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RESEARCH ARTICLE

Cross Adaptation Quality of Life Questionnaire for Periodontitis Patients (Modified Indonesian Version) in Menopausal Women

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Abstract:

Background:

Changes in steroidal sex hormones in peri- and post-menopausal women affect their bodies, including their periodontal tissues. Disorders of periodontal tissues can impact the patient's quality of life, so a valid instrument in measuring quality of life is needed in order to know how much periodontitis affects the quality of life of sufferers in peri and postmenopausal women.

Objective:

This study aimed to examine the validity and reliability of the quality of life questionnaire for patients with periodontitis (modified Indonesian version).

Methods:

Cross-cultural adaptation was tested in peri- and post-menopausal women aged 45–59 years. The reliability and validity of the questionnaire was examined among 268 women, who lived in Jakarta and were undergoing a periodontal examination to determine periodontitis severity.

Results:

Cronbach's α coefficients for internal consistency were: 0.929 (questions related to gums) and 0.942 (questions related to teeth); The test-retest reliability was good as determined based on a test–repeat test involving 27 women; the interclass coefficient was 0.880 (questions related to gums) and 0.878 (questions related to teeth). The construct validity of the questionnaire (questions related to gums and teeth) showed that the questionnaire was significantly associated with oral health and food taste ($P<0.001$). The discriminant validity of the questionnaire, the influence of the gums on speaking difficulties ($P=0.011$) and family life ($P=0.025$) and the influence of the teeth on family life ($P=0.020$) and mood ($P=0.019$) could enable differentiation of periodontal severity in peri- and post-menopausal women.

Conclusion:

This study confirmed the reliability and validity of the quality of life questionnaire for patients with periodontitis (modified Indonesian version) in peri- and post-menopausal women, therefore this questionnaire can be used to measure the quality of life of periodontitis patients in peri and postmenopause in Indonesia.

Keywords: Quality of life, Questionnaire, Periodontitis, Hormones, Perimenopause, Postmenopause.

1. INTRODUCTION

Periodontal disease prevalence increases with age, and it is considered to be a major public health problem as it can negatively impact oral health [1, 2].

Latest data from 743 million people, 10.8 percent of the population suffer from severe periodontitis worldwide [3]. The

American Academy of Periodontology workshop in 1999 established a system to classify periodontitis into chronic periodontitis, aggressive periodontitis, necrotizing periodontitis, and periodontitis as a manifestation of systemic disease. This classification system was updated in 2017, and periodontitis was divided based on severity, complexity assessed based on history, clinical examination, and investigation. Periodontitis severity was divided into stages one, two, three, and four [4].

Various risk factors are associated with this disease, including heart disease, diabetes mellitus, stress, and reproductive hormones [5]. Periodontitis is a damage of tooth supporting tissue due to the inflammatory process of microbial biofilms. The role of periodontal bacteria and inflammatory mediators of systemic disease is underlined as the fact that bacteria can enter blood vessels and spread systemically [3].

Reproductive hormones regulate reproductive functions. Steroidal sex hormones have an important effect on the nerves and cardiovascular system and are the primary determinants of system development and skeletal and oral integrity, including periodontal tissue [4, 5]. The functional movement of the stomatognation system and its strength depend on signals arising from various sensory organs in the orofacial structure. The special role is regulated by the mechanoreceptors of the periodontal and sensory nerves that are in the periodontal ligament, which is the optimal location in detecting the functional strength of the tooth. Periodontal ligament is part of periodontal tissue [6, 7].

Yoshida *et al.* showed that a decline in estradiol levels caused a decrease in salivary flow rate, which impacted oral health, including the health of the periodontium [8]. Periodontal disease can also cause disorders, limit function, and cause discomfort for patients, ultimately affecting their quality of life [1, 2]. Quality of life tends to decrease in women who are of middle age, therefore, it is necessary to determine the actions that must be taken when symptoms arise, particularly during the menopause and post-menopausal transition [9]. Moustafa *et al.* showed that menopause can reduce the quality of life of women [10]. This is in line with a study by Nayak *et al.*, which found that perimenopausal symptoms vary markedly in women; therefore, recording data and understanding these conditions is essential for planning effective interventions to improve quality of life [11]. Debaz *et al.* revealed that post-menopausal women who suffer from chronic periodontitis have a significantly poorer quality of life compared with healthy subjects [12].

The quality of life for patients with periodontitis is measured using quality of life instruments. Various instruments are used to measure the quality of life of patients with chronic periodontitis. Bernabe *et al.* used a short-form oral health impact profile (OHIP-14) to examine the relationship between periodontal disease and patient quality of life [13]. Kusdhany *et al.* used the oral health-related quality of life questionnaire developed by Ariani to measure the quality of life of middle-

aged women aged between 45 and 59 years in Indonesia [14]. Isola *et al.* uses a specific questionnaire namely C-HAQ (Childhood Health Assessment Questionnaire) that has been validated in measuring global disability and daily activities in patients with juvenile idiopathic arthritis [15].

Musurlieva *et al.* conducted a study of 228 subjects aged 20–80 years with chronic periodontitis, which assessed the impact of chronic periodontitis on the individual's quality of life using a self-developed tool to measure quality of life in patients with chronic periodontitis. The results of this study revealed that patients with severe chronic periodontitis had a poor quality of life. This questionnaire was established explicitly to measure the quality of life of patients with chronic periodontitis. This questionnaire has also been tested for its validity and reliability, in order for it to be used in clinical practice to evaluate the quality of life of patients with periodontitis [16 - 18]. The questionnaire consists of nine questions, for which there are six possible answers (0, no influence; 5, very strong influence). This questionnaire is used to measure the quality of life of patients with periodontitis as it can establish how patients feel about the disease [17, 18]. However, the original form of the questionnaire was in English, therefore, so that it could be used in Indonesia, it was adapted through culture and language adaptation, and its validity and reliability were assessed to determine whether the questionnaire was suitable for measuring the quality of life of patients with chronic periodontitis. This questionnaire is useful for clinicians in providing care and preventing the development of periodontal disease [18]. The purpose of this study was to examine the validity and reliability of the quality of life questionnaire for patients with periodontitis (modified Indonesian version). The null hypotheses in this study are: (1) there is no difference in test and retest questionnaire on the subject (2) the total score and all item are not related to global question on construct validity test (3) all questionnaire items cannot distinguish the periodontitis severity in mild, moderate and severe.

2. MATERIALS AND METHODS

2.1. Study Population

This is a cross-sectional study with 268 subjects. The study subjects consisted of women who lived in the cities of Central Jakarta and East Jakarta between May 2018 and December 2018 with the following inclusion criteria: aged 45-59 years, had entered the menopausal transition (peri- and post-menopausal women), calculated one year following their last menstrual period, diagnosed with periodontitis, and willing to participate in the study and provide signed informed consent. Calculation of the samples was performed using a sample size formula for validation tests [19]. The reliability test was carried out using internal consistency reliability as measured by Cronbach Alpha and test retest methods using interclass correlation coefficient (ICC), whereas validity tests conducted are face validity, content validity, construct validity and discriminant validity.

2.2. Instruments

In the present study, cross adaptation was performed and

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the validity and reliability of the questionnaire (modified) to be used in Indonesia were tested. This questionnaire was adapted from Dr. Musurlieva's questionnaire and the modifications to this questionnaire comprised the addition of two additional items that were appropriate to the subject's condition and culture in Indonesia. Permission for the process of adaptation and modification of this questionnaire had been previously granted by the original questionnaire designer. The two items added to the modified questionnaire relate to the psychological condition of the subject. This is based on the consideration that the psychological condition of the subject has an influence on patient quality of life [20]. Measuring quality of life in aspects of dental and oral health assists in clinical decision-making by considering the patient's emotional and physical needs [21]. The reverse translation was only marginally different from the original English version. No specific problems were identified during the translation/reverse translation process.

The quality of life questionnaire for patients with periodontitis (modified Indonesian version) consisted of 11 questions and comprised four domains, namely the physical ability (questions 4, 5 and 6), social relations (questions 1, 2, 7, 8 and 9), and general health (question 3), in addition to the added psychological domain (questions 10 and 11). As the researchers wanted to determine whether the condition of the gums or teeth affected the quality of life of the subject, the questionnaire was divided into two parts. The first part of the questionnaire concerned how the condition of the subject's gums relates to their quality of life (11 questions) and the second part concerned how the condition of the subject's teeth relates to their quality of life (11 questions), items about gums and teeth have the same answer choices. In the original questionnaire, the conditions of the gums and teeth were assessed together for all questions in the original questionnaire, items containing questions about gums and teeth were combined in one item [17, 18].

All questions in this questionnaire are positive questions. The questions in the questionnaire were assessed based on the respondents' answers. Each question in the questionnaire was rated on a six-point scale (0: no influence; 5: very strong influence). The total score was calculated from the total score for each item. The total score ranges from a value of 0 (lowest score) to 55 (highest score), with the highest score indicating that periodontal disease has a marked influence on quality of life.

2.3. Cross Adaptation and Language

The translation process and cross adaptation of the questionnaires were based on standard rules from various literature [22 - 24]. The initial stage of the present study consisted of adaptation of the questionnaire according to the language and culture in Indonesia. The first step of the adaptation process was to translate the questionnaire into Indonesian; the translation process was performed by two translators, one of which was a dentist and another was not, to produce two Indonesian questionnaires. The questionnaires translated into the Indonesia language were then reverse-translated from Indonesian into English; the individual performing the reverse translation differed from the previous

translator, was fluent in English, and had not seen the original form of the questionnaire [24 - 27].

After obtaining the Indonesian translation and reverse translation in English, the results of this translation process were then reviewed by a panel of experts, consisting of three experts and a researcher involved from the initial process, to obtain a questionnaire suitable for later use with patients [24, 28].

The patients were asked to answer questions on the questionnaire and interviews were subsequently conducted to determine what they thought about each question and to answer it according to their conditions. It was emphasized to the patients that there is no right or wrong answer to the questions. Each evaluation and revision stage was recorded by the researcher [24].

2.4. Procedure

The questionnaire was given to the subjects to answer the questions in accordance with their previous condition with the available answer choices. The time given to complete the questionnaire was 10–15 min. Twenty-seven of the 268 subjects were willing to complete the questionnaire twice to conduct a test-retest assessment. The time between the first and second testing was 7 days [26]. Personal information was also recorded, including age, education level, occupation and whether the subject was in the menopause transition stage or has been menopausal. All subjects experienced menopause naturally and subjects who smoked were excluded from this study because smoking is a risk factor for periodontal disease [3].

Perimenopausal conditions were determined by asking about perimenopausal symptoms, where a subject experiencing more than three of these symptoms was considered to be perimenopausal [29]. Attachment loss is the distance measured from the cementoenamel junction to the pocket base. Attachment loss was measured on six sides using oral glass and periodontal probes (Hu Friedy Chicago IL, USA). The examination commenced on the upper right and ended on the lower right side of the jaw [30, 31].

2.5. Analysis of Data

Statistical significance was established at $P<0.05$. Descriptive statistics were used to describe the demographics of the sample. Internal consistency reliability was measured using Cronbach's α statistic, with a value of ≥0.70 considered reliable. The test was performed using the test-retest method of 27 subjects using the Intraclass Correlation Coefficient (ICC) [25]. The construct validity was measured by the Spearman's correlation between the total item value and the total of each domain with two global questions, namely (1a) Do you think that condition your gum has an influence of your oral health? (1b) Do you think that the condition of your teeth has an influence on your oral health? (2a) Do you think that the condition of your gums has an influence on your food taste? (2b) Do you think that the condition of your teeth has an influence on your food taste? These global questions had a six-scale answer (0: no influence; 5: very strong influence). Discriminant validity was measured using the Kruskall Wallis

test between each item with the severity of periodontitis. The severity of periodontitis was measured by attachment loss, which was divided into stage 1 (mild) if attachment loss is 1–2 mm, stage 2 (moderate) if attachment loss 3–4 mm and stage 3 (severe) if attachment loss is ≥ 5 mm [4].

3. RESULTS

3.1. Description of Samples

Demographic data, age, education level, occupation, marital status and type of menopause sample are presented in Table **1**. A total of 301 women were willing to take part in this study; however, 33 subjects were excluded from the study as they did not meet the inclusion criteria, resulting in 268 subjects taking part. All subjects completed the questionnaire and no questionnaires were excluded from the study due to missing data. The research subjects were predominantly aged 45–59 years (41.0%). The education level of the majority of subjects was high school (96 subjects; 35.8%). A total of 236 subjects (88.1%) listed "housewife" as their occupation. The majority of subjects were married (215 subjects; 80.2%) and the majority of subjects who participated were post-menopausal (143 subjects; 53.4%).

3.2. Reliability and Validity Test

Test reliability was assessed with the test-retest of 27 subjects. The ICC for the quality of life questionnaire for patients with periodontitis (modified Indonesian version) relating to the gums was 0.880, whereas that related to the teeth was 0.878. This score indicates good reproducibility. Cronbach's α coefficient was 0.929 for questions related to the gums and 0.942 for questions related to the teeth (Table **2**). Both showed good internal consistency. Table **2** shows the mean quality of life scores for the questions related to the teeth compared with those related to the gums. The total score for the quality of life questionnaire for patients with periodontitis

(modified Indonesian version) related to the gums ranged between 0 and 55 with a mean of 16.08 (14.38), whereas that related to teeth had a mean of 19.44 (15.57). Based on the retest test reliability test results, the first null hypothesis is accepted as no difference in the first and second test results on the subject was observed.

Construct validity revealed a significant correlation between the total score of the questionnaire related to the gums and the global rating questions describing oral health and food taste. Each question in the questionnaire related to the gums was also significantly correlated with the global rating questions ($P<0.001$) (Table **3a**).

The construct validity of the questions related to the teeth showed a significant correlation between the total score and the global rating questions. Each question related to the teeth was also significantly correlated with the global rating questions ($P<0.001$) (Table **3b**). Based on the results of construct validity, the second null hypothesis is rejected due to a relationship between total scores and all items with global questions.

The discriminant validity of questions related to the gums showed that the influence of the gums on speaking difficulties ($P=0.011$) and family life ($P=0.025$) were the distinguishing factors (Table **4a**).

Questions related to the teeth show that mild, moderate, and severe periodontitis could be distinguished by questions relating to the influence of teeth on family life ($P=0.020$) and on mood ($P=0.019$) (Table **4b**).

Based on the results of discriminant validity, the third null hypothesis is rejected because the influence of the gums on speaking difficulties and family life items in quality of life related to gums questionnaire and the influence of the teeth on family life and on mood items in quality of life related to teeth questionnaire can distinguish periodontitis severity.

Table 1. Sociodemographic characteristics of subjects.

Variables	n (%)
Age (years)	–
45–49	110 (41.0)
50–54	95 (35.4)
55–59	63 (23.5)
Education	–
Illiterate	16 (6.0)
Elementary School	80 (29.9)
Junior High School	52 (19.4)
Senior High School	96 (35.8)
College degree	24 (9.0)
Occupation	–
Housewife	236 (88.1)
Self-employed	16 (6.0)
Employee	16 (6.0)
Marital Status	–
Not married	12 (4.5)
Married	215 (80.2)

(Table 1) contd.....

Widow	41 (15.3)
Peri-menopausal	125 (46.6)
Post-menopausal	143 (53.4)

Table 2. Question characteristics and reliability analysis (n=268).

Quality of Life in Patients with Periodontitis (minimum-maximum)	Mean (SD)	Reliability		Cronbach's α	Test–retest (n=27)
	–	Alpha if deleted*	CITC*	–	–
Related to Gums	–	–	–	–	–
Total Score (0–55)	16.08 (14.38)	–	–	0.929	0.880
Influence on outlook (0–5)	1.40 (1.77)	0.922	0.716	–	–
Influence on self-esteem (0–5)	1.18 (1.65)	0.925	0.648	–	–
Influence on general health (0–5)	2.07 (1.80)	0.924	0.683	–	–
Influence on choice of food (0–5)	2.20 (1.84)	0.928	0.591	–	–
Influence on chewing of harder food (0–5)	2.24 (1.90)	0.924	0.694	–	–
Influence on speaking difficulties (0–5)	1.00 (1.58)	0.923	0.716	–	–
Influence on family life (0–5)	0.86 (1.49)	0.922	0.726	–	–
Influence on professional life (0–5)	0.97 (1.58)	0.922	0.721	–	–
Influence on social life (0–5)	1.05 (1.59)	0.921	0.752	–	–
Influence on mood (0–5)	1.48 (1.73)	0.920	0.764	–	–
Influence on anxiety (0–5)	1.56 (1.78)	0.917	0.823	–	–
Related to Teeth	–	–	–	–	–
Total Score (0–55)	19.44 (15.57)	–	–	0.942	0.878
Influence on outlook (0–5)	2.11 (1.92)	0.938	0.713	–	–
Influence on pride (0–5)	1.72 (1.84)	0.935	0.788	–	–
Influence on general health (0–5)	2.19 (1.84)	0.937	0.737	–	–
Influence on choice of food (0–5)	2.36 (1.73)	0.938	0.709	–	–
Influence on chewing of harder food (0–5)	2.51 (1.86)	0.940	0.670	–	–
Influence on speaking difficulties (0–5)	1.25 (1.70)	0.939	0.688	–	–
Influence on family life (0–5)	1.02 (1.57)	0.937	0.744	–	–
Influence on professional life (0–5)	1.36 (1.74)	0.935	0.778	–	–
Influence on social life (0–5)	1.36 (1.72)	0.934	0.803	–	–
Influence on mood (0–5)	1.71 (1.76)	0.935	0.797	–	–
Teeth condition influence on anxiety (0–5)	1.80 (1.82)	0.934	0.810	–	–

* Cronbach's α for subscales if an item is removed. CITC: corrected item-total correlation; SD: standard deviation.

Table 3a. Construct validity of quality of life related to gum condition.

Gum Condition (minimum-maximum)	Oral Health (n=268)		Food Taste (n=286)	
	r	*P-value**	*r*	*P-value**
Total Score (0–55)	0.756	<0.001*	0.747	<0.001*
Influence on outlook (0–5)	0.606	<0.001*	0.539	<0.001*
Influence on self-esteem (0–5)	0.488	<0.001*	0.493	<0.001*
Influence on general health (0–5)	0.638	<0.001*	0.556	<0.001*
Influence on choice of food (0–5)	0.527	<0.001*	0.557	<0.001*
Influence on chewing of harder food (0–5)	0.589	<0.001*	0.625	<0.001*
Influence on speaking difficulties (0–5)	0.562	<0.001*	0.520	<0.001*
Influence on family life (0–5)	0.504	<0.001*	0.527	<0.001*
Influence on professional life (0–5)	0.530	<0.001*	0.612	<0.001*
Influence on social life (0–5)	0.568	<0.001*	0.598	<0.001*
Influence on mood (0–5)	0.660	<0.001*	0.676	<0.001*
Influence on anxiety (0–5)	0.673	<0.001*	0.706	<0.001*

*. *r*=Spearman's rank correlation coefficient, Statistically significant at *P*<0.05.

Table 3b. Construct validity of quality of life related to teeth.

Teeth Condition (minimum-maximum)	Oral Health (n=268)		Food Taste (n=286)	
	r	*P-value**	*r*	*P-value**
Total Score (0–55)	0.800	<0.001*	0.731	<0.001*
Influence on outlook (0–5)	0.639	<0.001*	0.556	<0.001*
Influence on self-esteem (0–5)	0.660	<0.001*	0.586	<0.001*
Influence on general health (0–5)	0.703	<0.001*	0.601	<0.001*
Influence on choice of food (0–5)	0.658	<0.001*	0.592	<0.001*
Influence on chewing of harder food (0–5)	0.633	<0.001*	0.637	<0.001*
Influence on speaking difficulties (0–5)	0.553	<0.001*	0.547	<0.001*
Influence on family life (0–5)	0.600	<0.001*	0.521	<0.001*
Influence on professional life (0–5)	0.613	<0.001*	0.552	<0.001*
Influence on social life (0–5)	0.594	<0.001*	0.604	<0.001*
Influence on mood (0–5)	0.690	<0.001*	0.563	<0.001*
Influence on anxiety (0–5)	0.662	<0.001*	0.632	<0.001*

* *r*=Spearman's rank correlation coefficient, Statistically significant at *P*<0.05.

Table 4a. Discriminant validity of quality of life related to the gums.

Gum Condition (minimum-maximum)	Mean (SD)			P-value
	Periodontitis Severity			
	Mild (n=185)	Moderate (n=78)	Severe (n=5)	
Total Score (0–55)	16.70 (14.69)	14.11 (13.23)	23.60 (18.28)	0.280
Influence on outlook (0–5)	1.50 (1.82)	1.11 (1.59)	2.20 (2.16)	0.154
Influence on self-esteem (0–5)	1.19 (1.65)	1.12 (1.66)	1.80 (1.64)	0.585
Influence on general health (0–5)	2.13 (1.79)	1.93 (1.80)	2.20 (2.28)	0.625
Influence on choice of food (0–5)	2.34 (1.87)	1.91 (1.74)	2.00 (2.00)	0.213
Influence on chewing of harder food (0–5)	2.27 (1.87)	2.19 (1.95)	2.00 (2.34)	0.919
Influence on speaking difficulties (0–5)	1.08 (1.60)	0.70 (1.44)	2.60 (2.30)	0.011*
Influence on family life (0–5)	0.93 (1.55)	0.61 (1.25)	2.20 (1.92)	0.025*
Influence on professional life (0–5)	0.95 (1.60)	0.92 (1.48)	2.40 (1.94)	0.079
Influence on social life (0–5)	1.05 (1.61)	1.02 (1.50)	1.60 (2.30)	0.882
Influence on mood (0–5)	1.57 (1.78)	1.23 (1.56)	2.40 (2.30)	0.197
Influence on anxiety (0–5)	1.64 (1.83)	1.33 (1.64)	2.20 (1.92)	0.244

P-value from the Kruskal-Wallis test results. *Statistically significant at *P*<0.05. SD: standard deviation.

Table 4b. Discriminant validity of quality of life-related to teeth.

Tooth Condition (minimum-maximum)	Mean (SD)			P-value
	Periodontitis Severity			
	Mild (n=185)	Moderate (n=78)	Severe (n=5)	
Total Score (0–55)	20.18 (16.18)	16.91 (13.44)	31.20 (18.21)	0.135
Influence on outlook (0–5)	2.10 (1.95)	2.06 (1.86)	3.20 (1.78)	0.394
Influence on self-esteem (0–5)	1.74 (1.86)	1.62 (1.77)	2.80 (2.16)	0.423
Influence on general health (0–5)	2.03 (1.90)	1.87 (1.65)	3.20 (1.78)	0.093
Influence on choice of food (0–5)	2.44 (1.79)	2.12 (1.57)	3.40 (1.51)	0.150
Influence on chewing of harder food (0–5)	2.57 (1.87)	2.32 (1.84)	3.20 (1.64)	0.387
Influence on speaking difficulties (0–5)	1.38 (1.77)	0.89 (1.47)	1.80 (2.04)	0.088
Influence on family life (0–5)	1.07 (1.60)	0.79 (1.42)	2.80 (1.92)	0.020*
Influence on professional life (0–5)	1.42 (1.77)	1.17 (1.68)	2.20 (1.48)	0.285
Influence on social life (0–5)	1.38 (1.76)	1.20 (1.59)	2.80 (1.92)	0.145
Influence on mood (0–5)	1.86 (1.79)	1.28 (1.61)	2.80 (2.16)	0.019*
Influence on anxiety (0–5)	1.89 (1.85)	1.53 (1.68)	3.00 (2.12)	0.144

P-value from the Kruskal-Wallis test results. *Statistically significant at *P*<0.05. SD: standard deviation.

4. DISCUSSION

The present cross-sectional study was conducted on women aged 45–59 years who were in the peri- and post-menopausal stages and diagnosed with periodontitis. This was in line with a study performed by Widodo *et al* [32]. Periodontal disease is a disease that can cause disruption in the stomatognathic system, such as the function of mastication, swallowing, speaking, and laughing, and can consequently reduce the confidence of the individual. This condition can also lead to a poor perception of oral health and worsen the quality of life [30, 33].

The present study was conducted on peri- and post-menopausal subjects suffering from periodontitis due to the decreased quality of life experienced in women entering the menopausal transition and post-menopausal period. This is in line with a study by Elazim *et al*., which showed that the menopausal symptoms experienced by women were associated with a decrease in quality of life [9]. During perimenopause, women also experience biological, psychological, and social changes which affect their quality of life, and periodontitis is also one of the diseases that can affect the quality of life [12, 16, 34]. Therefore, periodontitis and menopausal symptoms can have a marked influence on the quality of life of the individuals, highlighting the need for an appropriate questionnaire to measure the quality of life of peri- and post-menopausal patients with periodontitis in Indonesia.

In terms of face validity and content validity, three of the subjects were confused about how to answer questions so the question is repeated again, following changes in intonation and the subjects understood the purpose of the question and how to answer it.

4.1. Internal Consistency Reliability

The internal reliability was assessed and a test-retest was performed for the questionnaire for both questions related to the gums and questions related to the teeth. The results of Cronbach's α for both questionnaires produced a value of ≥0.90, which indicates good reliability [35], and the retest-test (ICC) results ranged between 0.80 and 0.89, which indicates high reliability. Cronbach's α is one of the most commonly used psychometric indicators in determining the reliability and internal validity of an instrument [34 - 36].

4.2. Construct Validity

Construct validity is the extent to which a new instrument is related to certain variables and in accordance with the basic theory or hypothesis construction. In the present study, all questions related to gums and teeth exhibited a significant correlation (*P*<0.001) with oral health and food taste (global questions). In addition, these correlations were all positive. The total score of the questions related to the gums and teeth had a correlation value >0.70, which indicated a strong correlation [36].

4.3. Discriminant Validity

Measuring discriminant validity can be achieved by using the variable of periodontitis severity based on the World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions 2017 [4]. In the present study, the determination of periodontitis severity was measured using attachment loss only. This is due to attachment loss being a standard parameter in a periodontal examination as it describes the periodontal conditions of the subject [37].

However, the severity of periodontitis in the present study was only divided into three stages, namely, stage 1, stage 2, and stage 3 (combined stages 3 and stage 4). This is due to the size of attachment loss in stages 3 and 4 having the same value [4]. In measuring the discriminant validity of the gum-related questions, only items related to speech difficulties and family life were found to distinguish the severity of periodontitis (*P*<0.05). The condition of gum exposure, or gingival recession, is one of the periodontal problems that often raises patient concern as it can cause functional disorders and affect the aesthetics and psychology of the patient [38]. Such conditions can lead to the individual feeling too ashamed to communicate with others.

In the dental-related questions, only questions related to family life and mood were shown to distinguish the severity of periodontitis (*P*<0.05). Health comprises physical, mental, and social wellbeing in addition to the absence of disease or weakness, therefore, oral health is important in the overall wellbeing of an individual. Conditions, including depression, stress, and coping are considered important factors in the development of the periodontal disease. The maintenance of oral health is dependent on the mental health and mood of the subject. Stress and low mood can lead to changes in behavior that can result in a tendency to ignore oral hygiene and increase the severity of periodontal disease [39]. The total score of the questionnaire used in the present study was unable to distinguish the severity of periodontitis; this is due to the periodontal condition being an independent factor that is enforced through clinical examination and may not sufficient to predict using a questionnaire alone [4, 40].

4.4. Limitations of the Study

In this study, no data were obtained on the habits of patients in terms of maintaining oral hygiene like the way a patient brushes, the frequency and time of toothbrushing, because oral hygiene is also one of the factors involved in maintaining periodontal health, therefore, it is expected that further research will include the recording of information relating to oral hygiene habits.

CONCLUSION

The results of the present study provide evidence supporting the reliability and validity of the quality of life questionnaire for patients with periodontitis (modified Indonesian version) in peri- and post-menopausal women.

LIST OF ABBREVIATIONS

ICC	=	Intraclass Correlation Coefficient
LOA	=	Loss of Attachment
OHRQoL	=	Oral Health-Related Quality of Life

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Dental Research Ethics Commission (KEPKG), Faculty of Dentistry, University of Indonesia, Indonesia (No: 36/Ethical Approval/FKG UI/V/2018).

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2008.

CONSENT FOR PUBLICATION

The patient signed a consent form to be involved in this study.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AVAILABILITY OF DATA AND MATERIALS

The data sets analyzed during the current study are available from the corresponding author [S.M] upon request.

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