Psychosocial, Behavioural and Oral Health Indicators – Review of the Literature

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Received August 23, 2006, Accepted October 2, 2006

Key words: Oral health – Psychosocial and behavioural factors – Oral-health indicators – Oral health-related attitudes

This work was supported by the IGA MZ ČR, project NR/8331-3.

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Abstract: The paper provides a literature review focused on the current methodological approach to psychosocial and behavioural factors (socioeconomic and demographic status, education level, health-related attitudes, risk behaviour, stress, oral health and quality of life) and oral-health indicators (DMFT – Decayed, Missing and Filled teeth; CPI – Community Periodontal Index, proportion of edentulous subjects, proportion of subjects in need for dental treatment and SiC Index – Significant Caries Index). The selected factors are recognized as additional factors associated with oral health and a detailed investigation thereof represents a novel approach to the prevention of dental caries and periodontal diseases. The paper also specifies the type of research that is needed in this branch of the preventive dentistry.

Introduction

The main purpose of this paper is to provide a literature review focused on the current methodological approach to psychosocial, behavioural and oral-health indicators. This issue may be addressed from two aspects: the first one is the impact, which the above-mentioned indicators may have on oral health of an individual, and the second one is a question to what extent oral health influences everyday life of an individual.

This mutual relationship can be measured both qualitatively and quantitatively. A classical tool for the assessment of psychosocial factors is psychometrics, i.e. the use of standardised questionnaire/interview designs and scales. These tools allow for critical analysis of psychosocial and behavioural factors, measure their strength and determine relationship thereof to the incidence of certain pathologic conditions [1].

In order to obtain comparable data concerning the relationship of certain socio-behavioural risk factors to the incidence of wide spread diseases closely associated with a life-style such as dental caries, the use of consistent methodology is essential. For the purposes of this literature review, oral health is defined as a natural, functional, acceptable dentition which enables an individual to eat, speak, and socialise without discomfort, pain or embarrassment for a lifetime, and which contributes to general well being [2]. The most common reasons for teeth loss that impair oral health are complications of dental decay and periodontal diseases. These pathologies are chronic, infectious and multifactorial, associated with a life-style of an individual. Main aetiological factors of dental decay are related to cariogenic bacteria (mutant streptococci and several of the lactobacillus species), frequency of ingestion of fermentable carbohydrates and salivary dysfunction [3]. Aetiological factors of periodontal diseases include subgingival microbial biofilm, genetic, environmental and microbial factors [4, 5]. These factors may interact, but still they do not always fully explain the distribution of these diseases [6] especially in case of rapidly progressing forms (such as early childhood caries or aggressive periodontitis). In search for explanatory models of these pathologies, the attention of oral epidemiologists has been attracted to psychosocial and behavioural factors [7].

Standardly used oral health status indicators are **DMFT** indicator (**D**ecayed, **M**issing and **F**illed **T**eeth; calculated by counting the number of DMFT of individuals and taking the mean for the group examined), **CPI** Index (**C**ommunity **P**eriodontal **I**ndex, scored 0–4, which evaluates periodontal impairment and also the need for periodontal treatment) [8], proportion of edentulous subjects and proportion of subjects in need for dental treatment. Since DMFT may not accurately describe the disease level in populations with skewed distribution, a **SiC** Index (**Si**gnificant **C**aries Index calculated as the mean DMFT of the one-third of the group having the highest DMFT values) was proposed to reveal hidden high caries groups and it was used in large studies investigating inequalities in the distribution of dental caries [9, 10, 11].

Measures used for oral-health impact assessment should include scales corresponding to decision-making criteria, be supported by a relevant theoretical model and be brief and easy to use [12]. Any scale must be reliable, valid, precise, acceptable and amenable to statistical analysis [13]. Provided the measure is used on a cross-national basis, the original questionnaire has to be translated into a target language by a native speaker, pre-tested and then back translated by another native speaker (to insure validity of the translated version). Statistical techniques used most often include *factor-analytic procedures* and *logistic regression* [14].

Data provided for psychometric measuring are self-reported, so there is a risk that the respondents report what they perceive as the correct answer rather than what they actually believe or do. However, the presence or absence of a disease can assist the validation [15].

The use of questionnaires enables to lower cost, widen geographical dispersal, ensure anonymity of participants and reduce bias by removing interaction with the interviewer as a source of error. The disadvantages of questionnaire surveys include lower response rates, respondent bias (respondents with linguistic, literacy or visual problems), poor levels of completion, need for simple instruments and a limited control over who completes the instrument [13].

Psychosocial and Behavioural Indicators

Socioeconomic and Demographic Status

It has long been recognized that people with a lower socio-economic status (SES) enjoy poorer health than people with a higher SES. Individuals with low SES often lack health insurance and thus they have restricted access to specialized health care such as dental care. The evidence for this relationship is stronger for children, and the literature findings support the relationship between caries prevalence and low SES, which is common in cultural and ethnic minorities [16], low-income families [17], incomplete families [18] and families with restricted access to dental care [18, 19]. Low SES is associated with an increased caries risk [20, 21], although the association between SES and caries risk among older children and adults is

inconsistent, because of the relatively small number of studies and methodological limitations [22, 23].

Periodontal diseases also appear to be associated with socio-economic variables, although this association is of less importance than e.g. smoking [24, 25].

Education Level

With respect to caries experience in children, the literature reports that children whose parents completed a university education tend to have a significantly lower mean number of decayed, missing and filled surfaces in their primary teeth than children whose parents have a lower education level [26]. In addition, higher caries experience in children is associated with a low education of mother [27]. In adults, low education level seems to be a risk marker for edentulism [28]. As for the risk of periodontal diseases, educational level was shown to influence the oral conditions and should be considered in assessing risk, and in planning appropriate preventive measures [25, 29].

Health-related Attitudes

Measurement of a person's health-related attitudes is based on psychological theories and concepts, which presume that attitudes are relevant determinants of a person's behaviour and vice versa – that behaviour can be predictable from measurable behavioural intentions [30, 31, 32, 33].

Theory of Reasoned Action

According to this theory, the most important determinant of a person's behaviour is behaviour intent. The individual's intention to perform behaviour is a combination of attitude toward performing the behaviour and subjective norm. The individual's attitude toward the behaviour includes behavioural belief, evaluations of behavioural outcome, subjective norm, normative beliefs, and the motivation [30]. In dental prevention, the example of an attitude towards behaviour would be a positive intention of a person to keep the teeth healthy, but he/she may refrain from it due to cost associated with care for oral health.

Theory of Planned Behaviour

This theory considers behaviour to be predictable from measurable behavioural intentions (are you intending to do...), which are in turn explainable and predictable from social norms. Perceived behavioural control (would you be capable to do...) serves as an extra explanatory factor in this model [31].

Health Belief Model

This concept is based on the understanding that a person will take a health-related action if: 1) a negative health condition can be avoided, 2) there is a positive expectation that by taking a recommended action, he/she will avoid a negative

health condition and 3) that person believes that he/she can successfully take a recommended health action. This model has been developed with respect to the following characteristics representing the perceived threat and benefits: perceived susceptibility, severity, benefits, barriers and self-efficacy, or one's confidence in the ability to successfully perform an action [32].

Multidimensional Health Locus of Control Scale (MHLC)

This scale was developed to help predict health behaviour based on health beliefs about the control over one's health status. A subject is determined to be, to varying degrees, a health-external, in which one's health is believed to depend on luck, fate or chance, or health-internal, in which one believes health status is determined by one's own behaviour [33].

The above-mentioned concepts served as theoretical basis for the development of questionnaires employed in international surveys on childhood dental caries [34, 35]. According to these studies, which assessed the relationship of oral health-related behaviours of parents and attitudes to these behaviours to caries experience and oral hygiene level of their preschool children support the hypothesis that parental attitudes significantly impact on the establishment of habits favourable for oral health in children, which determine whether they develop caries. However, further research is needed to determine whether supporting the development of parenting skills would reduce dental caries in children from disadvantaged communities independent of ethnic origin [34, 35].

As regards prevalence of caries experience and periodontal diseases in adults, with a focus on health attitudes and behavioural habits, more epidemiological studies are needed using appropriate scales and cumulative frequency analysis [36, 37].

Self-regulation theories

Self-regulation theories presume that human behaviour is goal-directed and that feedback control is exercised in order to minimize discrepancies between current actions and stated goals. The approach focuses on individual cognitions (personally relevant goals and values) mediating between internal or external stimuli and resulting in emotional or behavioural responses. Models of self-regulation of patient adherence to specific health promotion recommendations by professionals are used when patients are asked to follow a specific oral self-care regimen [38]. Thus, the patients are being given a target (for example, brush twice a day) and their task is to control or regulate their behaviour to achieve that objective.

More long-term and prospective studies are needed in this subject, as it has been observed, that behavioural educational intervention is more effective than a classical intervention based on information and training about prophylactic techniques [39] and that caries and periodontal disease can be controlled by regular tooth brushing with a fluoride toothpaste but a cost-effective method for reliably promoting such behaviour has not yet been established [40]. A major limitation of oral hygiene

studies results from the fact that desired behaviours decrease in frequency when external reinforcement is withdrawn. This is often seen as evidence that the technique is not efficacious rather than simply a confirmation of the underlying theory that reinforcement is needed [41].

Sense of Coherence

Another attitudinal predictor of behaviour, which adults identify as promoting health, is a central construct of Antonovsky's salutogenic theory – sense of coherence (SOC). Individuals with a strong SOC have the ability to define events as less stressful (because of comprehensibility); to mobilize resources to deal with encountered stressors (manageability); and to possess the motivation, desire, and commitment to cope (meaningfulness) [42].

Results of the performed studies suggest that a weak SOC increases the probability of having a poor level of oral hygiene [43], while stronger SOC is associated with regular dental attendance [44, 45]. This association is reported to be significant in mothers' SOC associated with their children's levels of dental caries and periodontal disease [46].

Risk Behaviour

Tobacco and Alcohol Use

Well documented is an association between tobacco and alcohol use and risk for oral cancer development [47]. Although literature findings do not support its association with caries development, environmental tobacco smoke is reported to be associated with an increased risk of caries among children [48].

In addition, smoking is recognized as an aetiological factor of periodontal diseases [49]. Data from epidemiological, cross-sectional and case-control studies strongly suggest that quitting smoking is beneficial to patients following periodontal treatments [50].

As for alcohol use, the results of relevant studies suggest that alcohol consumption is an independent modifiable risk factor for periodontitis [51].

Drug Abuse

With respect to drug abuse, already performed studies report that during periods of drug abuse, drug addicts rank oral health as a low priority and they generally receive only emergency dental attention [52]. Drug users comprise a group with special dental needs; they have poorer periodontal health as well as higher caries experience [53], and need greater access to dental care than most people [54]. Rampant dental caries is a characteristic finding [55, 56].

Mental conditions

Stress

As for the complex pathophysiology of periodontal disease, nervous system contributes to the pathophysiology of peripheral inflammation including periodontitis. Psychological

stressors may influence the progression and course of gingivitis and periodontitis as they induce adverse behavioural changes in conjunction with alterations in host resistance. Multiple signalling systems modulate the host response (eventually manifesting as the severity of inflammation) via various neuroendocrine and neuronal pathways [57, 58, 59].

Passive stress coping strategies are more pronounced in advanced forms of periodontal disease as well as in cases of poor response to a non-surgical periodontal treatment, whereas patients with active coping modes tend to have milder disease and a more favourable course of treatment. In addition, it appears that the inability of some individuals to apply effective coping measures may be of more importance that the stress itself [59, 60, 61].

Dental anxiety

Regular dental attendance may be adversely influenced by anxiety, as the patient may deliberately avoid dental visits. Dental anxiety and depression are related to toothache, higher caries experience, gum bleeding and need for oral rehabilitation [62, 63]. Dental anxiety is reported to be associated with an experience of pain during dental treatment and it is often accompanied with post-traumatic symptoms (e.g. in individuals having been a victim of a violent crime) and in such cases, is experienced even when dental treatment is not imminent [64, 65].

Depression

Studies that investigated the relationship between periodontitis and psychopathology using multifactorial analysis of variance confirmed that depressive mood is a relevant pathogenic factor for periodontitis. In depressive patients, decreased cerebral monoamine and increased cortisol levels result in psychopathology, which in turn, at the behavioural level, is responsible for a lack of dental hygiene, which is supported by in increased plaque index in our periodontal patients. Anxiety and depression may also cause salivary flow rates to decrease, making the individual more susceptible to oral diseases and disorders [66].

Oral Health and Quality of Life

Quality of life is an important outcome of care for conditions, which do not threaten life. Measuring oral health in terms of function and its impact on everyday life is considered to be more reliable than professionally defined (normative) indices such as DMFT [67]. It therefore should be further investigated and considered as one of the factors that help to assess the quality of care subjectively perceived by a patient.

Oral Health Impact on Daily Performance (OIDP)

Modified version of OHIDP measures impact of oral health on eight daily performances: eating and enjoying food, speaking and pronouncing, cleaning teeth,

sleeping and relaxing, smiling, laughing and showing teeth without embarrassment, maintaining usual emotional state and carrying out major work or social role and enjoying contact with people. Participants report experiences over a six-month reference period and record the impacts on a Likert scale. The questionnaire contains 8 or 10 items. [68].

The questionnaire was translated and validated on a cross-national basis and in different population groups. The results of the performed studies suggest that oral health impacts on quality of life, although in some studies these impacts were mild and moreover, relationship between perceived oral health status and social circumstances has been observed [69, 70, 71].

Oral Health Impact Profile (OHIP 14)

This questionnaire measures oral impacts in seven dimensions: functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability and handicap and uses a six-month reference period and a five-point Likert scale. As original OHIP questionnaire was criticised for its length, a shortened form with 14 questions was developed. [72].

Results of the studies, which used this measure, confirm that improvement of oral health improved the quality of life and also other social determinants such as employment or accessibility to better job [73].

Oral Health Related Quality of Life (OHRQL)

Several instruments have been developed to measure the impact of oral health on quality of life. One of them is OHQoL-UK(W)©, which takes into account both "effect" (bad-none-good) of oral health on life quality and "impact" of this "effect" (none-little-moderate-great-extreme). According to the results of the study, which used OHQoL-UK(W)© in adult patients [74], aspects of physical oral health related quality of life were rated as having greater impact on life quality compared to social or psychosocial aspects.

Conclusion

According to the World Health Organization, identification and description of common risk factors are essential parts of chronic diseases surveillance. Analysis of the information obtained using questionnaires should be included in the risk factors assessment process [75].

Further studies need to be performed on the association of psychosocial factors and risk for periodontal diseases in adults, and the association between psychosocial factors and oral health in disadvantaged communities.

OHRQL measures may be used in public health initiatives to demonstrate the effects of oral disorders to policy makers as they identify social and behavioural risk factors more sensitively than traditional indices [67]. Therefore their wider use both in research and public health should be advocated.

A potential use of subjective health status measures is to predict treatment need, but predictive validity of currently available measures is questionable.

Moreover, knowledge levels can almost always be improved by oral health promotion initiatives but whether these shifts in knowledge and attitudes can be causally related to changes in behaviour or clinical indices of disease has also not been established.

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