011).

In patients with periodontal disease, it is possible to measure their compliance with suggested oral hygiene regime by determining home care efficiency (by examining for bacterial plaque, e.g. Approximal Plaque Index, API) and efficacy (by examining bleeding on probing, increased probing depth or attachment loss) (Wilson, 1996).

The aim of this study was to examine the relationship between the extent of motivation and clinical periodontal status (measured with the clinical indices) in patients treated for chronic periodontitis by the use of a questionnaire based on the Żychliński motivation's assessment scale and a clinical examination of the periodontal status.

Methods

The cross-sectional study was conducted at the Department of Periodontology and Oral Medicine of the Jagiellonian University in Cracow according to the STROBE guidelines. Among the group of patients with diagnosed chronic periodontitis presenting for a recall visit of supportive periodontal treatment every fifth patient was asked to take a part in the study.

Chronic periodontitis was diagnosed on the basis of clinical and radiological examination and according to the guidelines given by American Academy of Periodontology. Chronic periodontitis with slight to moderate loss of periodontal support was diagnosed with probing pocket depths of up to 6mm and clinical attachment loss of up to 4mm, chronic periodontitis with advanced loss of periodontal support was diagnosed with those parameters greater than 6mm and 4mm, respectively (American Academy of Periodontology, 2000).

In all patients participating in the study, periodontal treatment was performed in the Dental University Clinic in Kraków by experienced clinicians - each patient with their attending clinician. Although the treatment was delivered by several clinicians, it was performed in each case in the adherence to the standard protocol. According to the protocol the supportive periodontal treatment process is divided into three phases: initial (cause related), corrective and maintenance. Patients enrolled in the maintenance programme appear for a recall visit once every three months. Each recall visit comprises clinical periodontal examination, re-motivating session and periodontal debridement. Thus, the group can be considered coherent in terms of the received periodontal care and motivational support received.

The study was approved by the Ethical Committee of the Jagiellonian University, Medical College and conducted in accordance with the Declaration of Helsinki. The details of the study were explained to each patient individually by one clinician. Written consent was obtained from each patient.

The study consisted of two parts: questionnaire and a clinical examination. The questionnaire was divided into two sections. The first section included multiple choice questions concerning the patient's medical and dental history (age, gender, systematic diseases, medications, smoking status, oral hygiene habits). The second section was the 14 item Żychliński motivation assessment questionnaire adapted and validated for the periodontal patients (Pac *et al.*, 2014; Żychliński and Żychlińska, 2008). The responses for each item use a Likert scale (A, *Absolutely not*; B, *Rather not*; C, *Hard to say*; D, *Yes, rather*; E, *Absolutely yes*) with items 3 and 13 reverse coded. The scoring of the Żychliński scale were applied for the interpretation. The total motivation score ranges 14 to 70 with higher scores for greater motivation.

In the second part of the study, the clinical examination was performed. All of the subjects were examined by one clinician. Following periodontal parameters were recorded: Approximal Plaque Index, API (Lange, 1975); Bleeding on Probing, BOP (Ainamo and Bay, 1975); and, Community Periodontal Index of Treatment Needs, CPITN (Ainamo *et al.*, 1982). BOP was assessed full mouth by recording the presence or the absence of bleeding up to 30 seconds after gentle probing with a manual dental probe. Each tooth was probed at six sites: mesio-buccal, mid-buccal, disto-buccal, mesio-lingual, mid-lingual, disto-lingual. API was assessed as recommended by Lange *et al.* (1977) by recording the presence or the absence of dental plaque in approximal interdental spaces from the oral aspect for the first and third quadrants and from the buccal aspect in the second and fourth quadrants. API and BOP are expressed as a percentage of approximal sites with plaque/bleeding sites to all sites examined.

CPITN was recorded as recommended by WHO (Ainamo *et al.*, 1982) and indicated whether a patient can remain in the maintenance program. The highest sextant score was chosen as a representative for each patient (to avoid underestimating the current periodontal condition and the needs for treatment) and enrolled to the statistical analysis. The sites with physiologically occurring deeper probing depths (like distal aspects of second molars) were excluded from the examination to prevent from obtaining overestimated results.

Statistical analysis was performed using SPSS v21 with the threshold for significance set at 5%. The continuous variables (motivation score, API and BOP) were checked for normal distribution by using the Shapiro-Wilk test. Because those variables were not normally distributed, nonparametric analyses were used. To assess differences for motivation level between groups Kruskal-Wallis test was used. Spearman's rank correlation coefficient was applied to examine the relation between motivation score and the value of API and BOP indexes and between API and BOP.

Results

There were 199 participants (73 males and 126 females) with ages ranging from 20 to 78 years (mean 51.4, sd 13.7). Most commonly they were aged between 46 and 60 years (41%). Men were more likely to be smokers than women (21% vs 8%) and likewise for ex-smokers (49% vs 24%).

Most commonly patients reported visiting their general dentist for a check-up once every 3 months (39% patients) then every 6 months (36%) with 16% once a year, 5% every 2 years and the remaining 5% less often. Most respondents brushed their teeth twice a day (67%), 25% three times a day and 8% only once a day. When asked for oral hygiene self-assessment, 66% considered it good, 24% as satisfactory, 7% as very good and 3% as bad. However, API measurements revealed that 79 (40%) had poor oral hygiene (API $\geq 70\%$) while good (API 25%-39%) or very good (API $<25\%$) oral hygiene was recorded in 31 (16%) and 35 (17.6%) subjects, respectively. Analysis of BOP scores showed that 20% had a score of 75% or higher, 24% had a BOP between 50% and 74%, 28% in the range 25% to 49% and 28% had a BOP score lower than 25%.

Several questions about subjects' periodontal treatment history were also asked. In the case of 115 (58%) surveyed patients it was recommended by their dentist to visit a specialist in periodontology, 83 (42%) of them decided themselves they needed to do so. Only 10 patients were encouraged by family members or friends (multiple choice question). A great majority of respondents (75%) declared that they undergo periodontal treatment procedures regularly.

The respondents were also asked which symptoms of periodontitis they found most annoying. For 101 (51%) of them teeth hypermobility was such a symptom, 76 (38%) found bleeding the most unpleasant. Other mentioned were gingival recessions, halitosis, gingival pain or teeth hypersensitivity.

The mean motivation score was 57.2 (men 56.5; women 57.9). The mean API and BOP values were 63.1% and 47.2% respectively (Table 1). CPITN values were as follows: 42 (21%) patients as 4, 72 (36%) patients were classified as CPITN=3, 70 (35%) patients as 2 and 15 (8%) patients as 1.

To assess the relation between motivation and the periodontal indices the median values of motivation between API, BOP and CPITN groups were compared. We have found that the motivation scores were statistically significantly different between API score groups ($p<0.001$) and the patients with highest API index ($>70\%$) had significantly lower motivation scores as compared to those with API $<25\%$ ($p<0.001$), $25\%<API<39\%$ ($p=0.004$) as well as with those with API score between 40% and 69% ($p=0.009$). The statistically significant difference was also found between the lowest API group and group with API between 40% and 69% ($p=0.017$; Figure 1).

The similar relation was found between the Bleeding on Probing and motivation score – the group of patients

with the highest BOP scores had significantly lower motivation as compared to those with BOP score 25%-49% ($p=0.001$) and $<25\%$ ($p<0.001$; Figure 2).

There were no significant differences in motivation scores between patients with different CPITN levels (Figure 3).

The relationship between patient's motivation and API was assessed also by Spearman's rank correlation coefficient. Motivation correlated negatively with API ($R=-0.438$) as well as with BOP ($R=-0.352$) and both associations were significant ($p<0.001$). Spearman's rank correlation coefficient was also applied to assess the relationship between API and BOP. A positive association ($R=0.664$, $p<0.001$) was detected.

Discussion

The main finding of the present study is that for these periodontal patients their motivation correlated negatively with both the accumulation of plaque in interdental spaces (API) and Bleeding on Probing (BOP). This suggests that greater self-reported motivation indicates better patient compliance with the daily oral self-care. What is more, API correlates positively with BOP values, associating higher plaque accumulation with greater severity of inflammation. The lack of association between motivation and CPITN levels may result from several patient-independent factors influencing the level of treatment need.

Enhancing patient motivation and improving compliance appears crucial in achieving and maintaining good periodontal health (de Carvalho *et al.*, 2010; Jönsson *et al.*, 2006). In the treatment of chronic periodontitis, patients' compliance with oral hygiene instructions was found to be associated with their state of motivation. Motivation cannot be, however, considered exclusively as a purely personal feature, as it is also highly dependent on the interaction with dental professionals. Because the compliance has to be life-long, developing patient-centred strategies based on individual factors and goals is desirable (Jönsson *et al.*, 2009). One such approach is Motivational Interviewing (MI). MI is a health coaching technique centred on eliciting individual's own reasons and arguments for change (Linden *et al.*, 2010; West Smith *et al.*, 2007) and consists of such elements as strategic use of reflective listening, using open-ended questions to amplify client-generated reasons for change, affirming self-confidence in ability to change and supporting perceived importance of behavioural change (West Smith *et al.*, 2007). MI has been applied with chronic periodontitis patients who formulated personal overall long-term goals related not only to periodontal status, but also to behav-

Table 1. Mean values of recorded parameters (M, API, BOP) in the surveyed population

Recorded parameters	Min.	Max.	All mean (sd)	Women mean (sd)	Men mean (sd)	p-value for male/female difference
Motivation	41	70	57.4 (6.08)	57.9 (5.90)	56.5 (6.32)	0.133
Approximal Plaque Index (%)	5	100	55.7 (30.84)	51.3 (30.25)	63.2 (30.60)	0.009
Bleeding on Probing (%)	5	100	46.4 (29.76)	42.2 (28.71)	53.6 (30.34)	0.006

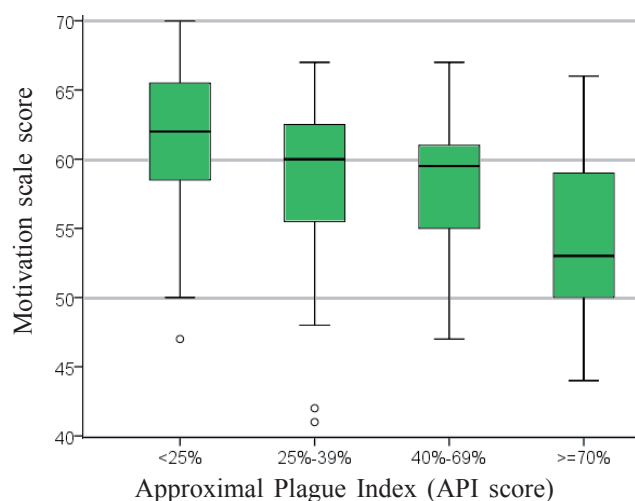


Figure 1. Box and whisker plot of motivation scores for patients with different Approximal Plaque Index (API score)

Kruskal-Wallis test p-value <0.001. On these three charts the bold line represents the median; the box, the 25%-75% percentiles; whiskers range for observations within the distance of 1.5 times the interquartile range from the median; and o, an outlier

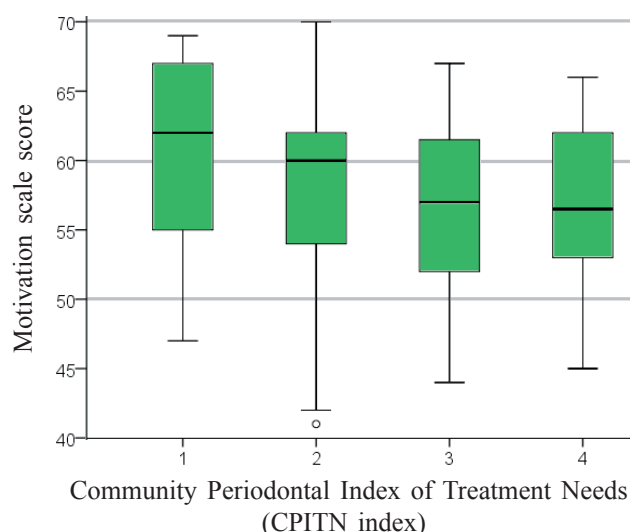


Figure 3. Box and whisker plot of motivation scores for patients with different Community Periodontal Index of Treatment Needs (CPITN index)

Kruskal-Wallis test p-value 0.089

iorally and psychologically relevant areas that work as a source of motivation, for example 'Increase my chances to keep my present teeth for the future'(Jönsson *et al.*, 2009). The study suggests that long-term goals enhance individuals' motivation for performance. The same authors used MI to create an Individually Tailored Oral Health Educational Programme (ITOHEP) and evaluated it in comparison with the effectiveness of the standard oral hygiene educational programme (Jönsson *et al.*, 2010). The central theme of the ITOHEP was tailoring of treatment to each individual's cognitions and beliefs, capacity, extent of motivation, outcome expectations and goals, with a subsequent guidance towards appropriate and

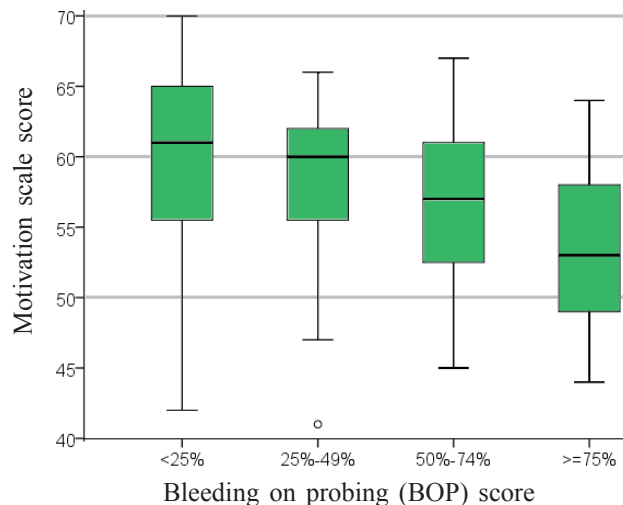


Figure 2. Box and whisker plot of motivation scores for patients with different Bleeding on probing (BOP) score

Kruskal-Wallis test p-value <0.001

effective oral hygiene habits. The ITOHEP group found lower full-mouth BOP scores and lower Plaque Index (PII) at 3- and 12-month re-examination in comparison with the control group, where participants received standard oral hygiene instruction and individuals in the ITOHEP group were more likely to achieve the proposed level of treatment success.

Philippot *et al.* (2005) also stated that although partially effective, educating patients about the proper prophylactic techniques is not enough. Patients in the experimental conditions were provided with the accurate information about periodontitis following the five aspects of illness in the Leventhal self-regulation model (illness identity, causes, consequences, time course and controllability). They were asked to keep daily compliance diaries and received extra follow-up sessions, while the control group received standard educational intervention. Although both groups PII scores improved, the experimental group improved significantly more. It seems that better treatment results can be obtained if patients are aware of the representation of periodontitis because this is how their sense of self-efficacy develops through their own direct experience in observing the effects of their behaviour on their symptoms. According to providing patients with information on their personal risk, the benefits of oral self-care behaviour and the easiness of performance can enhance their motivation to act, but may however be not enough for actual behaviour change (Schutz *et al.*, 2006). What may support compliance to oral health behaviour, in this case flossing, is employing *action planning* (precise description of when, where and how to act) and *coping planning* (what to do in the face of barriers). Forming action plans by patients, e.g. 'Every evening just before I go to bed I floss my teeth in the bathroom' creates an image of themselves flossing in the bathroom before going to bed. Entering the target situation will be associated with the plan and the action

will be carried out almost automatically. Coping plans help to deal with obstacles that may occur and prevent from performing the action (lack of time, motivation lapses), e.g. 'Whenever I don't have the time to floss in the evening I put the floss next to the toothbrush in order to floss the next morning' (Schütz *et al.*, 2006). The effectiveness of forming simple if-then plans on the adherence to a daily flossing regimen was confirmed by Sniehotta *et al.* (2007).

Conclusions

This study identified an inverse relationship between motivation and the extent of chronic periodontal disease. This finding suggests that motivating and re-motivating patients to adhere to suggested self-care should be a part of periodontal therapy. There may be advantages in dentists and dental hygienists paying more attention to eliciting and enhancing periodontal patients' motivation with the prospect of better treatment outcomes and reduced treatment costs.

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