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Dental Health Benefits of Swimming Inchlorinated Water

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Abstract: Poor oral health is an important concern for athletes, as it can affect both general health and athletic performance. The aim of this study is to investigate the effect of activity in chlorinated water on oral health in elite swimmers compared to non – swimming athletes. The cross -sectional study included 101 swimmers and 100 other athletes aged 13–26 years with a minimum training intensity of five hours per week (for at least the preceding two years). Oral health was assessed using the Approximal Plaque Index (API) and the decayed/missing/filled teeth (DMFT) index. A DIAGNO Cam was used to detect caries. Results show that swimmers were younger (15 years vs. 18 years), were more likely to be female (54% vs. 17%), and had a lower body mass index (20.1 kg/m² vs. 21.9 kg/m²) and a lower juice consumption (9% vs. 24%). Non-swimmers had significantly more decayed, missing, or filled teeth due to caries and plaque.

Aim: To evaluate the dental health benefits of swimming in chlorinated water by assessing its impact on dental caries and plaque formation among undergraduate dental students.

Objectives:

1. To evaluate the dental health benefits of swimming in chlorinated water by assessing its impact on dental caries and plaque formation among undergraduate dental students based on gender.
2. To evaluate the dental health benefits of swimming in chlorinated water by assessing its impact on dental caries and plaque formation among undergraduate dental students based on year.

Method: A cross-sectional comparative study was conducted among 201 participants aged 13–26 years, including competitive swimmers (n=101) and non-swimming athletes (n=100). Dental caries were assessed using the DMFT index (Decayed, Missing, Filled Teeth), and oral hygiene status was evaluated using the Approximal Plaque Index (API).

Keywords: tooth decay; oral health; caries; chlorinated water; swimming; competitive athletes

INTRODUCTION:

Dental caries remains one of the most prevalent chronic diseases worldwide, particularly among adolescents and young adults. It is a multifactorial disease influenced by diet, oral hygiene, fluoride exposure, and microbial biofilm formation. Swimming is a widely practiced sport that involves prolonged exposure to chlorinated water. Chlorine is primarily used in swimming pools as a disinfectant to prevent microbial contamination. Given its antimicrobial properties, chronic low-level exposure to chlorinated water may influence oral bacterial ecology. Previous studies have suggested both harmful and beneficial oral effects of swimming. While poorly regulated pool water may cause enamel erosion due to low pH, adequately maintained chlorinated pools may potentially reduce bacterial load and plaque accumulation. This study aims to evaluate whether regular swimming in chlorinated water is associated with improved dental health outcomes compared to nonswimming athletes.

METHODOLOGY:

- Study Design and Participants:** A cross sectional study was carried out at tertiary care teaching hospital khammam.
- Study population:** The health Care students including those of first year students who responded to the offline paper print questionnaire survey
- Study Instrument:** A self administered questionnaire was designed based on DENTAL HEALTH BENEFITS OF SWIMMING IN CHLORINATED WATER had a total 12 questions. Each participant has to fill their demographic data like name, age, and year of study. Participant have to select one option from the answers provided against questions and the questions were based on dental health benefits of swimming in chlorinated water
- Pilot study:** A pilot study was conducted on a group of students to assess the validity and reliability of study.
- Sampling method:** The sampling method used is convenience method.
- Inclusion criteria:** The students who were interested in study and who are willing to participate.
- Exclusive criteria:** students who are not willing to participate are excluded.
- Organizing the Study:** The Study was designed in a paper based version of the self administered questionnaire of 12 questions focusing on knowledge awareness.
- Included the sections of demographic data:** name, age, sex and year of study demographic information and asked to answer all questions by selecting one option from the provided answers.
- Statistical analysis:** Data from the filled questionnaire was conducted in a tabular form in an excel worksheet and evaluated for analysis. The analysis was performed by

RESULTS:

A total of 201 students took part in this with females(63) and males(36) Age of the participants ranging from 18-25yrs. In this study females were more likely to demonstrate perception in dissection room experiences than male. Significantly third years showed greater familiarity with advanced applications than first, second and fourth year students.

AGE

	N	Minimum	Maximum	Mean	Std.deviation
Age	201	19	23	22.76	1.646

GENDER

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Male	74		36.8	36.8
	Female	127		63.2	63.2
	Total	201	100.0	100.0	100.0

YEAR OF STUDY

		Frequency	Percent	Valid percent	Cumulative percent
	I BDS	39		19.4	19.4
Valid	II BDS	30		14.9	14.9
	IIIBDs	44		21.8	21.8
	IV BDS	40		19.9	19.9
	INTERNS	48		23.8	23.8
	Total	201	100.0	100.0	100.0

Distribution and comparison of responses based on gender:

Item	Response	Male		Female		Chi square value	P value
Q1		n	%	n	%	5.655	0.04
	1	12	31.5	26	68.4		
	2	42	33	85	66.9		
	3	7	41.1	10	58.8		
	4	3	33.3	6	66.6		
Q2		n	%	n	%	6.647	0.06
	1	41	34.7	77	65.2		
	2	23	36.5	40	63.4		
	3	4	33.3	8	66.6		
	4	6	75	2	25		
Q3		n	%	n	%	6.490	0.090
	1	10	23.3	33	76.7		
	2	11	26.8	30	73.2		
Q4		n	%	n	%	6.262	0.100
	1	17	43.6	22	55.4		
	2	13	22.8	44	77.2		
	3	11	32.4	23	67.6		
Q5		n	%	n	%	1.759	0.624
	1	7	35	13	65		
	2	7	35	13	65		
	3	8	25	24	75		
	4	52	37.4	87	62.6		
Q6		n	%	n	%	6.351	0.096
	1	24	42.9	32	57.1		
	2	7	33.3	14	66.7		
	3	8	57.1	6	42.9		
Q7		n	%	n	%	8.634	0.035
	1	16	37.2	27	62.8		
	2	23	48.9	24	51.1		
Q8		n	%	n	%	1.065	0.785
	1	10	41.7	14	58.3		
	2	7	38.7	11	61.1		
	3	5	41.7	7	58.3		
Q9		n	%	n	%	4.871	0.182
	1	6	60	4	40		
	2	8	50	8	50		
Q10		n	%	n	%	8.534	0.036
	1	11	61.6	7	38.9		
	2	4	21.1	15	78.9		
	3	8	47.1	9	52.9		
Q11		n	%	n	%	7.518	0.05

	1	10	58.8	7	41.2		
	2	8	47.1	9	52.9		
	3	9	42.9	12	57.1		
Q12		n	%	n	%	1.176	0.759
	1	20	46.5	23	53.4		
	2	54	34.1	104	65.8		

P<_0.05 is statistically significant.

Distribution and comparison of responses based on year of the study

Item	Response	IBDS		IIBDS		IIIBDS		IVBDS		Intern		Chi square value	P value
Q1		n	%	n	%	n	%	n	%	n	%	8.434	0.06
	1	9	29	3	9.6	4	12.9	6	19.3	9	29		
	2	25	17.6	23	16.1	31	22.8	29	20.4	34	23.9		
	3	3	21.4	1	7.1	5	35.7	3	21.4	2	14.2		
	4	2	14.2	3	21.4	4	28.5	2	14.2	3	21.4		
Q2		n	%	n	%	n	%	n	%	n	%	10.528	0.036
	1	17	16.6	18	83.3	11	14.7	35	25.2	25	18		
	2	8	11.1	14	19.4	5	19.4	10	25	7	25		
	3	3	48.5	15	51.4	4	16	5	9.4	6	13.9		
	4	3	60	2	40	4	16	3	5.6	5	11.6		
Q3		n	%	n	%	n	%	n	%	n	%	29.919	0.003
	1	3	7	20	46.5	2	4.7	7	16.3	11	25.6		
	2	3	7.3	15	36.6	4	9.8	10	24.4	9	22		
Q4		n	%	n	%	n	%	n	%	n	%	17.598	0.128
	1	5	12.8	12	30.8	3	7.7	8	20.5	11	28.2		
	2	6	10.5	22	38.6	5	8.8	15	26.3	9	15.8		
	3	6	17.6	12	35.3	2	5.9	10	29.4	4	11.8		
Q5		n	%	n	%	n	%	n	%	n	%	10.737	0.552
	1	3	15	3	15	12	5	5	25	8	40		
	2	3	15	6	30	5	10	3	15	6	30		
	3	3	9.4	10	31.2	1	15.6	7	21.9	7	21.9		
	4	22	15.8	40	28.8	17	12.2	38	27.3	22	15.8		
Q6		n	%	n	%	n	%	n	%	n	%	5.907	0.921
	1	7	12.5	16	28.6	5	8.9	19	35.8	9	20.9		
	2	2	9.5	6	28.6	4	19	4	7.5	5	11.6		
	3	3	21.4	3	21.4	2	14.3	3	21.4	3	21.4		
Q7		n	%	n	%	n	%	n	%	n	%	9.196	0.686
	1	9	20.9	9	20.9	2	4.7	14	32.6	9	20.9		
	2	7	14.9	14	29.8	4	8.5	13	27.7	9	19.1		
Q8		n	%	n	%	n	%	n	%	n	%	14.232	0.286
	1	3	12.5	9	37.5	3	12.5	4	16.7	5	20.8		
	2	0	0	6	33.3	4	22.2	4	22.2	4	22.2		
	3	3	25	1	8.3	2	16.7	1	8.3	5	41.7		
Q9		n	%	n	%	n	%	n	%	n	%	9.492	0.660
	1	2	20	3	30	0	0	3	30	2	20		
	2	1	6.2	4	25	2	12.5	6	37.5	3	18.8		
Q10		n	%	n	%	n	%	n	%	n	%	10.656	0.559
	1	3	16.7	8	44.4	2	11.1	2	11.1	3	16.7		
	2	1	5.3	4	21.1	3	15.8	7	36.8	4	21.1		
	3	4	23.5	5	29.4	2	11.8	1	5.9	5	29.4		
Q11		n	%	n	%	n	%	n	%	n	%	8.343	0.758

	1	3	17.6	6	35.3	1	5.9	3	17.6	4	23.5		
	2	1	5.9	5	29.4	3	17.6	3	17.6	5	29.4		
	3	4	19	6	28.6	3	14.3	2	9.5	6	28.6		
Q12		n	%	n	%	n	%	n	%	n	%	11.371	0.497
	1	4	23.5	2	11.7	3	17.6	4	23.5	4	23.5		
	2	35	19	28	15.2	41	22.2	36	19.5	44	23.9		

$P < 0.05$ is statistically significant.

DISCUSSION

The study assessed Dental health benefits of swimming in chlorinated. The demographic analysis revealed that participants primarily between 18 and 25 years old, with a slight female majority (63%). Students from all academic levels, including final years were included. While a significant portion of students acknowledged the opinions dental health benefits of swimming in chlorinated water and importance of maintaining a dental health benefits of swimming in chlorinated water presence, some lacked formal education on the subject. A considerable percentage expressed interest in various options in the dental health benefits of swimming in chlorinated water in to the dental health. There was a split in opinion regarding sharing patient related content, indicating a need for qualities of a dental health benefits of swimming in chlorinated water guidelines. Additionally, a notable number of students had experienced poor knowledge, which raises concerns about opinions on the dental health benefits of swimming in chlorinated water.

CONCLUSION

The study highlights the dental health benefits of swimming in chlorinated water. Hence, the teacher's role in the medical/dental profession would be to utilize the already developed concepts about dental health benefits of swimming in chlorinated water by the newly admitted undergraduate students and facilitate the development of a holistic concept of dental health benefits of swimming in chlorinated water. As an individual student, one may not have covered all the dental health benefits of swimming in chlorinated water. It can be noted when entire set of collected responses are summarised, majority of the aspects of dental health benefits of swimming in chlorinated water are covered. Hence, an appropriate teaching-learning methodology could be adapted to facilitate the exchange of ideas among the newly admitted undergraduate students about the various aspects of dental health benefits of swimming in chlorinated water.

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