International Journal of Drug Research and Dental Science
Volume 8 Issue 1 (Page: 1-9), 2026 ISSN: 2582-0826

Awareness and Perception of Undergraduate Dental Students Regarding Bio artificial Tongue- A Questionnaire Based Study

Dr. Jaahnavi Lakkineni[1*], Dr. T. Madhavi Padhma[2], Dr. K. V. N. R Prathap[3], Dr. Vengal Rao[4], Dr. Srujan Kumar[5], Dr. Darshika Chandini[6]

[1]*Student, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.*
[2]*Professor and HOD, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.*
[3]*Professor and Head, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.*
[4]*Professor, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.*
[5,6]*Senior Lecturer, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.*

Original Article

***Corresponding Author**: Dr. Jaahnavi Lakkineni**,** Department of Public Health Dentistry, Mamata Dental College, Khammam, India.
E-mail: jaahnavilakkineni@gmail.com
Crossref doi: https://doi.org/10.36437/ijdrd.2026.8.1.A

ABSTRACT

Background: The tongue plays a crucial role in taste perception, speech, swallowing, and overall oral function. Loss of tongue tissue due to oral cancer surgery or trauma leads to significant functional and psychological impairment. Bioartificial tongue technology is an emerging field in tissue engineering that aims to restore these lost functions. Awareness of such advanced rehabilitative technologies among dental professionals, especially in public health dentistry, is essential for future patient care and policy planning.

Aim: To assess the awareness, knowledge, and perception of bio-artificial tongue technology among undergraduate dental students.

Objectives: To evaluate the level of awareness regarding the concept of bio-artificial tongue. To assess knowledge about its indications and clinical applications.

To determine students' perception for its relevance, particularly in oral cancer rehabilitation.

Keywords: Awareness; Bio artificial Tongue; Public Health Dentistry; Oral Surgery, Oral Cancer Rehabilitation; Tissue Engineering.

Introduction

The tongue is a highly specialized muscular organ that plays an essential role in taste perception, speech articulation, mastication, swallowing, and maintenance of oral health. Diseases such as oral cancer, trauma, and congenital anomalies may necessitate partial or total glossectomy, resulting in severe impairment of oral functions and reduced quality of life.

Conventional rehabilitative approaches, including prosthetic devices and speech therapy, offer limited functional restoration and do not adequately replace sensory functions such as taste.

Advances in regenerative medicine and tissue engineering have led to the development of bioartificial tongue models that aim to replicate the biological and functional properties of the natural tongue.

Bioartificial tongue technology involves the use of biomaterials, scaffolds, and taste receptor cells to recreate taste sensation and oral function. Although still in the experimental stage, this innovation holds significant promise for oral rehabilitation, particularly for oral cancer survivors. From a public health dentistry perspective, awareness of such emerging technologies is essential for planning future rehabilitative services and improving oral health-related quality of life. However, data regarding awareness among dental students are limited, prompting the need for the present study.

Materials and Methods

A cross-sectional questionnaire-based study was conducted among undergraduate Dental students. A structured, self-administered questionnaire consisting of demographic details and questions assessing knowledge and perception regarding bio-artificial tongue technology was used. Data were analysed using descriptive statistics.

Methodology

Study Design: A cross-sectional questionnaire-based study was conducted among undergraduate dental students.

Objectives

To assess awareness of bio artificial tongue technology.

To evaluate perception regarding its clinical and public health importance.

Data Collection Methods

A structured, self-administered questionnaire was developed based on a review of relevant literature. The questionnaire consisted of two sections:

Section A: Demographic details (age, gender, level of study, year of undergraduation, type of institution)

Section B: Questions assessing knowledge, awareness, and perception of bioartificial tongue technology

The questionnaire was distributed to the participants, and informed consent was obtained prior to data collection.

Data Analysis

Collected data were entered into Microsoft Excel and analyzed using descriptive statistics. Results were expressed as frequencies and percentages.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethical Committee prior to the commencement of the study.

Participation was voluntary, and informed consent was obtained from all participants. Confidentiality and anonymity of the participants were strictly maintained.

Limitations

The study was limited to a specific group of dental students, which may limit generalizability.

Responses were self-reported and may be subject to response bias.

As a cross-sectional study, causal relationships could not be established.

Results

A total of 221 undergraduate dental students have participated in the study. The majority of respondents were undergraduate students aged between 1st year and internship.

Most participants reported having heard of the concept of bioartificial tongue. However, detailed knowledge regarding its development, clinical indications, and public health relevance was found to be moderate to low. A large proportion of respondents believed that bio-artificial tongue technology could significantly improve the quality of life of patients who have undergone

glossectomy due to oral cancer. Additionally, many participants expressed the need for incorporating advanced oral rehabilitation technologies into the dental curriculum.

	N	Minimum	Maximum	Mean	Std. Deviation
Age	221	18	26	21.62	1.604

Gender		Frequency	Percent
Valid	MALE	80	36.2
	FEMALE	141	63.8
	Total	221	100.0

Year of Study		Frequency	Percent
Valid	1 BDS	34	15.4
	2 BDS	38	17.2
	3 BDS	27	12.2
	4 BDS	46	20.8
	INTERN	76	34.4
	Total	221	100.0

Distribution and comparison of responses based on gender:

Item	Response	Males		Females		Chi-Square value	P value	Total	
		n	%	n	%			n	%
Q1	1	2	33.3	4	66.7	0.486	0.922	6	2.7
	2	71	36.8	122	63.2			193	87.3
	3	5	35.7	9	64.3			14	6.3
	4	2	25	6	75			8	3.6
Q2	1	12	34.3	23	65.7	1.211	0.750	35	15.8
	2	13	39.4	20	60.6			33	14.9
	3	54	36.7	93	63.3			147	66.5
	4	1	16.7	5	83.3			6	2.7
Q3	1	12	46.2	14	53.8	2.900	0.407	26	11.8
	2	15	39.5	23	60.5			38	17.2
	3	52	34.7	98	65.3			150	67.9
	4	1	14.3	6	85.7			7	3.2
Q4	1	18	41.9	25	58.1	2.226	0.527	43	19.5
	2	17	41.5	24	58.5			41	18.6
	3	43	33.6	85	66.4			128	57.9
	4	2	22.2	7	77.8			9	4.1
Q5	1	17	48.6	18	51.4	5.165	0.160	35	15.8

	2	13	44.8	16	55.2			29	13.1
	3	49	32.5	102	67.5			151	68.3
	4	1	16.7	5	83.3			6	2.7
Q6	1	13	48.1	14	51.9	4.972	0.174	27	12.2
	2	15	48.4	16	51.6			31	14
	3	50	31.8	107	68.2			157	71
	4	2	33.3	4	66.7			6	2.7
Q7	1	24	44.4	30	55.6	2.311	0.510	54	24.4
	2	12	36.4	21	63.6			33	14.9
	3	40	32.5	83	67.5			123	55.7
	4	4	36.4	7	63.6			11	5
Q8	1	21	41.2	30	58.8	3.071	0381	51	23.1
	2	11	42.3	15	57.7			26	11.8
	3	47	34.6	89	65.4			136	61.5
	4	1	12.5	7	87.5			8	3.6
Q9	1	27	46.6	31	53.4	5.544	0.136	58	26.2
	2	14	33.3	28	66.7			42	19
	3	38	33.9	74	66.1			112	50.7
	4	1	11.1	8	88.9			9	4.1
Q10	1	48	41	69	59	3.277	0.351	117	52.9
	2	5	41.7	7	58.3			12	5.4
	3	25	29.8	59	70.2			84	38
	4	2	25	6	75			8	3.6
Q11	1	17	37	29	63	1.378	0.711	46	20.8
	2	14	34.1	27	65.9			41	18.6
	3	47	37.9	77	62.1			124	56.1
	4	2	20	8	80			10	4.5
Q12	1	31	38.8	49	61.3	3.172	0.366	80	36.2
	2	10	45.5	12	54.5			22	10
	3	38	34.2	73	65.8			111	50.2
	4	1	12.5	7	87.5			8	3.6
Q13	1	32	39.5	49	60.5	13.115	0.004*	85	36.7
	2	16	64	9	36			25	11.3
	3	31	29	76	71			107	48.4
	4	1	12.5	7	87.5			8	3.6
Q14	1	11	50	11	50	4.689	0.196	22	10
	2	26	38.8	41	61.2			67	30.3
	3	42	34.1	81	65.9			123	55.7
	4	1	11.1	8	88.9			9	4
Q15	1	26	43.3	34		4.548	0.208	60	27.1
	2	9	50	9				18	8.1
	3	43	32.1	91				134	60.6
	4	2	22.2	7				9	4.1

P≤0.05 is statistically

Distribution and comparison of responses based on year of the study:

Item	Response	I BDS		II BDS		III BDS		IV BDS		INTERN		Chi-Value	P-Value	Total	
		n	%	n	%	n	%	n	%	n	%			N	%
Q1	1	1	16.7	0	0	0	0	1	66.7	4	66.7	25.533	**0.012***	6	2.7
	2	33	17.1	38	90.7	27	14	38	29.5	57	29.5			193	87.3
	3	0	0	0	0	0	0	5	64.3	9	64.3			14	6.3
	4	0	0	0	0	0	0	2	75	6	75			8	3.6
Q2	1	8	22.9	2	5.7	1	2.9	9	25.7	15	42.9	19.500	0.077	35	15.8
	2	4	12.1	6	18.2	2	6.1	9	27.3	12	36.4			33	14.9
	3	22	15	30	20.4	24	16.3	25	17	46	31.3			147	66.5
	4	0	0	0	0	0	0	3	50	3	50			6	2.7
Q3	1	8	30.	3	11.5	1	3.8	6	23.1	8	30.8	18.924	0.090	26	11.8
	2	4	10.5	6	15.8	2	5.3	8	21.1	18	47.4			38	17.2
	3	22	14.7	29	19.3	24	16	29	19.3	46	30.7			150	67.9
	4	0	0	0	0	0	0	3	42.9	4	57.1			7	3.2
Q4	1	10	23.3	8	18.6	4	9.3	8	18.6	13	30.2	13.442	0.338	43	19.5
	2	7	17.1	10	24.4	6	14.6	8	19.5	10	24.4			41	18.6
	3	17	13.3	20	15.6	17	13.3	27	21.1	47	36.7			128	57.9
	4	0	0	0	0	0	0	3	33.3	6	66.7			9	4.1
Q5	1	9	25.7	4	11.4	1	2.9	6	17.1	15	42.9	14.976	0.243	35	15.8
	2	5	17.2	5	17.2	3	10.3	5	17.2	11	37.9			29	13.1
	3	20	13.2	29	19.2	23	15.2	32	21.2	47	31.1			151	68.3
	4	0	0	0	0	0	0	3	50	3	50			6	2.7
Q6	1	9	33.3	3	11.1	1	3.7	5	18.5	9	33.3	14.721	0.257	27	12.2

	2	5	16.1	6	19.4	4	12.9	5	16.1	11	35.5			31	14
	3	20	12.7	29	18.5	22	14	34	21.7	52	33.1			157	71
	4	0	0	0	0	0	0	2	33.3	4	66.7			6	2.7
Q7	1	15	27.8	9	16.7	7	13	11	20.4	12	22.2	18.549	0.100	54	24.4
	2	2	6.1	5	15.2	3	9.1	9	27.3	14	42.4			33	14.9
	3	17	13.8	23	18.7	17	13.8	23	18.7	43	35			123	55.7
	4	0	0	1	9.1	0	0	3	27.3	7	63.6			11	5
Q8	1	14	27.5	9	17.6	8	15.7	11	21.6	9	17.6	22.160	0.036*	51	23.1
	2	3	11.5	6	23.1	1	3.8	3	11.5	13	50			26	11.8
	3	17	12.5	23	16.9	18	13.2	29	21.3	49	36			136	61.5
	4	0	0	0	0	0	0	3	37.5	5	62.5			8	3.6
Q9	1	15	25.9	13	22.4	9	15.5	11	19	10	17.2	23.238	0.026*	58	26.2
	2	3	7.1	9	21.4	3	7.1	10	23.8	17	40.5			42	19
	3	16	14.3	16	14.3	15	13.4	22	19.6	43	38.4			112	50.7
	4	0	0	0	0	0	0	3	33.3	6	66.7			9	4.1
Q1 0	1	22	18.8	28	23.9	15	12.8	22	18.8	30	25.6	25.928	0.011*	117	52.9
	2	0	0	1	8.3	0	0	2	16.7	9	75			12	5.4
	3	12	14.3	9	10.7	12	14.3	19	22.6	32	38.1			84	38
	4	0	0	0	0	0	0	3	37.5	5	62.5			8	3.6
Q1 1	1	13	28.3	3	6.5	7	15.2	9	19.6	14	30.4	35.896	0.001*	46	20.8
	2	0	0	7	17.1	2	4.9	15	36.6	17	41.5			41	18.6
	3	21	16.9	28	22.6	18	14.5	19	15.3	38	30.6			124	56.1

	4	0	0	0	0	0	0	3	30	7	70			10	.4.5
Q1 2	1	14	17.5	9	11.2	11	13.8	18	22.5	28	35	31.675	0.002*	80	36.2
	2	1	4.5	1	4.5	0	0	5	22.7	15	68.2			22	10
	3	19	17.1	28	25.2	16	14.4	21	18.9	27	24.3			111	50.2
	4	0	0	0	0	0	0	2	25	6	75			8	3.6
Q1 3	1	13	16	10	12.3	8	9.9	17	21	33	40.7	34.863	0.001*	81	36.7
	2	0	0	3	12	0	0	5	20	17	68			25	11.3
	3	20	18.7	25	23.4	19	17.8	22	20.6	21	19.6			107	48.4
	4	1	12.5	0	0	0	0	2	25	5	62.5			8	3.6
Q1 4	1	2	9.1	1	4.5	0	0	3	13.6	16	72.7	39.908	0.001*	22	10
	2	7	10.4	10	14.9	7	10.4	22	32.8	21	31.3			67	30.3
	3	25	20.3	27	22	20	16.3	19	15.4	32	26			123	55.7
	4	0	0	0	0	0	0	2	22.2	7	77.8			9	4
Q1 5	1	11	18.3	6	10	6	10	14	23.3	23	38.3	40.528	0.001*	60	27.1
	2	0	0	0	0	0	0	3	16.7	15	83.3			18	8.1
	3	23	17.2	32	23.9	21	15.7	26	19.4	32	23.9			134	60.6
	4	0	0	0	0	0	0	3	33.3	6	66.7			9	4.1

P≤0.05 is statistically significant

Discussion

The present study was conducted to assess the awareness and perception of bioartificial tongue technology among undergraduate dental students. With rapid advances in tissue engineering and regenerative medicine, innovative rehabilitative options such as bioartificial tongue have gained importance, particularly in the management of oral cancer patients. Understanding the level of awareness among future dental public health professionals is essential for effective integration of such technologies into clinical practice and public health planning.

The findings of the study revealed that although a majority of participants were aware of the concept of bioartificial tongue, their depth of knowledge regarding its development, clinical application, and public health relevance was limited. This may be attributed to the fact that bioartificial tongue

technology is still in the experimental stage and is not extensively covered in the current dental curriculum. Similar observations have been reported in studies assessing awareness of emerging regenerative technologies among dental professionals, where general awareness existed but a detailed understanding was inadequate.

Most respondents in the present study perceived bioartificial tongue technology as a promising tool for improving the quality of life of oral cancer survivors. Loss of tongue function following glossectomy often results in compromised speech, swallowing difficulties, and nutritional deficiencies, which have significant public health implications. Advanced rehabilitative technologies that restore oral function can therefore play a crucial role in holistic cancer care and long-term rehabilitation.

From a public health dentistry perspective, the positive attitude observed among participants highlights the potential acceptance of bioartificial tongue rehabilitation in future oral health programs. However, limited technical knowledge suggests the need for enhanced academic exposure through lectures, seminars, and interdisciplinary collaborations involving oral pathology, oral surgery, and biomedical engineering.

The study also emphasizes the importance of incorporating emerging regenerative technologies into dental education. Improved awareness and understanding among dental students can facilitate early referral, patient education, and advocacy for rehabilitative services, thereby contributing to improved oral health-related quality of life at the community level.

Despite its strengths, the study has certain limitations. The use of a self-administered questionnaire may have introduced response bias, and the restricted study population limits the generalizability of the findings. Further multi-center studies with larger sample sizes are recommended to obtain a broader understanding of awareness levels among dental professionals.

Conclusion

The present study concludes that while Public Health Dentistry students exhibit basic awareness of bioartificial tongue technology, there is a noticeable gap in comprehensive knowledge regarding its clinical application and public health significance. The generally positive perception towards its role in oral cancer rehabilitation reflects the potential for acceptance of such advanced technologies in future dental practice.

Incorporation of emerging concepts like bioartificial tongue into the dental curriculum and continuing dental education programs is recommended to enhance knowledge and preparedness among future dental professionals. Strengthening awareness and understanding of advanced oral rehabilitation technologies can contribute significantly to improving the quality of life of oral cancer survivors and advancing public health dentistry practices.

Data Availability Statement

The data generated and analysed during the present study are based on responses obtained from a self-administered questionnaire. All data are included within the article. Additional anonymized datasets supporting the findings of this study are available from the corresponding author upon reasonable request.

References

1. Kim JW, Cho YK, Kim N, Jung HS, Kim JH. Development of a bioartificial tongue using primary taste cells and tongue extracellular matrix. Biomaterials. 2018;154:1–10.
2. Spielman AI. Structure and function of the human tongue and taste buds. Oral Diseases. 2019;25(6):1385–1393.
3. Logemann JA. Effects of glossectomy on speech and swallowing. Head C Neck Surgery. 2015;37(4):563–569.

4. Kumar N, Singh S, Gupta R. Oral cancer rehabilitation: Role of advanced prosthetic and regenerative approaches. Journal of Oral and Maxillofacial Surgery. 2020;78(9):1562–1570.
5. Zhang Y, Li Y, Wang Z. Artificial tongue systems for taste sensing and biomedical applications. Biosensors and Bioelectronics. 2018;112:1–10.
6. Petersen PE. Oral cancer prevention and control – The role of public health dentistry. Community Dentistry and Oral Epidemiology. 2018;46(2):113–120.
7. Patil S, Rao RS, Sanketh DS. Oral health–related quality of life in oral cancer patients. Journal of International Oral Health. 2016;8(2):222–227.

How to cite this Article: Lakkineni. J, T. Madhavi Padhma, K. V. N. R Prathap, Rao. V, Kumar. S, Chandini. D; *Awareness and Perception of Undergraduate Dental Students Regarding Bioartificial Tongue- A Questionnaire Based Study;* Int. J. Drug Res. Dental Sci., 2026; 8(1): 1-9, **doi:** https://doi.org/10.36437/ijdrd.2026.8.1.A
Source of Support: Nil, **Conflict of Interest:** Nil.
Received: 04-12-2025 **Revised:** 16-1-2026 **Accepted:** 20-1-2026