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A Questionnaire Study On Knowledge And Awareness About Botulinum Toxin (Botox) Among Undergraduate Dental Students

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Abstract

Background: Botulinum toxin (Botox) has gained significant application in both therapeutic and aesthetic dentistry. However, awareness and understanding among undergraduate dental students remain inconsistent.

Objective: This study aimed to assess the knowledge and awareness of Botulinum toxin among undergraduate dental students, focusing on its applications, safety, and educational relevance.

Methods: A descriptive cross-sectional study was conducted from September to November 2025 among 129 dental students at a private dental college in Chennai. Data were collected using a structured, prevalidated online questionnaire and analyzed using Microsoft Excel to determine percentage distributions.

Results: The majority of participants (97.7%) had heard of Botox, primarily through social media (20.9%). While awareness of cosmetic applications was high, knowledge regarding therapeutic uses and safety aspects was moderate. Most students (67.4%) supported curricular inclusion, and 77.5% expressed interest in further training.

Conclusion: The study highlights strong awareness but limited clinical understanding, emphasizing the need for structured Botox education and ethical training in dental curricula.

Keywords: Botulinum toxin, Dental students, Awareness, Aesthetic dentistry, Curriculum integration

Introduction

Botulinum toxin (Botox) is a neurotoxic protein produced by the bacterium *Clostridium botulinum*, which acts by blocking the release of acetylcholine at the neuromuscular junction, thereby inducing temporary muscle paralysis. Although initially recognized for its toxic potential, in controlled doses it has evolved into a widely used therapeutic and cosmetic agent in medicine and dentistry.[1] There are seven serotypes of botulinum toxin (A–G), among which Types A and B are commonly employed in clinical practice. Commercial preparations such as Botox®, Dysport®, and Xeomin® have been approved by the U.S. Food and Drug Administration (FDA) for various medical and aesthetic indication. In dentistry, Botox has emerged as a minimally invasive adjunct in the management of several orofacial and temporomandibular disorders.[2]

Therapeutically, Botox is used in the management of bruxism, myofascial pain syndrome, masseteric hypertrophy, temporomandibular joint (TMJ) dysfunction, sialorrhea, and postoperative muscle hyperactivity. By temporarily relaxing overactive muscles, it helps alleviate pain, improve mandibular function, and enhance overall patient comfort.[3] In aesthetic dentistry, Botox is employed to correct a gummy smile, asymmetric smiles, and facial wrinkles, thereby contributing to smile design and facial harmony.[4] Thus, Botox effectively bridges the gap between therapeutic dentistry and facial aesthetics, establishing itself as an integral component of contemporary multidisciplinary dental care.

Despite its growing clinical relevance, awareness and understanding among dental students regarding Botox's mechanism, dosage, indications, and safety profile remain inconsistent. Given the increasing integration of aesthetic dentistry into general dental practice, it becomes imperative that undergraduate students receive adequate exposure to the clinical, ethical, and regulatory aspects of Botox administration. Formal inclusion of Botox education and practical training within the dental curriculum can enhance competency, ensure patient safety, and expand the professional scope of dentists in both therapeutic and aesthetic domains.[5] Hence, this study aims to assess the knowledge and awareness of Botulinum toxin among undergraduate dental students, exploring their understanding of its applications, safety, and attitudes toward its inclusion in dental education and clinical practice.

Materials and Methods

This descriptive cross-sectional study aimed to assess the knowledge and awareness of Botulinum toxin (Botox) among undergraduate dental students. Conducted over a two-month period from September to November 2025, the research followed systematic stages of data collection, analysis, and documentation. The study was carried out in the Department of Oral and Maxillofacial Surgery at a Thai Moogambigai Dental College & Hospital in Chennai. Data were obtained through a structured and prevalidated questionnaire specifically developed to evaluate students' understanding and awareness of Botox. A total of 129 participants completed a self-administered online survey distributed via social media platforms. Informed consent was obtained from all respondents after explaining the study objectives and ensuring confidentiality. The questionnaire also included demographic details to facilitate contextual interpretation of findings. Collected responses were organized and analyzed using Microsoft Excel, allowing calculation of percentage distributions and systematic presentation of results for comprehensive analysis.

Inclusion Criteria

i. Undergraduate dental students enrolled in any academic year from first year to internship were eligible to participate in this study.
ii. Only those who provided informed consent and voluntarily agreed to complete the structured online questionnaire were included.
iii. Students who completed the questionnaire in full were considered part of the final sample for analysis.

Exclusion Criteria

i. Postgraduate students, dental practitioners, or individuals not currently enrolled in the undergraduate dental program were excluded from the study.
ii. Students who did not provide informed consent or submitted incomplete or partially filled questionnaires were also omitted from the final data set.

Results

A total of One twenty-nine respondents participated in the survey. The age distribution revealed that nearly half of the participants (47.3%) were between 23 and 25 years. In terms of gender, female respondents comprised 59.7%, while males accounted for 40.3%, reflecting a predominantly female representation. [Figure 1] With respect to academic standing, interns constituted the largest group (33.3%), followed by fourth-year students (28.7%), first-year students (15.5%), third-year students (14.0%), and second-year students (8.5%).

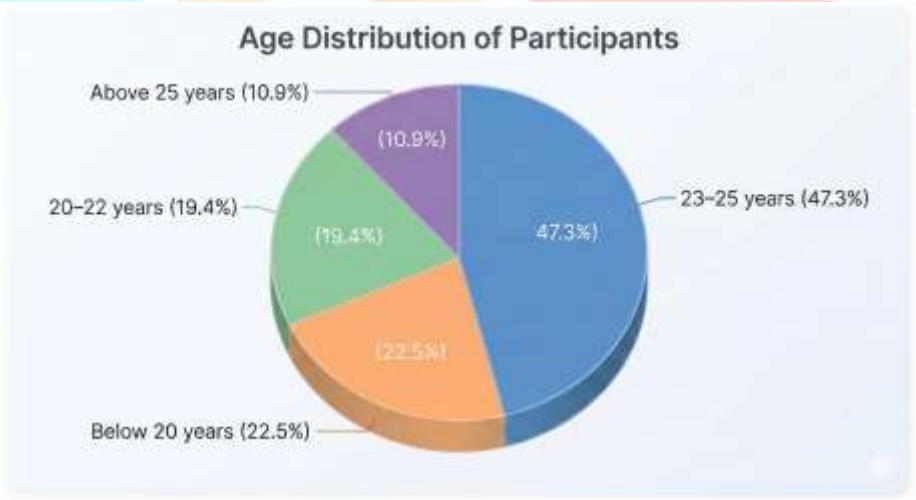

Figure 1: Age distribution of Participants

In terms of general awareness, 97.7% of the participants reported having heard about *Botulinum toxin (Botox)*, while only 2.3% had not. The most common source of knowledge was social media and the internet (20.9%), followed by friends or peers and workshops/conferences (15.5%), and academic curriculum combined with peers (14%). When asked about the source bacterium, 58.1% correctly identified *Clostridium botulinum*, while 31% admitted they did not know. Regarding knowledge of the commonly used serotypes, 48.1% recognized Type A and B as the clinical variants, 33.3% were unsure.

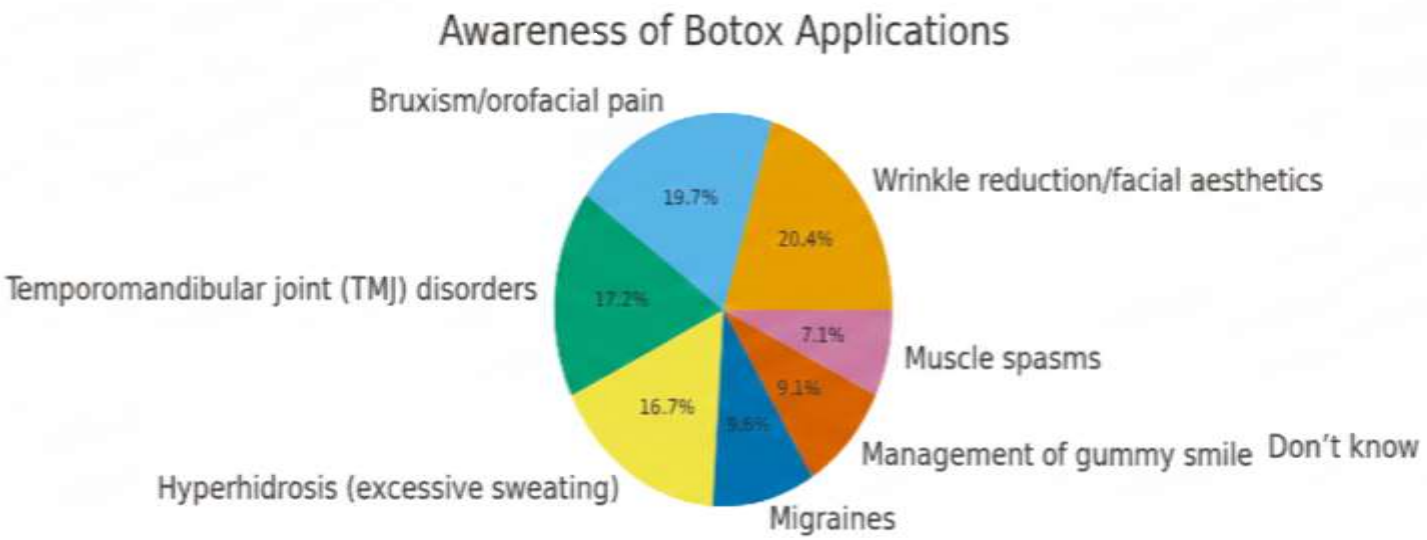

Figure 2: Awareness of Botox applications

Figure 2 suggests that while cosmetic use remains the most well-known, there is substantial, though slightly lower, awareness of therapeutic applications like Bruxism/orofacial pain and TMJ disorders. Awareness drops significantly for the applications related to muscle spasms, gummy smile, and migraines.

Duration of effect of a Botox injection	2–3 months	48.84%
	Incorrect	49.16%

Table 1 opinion based on duration of effect of a Botox injection

Table 1 highlights that nearly half of the respondents (48.84%) correctly identified the duration of Botox effect as 2–3 months, while a slightly higher proportion (49.16%) answered incorrectly. This near-equal distribution indicates a noticeable gap in knowledge regarding the typical effectiveness period of Botox.

How long after administration do the effects of Botox usually become noticeable	2–3 days	29.46%
	Don't know	70.14%

Table 2 : Opinion based on knowledge of applications

Table 2 shows a striking pattern emerged regarding students' understanding of the onset of Botox action, While 29.46% correctly identified that its effects typically become noticeable within 2–3 days, an overwhelming 70.14% admitted they "don't know." This substantial knowledge gap suggests that although students recognize Botox as a common aesthetic and therapeutic agent, many lack awareness of its basic pharmacological timeline.

Awareness that repeated Botox injections may leading to antibody development and reduced effectiveness	No	83.72%
	Yes	16.28%

Table 3 :Awareness towards antibody development and reduced effectiveness due to repeated Botox injections

Table 3 highlights that only **16.28%** of students were aware that repeated Botox injections can trigger antibody formation and reduce treatment effectiveness, revealing a critical gap in long-term therapeutic understanding.

Botox in dentistry can improve:	Both	41.09%
	Don't know	31.01%
	Orofacial aesthetics (e.g., smile design)	14.73%
	Functional disorders (e.g., TMD, bruxism)	13.18%

Table 4: Opinion on Botox in Dentistry

Table 4 suggests that for the informed population, the combined therapeutic and cosmetic use is the most recognized application of Botox in the dental field.

Awareness that Botox is one of the most poisonous biological substances	No	71.32 %
	Yes	28.68%
Awareness that Botox should be avoided	All of the above	67.44%
	Pregnancy	19.38%
	Patients with neuromuscular disorders	11.63%
	Lactation	1.55%
Most important factor for safe Botox administration	All of the above	77.52%
	Anatomical knowledge	10.85%
	Proper dosage knowledge	10.08 %
	Sterile technique	1.55 %

Table 5: based on the safety of Botox

Table 5 highlights that only 28.68% of students recognized Botox as one of the most poisonous biological substances, showing a major gap in understanding its inherent toxicity. While 67.44% correctly identified all major contraindications pregnancy, lactation, and neuromuscular disorders many still relied on partial

or incorrect knowledge. Encouragingly, 77.52% acknowledged that safe administration depends on a combination of anatomical understanding, proper dosage, and sterile technique. However, the remaining responses reflected fragmented perceptions of safety essentials. Overall, these findings highlight the need for comprehensive, structured education on Botox's risk profile and safe clinical practice.

Awareness that Botox effects are temporary and usually last for a few months only	Yes	20.16 %
	No	79.84 %
Awareness regarding misuse or injection by untrained personnel may lead to serious complications	Yes	23.26 %
	No	76.74 %

Table 6: opinion based on adverse effects of Botox

Table 6 shows that 20.16% of students were aware that Botox produces temporary effects lasting just a few months, while a large 79.84% misunderstood or were unaware of its short-term nature. Similarly, just 23.26% recognized that misuse or administration by untrained individuals can lead to serious complications, leaving 76.74% unaware of these critical risks. This double knowledge gap highlights a significant lack of understanding of both the pharmacological timeline and the safety implications of improper Botox use.

Botox being included in the undergraduate dental curriculum	Yes	60.47
	No	39.53
Interest in attending workshops/training programs on Botox use in dentistry	No	51.94
	Yes	48.06
Opinion on specialized certification be mandatory for dentists before administering Botox	Yes	51.16
	No	48.84
Intention to incorporate Botox administration into your private dental practice	Yes	64.34
	No	35.66

Table 7:Opinion on attitude and future practice over Botox

Table 7 reveals that little over half of the students (60.47%) advocated for including Botox training within the undergraduate dental curriculum, reflecting growing academic interest in aesthetic and therapeutic advancements. However, enthusiasm for hands-on training was divided, with 48.06% expressing interest in workshops while 51.94% were hesitant, indicating uncertainty about skill readiness. Views on mandatory certification were similarly split: 51.16% supported regulated credentialing, while 48.84% did not recognize its necessity. Notably, 64.34% indicated a willingness to incorporate Botox into future private practice, despite mixed confidence and inconsistent training exposure.

Discussion

The present study assessed the knowledge and awareness of Botulinum toxin (Botox) among undergraduate dental students, with an emphasis on its applications, safety, and educational relevance. A total of 129 respondents participated, demonstrating high general awareness (97.7%), but variable understanding of specific therapeutic and safety aspects.

In the current study, participants showed substantial awareness of Botox use for wrinkle reduction (20.4%), bruxism (19.7%), and TMJ disorders (17.2%), reflecting growing recognition of both cosmetic and functional applications. This finding aligns with Grover et al.[6] and Kumar et al,[7] who highlighted the efficacy of Botox in managing orofacial conditions such as bruxism, TMD, and sialorrhea, thereby improving patient comfort and quality of life. Similarly, Gower et al.[8] reported that dental practitioners displayed the highest awareness of Botox's therapeutic value in TMD treatment, while students demonstrated moderate but progressively improving understanding as they advanced in their training.[6,7,8]

However, when compared to Pagidimarry et al.[9], where fifth-year students demonstrated 100% awareness of non-cosmetic uses such as TMD and periodontal applications, our findings indicate moderate knowledge across academic years, with interns showing slightly better comprehension.[9] This suggests that clinical exposure and seniority positively influence knowledge depth regarding Botox's therapeutic potential.

Aesthetic awareness was strong among our participants, particularly regarding wrinkle correction and facial esthetics, consistent with Nobi et al, who emphasized Botox's expanding role in addressing conditions such as the gummy smile.[10] In our study, social media and the internet (20.9%) were the leading sources of information, similar to Mohammed Moizuddin Khan's[11] findings, where 67.8% cited social media as the main information source.

While 95.1% of participants in Zaaba et al.[12] reported general knowledge of Botox, our study recorded a slightly higher awareness (97.7%), reflecting similar exposure levels. However, understanding of its mechanism and full range of applications remains moderate in both studies, indicating that most students still associate Botox primarily with aesthetic treatments rather than therapeutic indications.

The results strongly suggest the need for formal curricular inclusion of Botox education in undergraduate dental programs. In our study, 67.4% of respondents agreed that Botox training should be included in the curriculum, echoing the recommendations of Marques et al[13] who emphasized structured curriculum development to prepare students for contemporary dental practice.

Further, 77.5% of our participants expressed interest in attending workshops or certification courses, comparable to the findings of Pagidimarry et al., who observed that awareness and confidence increased with academic advancement.[9] Similarly, V. Soumya et al.[14] reported that senior students exhibit greater academic engagement and appreciation for research-based learning when properly mentored suggesting that educational scaffolding and mentorship are critical for skill development in newer treatment modalities such as Botox.

Knowledge regarding toxicity, contraindications, and adverse effects was moderate among our participants. Only 16.3% demonstrated awareness of potential complications, and 77.5% were unsure. This is lower than in Khan's study[11], where 75.9% were aware of potential side effects such as pain, swelling, and drooping. Similarly, Zaaba et al. found that 96.1% of respondents were aware of Botox's toxicity when administered in high doses, indicating greater awareness in that cohort compared to ours.[11,12]

In contrast, Uthayasankar et al. reported that 54.8% of college students recognized Botox-related side effects, while 45.2% were unaware, consistent with our observation of mixed awareness. This highlights the importance of reinforcing safety knowledge, particularly regarding dosage, contraindications (pregnancy, neuromuscular disorders), and potential misuse by untrained practitioners.[15]

Ethical competence remains an essential dimension in Botox administration. In our study, 66.7% of respondents agreed that specialized certification should be mandatory, paralleling Alenezi BT et al and Hoque et al who stressed adherence to ethical and regulatory standards to ensure patient safety, informed consent, and proper training.[16,17] Understanding the ethical and safety implications of Botox use is as critical as mastering its technical application. Our findings similarly highlight that while student attitudes toward learning and practice integration are positive, formal ethical training and competency certification are still limited, warranting urgent curricular attention.

Conclusion

The present study revealed high general awareness of Botulinum toxin among undergraduate dental students but moderate understanding of its therapeutic scope, safety, and contraindications. While most participants recognized its aesthetic benefits, fewer were confident about its clinical and ethical aspects. Enhanced focus on safety, efficacy, and ethical practice will better prepare future practitioners for responsible use. Overall, integrating evidence-based Botox training can bridge existing knowledge gaps and promote competent, patient-centered care.

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