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COMMENT

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Dental public health

How far does feedback on oral malodor assessment influence the decision to quit smoking?

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A COMMENTARY ON
Yatabe N, Hanioka T, Suzuki N, Shimazu A, Naito M.
Oral-malodor measurement and intention to quit smoking in men: A before-after study. *Tob Induc Dis* 2023; **21:** 95.

PRACTICE POINTS

- In this study, dental professionals were able to induce effective motivation to change smoking behavior in male smokers through the provision of halitosis feedback. Specifically, a significant association was observed between elevated methyl mercaptan concentrations in oral cavity air and increased intention to quit smoking in the next month.
- Dental visit is a time in which smokers may be more open to motivation efforts. In addition to administering appropriate treatment, dentists should possess the skill of delivering effective halitosis feedback using suitable measurements to enhance the intention of their smoker patients to quit.

DESIGN: A retrospective, uncontrolled, questionnaire-based, pre-post study involving adult male smoker volunteers who were invited to attend a one-day smoking cessation event at their workplace.
OBJECTIVE: To assess the effect of feedback on motivation for smoking cessation using oral-malodor measurements.
METHODS: At baseline, the participants attended a brief video presentation regarding various oral health-specific effects of smoking, joined a group introduction to smoking-cessation aids, and were given questionnaires that inquired information about smoking status including type, daily consumption, and duration. Subsequently, respiratory function and oral-malodor assessment were conducted using exhaled and oral cavity air, respectively. To measure oral-malodor, hydrogen sulfide, methyl mercaptan, and dimethyl sulfide concentrations were determined. Participants' intention for smoking cessation was evaluated through questionnaire before and after the event, classifying their intentions as aiming to quit within the next month, within the next 6 months, or having no intention to quit smoking. Immediate feedback on respiratory function and oral malodor measurements was provided by medical and dental blinded examiners, respectively.
RESULTS: A total of 241 men, aged 20–54 years, were enrolled and included: 169 (70.1%) exclusive cigarette smokers, 39 (16.2%) exclusive heated-tobacco product users, and 33 (13.7%) users of both. Prior to the health event, 8.7%, 17.0%, and 74.3% of smokers expressed intentions to quit within the next month, the next 6 months, or had no intention to quit, respectively. After the event, the corresponding percentages shifted to 17.8%, 26.6%, and 55.6%. In multivariable logistic regression analysis, the association with intention to quit in the next month was significant only for methyl mercaptan concentration in oral cavity air, with an adjusted odds ratio (AOR) of 4.24 (95% CI: 1.52–11.84; $p = 0.006$). Sensitivity analysis revealed that this association was concentration-dependent. On the other hand, higher daily tobacco consumption (≥ 15 pieces) was significantly associated with less likely intention to quit in the next 6 months (AOR = 0.37; 95% CI: 0.15–0.92, $p = 0.032$).
CONCLUSION: Feedback on oral malodor measurement may support the motivation of men to quit smoking within the next month, rather than waiting for the next 6 months.

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GRADE Rating: ●● ○ ○

COMMENTARY

Smoking cessation interventions, ranging from simple advice to intensive behavioral support combined with pharmacological treatment, constitute a vital element of tobacco-control strategies, and their beneficial effect is indicated by many evidence-based

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guidelines[1]. However, the effectiveness of these interventions can vary among individuals, and a personalized, tailored approach tends to be more successful. Given that quitting smoking is basically a behavior change progressing through a series of stages, it is equally essential to consider not only the ultimate goal of successful smoking cessation but also the intricacies of the behavior change process[2]. Current research has predominantly focused on the former aspect rather than the latter.

Since the 1980s, the transtheoretical model has been used to describe the process of smoking cessation behavior. The model outlines 6 stages of change: pre-contemplation, contemplation, preparation, action, maintenance, and termination[3]. People in the contemplation and preparation stages are intending to change in the next 6 months and the next month, respectively. In smoking cessation behavior, these 2 stages represent the intention to quit (ITQ) zone, which is the most important precursor and predictor of subsequent quitting attempts and successful cessation[4]. Conversely, low ITQ may be a major barrier for the effectiveness of smoking cessation interventions. Different demographic, psychological, social, and political factors can influence smokers' positive ITQ[1,5]. Knowledge about the most influential feedbacks on ITQ of smokers would help healthcare professionals to select effective cessation methods. In dentistry, minimal literature exists regarding the impact of feedback delivered by dental professionals on the level of ITQ of their patients.

In the present study[6], the authors aimed to evaluate the beneficial effect of using objective measurements of oral malodor as feedback on ITQ smoking within a distinct community of male workers. Gender restriction might limit the generalizability of results to female smokers, who are claimed to face greater challenges in quitting smoking[5]. Still, the homogeneous nature of the workplace population offered greater control over potential biases and confounding variables, thereby enhancing the reliability and internal validity of the findings. Additionally, the retrospective design of the study could have helped alleviate selection bias. Multiple logistic regression was used to account for many confounding factors; however, data on tobacco dependence and history of previous attempts to quit were missing. Feedback on oral malodor constitutes a straightforward and less intensive intervention, making it both practical and well-suited for the dental care setting. The study utilized a portable sulfide monitor that produces detailed data with clear cut-offs and automated guidelines, which could improve the objectivity of assessments. Furthermore, examiners delivering feedback were blinded to the ITQ questionnaire, potentially mitigating the risk of detection bias.

Oral malodor (halitosis) mainly stems from the oral cavity, where anaerobic bacteria degrade sulfur-containing amino acids, resulting in the production of malodorous volatile sulfur compounds (VSCs) such as hydrogen sulfide and methyl mercaptan (MM), which are frequently linked to unpleasant odors[7]. Smoking has consistently been linked to the development of halitosis, most likely because of hyposalivation and periodontal disease, coupled with an increase in pathogenic microbes[8]. Halitosis in smokers affects their social relationships negatively and constitutes a major offender to seek dental care. Like other evidence-based consequences of smoking on oral health[9–12], feedback on halitosis effect of smoking presents a suitable approach to encourage smoking cessation.

Of the measured VSCs, only the concentration of MM showed a significant association with ITQ smoking. This finding could be linked to the association between MM and periodontal disease, as well as its resistance to reduction by tooth brushing compared to other VSCs. Smokers with high MM measurements, upon receiving information connecting MM to periodontal disease and the risk of tooth loss, along with knowing that the most effective way to reduce this risk is to stop smoking, would logically exhibit a higher ITQ. After statistical adjustment, smokers who had MM concentrations higher than the median value were 4 times more likely to indicate an ITQ smoking in the next month compared to those with lower MM concentrations. This substantial effect size was shown to be concentration-dependent, as the acquisition of ITQ steadily increased with higher MM concentrations, thereby enhancing the overall quality of evidence provided.

Heated-tobacco products (HTPs), like e-cigarettes, are gaining global popularity. Users of HTPs produce minimal or no carbon monoxide in their exhaled air and may be exposed to fewer malodor components due to decreased combustion. In the current study, 30% of participants were HTP users, either exclusively or in combination with traditional cigarettes. Interestingly, no relationship was found between the type of smoking and the ITQ in the next month. Despite the perception that HTPs are a safer alternative to traditional cigarettes, the primary motive for transitioning of smokers to HTPs is that combustible cigarettes pose health risks. Therefore, HTP users may still maintain the ITQ smoking entirely. Further research is warranted to clarify the trend of ITQ and the role of halitosis feedback in HTP users.

In short, halitosis feedback by dentists using MM measurements specifically improved the ITQ smoking in the next month among male tobacco users. Thus, halitosis feedback could be a promising approach to transition more smokers into the preparation stage of smoking behavior change model. However, solid conclusions require future prospective breadth-focused studies with larger sample sizes.

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COMPETING INTERESTS

The author declares no competing interests.

ADDITIONAL INFORMATION

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