ORIGINAL ARTICLE

Socio-demographic factors are linked to oral hygiene index (CPITN index) - a study from rural setting in Southern Punjab, Pakistan

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ABSTRACT

Background and Objective: Oral health is significantly impacted by an individual's social interactions and quality of life. The aim of this study was to evaluate the association between oral health status and socio-demographic factors, in particular, monthly income and level of education, of a rural community in Pakistan.

Methods: This cross-sectional survey study was conducted among *n* = 380 people from the Jahangirabad community of Multan from July 2021 to September 2021. A validated questionnaire was designed to be filled by the subjects or the researchers in case of low literacy levels. Two qualified oro-dental examiners assessed all the subjects for their oral health status by using the community periodontal index of the treatment needs (CPITN index).

Results: There were 209 males and 171 females. As regards the status of education, 27% of the subjects had no formal education, 21% of respondents were primary (5th grade) pass, 31.9% attended secondary school, 10.7% got higher secondary school education, whereas 9.4% of respondents had passed the college/university examination. The majority of the participants (46.7%) had income within the range of 10,000-20,000 Pakistani rupees per month, whereas only 12.8% of subjects reported earning more than Rs. 50,000 per month. No significant association was found between average monthly income and oral health status; however, the CPITN score and the higher level of education (high school and college/university) showed a significant association (*p*-value = 0.012).

Conclusion: Level of education, independent of socioeconomic status, is identified as a potential risk factor for poor oral health status among the rural community in Pakistan. Dental practitioners should consider enhancing timely screening and awareness campaigns, especially within this specific class of community, to improve oral health outcomes.

Keywords: Community periodontal index treatment need (CPITN), education, income, oral health, impact.

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Introduction

Oral health impacts social relationships and is intimately tied to the quality of life.[1] It is defined as "*the absence of any chronic mouth, throat, and oral illness that is neoplastic, reactive, infective, or inflammatory in character, as well as the lack of any birth abnormalities (connected to the mouth) and/or tooth loss due to decay and disorders that distract one's mouth.*"[2]

Good dental/oral health is essential in order to keep the teeth healthy. Simple ways of tooth flossing as well as brushing can assist in the preservation of oral/dental health.[3-5]

Modern research has indicated probable associations between chronic dental infections and diabetes mellitus (DM), cardiovascular and respiratory illnesses, stroke, and premature births. Oral wellbeing refers to the health of the mouth/oral cavity, which subsequently supports the health of the entire body.[5] Most communal oral/dental ailments include decays of tooth and gum (periodontal) illness. Periodontitis causes loss of bone and supporting tissues and is considered a major cause of tooth loss. Pathogenic microscopic organisms' genetic and environmental factors,

specifically tobacco use, play a significant role in the causation of oral diseases.[6]

In 1978, the World Health Organization (WHO) introduced the community periodontal index of treatment needs (CPITN) probe for the measurement of pocket depth and to detect the sub-gingival calculus. In 1982, the CPITN index was introduced, which is used as a screening method for the identification of the potential as well as actual problems posed by periodontal ailments, both in the individual as well as the community. The CPITN records and measures common curable conditions, namely periodontal pockets, dental calculus, gingival inflammation, and other plaque retentive factors.[7]

Dental health treatment is a considerable fiscal problem for numerous nations. According to a study conducted by Jevdjevic et al.[8] oral treatment expenditures in "The Organization for Economic Co-operation and Development" countries could increase substantively in the coming 20 years and may fluctuate noticeably across various nations. It is reported that the education level and earnings of individuals also impact their behavior and attitude toward dental care, as most people ignore their earlier stages of the disease on the basis of lack of affordability. Keeping this imperative need in mind, cost-effective and outcome-based methods for promoting good dental care avoidance of gum disorders and dental decay may be implemented in different settings across the countries, accordingly.[9,10]

This study was planned to evaluate the association between oral health status (CPITN index) and the socio-demographic factors (monthly income and education) of the community residing in a rural setting in Southern Punjab, Pakistan.

Methods

This cross-sectional survey was carried out in a three-month period (July 2021 to September 2021) among 380 individuals from the community of Jahangirabad, Multan, Pakistan. Open-Epi created a sample size of *N* = 380, along with a margin of error of 5%, a confidence level of 95%, and a population size of 18,000 from the random data available at the Jahangirabad Union Council Office. Simple random sampling was practiced.

All individuals provided informed consent, and the study was approved by the Institutional Ethics Committee of Multan Dental College, Multan, Pakistan. A questionnaire was designed, which was pretested by administering it to the 10 participants who were not made a part of the current study. Two qualified dental practitioners were assigned with the responsibility to assess all the patients for their oral health status by using the CPITN index. The CPITN is primarily a screening procedure that requires clinical assessment for the presence or absence of periodontal pockets, calculus, and gingival bleeding. For epidemiological purposes in adult populations, 10 specified index teeth are examined; for persons under 20 years of age, only six index teeth are specified. A recommended special CPITN periodontal probe (or its equivalent) was used. The explorer and the mouth mirror were used for the intra-oral examination under the good light of a dental unit. Participants of this research were categorized on the basis of their level of education, age (15-40 years) group, and monthly income. Subjects aged ≥13 years, i.e., those who had permanent dentition, were included in this study, while those of <13 years of age, i.e., those who were in the stage of the deciduous or mixed dentition, patients with missing teeth or had extractions because of any medical ailment or esthetic procedure were excluded from the current study. CPITN scores of individual participants from 0 to 5 were recorded as follows:[11]

0 = No bleeding on probing
1 = Bleeding on probing with no plaque and calculus
2 = Plaque and calculus present
3 = CPITN probe color band partially visible
4 = CPITN probe color band in visible with pocket depth more than 5 mm
* = Furcation involvement

Score 0 is considered healthy, while scores 1-5 are considered unhealthy (on the basis of intensity and depth of the disease).

Statistical analysis

The collected data were coded, entered, and analyzed using SPSS-version 23.0. Gender, age, monthly income, education, and CPITN scores of participants were recorded. The chi-square test was used to check if CPITN was associated with the monthly income and/or education levels, with the threshold of significance set at 95%. *p*-value of ≤0.05 was considered as significant.

Results

There were 209 (55%) males and 171 (45%) females recruited for the study.

The participants were categorized on the basis of their level of education, age group, and monthly income. Almost 26.4% (*n* = 100) of participants were between 36 and 40 years of age, followed by individuals falling in the age group of 26-30 (23.7%, *n* = 90).

When considering the educational level, the majority of the participants (31.9%, *n* = 120) had higher secondary education, whereas 27% (*n* = 105) of the subjects had no formal education (Table 1).

CPITN index scoring, as shown in Table 2, indicates that the majority of the participants (57%, *n* = 216) had healthy gums, followed by bleeding of gums on probing in about 26% (*n* = 99) subjects.

Table 1. *Socio-demographic characteristics of the study participants (N = 380).*

Variable name with category		Frequency (*n*)	Percentage (%)
Age (years)	15-20	40	10.5
	21-25	70	18.4
	26-30	90	23.7
	31-35	80	21.0
	36-40	100	26.4
Level of education	No formal education	105	27.0
	Primary school	80	21.0
	Secondary school	120	31.9
	High school	40	10.5
	College/University	35	9.2
Monthly income (PKR)	<10,000	85	22.3
	10,000-20,000	178	46.7
	20,000-50,000	69	18.2
	>50,000	48	12.8

Table 2. *The CPITN index score of participants (N = 380).*

CPITN index	Description	Frequency (*n*)	Percentage (%)
Score 0	Healthy gums	216	57.0
Score 1	Bleeding on probing	99	26.0
Score 2	Sub-gingival calculus	25	6.6
Score 3	Band partially visible	16	4.2
Score 4	Band completely visible	14	3.6
Score *	Furcation involvement	10	2.6
Total		380	

For the computing association, monthly income was categorized into two groups, with one group having an income of less than 20,000 Pakistani rupees (PKRs) and another getting PKR 20,000 or more per month, whereas the level of education was grouped from no formal education to university/college degree holders. In this study, no significant association was found between average monthly income and oral health status. A significant association was, however, found between the CPITN score and the higher level of education (high school and college/university) (*p*-value = 0.012), as shown in Table 3.

Discussion

Socio-economic characteristics have also been documented as risk indicators for the development of different dental ailments.[12]

In the present research, 27% of respondents had no formal education, whereas a study by Francis[12] from the Indian population revealed 57% partakers having no formal education. In the current study, 57% of the subjects had a CPITN score of 0, and 26% showed a score 1, whereas 17% of the subjects recorded score 2. These results are comparable to the results of Bokhari et al.,[13] who conducted a study for the assessment of oro-dental health in a tertiary care hospital in Rawalpindi, Pakistan, where 64% of the subjects scored 0 and 34% of subjects scored above. Patients having poor periodontal conditions took up most of the treatment time.

The oral cavity is also a portal of entry for different toxins and pathogens, which may adversely affect the health of the mouth and, if not cleaned by a defense mechanism, may spread and transfer these infections to the rest of the body.[14,15] Researchers have demonstrated the association of periodontal disorders with numerous systemic disorders such as DM, adverse pregnancy outcomes, cardiovascular diseases, and so on.[16] Illiteracy and poorer socio-economic rank status in the community enhance the chances of poor oral hygiene with subsequent adverse impact on general health.[17]

In this study, no significant association was found between average monthly income and oral health status of the studied community, wherein these results are contrary to the findings of Mohamed and Vettore[18] from a Brazilian Oral Health Survey, who concluded that periodontal disease

Table 3. *Relationship between CPITN score and socio-demographic variables.*

	CPITN score		
	Healthy (Score 0) *n* (%)	Unhealthy (Score 1-5) *n* (%)	*p*-value
Education			
Less than primary or primary	92 (49.5%)	93 (50.5%)	8.87
Middle to Secondary School	75 (62.4%)	45 (37.6%)	2.0
Higher Secondary and Graduation	60 (80%)	15 (20%)	0.012
Total	227 (60%)	153 (40%)	
Income (PKR)/month			
Less than 20,000	158 (60.1%)	105 (39.9%)	1.673
20,000 or above	59 (51.2%)	58 (48.8%)	1.0

is inversely related to the level of education as well as income of the participants. The current study has shown that 26% of subjects had CPITN score-1, which is similar to the findings by Bobu et al.[19] from the Romanian population. Oral health status has been reported to be significantly associated with an individual's education ($p = 0.001$) in a Turkish study,[7] which is in concordance with our findings where the CPITN score and higher level of education had a significant relationship (p-value = 0.012). Furthermore, lower monthly earnings have been associated closely with a low level of education, as reported by a local study from Karachi, Pakistan,[20] but no such association was found in the present study.

Dental caries and periodontal diseases are the most consequential dental ailments that affect global health because of their high prevalence.[11] Promotion of oral wellbeing is a planned as well as a strategic effort to develop publicized policies, produce a supportive atmosphere, enhance and strengthen the action of the community, improve individual skills, or re-orient the health services.[2] Results of the present study when compared to an Indian study by Kumari et al.[21] confirm that CPITN score had no significant association with the monthly income of the participants. However, the score 0 CPITN was quite lesser reported in the Indian population (39.5%) as compared to ours (57%). Similarly, this finding is also contrary to the study from a Spanish study by Almerich-Silla et al.,[22] in which only 13% of the adult population had a CPITN score <1. WHO has considered dental health as an important public health concern due to its significant impact on the everyday lives of the populace. Long-term epidemiological studies, appropriate planning and strategies, and the development of public policy and guidelines for the implementation and promotion of oral and dental health at the national or regional levels are required to reduce the burden of the disease in our country.[23]

Conclusion

Level of education, independent of socioeconomic status, is identified as a potential risk factor for poor oral health status among the rural community in Pakistan. Dental practitioners should consider enhancing timely screening and awareness campaigns, especially within this specific class of community, to improve oral health outcomes.

Limitations of the Study

Data analysis has some limitations as education, income, and age were collected as categories; hence, correlations could not be computed. The sample size was small; hence, generalizability is limited. This study did not mention any previous dental history of the patients, which could be tracked as an attitude toward the dental health of each individual.

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List of Abbreviations

CPITN	Community periodontal index of treatment needs
DM	Diabetes mellitus
PKR	Pakistani rupees
WHO	World Health Organization

Conflict of interest

None to declare.

Grant support and financial disclosure

None to disclose.

Ethical approval

The study was approved by the Institutional Ethics Review Committee of Multan Dental College, Multan vide letter no: ERC/0474, dated 22-02-2021.

Authors' contributions

RZ, AA NK, and SMB: Concept and design of study, acquisition and analysis of data, drafting of manuscript, critical intellectual input.
MA, DR, and MS: Interpretation of data, critical intellectual input.
ALL AUTHORS: Approval of the final version of the manuscript to be published.

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