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Prevalence of oral cancer and potentially malignant lesions among shammah users in Yemen

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Summary The purpose of this study was to assess the prevalence of oral precancerous lesions and squamous cell carcinoma (OSCC) in Yemeni users of *shammah*, a traditional smokeless tobacco habit known in the Arabian Peninsula. The study group comprised 199 male and one female *shammah* users who were interviewed via a standardised questionnaire and clinically examined in 48 Yemeni villages and cities. Cases with oral leukoplakia (OL) or mucosal burns (MB) were compared with users without any lesion. MB were detected in 31%, of which 46.8% were located on the tongue or floor of the mouth, and OL in 27%, of which 59.2% were located in the same region. In addition, two cases (1%) of apparent OSCC were identified. Statistically significant increased OR (95% CI) of OL were (a) 6.91 (2.66–17.95) for an average duration of the respective *shammah* application >5 min.; (b) 4.90 (1.99–12.08) for a daily frequency of those applications >10; and (c) 4.22 (1.43–12.43) for a daily duration >6 h of chewing qat, also a traditional habit in Yemen. Likewise, decreased OR were (a) 0.39 (0.18–0.85) for rinsing the mouth after the *shammah* application; (b) 0.36 (0.17–0.78) for successful attempts to stop the use in the past; and (c) 0.26 (0.09–0.72) for existing knowledge about the carcinogenicity of *shammah* that was present in only 19% overall. In conclusion, evidence was shown for a significant association between the prevalence of OL and the daily duration of *shammah* application in a dose-dependent manner. An appropriate public health program might help to reduce this potential OSCC burden in *shammah* users.
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Introduction

Smokeless tobacco (ST) in the modes of chewing tobacco and snuff is used in a large number of variations worldwide. ST habits have been extensively described from South- and Southeast Asia as the betel quid chewing habit[1] and as snuff dipping or *snus* from the USA and Scandinavia.[2,3] While there is also increasing information on similar habits from Northern Africa,[4–13] the use of ST in the Arabian peninsula has less well been studied and reported.[14–23] One such habit in this area is the use of *shammah*, which is common in some southern parts of the Kingdom of Saudi Arabia (KSA), Algeria, and Yemen. A similar product is referred to as *toombak*, the traditional variation of snuff dipping from Sudan.[4–13] *Shammah* is a complex ST mixture consisting of powdered tobacco leaf, slaked lime (calcium carbonate), ash, oil and other substances, e.g. black pepper, mint, and flavours.[15,21–23] The use of sodium carbonate in *shammah* has also been described,[20] whereas sodium carbonate, sodium sesquicarbonate, or sodium bicarbonate are regular ingredients of *toombak*.[4–13] All these products are moist with a strong aroma, highly addictive and their use is widespread among males.[3,7,11,12]

Shammah in Yemen exists in two varieties as a greenish-yellow (so-called ''white'') or brownish to black powder or paste.[21] The material is placed in the buccal lower and sometimes upper labial vestibule. Only a few reports on the use of *shammah* and associated potentially premalignant oral lesions such as oral leukoplakia (OL), and furthermore typical lesions such as alkaline burn and gingival recession, have been published from Yemen and the Jizan Province in the southern KSA, that is directly adjacent to Yemen.[20,24] In 1982, the prevalence of OL-like lesions in the general population in Jizan was estimated to 15–42% ($n = 661$), the prevalence of *shammah* users was 28.3%, and the prevalence of OL in the latter was 69%.[20] In a 2002 study ($n = 2500$), the prevalence of OL in the general Yemeni population was estimated to 1.72%, the prevalence of *shammah* users was 1.6%, and the prevalence of OL in the latter was 72.5%.[24] Two cases of Algerian migrants using *shammah* with OL-like lesions were described from Germany.[25,26]

Contrary to precancerous lesions, the association of *shammah* with oral squamous cell carcinoma (OSCC) has been comparatively well documented on an epidemiological base.[14–17,19,22,23] Hannan et al. (1986) described a brand of *shammah* and its potential carcinogenicity based on in vitro bioassays.[18] One experimental study showed that mint in brown *shammah* may prevent *shammah*-induced carcinogenesis in hamster cheek pouch.[21]

Besides the use of *shammah*, the chewing of qat leaves (*Catha edulis*) is common in Yemen. Oral lesions associated with qat chewing have been described.[24,27] Smoking tobacco in different varieties is also known from Yemen. Alcohol consumption on the other hand is not widely used; however, answers regarding its consumption cannot be relied upon because of legal, social and religious implications.[5]

Due to the small number of available publications on the use of *shammah* in Yemen, it was the purpose of the present study to examine the effects of this particular habit on the oral mucosa.

Patients and methods

A total of 200 voluntary Yemeni *shammah* users were examined for oral mucosal lesions between April and October 2004 in 48 different Yemeni villages and cities. Individual interviews were performed via standardised questionnaires and comprised: (1) basic data on age, gender, residence, marital status and education, (2) present medical status, (3) smoking history, (4) qat use history, and (5) detailed *shammah* use history. One examiner (AN), in natural light with additional flashlight, using two mouth mirrors, performed all oral examinations. Oral lesions were recorded using a digital camera.

The guidelines for epidemiology and diagnosis of oral mucosal diseases and conditions proposed by WHO were used.[28] Oral leukoplakia (OL) was defined according to the Uppsala agreement of the WHO definition.[29] Oral mucosal burns (MB) were defined as: (1) clinically white or white-yellow lesions that could not or only partly be wiped off, (2) a history of burning sensation during 48 h before examination, and (3) an individual experience that comparable lesions normally quickly disappeared, when *shammah* had been placed elsewhere or the use had been temporarily stopped.

Two case–control comparisons were performed. The first compared individuals with the diagnosis ''mucosal burn'' (MB) with those without any mucosal lesion. The second compared those with the diagnosis ''oral leukoplakia'' (OL) with the same control group. The explanatory variables assessed were age, education, attitude towards *shammah*, smoking and qat history, type, duration and intensity of *shammah* use, and mouth rinse after *shammah* use. In addition, correlation with objective findings of *shammah* use, e.g. localized gingival recessions or tooth staining, was assessed.

Statistical analysis comprised basic descriptive statistics, Mann–Whitney *U*-test, and logistic regression for age-adjusted odds ratios (OR), when appropriate. SPSS 13 was used for analyses and $p < 0.05$ considered significant.

Results

Basic data

The study group comprised 199 males and one 82-year-old female. As most individuals could only remember their year of birth, age was ascertained as complete years at January 1, 2004. For males, the median (mean, SD) age was 30 (33.2 ± 13.3) years. with a range from 11 to 74 years. Of all individuals, 125 (62.5%) were resident in northern, 50 (25%) in central, and 25 (12.5%) in southern Yemen. The number of illiterates was 86 (43%), and 125 (62.5%) were married. The most frequent diseases were renal diseases ($n = 9$; 4.5 %), diabetes ($n = 5$; 2.5%), heart diseases ($n = 4$; 2%), and rheumatic diseases and nutritional disorders with two (1%) cases each. The number of those in outpatient medical treatment was 16 (8%).

Smoking and qat history

Of all individuals, 122 (61%) were non-smokers, 38 (19%) smoked <10, 7 (3.5%) 10–20, and 33 (16.5%) >20 cigarettes

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