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Gengivite e qualidade de vida relacionada à saúde bucal: uma revisão de literatura

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Orientador: Prof. Dr. Fábio Luiz Mialhe

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“Feliz aquele que transfere o que sabe
e aprende o que ensina”
Cora Coralina

SUMÁRIO

RESUMO

Objetivo: Revisar a literatura sobre a relação entre gengivite e qualidade de vida relacionada à saúde bucal (QVRSB). **Material e Métodos:** Bases de dados relevantes foram utilizadas para busca de artigos em Inglês, publicados entre Outubro/1990 e Fevereiro/2014. Dois revisores independentes selecionaram os estudos relevantes, inicialmente avaliando os resumos e, posteriormente, os artigos completos. Os estudos selecionados foram agrupados de acordo com os instrumentos clínicos e de QVRSB e foram submetidos à análise qualitativa. **Resultados:** Das 184 referências, doze foram consideradas para síntese. Todos os estudos eram transversais e apresentavam dados de cinco países diferentes: Chile (n=2), Índia (n=1), Brasil (n=3), Tailândia (n=5) e Sudão (n=1). O número e idade dos sujeitos variaram de 53 a 9133 e de oito a 106 anos, respectivamente. Os seis instrumentos de QVRSB utilizados foram: Oral Health Impact Profile (OHIP), OHIP-14, Child Perceptions Questionnaires (CPQ), Oral Impacts on Daily Performances (OIDP), Child-OIDP e Geriatric Oral Health Assessment Index (GOHAI). Os diferentes métodos utilizados para avaliar a presença de gengivite foram: lesões ulcerativas necrozantes agudas (n=2), Índice Gengival (n=2), Índice Periodontal Comunitário (n=7) e sangramento gengival após escovação (n=1). **Conclusão:** Esta revisão de literatura sugere a relação entre gengivite e o comprometimento da QVRSB.

Palavras-chave: Gengivite; Saúde bucal; Qualidade de vida; Revisão; Literatura

ABSTRACT

Objective: To review the literature about the relationship between gingivitis and oral health-related quality of life (OHRQoL). **Material and Methods:** Relevant databases were searched for articles in English that had been published from October 1990 to February 2014. Two independent examiners selected relevant papers, by initially assessing the abstracts and subsequently the full-text articles. Selected studies were grouped based on clinical and OHRQoL instruments and submitted for qualitative analyses. **Results:** Out of 184 references, twelve were eligible for synthesis. All studies were cross-sectional and reported data from the following five different countries: Chile (n=2), India (n=1), Brazil (n=3), Thailand (n=5) and Sudan (n=1). The number and age of subjects included ranged from 53 to 9133 and from eight to 106 years, respectively. The following six OHRQoL instruments were used: Oral Health Impact Profile (OHIP), OHIP-14, Child Perceptions Questionnaires (CPQ), Oral Impacts on Daily Performances (OIDP), Child-OIDP and Geriatric Oral Health Assessment Index (GOHAI). The different methods to evaluate the presence of gingivitis were: necrotizing ulcerative gingival lesions (n=2), Gingival Index (n=2), Community Periodontal Index (n=7) and gingival bleeding after teeth brushing (n=1). **Conclusion:** This literature review suggests that gingivitis is associated with impairment of OHRQoL.

Key words: Gingivitis; Oral health; Quality of life; Review; Literature

INTRODUÇÃO

A gengivite é a forma mais prevalente de doença periodontal, a qual inicia-se na infância, aumenta em frequência e severidade na pré-adolescência e diminui parcialmente até os 20 anos de idade (Califano et al., 2003). A severidade da gengivite está diretamente relacionada ao acúmulo de biofilme dentário devido à higiene bucal deficitária. A presença do biofilme dentário pelo período de 10 a 21 dias é suficiente para um processo de inflamação gengival, sendo reversível se métodos de controle do biofilme dentário forem estabelecidos (van der Velden, 2006).

Uma variedade de indicadores clínicos tem sido utilizados para diagnóstico da gengivite, mas ainda não há consenso sobre qual o método mais efetivo para obter dados válidos (Pihlstrom et al., 1992). Além disso, o uso somente de medidas clínicas tem sido questionado, uma vez que não fornecem percepção subjetiva dos sintomas e não avaliam o impacto da condição bucal no bem-estar do indivíduo como um todo (Locker, 1997). Neste sentido, medidas de qualidade de vida relacionada à saúde bucal (QVRSB) vem sendo frequentemente utilizadas para complementar os dados clínicos visando compreender melhor os aspectos funcionais e psicossociais das doenças bucais, auxiliar na escolha do tratamento odontológico e avaliar a qualidade de intervenções, serviços e programas em saúde.

De acordo com a literatura, o impacto da gengivite no bem-estar do indivíduo é frequentemente associado ao relato de sintomas orais, como sangramento gengival e sangramento gengival após escovar os dentes (Pihlstrom et al., 1992). Entretanto, com o uso de medidas clínicas como o Índice Gengival (Loe & Silness, 1963) e o Índice Periodontal Comunitário (Holmgren, 1994), fica claro que a doença gengival produz uma variedade de sinais e sintomas clínicos, muitos dos quais apresentam impacto significativo no bem-estar ou na qualidade de vida do paciente (Locker, 1988). Pouco se sabe sobre este aspecto da doença.

Portanto, o melhor conhecimento das consequências da doença gengival mostra-se importante para entender a percepção do indivíduo sobre o impacto da sua saúde bucal no seu bem-estar, para o planejamento do cuidado gengival considerando a necessidade e preocupações principais do paciente e para avaliar os resultados do tratamento odontológico sob a perspectiva do paciente (McGrath & Bedi, 1999).

Sendo assim, este estudo objetivou revisar a literatura sobre artigos publicados que avaliaram o impacto da gengivite na QVRSB sob a perspectiva do paciente.

ARTIGO

Gingivitis and oral health-related quality of life: a literature review*

Short running title: Gingivitis and quality of life: a review

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ABSTRACT

Background: The aim of this study was to review the literature about the relationship between gingivitis and oral health-related quality of life (OHRQoL). **Methods:** Relevant databases were searched for articles in English, which had been published from October 1990 to February 2014. Two independent examiners selected relevant papers, by initially assessing the abstracts and subsequently the full-text articles. Selected studies were grouped based on clinical and OHRQoL instruments and submitted to qualitative analyses. **Results:** Out of 184 references, twelve were eligible for synthesis. All studies were cross-sectional and reported data from the following five different countries: Chile (n=2), India (n=1), Brazil (n=3), Thailand (n=5) and Sudan (n=1). The number and age of subjects included ranged from 53 to 9133 and from eight to 106 years, respectively. The following six OHRQoL instruments were used: Oral Health Impact Profile (OHIP), OHIP-14, Child Perceptions Questionnaire (CPQ), Oral Impacts on Daily Performance (OIDP), Child-OIDP and Geriatric Oral Health Assessment Index (GOHAI). The different methods to evaluate the presence of gingivitis were: necrotizing ulcerative gingival lesions (n=2), Gingival Index (n=2), Community Periodontal Index (n=7) and gingival bleeding after tooth brushing (n=1). **Conclusion:** This literature review suggests that gingivitis is associated with impairment of OHRQoL.

Key words: Gingivitis; Oral health; Quality of life; Review; Literature

INTRODUCTION

Gingivitis is the most prevalent form of periodontal disease. It begins in early childhood, increases in prevalence and severity into the early teenage years, and then subsides slightly and levels off until approximately 20 years of age [1]. The severity of the disease is directly related to the accumulation of biofilm due to poor oral hygiene. The presence of the biofilm for a period of 10 to 21 days is sufficient to establish a condition of gingival inflammation, but it is reversible if methods for controlling the biofilm are established [2].

A variety of clinical indicators have been used for the diagnosis of gingivitis, but there is still no consensus about the most effective measure for obtaining valid clinical data [3]. Moreover, the use of clinical measures alone has been criticized, as they give little indication of subjectively perceived symptoms and do not capture the impact of oral health on the individual as a whole [4]. Therefore, measures of oral health-related quality of life (OHRQoL) are being used more often to complement clinical measures and to explore the functional and psychosocial outcomes of oral disorders. In addition, these measures function as important clinical indicators when assessing the oral health of individuals and populations, making treatment decisions, or evaluating dental interventions, services and programs.

In the literature, the impact of gingival disease on an individual is usually characterized through self-reported symptoms, such as bleeding gums or bleeding after tooth brushing [3]. However, with clinical measures such as Gingival Index (GI) [5] and Community Periodontal Index (CPI) [6], it is clear that gingival disease produces a wide range of clinical signs and symptoms, some of which may have a considerable impact on the patient's day-to-day life or quality of life [7]. Little is known about this aspect of the disease.

Thus, on many fronts, it is important to have a better understanding of the consequences of gingival disease, in addition to understanding the patient's perception of the impact of their oral health on their lives. It is also important to plan gingival care, which addresses patient's needs and key concerns. Finally, it is crucial to evaluate the outcomes of gingival treatments from the patient's perspective and to draw attention to the overall significance of gingival care [8].

The aim of this study was to conduct a literature review of previously published

data regarding the impact of gingivitis on OHRQoL from the patient's perspective. The question addressed by this review was whether gingivitis is associated with impairment of people's OHRQoL.

MATERIAL AND METHODS

Literature search

Medline, Pubmed, Embase and the Cochrane Library were searched for articles that had been published from October 1990 to February 2014, using the following terms: "gingivitis" OR "gums" OR "gingival" AND "quality of life". Medical Subject Headings (MeSH) terms were used if the database search engine allowed this. Reference lists of the selected articles were also searched manually for additional relevant publications that may have been missed in the database searches (saturation). Only publications written in English were considered.

Study selection and eligibility criteria

Two researchers independently selected the articles to be included by reading the title and abstracts. Studies were included if they met the following criteria: (1) they were observational studies, including cohort studies, randomized trials, cross-sectional (CS) and case-control studies [9], (2) they used specific OHRQoL self-measure and (3) they provided quantitative measurements of clinical oral health status. We excluded qualitative studies, case reports, (narrative) reviews, studies with incomplete sample information, insufficient methods or involving medically compromised patient groups (e.g., irradiated patients and those with systemic diseases such as diabetes).

Inter-reader calibration at the beginning of the literature review and duplicate selections throughout the study collection were carried out. The respective agreement using Kappa statistics was found to be 0.79. Disagreement between reviewers was discussed and resolved by consensus. A full copy of all potentially or definitely relevant studies was retained for further assessment. The search procedure and reasons for exclusion of studies are shown in Figure 1. The intra-observer agreement for the final selection using Kappa statistics was found to be 0.90.

Synthesis of data

Studies were grouped based on clinical and OHRQoL instruments used. The rationale for this grouping was the incompatibility of the various instrument-scoring systems. For qualitative analyses, study characteristics, main outcomes concerning gingivitis and other potentially relevant outcomes were extracted and grouped according to clinical and OHRQoL measures used.

RESULTS

Study characteristics

The main characteristics of the eight eligible CS studies represented by twelve publications are summarized in Table 1. Of these researches, two were conducted in Chile [10,11], one in India [12], three in Brazil [13,14,21], five in Thailand [15,17-20] and one in the Sudan [16]. The number and age of subjects included in these studies varied considerably, ranging from 53 to 9133 in number and from eight to 106 years of age, respectively. The following six OHRQoL instruments were found in this review: (1) Oral Health Impact Profile (OHIP) [10,11], (2) OHIP-14 [12], (3) Child Perceptions Questionnaire (CPQ) (13), (4) Oral Impacts on Daily Performance (OIDP) [18-20], (5) Child-OIDP [14-16,17,19,20] and (6) Geriatric Oral Health Assessment Index (GOHAI) [21]. Two publications verified the presence of necrotizing ulcerative gingival (NUG) lesions [10,11], two evaluated the presence of gingivitis using GI scores [12,16], seven used CPI scores [13,15,17-21] and one recorded gingival bleeding after tooth brushing [14] (Table 1).

The OHIP has 49 items designed to measure self-reported dysfunction, discomfort and disability attributed to oral conditions [22] in the adult population. The five response categories assigned values of 0-4, ranging from “never” = 0 to “very often” = 4. In 1997, Slade [23] developed the OHIP-14, which is a shorter version of the OHIP and consists of 14 items. These items are organized in seven subscales (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap), and address aspects of oral health that may compromise a person’s physical, psychological and social well-being. The CPQ is a group of self-completed questionnaires, designed to assess the frequency of the impact

of oral conditions on the quality of life in children aged 8-10 years (CPQ_{8-10}) [24] and aged 11-14 years (CPQ_{11-14}) [25]. The CPQ_{8-10} and CPQ_{11-14} consist of 25 and 37 items, respectively. They are divided into four subscales: (1) oral symptoms, (2) functional limitations, (3) emotional well-being and (4) social well-being. A four-point response format, ranging from "Never" = 0 to "Very often" = 4 is used for these questionnaires. The OIDP and Child-OIDP assesses the oral impacts during the past 6 and 3 months, respectively, in relation to eight daily performances (eating, speaking, cleaning mouth, relaxing, smiling, studying, emotion and social contact) in adolescents [26] and children [27]. For each performance, frequency and severity score (ranging from 0-5 for the OIDP and for 0-3 for Child-OIDP) are recorded. The GOHAI contains 12 questions about oral health, which are scored from 1 to 3, for a total score between 12 to 36, characterizing the worst and best assessment, respectively, of self-perceived oral health [28].

Qualitative analysis

A summary of the research according to clinical measures is shown in Table 2. Out of the twelve publications selected, two publications showed that the presence of NUG lesions was associated with negative impacts on adolescent OHRQoL [10,11]. Two studies found statistically significant associations between GI scores and OHRQoL in adults [12] and schoolchildren [16]. Eight- to ten-year-old children without gingival bleeding on probing, recorded by CPI, rated their OHRQoL worse than those with gingivitis [13]. Other studies found negative impacts on OHRQoL of children [14] and the elderly [21] with normative treatment needs for periodontal disease, which was measured using CPI scores. Four publications showed that children [17, 19, 20] and adolescents [18-20] with extensive gingivitis, recorded by CPI, were more likely to report negative impacts on their OHRQoL. Worse OHRQoL was also associated with the perception of gingival bleeding after tooth brushing in 11- to 12-year-old children [15].

Table 3 summarizes the findings of the twelve eligible publications according to the OHRQoL measure. Out of the three publications that used OHIP measures, one used OHIP-14, which is a shorter version and only consists of 14 items [12]. One study, using a Chilean population, reported OHIP data as the mean total scores. In this study,

mean OHIP scores of adolescents without NUG lesions were compared with mean OHIP scores of those with NUG lesions [10]. The latter had significantly higher mean OHIP scores than the former (11.9 vs. 9.2) [10], indicating a worse OHRQoL. Differences between these clinical categories were also presented as Odds Ratios (OR), using presence of an OHIP impact as a dependent variable [11]. Adolescents with NUG lesions were 1.6 times more likely to report an impact [11]. The results of a multivariate analysis showed GI scores to be significant impacting factors on OHRQoL in Indian dental patients [12]. The CPQ study used mean total scores as outcome measures [13]. Differences in the mean scores showed that CPQ_{8-10} scores were higher for children without gingival bleeding on probing (CPI $\geq$ 1), indicating a worse OHRQoL. All studies using OIDP and/or Child-OIDP presented the differences between the clinical categories such as OR [14,16,17-20], except for one publication that considered differences in the mean scores. The latter showed that Child-OIDP scores were higher for Thai students with normative treatment needs for periodontal disease, indicating worse OHRQoL [15]. Twelve-year-old students with mean GI scores > 1 were 1.3 times more likely to report an impact than those with mean GI scores $\leq$ 1 [16]. Adolescents who presented with bleeding gums after tooth brushing reported a four times higher negative impact on their daily lives than those without gingival bleeding [14]. Children [17] and adolescents [18] with extensive gingivitis in 3 or more mouth sextants were twice as likely to experience moderate/high condition-specific impacts. At a moderate or higher level of condition-specific impact, there were significant associations of relationships with extensive gingivitis in 12- (OR=2.1; $p<0.01$) and 15-year olds (OR=2.2; $p<0.05$) [19]. Another study found significant association between gingivitis and negative impacts on relaxing (OR=2.0; $p<0.05$), smiling (OR=1.7; $p<0.01$), studying (OR=3.8; $p<0.01$) and social (OR=2.2; $p<0.01$) contact in 12-year-olds, but not with any performance in 15-year-olds [20]. One study showed that elderly persons with gingival problems had 5.7 times more negative self-perception of OHRQoL, rated by GOHAI [21].

DISCUSSION

In the present study, we conducted a review of the literature on the relationship between OHRQoL and gingivitis. Data from CS studies suggest that gingivitis can have

a negative impact on daily life. This finding appears to be independent of the clinical and OHRQoL measures used.

There were apparent differences in OHRQoL associated with clinical gingival status. Those with higher GI scores had a poorer OHRQoL [12,16]. Moreover, the presence of NUG lesions was associated with impacts on adolescent OHRQoL [10,11]. Adolescents who presented with bleeding gums after tooth brushing were four times more likely to report an impact on their daily lives than those without gingival bleeding [15]. Other studies considering a variety of forms of extension of gingivitis [gingival bleeding on probing, normative treatment needs, sextants], recorded by CPI, found worse OHRQoL in a wide age-range of population [children, adolescents and the elderly] [13,14,17-21]. These results suggest that the OHRQoL measure is sensitive to gingival health, irrespective of whether it is self-reported or clinically observed [29]. In contrast, Barbosa et al. [13] found that children with gingivitis had a better OHRQoL than their counterparts. Additionally, eight out of 22 excluded studies found no association between the presence of gingivitis and OHRQOL scores [30-37]. These discrepancies in findings may be because the clinical instrument was not administered as a discriminative measure. Other explanations may be that there was oral disease in the sample of a small size, or that the impacts were affected by a variety of factors, such as relevance [13].

Given the limitations cited above, we used specific exclusion criteria for quality assessment of the included studies. In addition to being representative of larger populations, the studies also had to use clinical measures and well-validated OHRQoL instruments. Hence, nine out of 33 initially selected publications, which evaluated the impact on QoL only on patients' reported symptoms of gingivitis, were excluded from this literature review [29,38-45]. The rationale for exclusion was that although these studies found statistically significant associations between self-perceived symptoms of gingivitis and OHRQoL, they failed to show evidence of the clinical impact of gingivitis on daily life. According to Tsakos et al. [46], subjective measures cannot replace clinical measures. Therefore, to minimize the statistical weight of self-reporting, clinical and subjective measures should be complementary. However, if the objective is to assess QoL changes after a certain treatment modality, then the survey instrument may be acceptable.

We may have introduced a form of selection bias, as stated by Grégoire et al. [47] and Moher et al. [48], by only including articles written in English. However, this is a controversial subject. The effect of inclusion or exclusion of articles written in English was shown in two studies of meta-analyses. Exclusion of trials reported in a language other than English did not significantly affect the results of the meta-analyses [49]. However, non-English trials were more likely to produce significant results at $p<0.05$ because the average estimates of intervention effects were 16% (95% CI 3% to 26%) higher in non-English-language trials than in English-language trials [50]. Nevertheless, the extent and effects of language bias may have diminished recently because of the shift towards publishing studies in English (Cochrane manual on line).

We defined HRQoL instruments as well validated if they had the ability to assess the patient's self-reported perception of health status, had been shown in the scientific literature to be valid, reliable and responsive and included at least an assessment of physical function, mental status and social interaction [51, 52]. According to Weintraub [53], discriminative ability is an important attribute of patient-centered measures if they are to play a role in understanding the consequence of gingivitis, identifying the need for treatment and helping in determining and planning the appropriate treatment method. In their study, Bernabé et al. [15] confirmed the ability of the condition-specific version of the Child-OIDP to distinguish between children with and without normative treatment needs in a variety of oral conditions, including periodontal disease. In contrast, the generic version of the Child-OIDP was only able to distinguish between children with and without normative treatment needs for dental caries [15]. One of the 11 excluded articles that used a HRQoL measure found minimal effects due to gingivitis but a higher degree of disability secondary to periodontal pocket depths of greater than 6 mm [54]. These findings justify the inclusion of studies that use only condition-specific OHRQoL instruments, as they are more sensitive for detecting slight changes in specific conditions and may allow a more detailed evaluation of the limitations caused by oral diseases.

Certain limitations, such as potential selection bias and absence of quantitative analysis, are common in these types of studies. Despite the extensive search strategy, the number of included studies in each OHRQoL group was limited. Another limitation is caused by the difficulty in accessing literature not published in English. Because no

intervention studies were available, this review was conducted based only on CS studies and cannot prove causality. Additional studies and longitudinal research are needed before quantitative analysis and causality can be determined.

CONCLUSIONS

The data presented in this literature review are suggestive of a relationship between gingivitis and OHRQoL. This association appears to be independent of the clinical and OHRQoL instruments used. Further studies and longitudinal research are needed before quantitative analysis and causality can be determined.

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Table 1. Description of the methodology of the studies included in the systematic review.

Reference	Year published	Country	Study design	Number of subjects	Age (years)	Clinical measure	OHRQoL measure
10	2006	Chile	CS	9133	12-21	NUG lesions	OHIP
11	2007	Chile	CS	9133	12-21	NUG lesions	OHIP
12	2008	India	CS	414	18-65	GI	OHIP-14
13	2009	Brazil	CS	210	8-14	CPI	CPQ
14	2009	Thailand	CS	1034	11-12	CPI	Child-OIDP
15	2010	Brazil	CS	571	11-12	Gingival bleeding after tooth brushing	Child-OIDP
16	2010	Sudan	CS	1109	12	GI	Child-OIDP
17	2012	Thailand	CS	1063	12	CPI	Child-OIDP
18	2012	Thailand	CS	811	15	CPI	OIDP
19	2012	Thailand	CS	1874	12 and 15	CPI	Child-OIDP OIDP
20	2012	Thailand	CS	1874	12 and 15	CPI	Child-OIDP OIDP
21	2012	Brazil	CS	587	60-106	CPI	GOHAI

CS, cross-sectional; NUG, necrotizing ulcerative gingival lesions; GI, gingival index; CPI, community periodontal index; OHIP, oral health impact profile; CPQ, child perceptions questionnaire; OIDP, oral impact on daily performance; Child-OIDP, child oral impact on daily performance; GOHAI, geriatric oral health assessment index

Table 2. Summary of studies according to clinical measure.

Reference	Population, sample n, (% females)	Subject of the study	Main outcomes regarding gingivitis
NUG (Necrotizing Ulcerative Gingival) lesions			
10	Chilean adolescents (n=9133) (♀49.2)	Assessment of the validity of the Spanish version of OHIP in Chilean adolescents.	Higher OHIP total score was observed among subjects with NUG lesions, indicating a worse OHRQoL.
11	Chilean adolescents (n=9133) (♀49.2)	Assessment of the impact of clinical signs of periodontal disease on the OHRQoL of adolescents.	The presence of NUG lesions was significantly more likely to have a higher negative impact on individual's OHRQoL.
Gingival Index (GI)			
12	Indian dental patients (n=414) (♀58.0)	Description of the OHRQoL and its associated factors in Indian adult population.	GI scores were significant impacting factors on OHRQoL.
16	Sudanese schoolchildren from public and private schools (n=1109) (♀50.1)	Estimation of the prevalence, severity and causes of oral impacts on daily performances in 12-year-old public and private schoolchildren.	Mean GI showed statistically significant association with OHRQoL.
Community Periodontal Index (CPI)			
13	Brazilian schoolchildren from public schools (n=210) (♀50.0)	Assessment of the validity of the Brazilian-Portuguese version of CPQ in Brazilian children.	Children with gingival bleeding had lower impacts on the overall and emotional well-being domains than

			those without gingivitis.
15	Thai schoolchildren (n=1034) (♀47.6)	Assessment of OHRQoL in groups defined by their normative treatment need.	OHRQoL overall score distinguished between children with and without normative treatment needs for periodontal disease, with the former presenting worse OHRQoL than the latter.
17	Thai schoolchildren (n=1063) (♀50.4)	Assessment of association between oral diseases and OHRQoL in a nationally representative sample of 12-yr-old children	Children with gingivitis in three or more sextants were twice as likely to report condition-specific impacts.
18	Thai adolescents (n=811) (♀52.0)	Assessment of association between oral diseases and OHRQoL as a basis for proposing OHRQoL-based goals for the population of 15-year-olds.	Adolescents with extensive gingivitis in 3 or more mouth sextants were twice as likely to experience moderate/higher condition-specific impacts.
19	Thai children (n=1874) (♀51.0)	Assessment of association of socio-demographic, behavioural and the extent of gingivitis with OHRQoL in nationally representative samples of 12- and 15-year-old children.	At a moderate or higher level of condition-specific impacts, there were significant relationships with extensive gingivitis in 12- and 15-year olds.
20	Thai children (n=1874) (♀51.0)	Assessment of association between oral disease and OHRQoL in a nationally	Gingivitis was significantly associated with impacts on relaxing, smiling, study

		representative sample of 12- and 15-year-old children.	and social contact in 12-year-olds, but not with any performance in 15-year-olds.
21	Brazilian institutionalized elderly (n=587) (♀48.6)	Assessment of association among OHRQoL, objective and subjective conditions and oral health-related behaviour, individual traits, and environmental factors	Elderly with gingival problems had 5.7 times more negative self-perception of OHRQoL.
Gingival bleeding after tooth brushing			
14	Brazilian schoolchildren from public schools (n=571) (♀61.4)	Assessment of association between OHRQoL and clinical oral health measures among scholars.	OHRQoL was associated with the perception of gingival bleeding after tooth brushing.

OHRQoL, oral health-related quality of life; OHIP, oral health impact profile; CPQ, child perceptions questionnaire; OIDP, oral impact on daily performance; Child-OIDP, child oral impact on daily performance; GOHAI, geriatric oral health assessment index

Table 3. Summary of the outcomes according to OHRQoL measure.

Reference	Reference group	Continuous data		Dichotomized data	
		Mean	SD	OR	95% CI
OHIP					
10	Presence of NUG lesions (n = 616)	11.9	-	-	11.3-12.6
	No lesion (n = 8,517)	9.5	-	-	9.0-9.3
11	Presence of NUG lesions (n = 616)	-	-	1.6	1.3-1.9
	No lesion (n = 8,517)				
OHIP-14					
12	GI score (n=414)	0.249 (mean square)*	-	-	-
CPQ					
13	CPI ≥ 1 (n=73)	17.6	10.9	-	-
	CPI = 0 (n=137)	28.9	22.9	-	-
OHIP and Child-OIDP					
14	Need for periodontal treatment (n=870)	0.72	2.61	-	-
	No need for periodontal treatment (n=164)	1.26	2.60	-	-
15	Bleeding gums after tooth brushing (n=259)	-	-	3.7	1.3-10.8
	No bleeding (n=312)				
16	GI > 1 (n=71)	-	-	1.3	1.0-1.7
	GI ≤ 1 (n=1038)				
17	Gingivitis ≥ 3 sextants (n=395)	-	-	1.9	1.0-3.8

	Gingivitis 1-2 sextants (n=319)				
18	Gingivitis 3/more sextants (n=287)	-	-	2.4	1.3-4.5
	Gingivitis 1-2 sextants (n=269)				
19	12-yr-old				
	Gingivitis 3/more sextants (n=395)	-	-	2.1	1.3-3.3
	Gingivitis 1-2 sextants (n=319)				
	15-yr-old				
	Gingivitis 3/more sextants (n=287)	-	-	2.2	1.2-4.1
	Gingivitis 1-2 sextants (n=269)				
20	12-yr-old (Domains: relaxing, smiling, study, social contact				
	Gingivitis 4-6 sextants (n=371)	-	-	2.0, 1.7, 3.8, 2.2	1.1-3.6, 1.1-2.5, 1.3-11.1, 1.2-4.2
	Gingivitis 1-3 sextants (n=472)				
GOHAI					
21	Presence of gingival problems (n=330)	-	-	5.7	1.7-18.5

OHIP, oral health impact profile; CPQ, child perceptions questionnaire; OIDP, oral impact on daily performance; Child-OIDP, child oral impact on daily performance; GOHAI, geriatric oral health assessment index

NUG, necrotizing ulcerative gingival lesions; GI, gingival index; CPI, community periodontal index; SD, standard deviation; OR, odds ratio; CI, confidence interval

*F=1.752; $p<0.05$ (multivariate analysis)

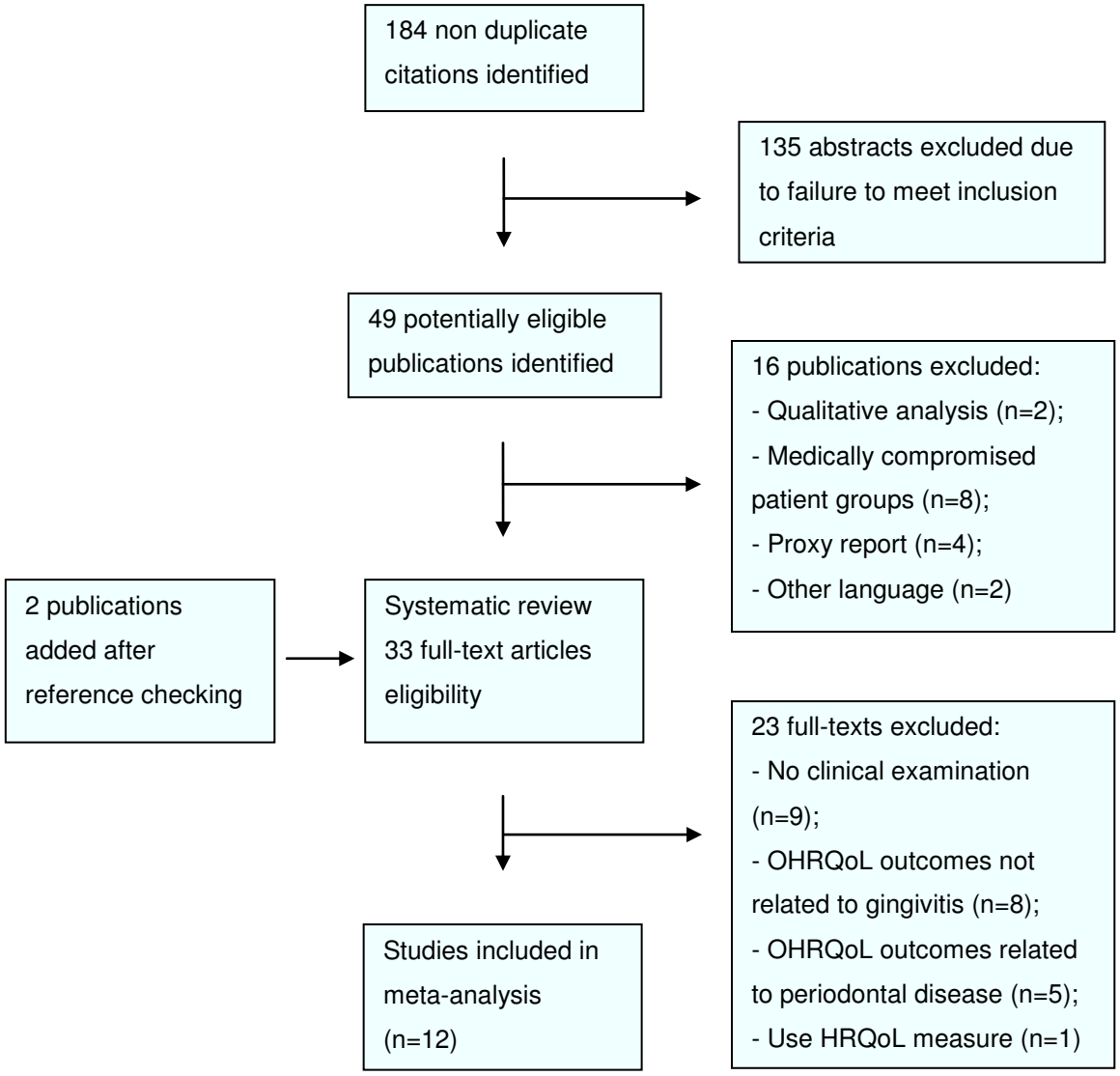

Figure 1. Flowchart of publication selection for inclusion in the systematic review.

CONCLUSÕES

Os dados apresentados nesta revisão de literatura são sugestidos da relação entre gengivite e QVRSB. Esta associação parece ser independente do instrumento clínico e da medida de QVRSB utilizados. Novos estudos e pesquisas longitudinais são necessários para verificar a relação causa-efeito entre as variáveis avaliadas.

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I, Margery J. Galbraith, a native English speaker residing in Brazil since 1974, have been involved in the translation of a wide range of technical documents since 1979, and in review and translation of scientific articles related to dentistry and medicine since 1982. Furthermore, I declare that I am a full partner and co-director of Galbraith Comunicações Ltda, and apart from my company activities, I work as a freelance translator.

I hereby certify that I reviewed the English language in the article entitled **"Gingivitis and oral health-related quality of life: a literature review"**, at the request of Prof. Taís de Souza Barbosa, Department of Pediatric Dentistry, Piracicaba Dental School, University of Campinas, São Paulo, Brazil.
Any changes made to the manuscript after this revision will be for the author's responsibility.

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