GLOBAL JOURNAL OF MEDICINE AND PUBLIC HEALTH

Dental pain as the predictor for caries experience among school children of Udupi district, south India

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GJMEDPH 2014; Vol. 3, issue 4

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Conflict of Interest—none

Funding—none

ABSTRACT

Objective: To evaluate child-Dental Pain Questionnaire (Child - DPQ) as the predictor for caries experience.

Methods: We conducted a cross-sectional survey among 10-15 year old school children of Udupi district, Karnataka. Prior consent from parents and verbal consent from school children was obtained. Permission to conduct the study was obtained from the school authorities. The study was approved by the ethics committee of Manipal University. All the eligible school children completed self-administered Child-DPQ followed by clinical examination for dental caries as per the WHO guidelines under natural day light within the school premises.

Results: A total of 306 children participated in the study, of them 56.5% were ≤ 12 years old, 58.8% were males, 50.7% were in government school and 54.9 % were from urban areas. Around 45.1% of the children were caries experienced and the mean child-DPQ was significantly higher among caries experienced children than caries free children (p=0.017). The Area Under the Curve (AUC) was 0.567 (p=0.043) and was above the reference line which was suggestive that the curve predicted individuals with disease (caries experience). The optimal cut-off point was considered as 3 points on child –DPQ score with sensitivity of 41.3% and specificity of 70.2% with a positive likelihood ratio of 1.39.

Conclusion: The Child – Dental Pain Questionnaire showed to be an acceptable instrument to predict the caries experience among school children.

Keywords: Caries, dental pain, predictor

INTRODUCTION

Dental caries is the most common prevalent disease affecting the oral cavity which can have varying levels of impact on children's daily activities [1,2]. The most common symptom an individual can have is pain and a direct casual relation between pain and various dental diseases was reported previously in the literature [3]. Pain is an unpleasant situation and can have a significant impact on individual's quality of life.

Pain in children is often neglected and remains a daunting task to health care professionals. Pain is a subjective phenomenon which can only be assessed through self-reported questions. Different degrees of cognitive abilities, lack of co-operation with the children, level of comprehension are some of the major issues that influence the assessment of pain in children. Nevertheless self-reported pain remains the gold standard for pain assessment. Few studies assessed the impact of pain on oral health related quality of life [4,5]. But such studies do not generally estimate or quantify the reasons of pain. Recently, child-Dental Pain Questionnaire (child-DPQ) was introduced and showed to be a valid and reliable instrument among 8-9 year old children [6].

In our previous study we tested the validity and reliability of child-DPQ among south Indian 10-15 year old school children [7]. We aimed to evaluate the child-DPQ as the predictor for dental caries which

help in screening large number of children in order to allocate valuable resources.

METHODOLOGY

We conducted a cross-sectional survey among 10-15 year old school children of Udupi district, Karnataka, South India. Prior informed consent from parents and verbal consent from school children were obtained. Permission to conduct the study was obtained from the school authorities. The study was approved by the Institutional ethics committee of Manipal University (IEC 108/2013). Information on sampling method, inclusion and exclusion criteria and child – DPQ were previously mentioned elsewhere [7]. All the children were examined for dental caries as per the WHO guidelines under natural day light within the school premises [8]. Decayed, Missing, Filled teeth (DMFT) index was used to record dental caries experience. Only teeth which were decayed, missing due to decay and filled due to decay were recorded.

All the statistical analysis were carried out using the Statistical Package for Social Sciences (SPSS version 16.0). A P-value of ≤ 0.05 was considered statistically significant. Based on the DMFT index, children were categorized as caries free (DMFT=0) and caries experienced (DMFT>0). Receiver Operating Characteristic (ROC) curves were calculated for evaluating the cutoff points in a continually distributed measure that best predicts whether a condition (Caries experience) is present.

RESULTS

A total of 306 school children participated in this study, of them 56.5% were ≤ 12 years old, 58.8% were males, 50.7% were in government school and 54.9 % were from urban areas (Table 1). Around 45.1% of the children were caries experienced and the mean child-DPQ was significantly higher among caries experienced children than caries free children (p=0.017) (Table 2).

ROC curves were plotted by calculating the sensitivity and specificity of dental caries in predicting the diagnosis for each value of the child-DPQ score. The curve makes it possible to determine the rate of true positives (sensitivity) and minimizes the rate of false positives (1-Specificity), and thus maximizing the likelihood ratio. The optimal cut-off point was identified on the curve which is the closest to the top left hand y-axis and the test-values were identified from the coordinate points of the curve. The Area Under the Curve (AUC) was 0.567 (p=0.043) and was above the reference line which suggests that the curve predicted individuals with disease (caries experience). Optimal cut-off point was considered as 3 points on child –DPQ score with sensitivity of 41.3% and specificity of 70.2% with a positive likelihood ratio of 1.39 (Figure 1).

Table 1 Socio-demographic distribution among the study participants

		N (%)
Age (years)	≤12	173 (56.5)
	>12	133 (43.5)
Gender	Male	180 (58.8)
	Female	126 (41.2)
School	Government	155 (50.7)
	Private	151(49.3)
Location	Urban	168 (54.9)
	Rural	138 (45.1)
Caries status	Caries free	168 (54.9)
	Caries experienced	138 (45.1)

ISSN#- 2277-9604

Table 2: Comparison of mean child – DPQ scores between caries free and experienced children

	Caries results				p-value
	Caries free		Caries experienced		
	Mean	SD	Mean	SD	
Child DPQ	2.76	4.40	4.01	4.98	0.017

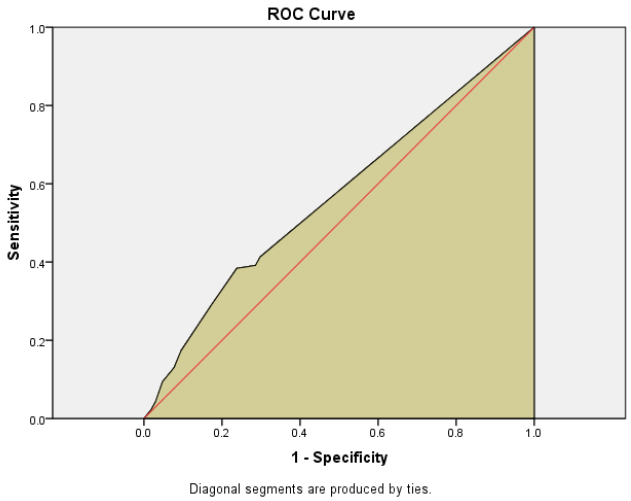

Figure 1 AUC for Child – DPQ and caries experience

DISCUSSION

Our study evaluated the ability of child-DPQ to predict the caries experience. It was shown that the child-DPQ was a reliable and valid instrument for evaluating dental pain among school children of Udupi district [7]. Hence we further evaluated this questionnaire's ability to predict dental caries experience.

Our study showed that the children with caries experience had higher mean child – DPQ scores than those who didn't have caries. This might be due to impact of untreated dental caries to which children might have experienced pain and discomfort. Although the mean DMFT score was low, a significant number of children reported dental pain which indicated that dental caries had significant influence on pain perception. A low mean caries level still does not exclude a number of individuals having considerably higher DMFT values in the same population. In fact, in all populations there seems to be a significant fraction of such individuals [9].

Child – DPQ scores showed to be a predictor of caries experience as demonstrated by good AUC with acceptable sensitivity and specificity. This suggests that child- DPQ can be used as a measure to identify the individuals at risk and prioritize specific and targeted actions. A previous study done to predict dental caries with oral health related quality of life also showed to be an acceptable measure using ROC curve analysis [10].

The use of child - DPQ could be helpful to screen large group of children in short time and with limited resources. Children with high caries levels will most likely be those adults demanding complex and expensive treatments in the future; hence continuous monitoring can be even done using child – DPQ.

Although the temporal association between dental caries and child – DPQ is forward and unidirectional, we attempted to predict caries using child – DPQ which could be one of the limitations of our study. Further follow-up studies would be required to further validate the model and help in development of recommendations/guidelines for screening and/or prevention of dental caries.

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