

The use of a self-report questionnaire for dental health status assessment: a preliminary study

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IN BRIEF

- Reports that dental caries remains the most common chronic childhood disease despite the fact that it can be prevented.
- Suggests that this new questionnaire might serve as good screening tool for caries risk assessment as reflected by clinical and radiographic evaluations.
- Stresses the use of a simple and easy questionnaire as a good screening tool for large populations in order to identify the group of high risk patients.

Objectives The aim of this work was to evaluate and validate a new questionnaire for caries assessment of large populations as well as to correlate the results from the questionnaire with the caries lesions detected in clinical and radiographic evaluation. **Methods** The study population included 460 young adults who arrived to a dental screening provided to all army recruits. Clinical and radiographic examinations were performed to all participants as part of the routine dental screening; two bite-wing radiographs were taken as well. The World Health Organization (WHO) caries diagnostic criterion for decayed, missing and filled teeth (DMFT) was also calculated. First, a questionnaire that included 20 questions regarding different caries risk factors such as socioeconomic status, dietary habits, smoking habits, dental treatment experience etc was filled by all participants. At the next stage, according to the statistical analysis finding, a new questionnaire based on the most predictive questions and answers for DMFT forecast was developed. **Results** The mean total DMFT was 3.71 ± 4.2 . DMFT value of 0 (caries free) was found in 28.8% of the participants while no caries lesion ($D = 0$) was detected in 52.9%. The new questionnaire developed consisted of the most predictive ten questions. When evaluating the ROC curves for the new questionnaire score in prediction of dental caries lesions, the area under the curve was found to be 85.7% (95% confidence interval was between 81.2% and 90.2%). The total value of 5.5 points in the new questionnaire was chosen as a cut-off for caries risk assessment and revealed sensitivity of 85.1% and false positive of 29%. **Conclusions** The use of a simple and easy questionnaire might serve as a good screening tool for large populations such as army recruits in order to identify the group of high risk populations that require more intensive intervention.

INTRODUCTION

Historically diseases of the oral cavity have been viewed separately from those of the rest of the body. In recent years, however, efforts have been made to recognise oral health as an integral part of overall health.^{1,2} Moreover, the oral cavity has a multitude of functions in relation to daily life such as food intake, speech, social contact and appearance. Thus poor oral health has the potential of hampering the quality of life. Decreased food intake because of oral pain or poor dental status can stunt

growth in children^{2,3} and may worsen their nutritional status. Pain might also have a negative impact on the ability to engage in social relations and children might not get the full benefit of their education if suffering from pain and discomfort. While poor dental status among children has a negative effect on speech development, it may also have a socially stigmatising effect in adolescents affecting social acceptance.⁴

The importance of assessing oral health in the young adult population is well recognised.⁵ Cost and other resources required to collect clinical data, the gold standard for caries and periodontal disease assessment, are obstacles to such surveys in large cohorts. A possible alternative to clinical assessment is self-report, a method widely used to assess the prevalence of various medical conditions, health-related behaviours and characteristics in a population.⁶⁻⁹ The literature regarding the validity of self-reported information with dental or oral health content suggests that certain

self-reported dental information might be valid but requires the correct questions to be asked and evaluated.⁵

In 2001, it was reported that dental diseases account for 5% to 10% of total healthcare expenditures, exceeding the cost of treating cardiovascular disease, cancer and osteoporosis in industrialised countries.¹⁰ In low-income countries, the cost of traditional restorative treatment of dental disease probably exceeds the available resources for healthcare. Dental health promotion and preventive strategies are clearly more affordable and sustainable. Moreover, assessment of caries risk without clinical and radiographic measures might be a good screening tool for large populations.

The aim of this work was to evaluate and validate a new questionnaire for caries assessment of large populations, as well as to correlate the results from the questionnaire with the caries lesions detected in clinical and radiographic evaluation.

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Table 1 DMFT scores

	Mean	Standard deviation
D (Decayed)	1.59	2.4
M (Missing)	0.04	0.2
F (Filled)	2.08	3.0
Total DMFT	3.71	4.2

METHODS

Study population

The study population included 460 young adults who arrived to a dental screening provided to all army recruits in a couple of military training bases. There was no common background regarding place of birth, education and socioeconomic status. The study was approved by the Ethics and Research Committee of the Medical Corps.

Examination

Clinical and radiographic examinations were performed to all participants as part of the routine dental screening in basic training bases. Clinical examination was carried out under artificial light, using a sharp sickle explorer, flat-surface mouth mirror, gauze, sponges and compressed air. Two bite-wing radiographs were taken as well. The World Health Organization (WHO) caries diagnostic criterion for decayed, missing and filled teeth (DMFT) was also calculated.¹¹

Questionnaire

First, a questionnaire that was developed according to our previous work^{5,8,9} was distributed to 20 pilot young adults to test the clarity and understanding of the questions. Then the original questionnaire that included 20 questions regarding different caries risk factors such as socioeconomic status, dietary habits, smoking habits, dental treatment experience etc was filled by all participants. Each answer was later coded to give a total score for the questionnaire.

At the next stage, according to the statistical analysis finding, a new questionnaire based on the most predictive questions and answers for DMFT forecast was developed.

Statistical analysis and new questionnaire development

The SPSS 17.0 (SPSS, Inc., Chicago, IL, USA) was used to analyse the data. Simple frequency tables and descriptive statistics

(means and standard deviations) were processed and analysed by chi-square, t-test and Fisher's exact tests. ROC curves were calculated. ANOVA and linear regression analysis were also utilised.

RESULTS

The pilot study was uneventful; all 20 participants completed the original questionnaire. Response rate for the whole group was 85% (391 out of 460).

The DMFT scores are presented in Table 1. The mean total DMFT was 3.71 ± 4.2 .

DMFT value of 0 (caries free) was found in 28.8% of the participants while no caries lesion (D = 0) was detected in 52.9%.

The mean calculated score for the original questionnaire was 11.88 ± 3.9 . When evaluating the ROC curves for the original questionnaire score in prediction of dental caries lesions, the area under the curve was found to be 74.4% (95% confidence interval (CI) was between 68.9% and 80.4%).

When evaluating each question separately as a predictor for active caries lesions (D), a new questionnaire was developed (Fig. 1). This questionnaire consisted of the most predictive ten questions. When evaluating the ROC curves (Fig. 2) for the new questionnaire score in prediction of dental caries lesions, the area under the curve was found to be 85.7% (95% CI was between 81.2% and 90.2%). The total value of 5.5 points in the new questionnaire was chosen as a cut-off for caries risk assessment and revealed sensitivity of 85.1% and false positive of 29%.

The adjusted r^2 value for linear regression in prediction of D according to the new questionnaire score was 26.2%. The linear regression equation was:

$$D = -0.398 + 0.401(\text{total new questionnaire score}).$$

DISCUSSION

Dental caries remains the most common chronic childhood disease despite the fact

1. How many times during the day you brush your teeth?
 - a. Twice a day or more (0)
 - b. Once a day or less (2)
2. Do you regularly visit a dentist for a check-up?
 - a. Once a year or more often (0)
 - b. Once every few years or when there is pain (2)
3. Do you go for calculus removal?
 - a. Never (2)
 - b. Once every few years / Once a year or more often (0)
4. Do you smoke?
 - a. No (0)
 - b. Yes, up to 10 cigarettes a day (1)
 - c. Yes, more than 10 cigarettes a day (2)
5. Do you bleed when you are brushing your teeth?
 - a. Very rarely or never (0)
 - b. Every brushing or almost every brushing (2)
6. Do you have teeth which are mobile?
 - a. Not at all (0)
 - b. Yes (2)
 - c. I don't know (0)
7. Are there cavities in your teeth?
 - a. No cavities at all (0)
 - b. 1-2 cavities (1)
 - c. Three cavities or more (2)
 - d. Don't know (0)
8. Do you have toothaches?
 - a. No aches at all (0)
 - b. Yes (2)
9. Do you have a bad smell from your mouth?
 - a. No (0)
 - b. Yes (2)
 - c. Don't know (0)
10. An average monthly income in Israel is 10,000 NIS, what is your family income?
 - a. Average or above (0)
 - b. Below average (2)
 - c. Don't know or prefer not to answer (0)

Fig. 1 The newly developed questionnaire (the number in parenthesis represents the relevant score for each answer)

that it can be prevented.¹² Dental care continues to be the most unmet health need among children and adolescents, especially among the poor.¹³

Studies are warranted to examine different modalities that may reduce or eliminate barriers to optimal oral health and improve oral health care utilisation by this population.¹² Screening large scale populations and identifying high risk patients, especially in organisations that are able to

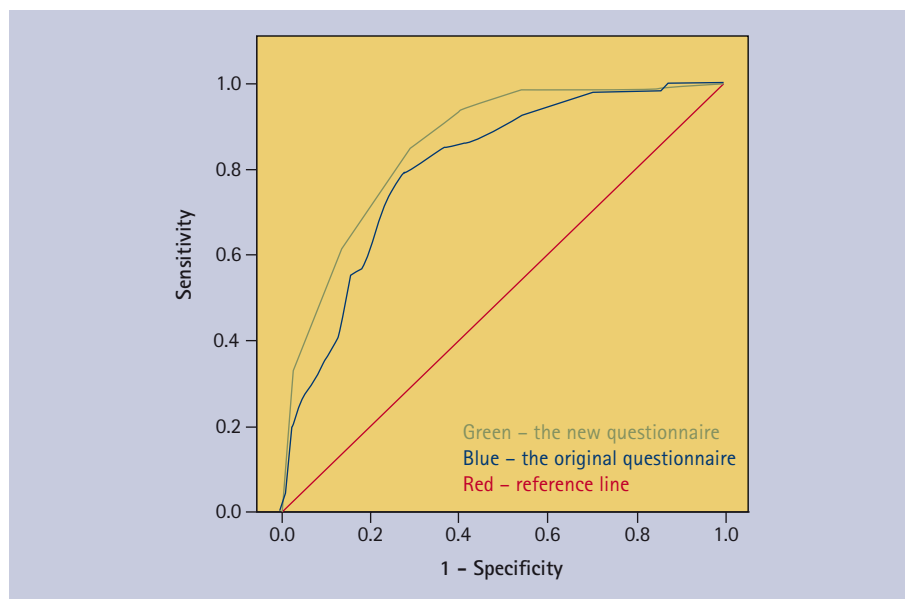


Fig. 2 ROC curves for the new questionnaire score in prediction of dental caries lesions, the area under the curve was found to be 85.7% (95% confidence interval was between 81.2% and 90.2%)

provide complimentary dental treatment and bring those patients to a stable, disease-free state, are of utmost importance.

Military settings usually deal with young adults from various socioeconomic backgrounds and might provide a good model for community service. Thus, identifying and treating high-risk population in such settings might improve the overall morbidity and offer a national partial solution for caries and periodontal diseases. Recent cross-sectional data suggest that new strategies are needed to improve utilisation of dental services among children and young adults.¹²

Our current findings suggest that the new questionnaire might serve as a good screening tool for caries risk assessment as reflected by clinical and radiographic evaluations; obviously this tool is designed for screening purposes only and cannot replace a thorough particular examination for treatment planning. The results of this study are only generalisable to populations with similar levels of education, income, access to care, and disease burden.¹⁴ Clearly, there will be variability in the questions and their relationship to caries occurrence based on racial, language, and ethnic differences.⁹ Moreover, utilising this tool in children and adolescents might require modification and adoption for those specific age groups. Therefore, further studies from different countries and population around the world are warranted. The results from these studies

should additionally be subjected to validation in other populations. Together, it will offer promise for useful self-reported measures of caries screening in populations where mass clinical examination is not practicable.

The simplicity and low cost of administering self-report questions makes the use of these measures attractive for health surveillance and predicting health outcomes in populations.

Within the limitations of the present preliminary study, our findings showed that the use of patient self-assessment was a good predictor of patient dental status. The information presented in this study could serve as a tool for public and preventive dentistry, as well as to help the dental practitioner in managing patients according to their complaints and self-assessment. When using the presented screening tool, a total value of 5.5 points in the new questionnaire might be chosen to indicate caries risk with sensitivity of 85.1% and false positive of 29%. This means that patients with those scores or higher should be recalled first for thorough dental assessment and treatment. It should be noted that the cut-off values used in this study were adopted from the statistical analysis and were validated to the specific study population. Cut-off values for various categories could vary in different populations. Therefore, caution should be used when generalising to different populations.

Dental practitioners as well as community services may request patients to assess their dental status before treatment or appointment. This might help both the community and the practitioner to accomplish more effective time and patient management. Furthermore, the use of patient self-assessment may have an important role in the dental education. Students might be trained to ask their patients questions regarding their dental status during the first interview and anamnesis.

Valid measure of caries could be used in conjunction with a comprehensive risk assessment in population-based screenings by school nurses/nurse practitioners, health educators, and physicians to guide them in assessing potential future caries risk for use in prevention and referral practices.¹⁵ This will also help in targeting intervention strategies, including behaviour modifications, that is, oral hygiene, dietary, fluoridation.¹⁶

The DMFT index, which represents caries experience as recommended by WHO, originally relates to clinical examination without radiographs. In this work we have added the radiographic examination to our evaluation. It was shown in previous work that without radiographs there is a 44% probability that the caries decay value will be lower than the actual value, thus causing a greater possibility of diagnostic errors.¹⁷ The addition of radiologic examination may enhance the accuracy of estimation of the individual's treatment needs, especially in this era of prevalent hidden caries.^{17,18}

CONCLUSIONS

Within the limitations of the present preliminary study, the use of a simple and easy questionnaire might serve as a good screening tool for large populations such as army recruits in order to identify the group of high risk patients that requires more intensive intervention.

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