

Knowledge and Attitude towards the Oral Hygiene Maintenance among Swimmers in and around Chitradurga, Karnataka, India – A Questionnaire Survey

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Keywords: Dental survey; Dental Erosion; Questionnaire survey; Swimmer’s perception; Swimming pool.

ABSTRACT

Background: Swimming for long time in contact with chlorinated pool water can lead to poor oral hygiene. Swimmers must be aware of the detrimental dental effects associated with prolonged exposure to chlorinated pool water and the measures to be taken to prevent such effects.

Aim: To evaluate the knowledge and attitude towards the oral hygiene maintenance among the swimmers in and around Chitradurga district, Karnataka, India.

Results: The overall response rate of the participants observed in this survey was 90%. Majority of respondents were aware of the presence of chlorinate dater (64.2%) in the swimming pools but they were equally not aware of the hazards of chlorinated water on the tooth structure.

Materials and Methods: A self-administered questionnaire consisting of 10 questions drafted for the survey using both online and offline approach. The data obtained was subjected to statistical analysis.

Conclusion: Swimmers around Chitradurga district were aware of basic knowledge regarding chlorinated water in the swimming pool but showed deficiencies in their attitude towards managing the oral hygiene.

Introduction

There are different sports with which a person can engage in their routine life. Swimming is one of the most popular sports with multiple physical and mental health benefits. While swimming is a healthy way to exercise, there are oral health problems arising from swimming pools for both competitive and recreational swimmers. Exposure to pool chlorination may negatively affect oral health of an individual through a phenomenon known as “swimmer’s mouth” [1,2]. Daily exposure to chlorinated water in the pools can cause various dental problems like teeth staining, dental pain, increased calculus formation, and dental erosion. If the pool is not properly maintained, these effects can manifest in as little as 27 days of exposure.

Chlorine is added to swimming pools in order to kill microorganisms and oxidize the matter present in the swimming pools. For this purpose, the pH of chlorine is always maintained to 7.4 to 7.6 in the pools. When the pH decreases, problems like irritation to eyes and mucous membranes happens. There is limited evidence existing in dental literature regarding the side effects of chlorinated water on the tooth structure among swimmers. Therefore, the present questionnaire study was

designed and conducted among swimmers in and around Chitradurga, Karnataka state, India. Investigation including surveys, epidemiological studies conducted among different population pertaining to different dental health domain will provide more elaborative data collection which in turn will give a comprehensive result about a particular region [3-6].

Methodology

A self-administered questionnaire with a set of 10 questions was prepared and used to obtain data using both offline and online platform concerning oral hygiene practices, fluoride intake and use of mouthguard (Table 1). The age of the participants (swimmers) participated in this study ranged from 20 to 40 years. The questions were framed following a vigorous literature review pertaining to this domain [1,2,8,9]. A total of 100 questionnaires were distributed which comprised both offline (67) and online distribution (33). The data obtained was tabulated and statistical analysis was performed using SPSS software. Simple descriptive statistics was used to analyze the results.

Table 1: Questions showing awareness of Swimmers about oral hygiene maintenance

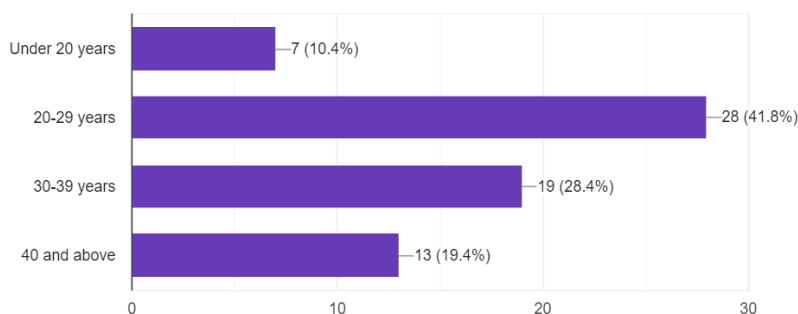
Q. No.	Questions
1.	Are you aware of chlorinated water is present in the swimming pools? Yes No
2.	Are you aware of side effects of chlorinated water on tooth structure? Yes No
3.	Does your master (trainee) teach you about protection of your teeth from the chlorinated water? Yes No
4.	Have you ever used mouthguards for the protection of teeth? Yes No
5.	Do you know that mouthguard can protect your teeth? Yes

	No
6.	Have you experienced problems like sensitivity in the teeth? Yes No
7.	Do you know the term “swimmer’s calculus”? Yes No
8.	Do you rinse your mouth regularly after coming out of the pool? Yes No
9.	Do you brush your teeth after swimming? Yes No
10.	Pools containing over doze of chlorine can cause a. Staining b. Wearing of enamel c. Making the teeth brittle d. Sensitive e. All of the above

Results

The overall response rate of the participants observed in this survey was 90%. Graph 1 shows the age group of the participants took part in this survey. Majority of respondents were aware of presence of the chlorinated water in the swimming pools (64.2%) (Figure 1) but they were equally not aware of the side effects of chlorinated water on the tooth structure (49.3%) (Figure 2). The percentage of knowledge and usage of mouthguard among swimmers was less (9% and 62.7%) (Figure 3 and 4). Regarding sensitivity of the tooth, majority of the respondents (56.7%) did not

experience any sensitivity in their tooth (Figure 5). Majority of respondents (86%) were not aware of the term “Swimmer’s calculus (Figure 6) and also their trainee (master) was also not aware about how to protect the teeth during swimming (Figure 7). For the question number 8, about 53% of respondents said that they rinse their mouth after coming out of the pool (Figure 8) but majority of respondents (79%) do not brush their teeth after swimming (Figure 9). Around three-fourth (67.2%) of the respondents replied that pools containing high amount of chlorine can cause different side effects like staining, erosion, brittleness and sensitivity in the teeth (Figure 10).



Graph 1: Age group of the subjects participated in the study

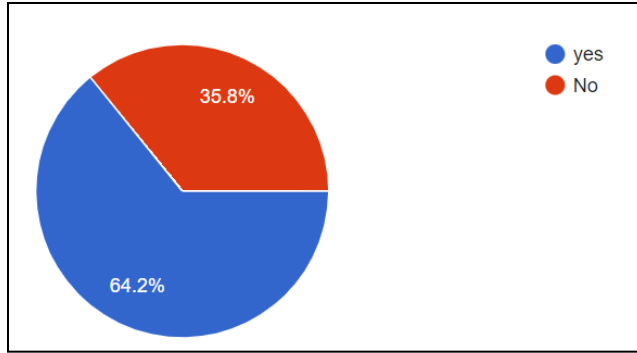


Figure 1: Awareness about presence of chlorinated water in swimming pools

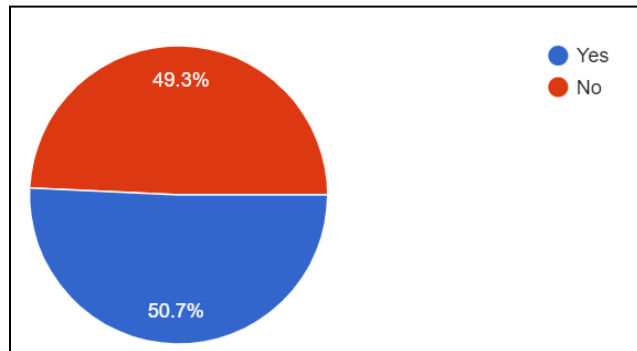


Figure 2: Response towards side effects of chlorinated water on tooth structure

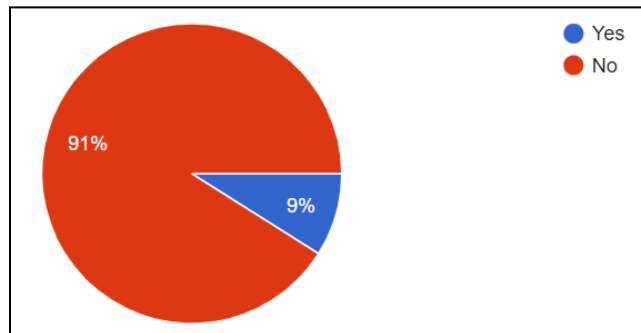


Figure 3: Usage of mouthguards among participants

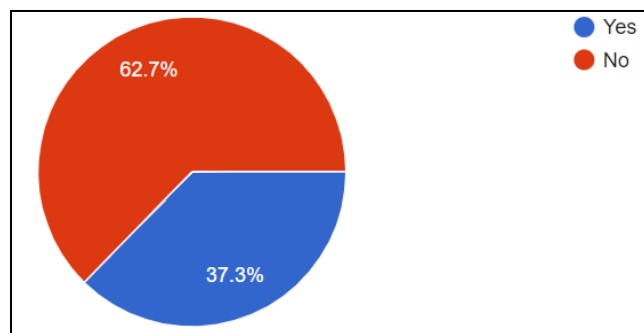


Figure 4: Response about "mouthguard" can protect teeth

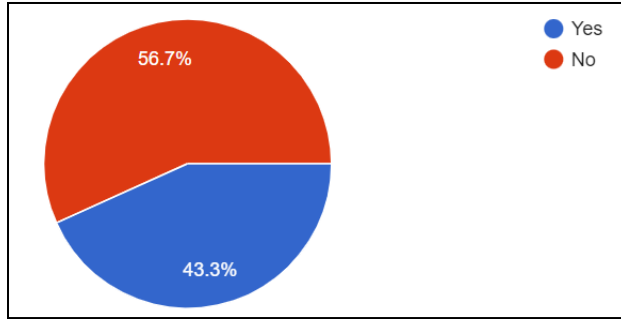


Figure 5: Eexperience of participants about problems like sensitivity in the tooth

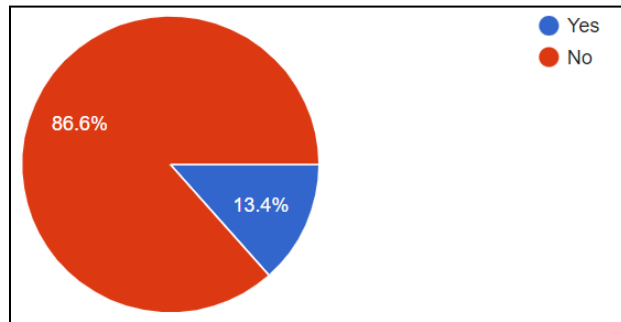


Figure 6: Awareness of the term "Swimmer's calculus" among the participants

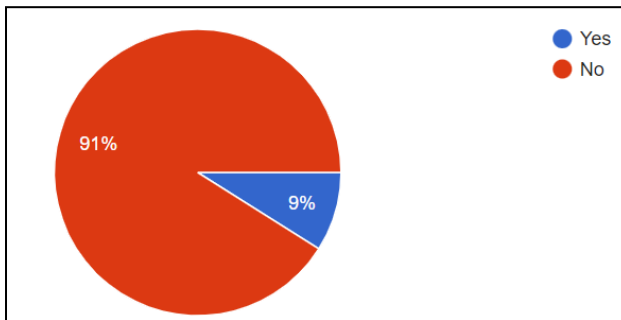


Figure 7: Trainee's knowledge about teeth protection from the chlorinated water

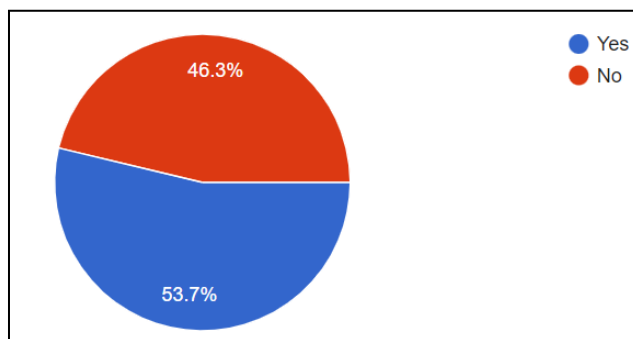


Figure 8: Response of the participants about rinsing of mouth after coming out of the pool

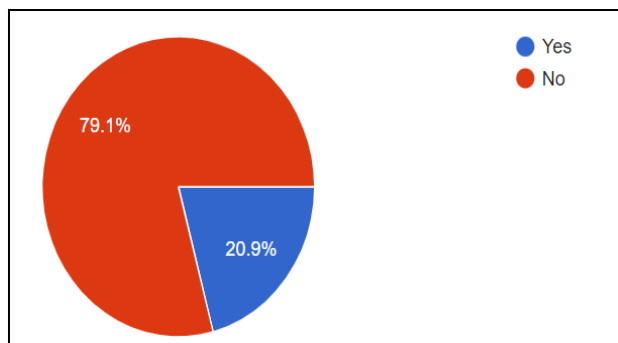


Figure 9: Response of participants for brushing of teeth following swimming

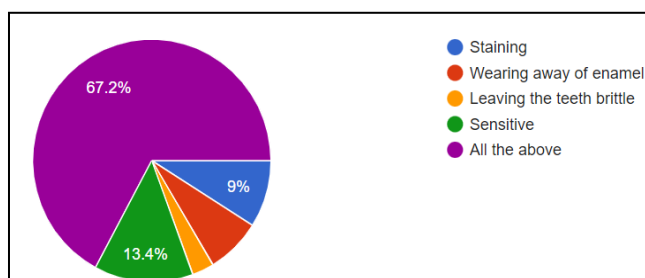


Figure 10: Consequences of high amount of chlorine present in the pools

Discussion

Maintenance of oral and dental health among all sport persons is highly essential for the overall success of their carrier. The success of management of dental and oral health in swimmers depends upon their knowledge and attitude towards harmful effects of chlorine present in the swimming pools on tooth structure [1,2,7]. As there was limited literature evidence available in dental science about the knowledge and awareness regarding the effects chlorinated water on the tooth structure and the oral health damage among swimmers, the present research study was formulated and carried out in Chitradurga city, (Karnataka State, India).

In the present study it was evident that the overall response rate of the participants observed was 90%. Majority of respondents were aware of presence of the chlorinated water in the swimming pools, but they were equally not aware of the side effects of chlorinated water on the tooth structure (49.3%). The percentage of knowledge and usage of

mouthguard among swimmers was less (9% and 62.7%). Regarding sensitivity of the tooth, majority of the respondents (56.7%) did not experience any sensitivity in their tooth. Majority of respondents (86%) were not aware of the term “Swimmer’s calculus [8]. Swimmer’s Calculus is a type of hard, brown tartar deposit present on front teeth seen following prolonged exposure to chlorine. This is attributed to the fact that swimmers’ salivary flow rates and levels of phosphorus decreased, while their calcium and fluoride levels increased [9]. With an increase in calcium and fluoride and a decrease in phosphorus, calculus formation is exaggerated and hence leading to formation of calculus and called by a term ‘swimmer’s calculus. When salivary flow rate decreases the oral environment become more drier than the normal and the amount of saliva becomes inadequate for flushing the debris and chlorine from the mouth. Therefore, it is well established fact that saliva plays a major role in neutralizing the chemicals present in the oral cavity. In another study conducted among 22 competitive

swimmers, researchers replied that the composition and flow rates of their saliva were greatly impacted by the exposure to chemically treated water with chlorine during swimming [8].

For the question number 8, about 53% of respondents said that they rinse their mouth after coming out of the pool but majority of respondents (79%) do not brush their teeth after swimming. Brushing the teeth immediately following swimming is harmful, as the enamel surface is softened by the chlorine which is acidic and hence more easily brushed away [1,2]. Therefore, some of the preventive measures like simply rinsing with water, using baking soda, or rinsing with fluoride containing mouth washes can be implemented immediately after swimming practice in order to make the oral cavity to attain a neutral pH, which in turn decreases the risk of dental erosion caused by acidic chlorine [12-20]. Even the trainee should have enough knowledge about this and give advice to the swimmers. Trainee or coaches have multiple roles. They can help swimmers to practice an appropriate breathing system that minimizes the mouth opening to reduce exposure to pool water. However, in the present study it was surprising that the participants (swimmers) trainee was also not aware about these preventive and prophylactic measures for the protection of the teeth from the detrimental effect of acidic chlorine.

The usage of “mouthguard” in swimmers whether they are competitive or noncompetitive swimmers will help in reducing the various dental health problems such as staining, dental pain, increased calculus buildup, tooth erosion and even traumatic injuries [10,11]. Therefore, in every sports center of any kind sports, mouthguard should be made available to the sport persons. In the present study, the percentage of awareness and utilization of mouthguard among swimmers was found to be less (9% and 62.7%).

Finally in this study it was found that around three-fourth (67.2%) of the respondents replied that pools containing high amount of chlorine can cause different side effects like staining,

erosion, brittleness and sensitivity in the teeth. One study showed that 15% of swimmers who daily practice had enamel erosion, whereas only 3% of infrequent or non-swimmers displayed enamel erosion [15-20]. A case report also expressed the significant dental erosion experienced by a competitive swimmer who swam in a gas-chlorinated swimming pool and experienced notable dental erosion within 27 days after going for a swimming [20]. The pH of saliva in a healthy mouth is very close to the neutral. It is the perfect pH to keep teeth strong. It is evident in the literature that teeth will become extra sensitive following swimming practice, because of erosion of the enamel. If a swimming pool is kept at the optimal pH of 7.4, the tooth structure will not demineralize. However, if the pH of the swimming pool water becomes acidic, then exposed tooth structures may start to dissolve. In addition to this, chlorine gas is also highly acidic. Normally, swimming pools counteract this acid with a strong base, such as ash. If the swimming pool does not get enough base to balance the acid from the chlorine, then it can become acidic and start to dissolve the teeth of those who swim regularly.

Apart from these consequences, other conditions also encountered in swimmers like dental pain and dental caries. Dental pain is caused by predisposing oral pathologic condition in swimmers and this condition is called as ‘barodontalgia.’ For the prevention of dental caries among swimmers’ various preventive measures can be considered [8,14]. Chewing gum containing xylitol usage reduces caries risk in swimmers. Individuals need to consume 5 gm to 6 gm of xylitol at least three times or more per day to gain caries-prevention benefits. In addition to chewing gums, xylitol can also be found in syrups, wipes, dentifrices, lozenges, mouthrinses, and snack foods. Agents designed to support enamel health, such as arginine, and remineralization, such as calcium phosphate technologies, have also proved to be beneficial. The use of a power toothbrush also found advantageous. Literature suggests that the use of a power brush can significantly

reduce stains and calculus formation on teeth when compared with manual toothbrushes [13-16].

Conclusion

Within the limitations of the study, it can be concluded that swimmers around Chitradurga district were aware of basic knowledge regarding presence of chlorinated water in the swimming pool but showed less knowledge in their attitude towards managing the oral hygiene or protecting the tooth structure from chlorinated water. Educating the pool maintenance employees, coaches and trainee on the harmful effects of pools with over-

chlorinated water highly essential. However, more elaborative data collection is required to give a comprehensive result about particular region. The detailed information about maintenance of healthy oral hygiene should be distributed and publicized among public swimming pool attendants and the trainees. Therefore, more efforts are required to educate and update not only general public but also coaches regarding the modes of protective measures to be taken to prevent the detrimental effect of chlorinated water like use of mouthguards, fluoride mouth rinsing after getting out from the pool and usage of chewing gums.

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