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Authors' Affiliation:
[1]DDS, MS, Assistant Professor, Department of Oral and Maxillofacial Medicine, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2]DDS, Oral and Maxillofacial Surgery Preceptor, Department of Oral and Maxillofacial Surgery, School of Dentistry, University of California, Los Angeles, USA
[3]DDS, Private Dentist, Tehran, Iran

[*]**Corresponding Author**
DDS, MS, Assistant Professor, Department of Oral and Maxillofacial Medicine, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran,
Iran
Email: fahimeh.anbari@gmail.com

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Correlation between halitosis and self-reported halitosis in patients with personality type A and B

Hamid Reza Khalighi[1], **Zahra Yazdani**[2], **Saeid Ghasemi**[3], **Fahimeh Anbari**[1*]

ABSTRACT

Background: It has been shown that the patient's personality type can affect the outcome of dental diagnosis and treatment. Therefore, this study aimed to investigate the relationship between self-reported halitosis and halitosis identified by the organoleptic method in two distinct personality types, A and B. *Material and Methods:* This cross-sectional study was conducted among the patients attending the dentistry school of Shahid Beheshti University of Medical Sciences between December 2019- and March 2022. After filling out the consent form, patients were asked to complete Bortner's questionnaire to determine their personality type. Then, another questionnaire related to halitosis self-awareness was given to them. The organoleptic method was performed to determine the presence of halitosis. Descriptive statistics methods were used to report the results. *Results:* The frequency of halitosis was significantly higher (P = 0.002) among patients with personality type B. However, the frequency of self-reported halitosis was considerably higher (P =0.000) among those with personality type A. There was more agreement between the examiner and the patients in the group with personality type A. A significant relation exists between personality types (A and B) and agreement between examiners and patients about halitosis (P-Value = 0.018). However, the relationship between age and gender factors and the agreement was insignificant (P-value> 0.05). *Conclusion:* Considering the relationship between halitosis and personality type, dental professionals should be aware of personality effects on a patient's halitosis.

Keywords: Halitosis, Personality type, Bortner's questionnaire, Organoleptic method.

1. INTRODUCTION

Halitosis refers to bad breath that originates from the mouth. Halitosis is divided into three categories: True halitosis (when the symptoms are objective), false halitosis (no apparent symptoms of bad breath, but the patient believes to have bad breath), and halitophobia (there are no symptoms and the patient insists on bad breath). Dentists can treat false halitosis, but patients with halitophobia should be referred to a psychologist (Anbari et al., 2019; Nakhleh et al., 2018; Aydin and Harvey-Woodworth, 2014). Clinical methods for assessing bad breath include organoleptic testing, halitometer, and gas chromatography. The organoleptic testing is a more reliable method that does not need advanced and expensive equipment (Dudzik et al., 2015). Another method used to assess halitosis is self-report halitosis. In this method, the patient puts his hand in front of his mouth, inhales his breath, and announces the mouth odor (Ramos et al., 2013; Lee et al., 2014). It is clear that in this method, different patients have different perceptions about their mouth odor.

While other methods, especially organoleptic testing, are more reliable (Settineri et al., 2010). There is evidence that shows psychiatric factors are effective in the incidence of halitosis. A study conducted in 2015 showed that psychological factors such as anxiety, anger, stress, and personality traits are risk factors for subjective halitosis. Vali et al., (2015) brushing less than once a day is the most crucial cause of self-reported halitosis. Other factors such as smoking history, female gender, age over 30 years, education less than high school, gastrointestinal diseases, and not flossing were reported as related factors in self-reported halitosis (Al-Ansari et al., 2006). In another study, the psychological status of patients complaining of halitosis was compared to those without halitosis; the results showed that more than half of the patients complaining of halitosis had false halitosis. These patients also had higher degrees of depression, anger, sensitivity, anxiety, and stress (Wang and He, 2018).

One study showed that there is a significant relationship between the degree of halitosis and the tendency to psychological disorders, and patients with a lower degree of halitosis who complain of bad breath have more severe problems in their psychological profiles (Oho et al., 2001). A set of personal characteristics and traits of individuals shapes personality. Types of personality show people's behavior and differentiate human beings from each other. Besides determining a person's mental state, their personality type also affects their physical condition. Furthermore, this factor can affect the complaint of halitosis (Rahimian-Boogar et al., 2010). In a simple method, personality type can be divided into two types, A and B.

Type A individuals are competitive and aggressive. They are prone to physical illness. Type B characters are calm and relaxed and have less stress. Also, regularity and individual independence are more evident in these people. Bortner's questionnaire assesses personality types A and B. Furthermore, the effect of personality traits such as anxiety in pathological disorders in the oral and maxillofacial regions has been shown, and it is likely that different personalities can have an impact on other conditions, including halitosis (Anbari et al., 2020). Because the patient's report of halitosis is one of the influential factors in the diagnosis and treatment of halitosis, this study aimed to investigate the correlation between self-reported halitosis and halitosis identified by organoleptic tests in two personality types, A and B.

2. MATERIALS AND METHODS

All procedures performed in studies involving human participants were under the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

The sample size was calculated with the following formula:

$$n = \frac{\left(Z_{1-\alpha/2} + Z_{1-\beta}\right)^2 \left[P_1\left(1-P_1\right) + P_2\left(1-P_2\right)\right]}{\left(P_1 - P_2\right)^2}$$

According to previous studies, the false halitosis rate was approximately 50% (Wang and He, 2018). If the difference is 35% more in the group of people with personality type A, according to the above formula and below parameter, we needed 26 people in each personality type.

N1=N2=26 /Power= 0.9 /p1= 0.85 /p= 0.5 0.05 = α = 0.1 β

So, we performed this study on 52 patients over 18 years old who were referred to Shahid Beheshti Dental School between December 2019 and March 2022. They accepted to take part in the study by filling out the consent form and confirming they had no history of mental disorders. We determined the degree of halitosis by the organoleptic method. The patients reported their halitosis based on our score. They filled out Bortner's questionnaire to determine personality type.

Method of performing the organoleptic test

We performed all tests on fasting patients from 8 to 12 A.m. A plate (50 x 70 cm) was placed between the patient and the examiner to prevent them from seeing each other, and a transparent tube (2.5 cm in diameter and 10 cm long) was placed in the middle of the plate. We asked the patient to close his mouth for 60 seconds without swallowing and then expel his exhaled air to the tube inside his mouth (Dudzik et al., 2015). The consistent examiner scored the severity of patient halitosis in this manner: the absence of bad breath number 0, rarely the number 1; low and slight number 2, moderate number 3; severe but tolerable number 4; and severe but intolerable number 5. We considered individuals with scores greater than or equal to 2 as a group with halitosis (Akaji et al., 2014).

Halitosis Questionnaire

Through this questionnaire, we obtained information such as the ability to detect bad breath by hand-on-mouth technique, its severity and duration, its impact on their social life, and the problems they have experienced. Researchers graded this questionnaire. People who reported no bad breath were given a score of 1. The lowest score that people got after reporting halitosis was 5, which means that they realized this problem and that their social relations were not damaged. Others have reported people with scores of 7 and 8 to have bad breath and have mentioned moderate severity that may or may not affect their social relationships. People with scores of 9 and 10 have noticed their mouth odor concerning others, which is powerful in their opinion and has affected their social life. Thus, score 1 has no mouth odor; 5 and 6 are low and slight, 7 and 8 are moderate, and 9 and 10 are severe (Ramos et al., 2013).

Determining the personality type

To determine the personality type of individuals, we used Bortner's questionnaire. This questionnaire has 14 pairs of phrases on two sides of a table. Type A index behaviors are shown on one side, and type B-specific behaviors are shown on the other. There are scores 1 to 7 between each pair. Each person selected a number from this range based on the proximity of his behavior to one of these phrases. We calculated the sum of the selected numbers for each pair of expressions. Scores lower and equal to 49 were considered personality type A, and scores higher than 49 were considered personality type B (Bortner, 1969).

Statistical analysis

Data analysis was performed using SPSS21 software. We used a linear regression model to investigate the negative effect of personality type, gender, and age variables on halitosis in two personality type groups, A and B. We also calculated the agreement of the examiner with the patient in each group by calculating the kappa agreement coefficient and comparing the two groups using the chi-square test.

3. RESULTS

In this study, 52 patients referred to Shahid Beheshti Dental School participated. Among them, 23 were male (44.2%) and 29 were female (55.8%). Half of the study participants had personality type A (26 people), and the other half had personality type B (26 people). The number of men and women in Type A was equal (13 men and 13 women). In personality type B, the number of women and men was 16 and 10, respectively. The mean age of participants in this study was 30.77±10.52. The mean age of individuals with personality type A was 31.46±11.57. This number for individuals with type B was 30.08±9.54.

Organoleptic test results for halitosis

There was no halitosis in 18 patients (34%); 14 patients (26.92%) had "low" degree halitosis. Fourteen patients (26.92%) also had "moderate halitosis". 6 people (11.53%) also had "severe halitosis".

Results of organoleptic test for halitosis by personality type

In type A patients, 15 patients (57.69%) had no halitosis, six patients (23.07%) had low halitosis, four patients had moderate halitosis (15.38%), and one patient (3.84) had severe halitosis.

In type B patients, three patients (11.53%) had no halitosis, eight patients (30.76%) had low halitosis, ten patients had moderate halitosis (38.46%), and five patients (19.23%) had severe halitosis.

Comparison of organoleptic test results in two personality types, A and B

Figure 1 shows the severity of halitosis in two personality types, A and B. A chi-square test was performed to compare the frequencies of people without halitosis, low, moderate, and severe halitosis with two personality types, A and B, which was statistically significant (P = 0.002). Therefore, the two groups of personality types, A and B, had significant differences in the organoleptic test.

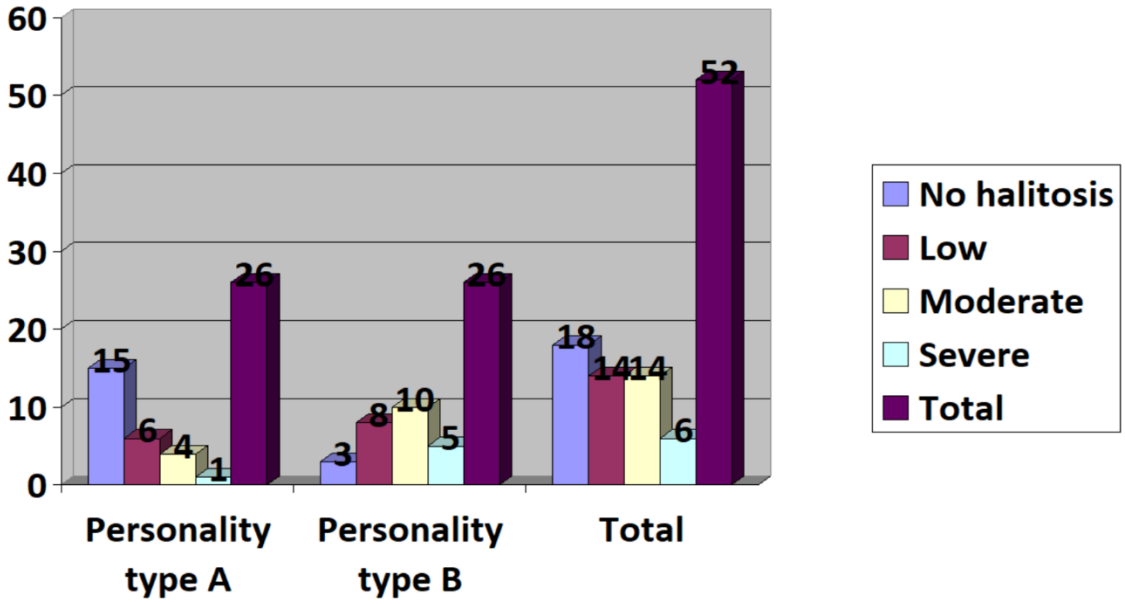

Figure 1 Severity of halitosis in two personality types

Results of self-reported halitosis

After reviewing four graded questions of the Halitosis Questionnaire, twenty-two of the total 52 (42.30%) reported that they had no bad breath and "did not have halitosis". Twenty people (38.46%) considered themselves to have "low halitosis". 9 people (17.30%) mentioned "moderate halitosis", and one person (1.92%) believed that he had "severe halitosis". Figure 2 shows the results of self-report halitosis by personality type.

Comparison of self-report halitosis in two personality types, A and B

A chi-square test was performed to compare the frequencies of people without halitosis, low, moderate, and severe halitosis with two personality types, A and B, which was statistically significant (P = 0.000). Therefore, the two personality groups, A and B, had significant differences in self-reporting of halitosis.

Examiner and client agreement on halitosis and self-reported halitosis

To examine the agreement between the examiner and the clients, we must consider weights for facing different degrees of halitosis and self-reported halitosis in different clients. These agreement weights listed in Table 3 indicate the degree of closeness and agreement between the examiner and clients in the halitosis rating. We considered five different weights for agreeing on 16 different modes of confrontation of the examiner's opinion with the clients, which included agreements of 100%, 50%, 30%, 3%, and 0.3%.

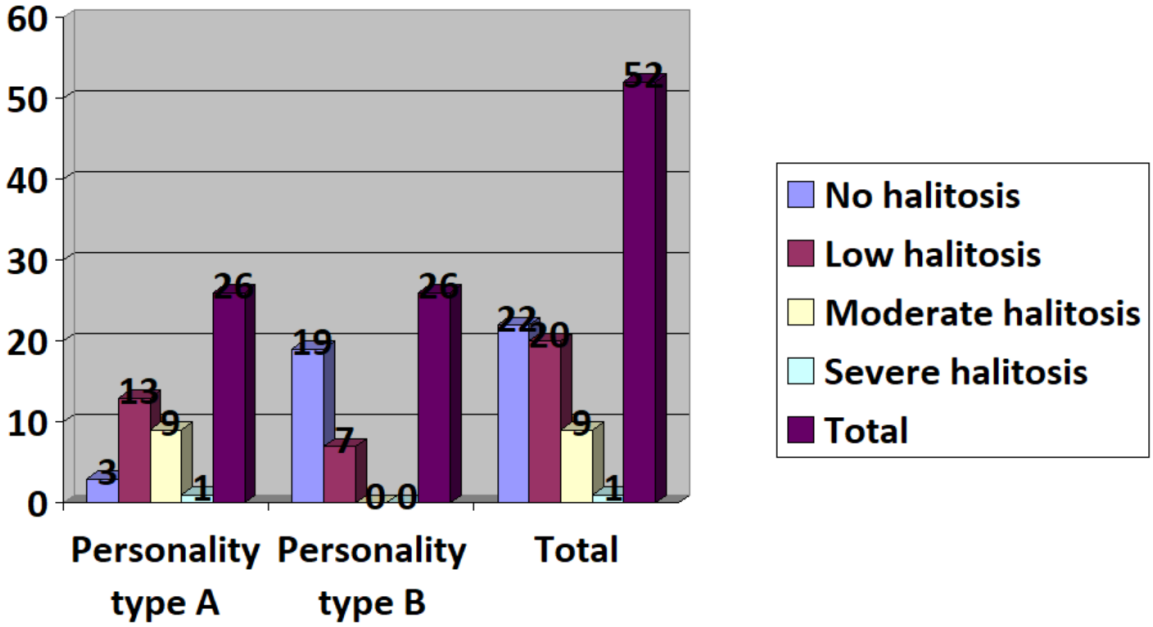

Figure 2 Results of self-reported halitosis in two personality types

Table 3 The agreement weight between the examiner and self-reported halitosis.

	No halitosis by examiner	Low halitosis by examiner	Moderate halitosis by examiner	Severe halitosis by examiner
Report no halitosis	100%	30%	3%	0.3%
Report low halitosis	30%	100%	50%	30%
Report moderate halitosis	3%	50%	100%	50%
Report severe halitosis	0.3%	30%	50%	100%

According to the chi-square obtained by comparing the frequencies of the five groups, the degree of agreement of halitosis in two personality types, A and B, is statistically significant (P = 0.03). Thus, the two personality types, A and B, in terms of the degree of agreement on halitosis, are significantly different. In the linear regression model to investigate the negative effect of personality type on the score of Halitosis agreement, it was found that personality types A and B were significantly associated with agreement (P-Value = 0.018).

4. DISCUSSION

This study aimed to determine the relationship between true and self-reported halitosis in two personality types. The prevalence of true halitosis in personality type B was significantly higher (P = 0.002) than in type A, but self-reported halitosis was significantly lower (P = 0.000) in them. Thus, people with personality type B are more unaware of their bad breath. They are less likely to see a dentist for treatment of halitosis. According to Settineri's study, less anxious people (such as people with personality type B) are less likely to see a dentist (Settineri et al., 2010). WANG and HE also stated that people without anxiety are less likely to complain of halitosis (Wang and He, 2018).

Based on our results, the agreement between the examiner and the clients in personality type A was approximately 55%, While the agreement was much lower in personality type B (27.47%). The chi-square test also showed significant differences (P = 0.03) between the two personality types in agreement on halitosis. The results of our study showed that the perception and opinion of clients with personality type A are closer to the opinion of the examiner about halitosis. People with personality type B have conflicting opinions with the examiner about bad breath. These people often do not notice or complain about bad breath. To the best of our knowledge, no

similar study compares our results. However, the linear regression model results also showed that personality types A and B were significantly associated with agreement between the examiner and clients on halitosis (P-Value = 0.018).

There were more people without halitosis in the personality type A group (15 out of 18). The chi-square test showed that the two personality types, A and B groups, significantly differed regarding the organoleptic tests. It means that the prevalence of true halitosis was higher among people with personality type B. Tachalov et al., (2016) showed that people with external control sources pay less attention to their oral hygiene and anxious people follow their doctor's advice. Since people with personality type A are more concerned about their health and personal and social affairs and are generally anxious, it is not unreasonable to take their dentist's advice and pay more attention to their oral health. Bovanova Showed that stress hormones can increase the growth of anaerobic bacteria involved in halitosis and periodontal disease in some cases (Boyanova, 2017).

It was shown that the role of oral health in bad breath is severe and effective, and periodontal diseases and normal oral flora are not significantly associated with halitosis (Anbari et al., 2019). The present study showed that the two personality groups, A and B, significantly differ in self-reported halitosis. Self-reported halitosis was more common among type A individuals than type B. It seems that psychological factors are a risk factor for self-reported halitosis. Anxiety, anger, stress, and personality traits are these risk factors. So, psychiatric treatments are recommended in these cases. WANG and HE also showed that patients with self-reported halitosis had higher levels of depression, anger, sensitivity, anxiety, and stress, which are more common in people with personality type A (Wang and He, 2018). In this study, 25% of the participants had false halitosis or halitophobia (13 cases).

Twelve individuals had personality type A, and only one had personality type B. The higher prevalence of pseudohalitosis among personality type A individuals is consistent with the results of WANG and HE studies. In their study, patients complaining of halitosis had higher degrees of depression, anger, sensitivity, anxiety, and stress (Wang and He, 2018). All these are features of people with personality type A. Another study conducted in 2001 by Oho et al., (2001) in Japan also examined the effect of individuals' psychological status on complaints of bad breath. This study showed that the patients with a lower degree of halitosis who complain of bad breath (false halitosis) have more serious psychological and personality problems (Oho et al., 2001).

5. CONCLUSION

Based on the findings of this study, the rate and severity of halitosis in type B patients were significantly higher than in type A. The rate and severity of self-reported halitosis were higher in type A individuals than in type B. There was also more agreement between the examiner and the clients in Type A.

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Author's Contribution

Hamid Reza Khalighi: Conceptualization, Methodology
Zahra Yazdani: Data Collection, Writing, Literature Review, Data Analysis, Review and Editing
Saeid Ghasemi: Writing, Investigation, Analysis, Review and Editing
Fahimeh Anbari: Methodology, Supervising, Review and Editing
All authors have read and agreed to submit the manuscript.

Ethical approval

The study was approved by the Medical Ethics Committee of the Shahid Beheshti University of Medical Science (ethical approval code: IR.SBMU.DRC.REC.1398.221)

Informed consent

Written & Oral informed consent was obtained from the individual participant included in this manuscript.

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Conflict of interest
The authors declare that there is no conflict of interests.

Data and materials availability
All data sets collected during this study are available upon reasonable request from the corresponding author.

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