Halitosis from tonsilloliths: Literature review for oral healthcare providers

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ABSTRACT

Introduction: Although tonsillolith derived halitosis may affect a significant number of individuals, little attention has been given to increase the awareness of this condition to oral healthcare providers. Because these are the professionals who are primarily consulted by clients suffering from halitosis, it is crucial that such individuals possess knowledge of what the current literature provides concerning tonsilloliths and its relationship to halitosis. **Methods:** A literature review was performed to analyze the link between tonsilloliths and halitosis, as well as to investigate if any efforts had yet been done to increase this awareness to oral healthcare providers. A total of six papers were found which supported this link and were retrieved from CINAHL and PubMed databases. **Results:** Tonsilloliths not only emit a foul odour, but also contain obligate anaerobic bacteria that can produce volatile sulfur compounds associated with halitosis. Seventy five per cent of people who had tonsilloliths presented with abnormal halitometry, whereas only 6% of people presented with normal halitometry. Dycotomic logistic regression indicated that the presence of a tonsillolith represents a tenfold risk factor for halitosis, and case reports confirmed that the absence of halitosis was achieved upon tonsillolith removal and/or tonsillectomies. **Conclusion:** No papers addressed the need to increase the awareness of tonsillolith derived halitosis to oral healthcare providers. A proposal to implement this concept in the curriculum of dental educational institutions as well as to develop continuing education courses for oral healthcare providers addressing this condition is suggested.

RESUMÉ

Introduction : Bien que l'halitose découlant de l'amygdalolithe puisse affecter un nombre important de personnes, peu d'attention a été accordée au besoin de sensibiliser davantage à ce problème les fournisseurs de soins de santé buccale. Comme ceux-ci sont les professionnels les plus consultés par les patients atteints d'halitose, il est essentiel que ces professionnels se renseignent davantage sur ce que diffuse la littérature actuelle à propos des amygdalolithes et de leurs relations avec l'halitose. **Méthode :** Un examen de la littérature a permis d'analyser le lien entre les amygdalolithes et les halitoses, ainsi que d'investiguer tous les efforts visant à accroître la sensibilisation des fournisseurs de soins de santé buccale. On a ainsi trouvé six articles qui soutiennent ce lien, dans CINAHL et des bases de données de PubMed. **Résultats :** On a trouvé que les amygdalolithes non seulement émettent des composés de soufre volatile associé avec l'halitose. Soixante-quinze pour cent de gens atteints d'amygdalolithe présentaient une halitométrie anormale, alors que seulement 6 % présentaient une halitométrie normale. Une régression logistique dycotomique indiquant que la présence d'une amygdalolithe comportait un facteur décuplé de risque d'halitose, et certains comptes-rendus confirmaient qu'on obtenait une absence d'halitose par le retrait de l'amygdalolithe et/ou la tonsillectomie. **Conclusion :** Aucun article ne signalait le besoin d'accroître la sensibilisation des fournisseurs de soins buccaux pour l'halitose due à l'amygdalolithe. La suggestion porte sur l'introduction de cette notion dans le curriculum des institutions de formation dentaire, ainsi que sur l'élaboration de cours sur ce problème dans les programmes de perfectionnement continu pour les préposées aux soins buccaux.

Key words: caseous tonsillitis, cryptic tonsillitis, tonsil stones, tonsilloliths, caseum, tonsillar calculi, chronic fetid tonsillitis, halitosis, oral healthcare providers, education

INTRODUCTION

Halitosis, defined as the condition of having stale or foul smelling breath,[1] is a subject of concern for many people. Individuals suffering from halitosis may avoid circumstances such as social interaction that would possibly expose their condition, thus negatively impacting their quality of life. Because 80–90% of cases of halitosis are odontogenic related,[2] the population is often primarily instructed by an oral healthcare provider to adopt a proper oral hygiene care regimen. There are, however, systemically healthy people who suffer from halitosis while presenting with an excellent oral hygiene status.[2]

A condition that has been associated with halitosis is cryptic tonsillitis, more commonly known as tonsil stones. It has been referred in the literature as tonsilloliths, caseous tonsillitis,[3] tonsil caseous,[4] tonsillar calculi[5] and chronic fetid tonsillitis.[6] These stones form within the crypts of the tonsils—an area that promotes the ideal anaerobic condition for this formation to take place—and vary in size, consistency and degree of odour.[6] The emphasis on the link of tonsilloliths to halitosis has not been appropriately made to oral healthcare providers. The lack of awareness of this relationship has possibly led to overlooking this condition when attempting to diagnose the origin of halitosis in clients in the clinical setting.[2,7] Although research has already established a possible relationship between tonsilloliths and halitosis, a single review of all the studies that support this correlation has not yet taken place.

The purpose of this paper is to increase the familiarity of tonsilloliths as a possible factor in the manifestation

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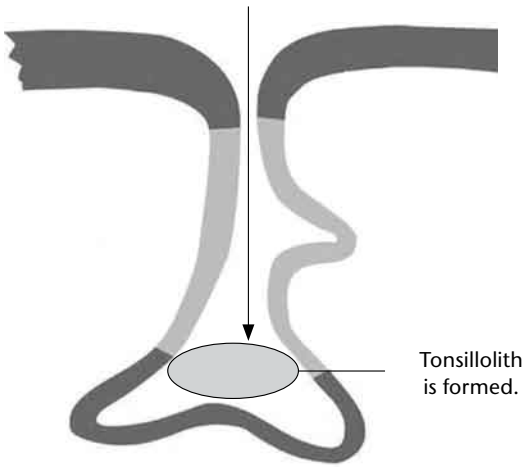
Figure 1. Scheme of tonsillar crypt.



Modified figure from source.[3]

of halitosis to oral healthcare providers. By implementing this knowledge into the curriculum of dental educational institutions and by developing continuing education dental courses focusing on this relationship, oral healthcare providers will be more aware of the nature of tonsilloliths and its link to halitosis. In addition, oral healthcare providers will be better able to assist clients who present with tonsillolith derived halitosis in the clinical setting.

A review of the literature on the nature of tonsilloliths, the causes of halitosis, and its diagnostic methods will be addressed in this paper. A relationship between tonsilloliths and halitosis will be investigated and reported. Recommendations for both the educational and the clinical settings as a means of increasing the awareness of tonsillolith derived halitosis to oral healthcare providers are discussed.

BACKGROUND

What are tonsilloliths?

Tonsilloliths are defined as structures that develop in the crypts of the tonsils that act as a localized concentration of both aerobic and anaerobic bacteria, progressing in calcification from soft gels to hard stones[8] (Figure 1). They are often associated with tonsillar inflammation or tonsillitis,[9] believed to be due to the suitable environment that the tonsillar crypts promote for the activity of anaerobic bacteria in the upper airway system.[6] A mixture of retained exfoliated epithelium cells, keratin debris, and foreign particles, is accumulated, and eventual caseum formation takes place. Chronic caseous tonsillitis (CCT) has been reported to be a common disease, although the exact statistical prevalence is unknown.[3]

Diagnosis of tonsilloliths can be made clinically, based on symptoms and physical examination. Small tonsilloliths are asymptomatic; however, large concretions may produce several symptoms such as halitosis, sensation of a foreign body, and frequent irritation of the throat which causes inflammatory tonsillitis.[10] In a case study, a 56 year-old female presenting with a giant tonsillolith complained of dysphagia, sore throat, right otalgia and swelling in the right tonsillar fossa.[11] At times, imaging techniques may be warranted to identify the extent of the lesion and the exact location. Radiographs may reveal an opaque mass. Computed tomography may reveal non specific calcified images.[12]

Treatment options

For clients with CCT, tonsilloliths are a common occurrence. It cannot be prevented since the inflammation of the tonsils enhances crypt depth, inducing the formation of tonsilloliths. The methods of treatment are the same methods of prevention of *further* tonsilloliths' formation.

The treatment options for tonsilloliths include tonsillectomy and laser cryptolysis. A study analyzed a mouthwash that has been developed for the treatment and prevention of tonsilloliths.[4] The mouthwash treatment is based on studies which have identified tonsilloliths to be composed of biofilm structures similar to dental biofilm.[9] A combination of both oxygenating and antiseptic properties of this mouthwash effectively destroys anaerobic bacteria that is linked to halitosis and biofilm formation. It was shown, however, that the mere act of gargling and swishing with a placebo mouthwash was also effective in decreasing the incidence of tonsilloliths.[4]

Upon realization of its importance in the immunological function of the body, tonsillectomy is no longer the common procedure that it once was. It is generally only recommended to undergo an invasive procedure like tonsillectomy if all other treatment options fail. CO_2 laser cryptolysis is a less invasive procedure used to reduce tonsillar crypt depth, thus decreasing the retention of tonsilloliths.[10] This method preserves the immunological function of the tonsils, and is virtually painless, well tolerated, and can be performed in an office setting under topical anesthesia, permitting patients to return soon after to their activities.[6] Patients with a strong gag reflex are not usually able to undergo this procedure.[6]

Halitosis

Volatile sulfur compounds (VSC) such as hydrogen sulfide, methyl mercaptan and dimethyl sulfide are most often the culprits in halitosis, with hydrogen sulfide and methyl mercaptan accounting for about 90% of the total content of VSC.[2,13] Most of these compounds are derived from the degradation of sulfur containing substrates—leucocytes, epithelial cells and food debris—by microorganisms. Most adults suffer only occasionally from transient halitosis that may be caused by fasting for long periods of time, or by ingesting foods with strong odours such as garlic and onions. An estimated 10–30% of the population, however, suffers from true halitosis, which persists continuously.[2] The main methods of diagnosing the degree of halitosis include using the organoleptic test (OLT), the gas chromatography (GC) and the sulfide monitoring. Studies show that using a combination of two or more of these methods may provide more accurate results.[14]

Organoleptic test

The OLT is the simplest approach to measure halitosis, performed by directly smelling the breath of a person. The degree of oral malodour is classified on a scale from 0–5, from no odour to extremely foul odour.[2] Researchers differ on the reliability and reproducibility of the method; some believe it is a problematic system of measuring halitosis due to its subjectivity, as it relies on the clinician's own opinion of the degree of malodour present.[2,3,7] On the other hand, some argue that because the degree of oral malodour a person has is subjective in itself, the use of the OLT may be considered valid.[15] Research is being conducted to improve the method by incorporating techniques that prevent embarrassment for the clinician and the client, and to acquire a more concentrated mouth air.[2,15] Other researchers claim that the OLT is the gold standard for the measurement of halitosis because of its significant correlation with the GC and the sulfide monitor.[16–19]

Gas chromatography

Gas chromatography is used in analytic chemistry for separating and analyzing compounds that can be vapourized without decomposition.[20] GC analysis has been considered the gold standard for measuring halitosis by some researchers,[18,21] because of its accuracy in quantification and its specificity for VSC. GC has been considered to be highly objective, reproducible and reliable.[22] However, GC analysis is costly, requires a skillful operator and an elaborate and sophisticated facility to adapt for its large size. Thus, this method may be impractical for oral healthcare providers to operate in their dental offices.

Sulfide monitoring

Sulfide monitoring identifies the quantity of volatile sulfur compounds present in the oral cavity by generating a signal using an electrochemical voltammetric sensor. The results are displayed and recorded on a digital screen in expired air parts per billion (ppb).[3] This method of measuring halitosis is frequently employed due to its objectivity, as it is based on the amount of VSC present in a client's mouth. In addition, its small size, price, and simplicity of use make it a popular and accessible tool in most dental offices. One reported limitation with this method is that important odours that may be related to halitosis are not detected.[2] This means that clients may produce normal sulfide monitor measurements, but still present with halitosis related to other compounds which this method does not detect—volatile short chain fatty acids, polyamines, alcohols, phenyl compounds, alkanes, ketones, and nitrogen containing compounds.

MATERIALS AND METHODS

A review of the literature was performed to analyze previous studies associating tonsilloliths to halitosis, and to investigate for efforts attempted to increase the awareness level of oral healthcare providers to this relationship. The first step in the investigation was to develop a PICO question (**P**atient/**P**opulation; **I**ntervention: **C**omparison: **O**utcome), followed by a literature search and this report. The PICO question:

Could the increased familiarity and knowledge of tonsillolith assist oral healthcare providers to properly identify its relationship to patients suffering from halitosis?

The literature search was performed from September 2009 to November 2009. The search included the following databases: CINAHL, PubMed, Cochrane and MeSH; the Cochrane database produced no literature pertaining to tonsilloliths as a halitosis inducing factor or to education of oral healthcare providers on this issue. The following key words were used: caseous tonsillitis, cryptic tonsillitis, tonsil stones, tonsilloliths, caseum, tonsillar calculi, chronic fetid tonsillitis, halitosis, oral healthcare providers and education. The literature search was limited to the English language, and focused on papers published from 2004 to 2009. Papers were selected for retrieval based on their relevance to the possible relationship between halitosis and tonsilloliths. These papers were critically analyzed for quality and evidence based methods of research. Only peer reviewed and indexed published studies were used in the formation of this paper. Articles retrieved as background information for this paper focused on current methods of diagnosing halitosis, the nature of tonsilloliths and treatment options available for this condition.

RESULTS

The earliest report found in the literature which correlates tonsilloliths to halitosis is dated to 1988.[23] It was not until almost two decades later that this relationship was investigated again.[6,10] Tsuneishi et al.[24] conducted a study to analyze the composition of the bacteria flora of tonsilloliths. The objective was to examine if the tonsilloliths shared VSC producing bacteria with the tongue and periodontal pocket. All tonsilloliths examined were reported to emit a foul odour when crushed. From the six tonsilloliths samples, a total of 273 clones were produced, and all were identified as known species or phylotypes. The number of species/phylotypes detected in each tonsillolith ranged from 9 to 17.[24]

When comparing samples, neither a common type of species/phylotypes, nor a predominant type of bacteria was identified. However, all samples included at least one bacterial species that is known to produce VSC or to be associated with halitosis. Bacteria belonging to the genus *Prevotella* were also found in all tonsillolith samples. Results of scanning electron microscopy showed cocci being more common than rods on the surface of the tonsilloliths, while rods and filamentous microorganisms predominated inside the tonsillolith. Except for one sample, all tonsilloliths presented with more anaerobes (over 50%) than aerobes.[24] The malodour produced when the tonsilloliths are crushed occurs due to the release of VSC from these obligate anaerobic bacteria. The authors proposed the need for further DNA sequencing to determine accurately the level of bacterial diversity, and to identify novel phylotypes in tonsilloliths using a phylogenic tree.[24] Only a small number of clones were evaluated in this study.[24] Suggestions are made for further studies to address an objective data on intact levels of VSC before they are crushed because a subjective method was employed after samples were crushed.[24] Since hydrogen sulfide and

Table 1. Summary of studies associating tonsilloliths to halitosis.

Study	Design	Results
2009 Stoodley et al.[19]	Observers. N=16	• Fusiform morphology and corncob structures found suggested that *F. nucleatum* was present in tonsilloliths.
2007 Rio et al.[3]	Observers, parallel group. N=49	• Kappa coefficient test = a tonsillolith was present in 75% of the patients with abnormal halitometry and in only 6% of the patients with normal halitometry. • Student's t-test = halitometry values were statistically higher in patients with a tonsillolith at the time of VSC analysis. • Dycotomic logistic regression = the presence of a tonsillolith represents a tenfold risk factor for halitosis.
2006 Tsuneishi et al.[23]	Observers. N=6	• All tonsilloliths produced foul odour when crushed. • Bacteria belonging to the genus *Prevotella* were found in all tonsillolith samples. • All tonsillolith samples included at least one bacterial species that is known to produce VSC or to be associated with halitosis.
2006 Myers et al.[24]	Case report. N=1	• Extreme halitosis disappeared upon adenotonsillectomy in an 11 year old girl with multiple bilateral tonsilloliths.
2005 Ansai and Takehara[7]	Case report. N=1	• Removal of tonsilloliths reduced concentration of hydrogen sulfide in the breath of a man from HgS 1.2 ng/10 ml, Grade 2 OLT to HgS 0.3 ng/10, Grade 0 OLT.
1988 Fletcher and Blair[22]	Case report. N=1	• Tonsillectomy was effective in treating halitosis.

methyl mercaptan are considered the major components of halitosis, and because all tonsilloliths carried at least one anaerobic bacterial species producing these products, it was concluded that tonsilloliths may contribute to halitosis.[24]

Another study was conducted by Stoodley et al.[9] to analyze the morphology and activity of tonsilloliths with a hypothesis that tonsilloliths were capable of metabolic activity consistent with dental biofilms. Histological analysis confirmed that tonsilloliths contained corncob structures, filaments, and cocci, and were therefore, assimilated to dental biofilms. Although unconfirmed by the authors, the fusiform morphology and corncob structures analyzed in the study suggested that *F. nucleatum* was present, which is an obligate anaerobe that can produce VSC associated with halitosis. Based on the results, the authors of both of the studies described above[9,24] suggest that obligate anaerobes that can produce VSC associated with halitosis are present in tonsilloliths.

Another study in 2007 evaluated the relationship between the presence of a tonsillolith and an abnormal halitometry in a population with chronic caseous tonsillitis (CCT).[3] The normal halitometry value for this study was considered to be less than 150 ppb of VSC. Forty-nine subjects, 17 male and 32 female, and ranging in age from 14–57 years were used in this study. The main criterion was that clients needed to have CCT. The percentage of people with CCT who had halitosis was 77%.

Participants answered a survey related to food debris, oral hygiene, medical history, and use of medications. The exclusion criteria included smokers (any tobacco product, either daily or occasionally), heavy alcoholic drinkers (more than 30 g alcohol/day), drug users, pregnant women, clients with tooth and gum diseases (specific conditions listed), and those taking any kind of regular medication. In addition, clients with periodontal diseases (specific methods of measuring the diseases are mentioned), and clients with a thick tongue coat (plaque, food debris) were also excluded from the study. Clients with gastrointestinal, pulmonary, and other systemic metabolic disorders were also excluded. Except for CCT, all clients had a normal medical background.

The instrument, Interscan Halimeter, was used to detect the amount of VSC present. The average value of three measurements taken for each subject during testing was used to analyze data. The subjects were divided into two groups based on halitometry profile—Group A: normal halitometry, and Group B: abnormal halitometry. The correlation between the presence of a tonsillolith and abnormal halitometry, and whether the presence of a tonsillolith was a predicting factor for the abnormal halitometry were studied using different tests. The Kappa coefficient test showed that a tonsillolith was present in 75% of the clients with abnormal halitometry, and in only 6% of the clients with normal halitometry. Student's t-test demonstrated that halitometry values were statistically higher in clients with a tonsillolith at the time of VSC analysis. Dycotomic logistic regression showed that the presence of a tonsillolith was a risk factor for abnormal halitometry. The results indicated that the presence of a tonsillolith at the moment of the physical examination represented a relative increased risk for abnormal halitometry of 10.3 times.

The difference in halitometry between Groups A and B is shown to be significant. Group B (abnormal halitometry) presented with much higher VSC levels than Group A (normal halitometry) when compared—285.2 ppb versus 53.9 ppb respectively. What makes this significant is the fact that 75 per cent of clients in Group B had a tonsillolith present in the mouth at the time of testing, whereas only 6 per cent of Group A presented with the tonsillolith at time of testing. As for the remaining 25 per cent (two subjects)

from Group B who did not present with a tonsillolith at the time of the testing, they were later reassessed and the presence of abundant exudative, non purulent secretion was detected by pressing the tonsils, indicating the presence of non visible tonsilloliths. No information was given to indicate when or how long after the testing these subjects were reassessed, but it was suggested that the non visible tonsilloliths were the cause of the abnormal halitometry in these subjects.

Because 94 per cent of the clients in Group A did not have a tonsillolith at the time of testing and had normal halitometry results, it is conclusive that when a tonsillolith is absent VSC levels tend to be normal. In other words, the presence of a tonsillolith suggests a great probability that VSC levels are high.

Although an objective method of measuring halitosis was employed, the Interscan Halimeter only measures VSC, thus excluding other smells that are offensive to the human olfaction. In addition, only a small number of subjects actually presented with abnormal VSC levels (16.3%), perhaps because halitosis can occur in only certain periods of the day (when a person wakes up for example), and because the measurement was only done at a given time, there exists a possibility that the subjects were not exhaling VSC at the time of analysis.

Information lacking in this study were:

- no indication of blindness to assess for possible bias and/or accuracy.
- details of the questionnaire for participants, and
- oral health status that was vaguely described as "no signs of gingival inflammation", without a reference to the use of plaque scores or bleeding indexes.
- whether the subjects were instructed to incorporate a proper oral hygiene home care procedure prior to the study.

Without the survey questions and the lack of plaque and bleeding scores, plus the great quantity of people (n=49) "without gingivitis", there may be some room for skepticism. Additionally, the student's t-test demonstrated that halitometry values were statistically higher in clients with a tonsillolith at the time of VSC analysis, but without any numerical values to indicate by how much higher. Despite the lack of information on these particular issues, a variety of tests and accuracy methods were used to confirm the hypothesis that a relationship between tonsilloliths and halitosis exists.

Another study that examined tonsilloliths as a halitosis inducing factor was performed by Ansai and Takehara.[7] The case report is of a 25 year old Japanese male student who presented at a breath odour clinic complaining that he felt like something had caught in his throat which he also considered to be the cause of breath odour. During oral examination, two tonsilloliths were clinically observed. Both the GC and the OLT were used to test the degree of halitosis present. Before the tonsilloliths were removed, the hydrogen sulfide measurement was HgS 1.2 ng/10 ml. Three trained dentists performed the OLT, which was determined to be Grade 2—slight, but clearly noticeable odour. Immediately after the removal of a total of four tonsilloliths, another GC was performed giving a result of HgS 0.4 ng/10 ml—one third of the value from first test. The reliability of the GC is shown to have a standard deviation lower than HgS 0.1ng/10 ml, therefore, the reduction of 0.8 is considered significant. The test was performed again the following day, and HgS 0.3 ng/10 ml was detected and OLT score was recorded as 0. The rationale for acquiring these measurements only a day later and not immediately after testing, is unknown. The patient's opinion on whether he thought his halitosis had disappeared is also not provided. Despite the lack of information on these particular topics, the choice of using the GC as a form of testing in this study is plausible. As previously addressed, the GC has been shown to be a highly accurate form of diagnosing halitosis, suggesting that the significant results given to link tonsilloliths with halitosis are valid.

The authors claim their study to be the first report to link tonsilloliths to halitosis. However, an article written in 1988 had already attempted to establish this relationship.[23] This incident may be considered evidence to support the notion that a higher degree of awareness of the tonsillolith–halitosis connection is needed among oral healthcare providers.

Myers et al.[12] reported a case where an 11 year old female presented with a history of chronic tonsillitis causing the retention of food debris to occur several times per week. The patient reported having extreme halitosis, and as a result, she would often avoid talking to people due to embarrassment. After attempting several unsuccessful methods to prevent debris from forming such as gargling with salt water, using mouthwash, and frequent tooth brushing, she desired to undergo adenotonsillectomy. Multiple bilateral tonsilloliths were discovered. Two weeks following the surgery, the patient returned to the clinic with improved symptoms. At that time, she stated she had not experienced any halitosis and that she was satisfied with the outcome of the procedure.

Although no instruments were used to measure halitosis in this case, one may still consider the subjective feelings of the subject towards her condition valid. The fact that she reported significant satisfaction and no longer experienced halitosis following surgery may eliminate the potential of pseudohalitosis, a belief that one is experiencing halitosis when it is not present.[14]

Education

No literature was found that addressed implementing the knowledge of tonsilloliths as a halitosis inducing factor in the dental educational setting. Some researchers, however, agreed that possessing this knowledge is highly expected of oral healthcare providers.[2,7]

DISCUSSION

The literature seems to show a significant correlation between tonsilloliths and halitosis. Because oral healthcare providers are the professionals who are primarily consulted for the treatment of halitosis, it is important that they possess the current knowledge to properly diagnose and refer their clients. As reviewed in this paper, tonsilloliths have been shown to be a possible cause of halitosis. However, oral healthcare providers are not fully

aware of this relationship. Researchers agree that oral healthcare providers are accustomed to examining the oral cavity, but rarely examine the tonsil and pharynx area, indicating that the presence of a tonsillolith may be easily overlooked.[7] Van den Broek et al.[2] made the following statement, "Non dental related halitosis should not be underexposed", suggesting the need to increase an awareness to oral healthcare providers that tonsilloliths may sometimes be the cause of halitosis. A suggestion to increase this awareness is to implement the concept of tonsilloliths as a possible cause of halitosis in the educational setting. This includes incorporating tonsilloliths in the curriculum of dental institutions and developing continuing education courses for oral healthcare providers that address this issue. A recommendation for clinical practice would be to include not only a question regarding halitosis, but also one that addresses tonsil stones in the health form filled out by clients in dental offices.

CONCLUSIONS

Halitosis is a condition that may restrict social interaction especially when it comes to intimate relationships, thus negatively affecting one's quality of life. In reference to the authors' PICO question, "Could the increased familiarity and knowledge of tonsillolith assist oral healthcare providers to properly identify its relationship to patients suffering from halitosis?" it is conclusive that the association between the presence of tonsilloliths and the manifestation of halitosis is present in the literature. There is no evidence, however, on any attempts that might have been made to address the need for an increased awareness and knowledge of tonsilloliths as a halitosis inducing factor to oral healthcare providers. Through the formation of this paper, however, its use will serve the purpose of increasing the familiarity of the halitosis–tonsillolith link to oral healthcare providers, who are the primarily consulted professionals by the public on the issue of halitosis. Implementation of increasing awareness of the relationship of tonsilloliths to halitosis in both the educational and clinical settings needs to be performed.

Further research needs to be conducted in order to analyze the prevalence of people with tonsilloliths, as this information was not found in the literature. This is an important statistic because it could bring more attention to this topic, thus, increasing awareness. The sooner the diagnosis of tonsillolith derived halitosis, the sooner the appropriate treatment is delivered, and quality of life is restored.

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