Journal of Pharmaceutical Research International

32(15): 34-42, 2020; Article no.JPRI.59653
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Awareness of Botox Injections in Facial Aesthetics among Dental Students

Nurul Afiqah Amani Binti Zaaba[1], Dhanraj Ganapathy[2*] and Revathi Duraisamy[2]

[1]Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.
[2]Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2020/v32i1530623
Editor(s):
(1) Dr. Ozlem Sultan Aslanturk, Adnan Menderes University, Turkey.
(2) Dr. Giuseppe Murdaca, University of Genoa, Italy.
(3) Dr. Rafik Karaman, Al-Quds University, Palestine.
Reviewers:
(1) Sanjay Rastogi, Gauhati University, India.
(2) Fereshteh Hassani, Payame Noor University, Iran.
Complete Peer review History: http://www.sdiarticle4.com/review-history/59653

Original Research Article

Received 29 May 2020
Accepted 05 August 2020
Published 24 August 2020

ABSTRACT

The aim of this study was to evaluate the awareness and knowledge on the use of Botox injections in facial aesthetics among undergraduate dental students. Botulinum toxin is considered as a quick and effective non-surgical solution for enhancing physical appearance. Botox is considered as the best choice, as it is affordable and less radical than surgery. It is derived from gram-positive spore forming, clostridium botulinum. A questionnaire was developed to evaluate the awareness of dentists towards using botulinum toxins in facial aesthetics. The survey was conducted online via survey planet. There were about 103 study population, participated in this study. Data is collected using an online survey planet link and statistically analysed. 95.1% of participants reported that they have general knowledge on the Botox (95.1%). 66 % of respondents agreed that clostridium botulinum bacterium is the source of Botox. 24.51% of respondents stated that Botox was commonly used for wrinkle reduction and 96.1% were aware of the toxicity effect of Botox when it is administered in a high dosage. Association between response of the participants and knowledge on Botox was found to be statistically significant ($p<0.05$). According to our study, the majority of students showed an acceptable level of knowledge and awareness on Botox and its use in facial aesthetics.

**Corresponding author: E-mail: dhanraj@saveetha.com;*

Keywords: Botox; botox injections; facial aesthetics; dental students.

1. INTRODUCTION

Facial aesthetics is considered as a very important feature for both men and women. Therefore, many people went to seek a surgical or non-surgical solution for enhancing their physical appearance in order to improve their facial aesthetics. Nowadays, more people choose to have non surgical treatment over the surgical treatment as it provides better results with no invasive procedures involved. Thus, in cosmetic dentistry botulinum toxin is chosen as one of the quick and effective non-surgical solutions [1], as they are more affordable and less radical in comparison to surgical methods [1].

Botulinum toxin (BTX) is also known as Botox. It is a drug made from a neurotoxin produced by bacterium *Clostridium botulinum* [2–4] . It is a gram positive spore forming bacterium that has seven different strains, where only BTX type A (Botox, dysport and xeomin) and BTX type B (MyoBloc) are used clinically for various cosmetics and medical treatments [1,5]. It was initially introduced by Alan Scott for treating crossed eyes and blepharospasm [1]. It is called a miracle poison, which is one of the most noxious natural substances to humans [6]. It was approved by the United States Food and Drug Administration in 2002 [7,8]. Botox injection is commonly used in the upper one-third of the face, which provides good and predictable results with fewer adverse effects [8]. Thus, more people choose to get Botox injections on their face to improve facial aesthetics.

There are various procedures that used Botox in cosmetic treatment, such as facial wrinkles, blepharospasm, strabismus, cervical dystonia, migraines, hyperhidrosis, and muscle spasticity [8]. It also can be used in many medical procedures, as it influences their perception of beauty and attractiveness. Unfortunately, despite providing good results for the patients, it also can cause be perceived as a lethal threat and botulism food poisoning when it is taken in large quantities [3]. Although the complications are uncommon, they can be mild and transient [9], which can be categorised into injection reactions and undesired botulinum toxin effects [8]. Therefore, the dosage should be regulated and controlled to prevent any Botox poisonings.

Majority of the studies were seen to be reported on the use of Botox in dentistry. In a study reported by E. M. Al Hamdan et al., Botox were commonly used to treat facial wrinkles [1]. Study reported by Imam et al. showed that there was high awareness of people on Botox therapy and its effectiveness in cosmetology [6]. Therefore, this study is important to understand and increase the awareness of dentists on the use and the complications of Botox in facial aesthetics. Previously our department has published extensive research on various aspects of prosthetic dentistry [10–20], this vast research experience has inspired us to research about the awareness and knowledge of dentists toward the use of Botox injections in facial aesthetics.

2. MATERIALS AND METHODS

A cross sectional study was done among undergraduate (includes third years, final years and interns) and postgraduate students of Saveetha Dental College and Hospitals, Chennai, India. A questionnaire was developed to evaluate the awareness of dentists towards the use of botulinum toxins in facial aesthetics. The questionnaire consists of two parts. The first part is based upon the demographic data, such as age, gender and level of education. The second part is about the source, usage and adverse effects of Botox if presented, which consists of 15 multiple choice questions. The survey was conducted online via survey planet, from December 2019 till January 2020 and the responses of the students were recorded.

There were about 103 participants, participated in this study. The inclusion criteria were undergraduate and postgraduate students aged above 18 years old and training in dental clinics for at least one year. Any students age below 18 years old with no experience in clinical practice were excluded from the study. Data was then collected via a survey planet. Then, the collected data was recorded in MS excel sheet and tabulated. IBM SPSS version 23 was used for importing data. The descriptive and inferential statistics was done for analysis. The Statistical test of Pearson's Chi square test was done. Then, variables definition processes were done by using graphical illustrations.

3. RESULTS AND DISCUSSION

In this present study, a total of 103 students participated in the study. Among 103 students, 15 were third years (14.6%), 15 were final years (14.6%), 64 were interns (62.1%) and 9 were

postgraduates (8.7%). [Fig. 1]. The study participants in the present study were between 17 to 35 years with the mean age of 22.2 years. Greater number of participants of the study reported that they heard and have general knowledge on the Botox (95.1%). Whereas only a few participants did not know about Botox (4.9%). [Fig. 2] Next, assessment on the knowledge of participants on the source of Botox gave the following results. Majority of the respondents answered correctly that *clostridium botulinum* bacterium is the source of Botox (66%). 33 respondents stated that botulinum toxin is the source of Botox (32%). While the remaining 2 respondents stated that *clostridium thermocellum* is the source of Botox (1.9%). [Fig. 3].

In our study, the majority of respondents heard and have knowledge on Botox and stated that *clostridium botulinum* is the source of Botox. The findings of this present study were in line with studies reported by Al Hamdan EM et al. and Imam S et al. [1,21]. Botox injection is a common and widely used for facial aesthetics procedure. Therefore, most of the people knew about it. Basically, Botox is derived from bacterium *Clostridium botulinum* which consists of eight antigenically distinguishable exotoxins, where Types A, B and E are commonly associated with systemic botulism in humans [22]. It is caused by botulinum toxin or neurotoxin produced by *Clostridium botulinum*,[23] where most people have misconception of it as the source of Botox.

In addition to this, while enquiring on the knowledge of the participants on the uses of Botox, 24.51% respondents stated that Botox was commonly used for wrinkle reduction, 21.36% stated that it used in management of temporomandibular joint (TMJ) disorders, 16.26% stated that it used for management of gummy smile and 5.58% stated that it can be used for management of drooling. The association between response of the participants and knowledge of respondents on the use of Botox was found to be statistically significant (Pearson Chi square value- 155.565; p =0.000). [Fig. 4].

On the other hand, when inquiring about the knowledge of the respondents on the use of Botox on facial aesthetics. Greatest number of the respondents believed that Botox can be used for management of facial imperfections (24.76%), 20.63% believed that it can be used for management of facial tics, and 19.9% believed that it can be used for management of facial paralysis. Only 4.13% of respondents stated that Botox can be used for management of stroke. The association between response of the participants and knowledge of respondents on the use of Botox for facial aesthetics was found to be statistically significant (Pearson Chi square value- 191.754; p =0.000) [Fig. 5].

Our study showed significantly high acceptance of wrinkles reduction on the use of Botox. The results obtained were supported by Al Hamdan EM et al. [1], where Botox was commonly used for wrinkle reduction. In general Botox was used as an alternative to cosmetic surgery [24] to enhance facial aesthetics. It can be used for many purposes including facial wrinkles, dentofacial aesthetics, gummy smile and drooping of eyelids [23]. On top of that, Botox also can be used for therapeutic purposes, which may affect physical appearance such as temporomandibular joint disorders, hemifacial spasm and blepharospasm [25], where it demonstrated a beneficial effect over the placebo and safe to be used [26]. In addition to this, it basically acts by inhibiting the release of acetylcholine causing temporary chemical denervation and results in localised muscle relaxation [8,27].

Assessment on the knowledge of participants on the exact dosage of Botox to be administered during treatments showed that only 6.8% of the participants knew the dosage of Botox to be administered during treatments [Fig. 6]. Next, based on their awareness on high dosage of Botox can cause toxicity, the results showed that the majority of the participants were aware of the toxicity effect of Botox when it is administered in a high dosage (96.1%). Only 3.9% of participants were not aware of the toxicity effect of Botox. [Fig. 7].

Analysation of the awareness of respondents on the adverse effects of Botox gave the following results, 18.62% of the respondents stated that drooping eyelids were commonly seen as the adverse effects of Botox, followed by muscle weakness (17.88%), soreness and bleedings of injection sites (17.5%), allergy reactions (17.13%), continuous facial pain (15.27%) and infections on the affected area (13.59%). The association between response of the participants and knowledge on adverse effects of Botox was found to be statistically significant (Pearson Chi square value- 43.263 p =0.000) [Fig. 8].

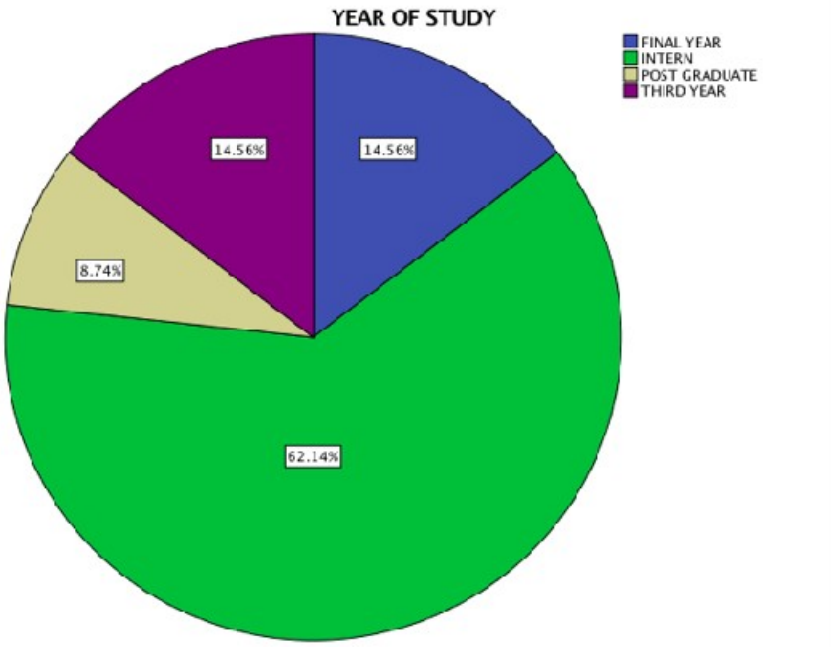

Fig .1. Pie chart depicting the frequency distribution of study participants of undergraduates and postgraduates students based on their year of study. 62.14% of the respondents were interns (green), 14.56% of the respondents were final year students (blue), 14.56% of the respondents were third year undergraduate students (purple) and 8.74% of the respondents were postgraduate students (yellow)

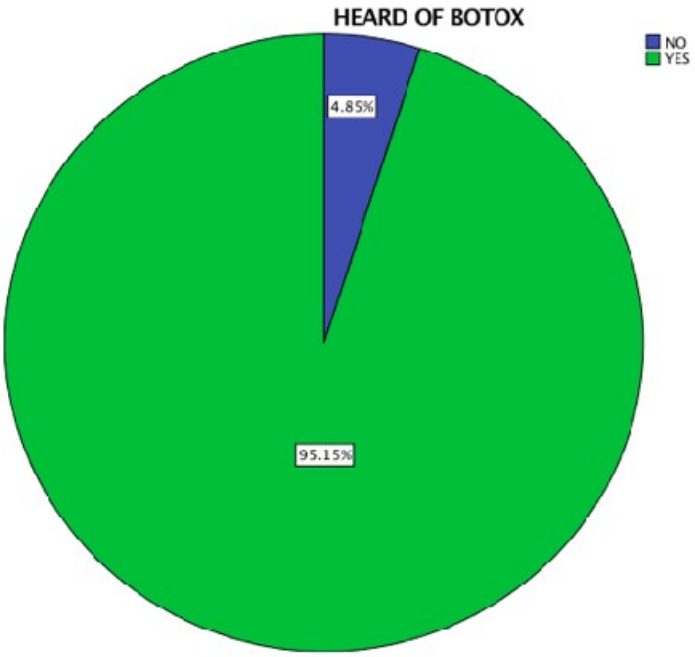

Fig. 2. Pie chart depicting the knowledge of participants on Botox. 95.15% of respondents heard and have knowledge about Botox (green) and 4.85% of respondents never heard of Botox (blue)

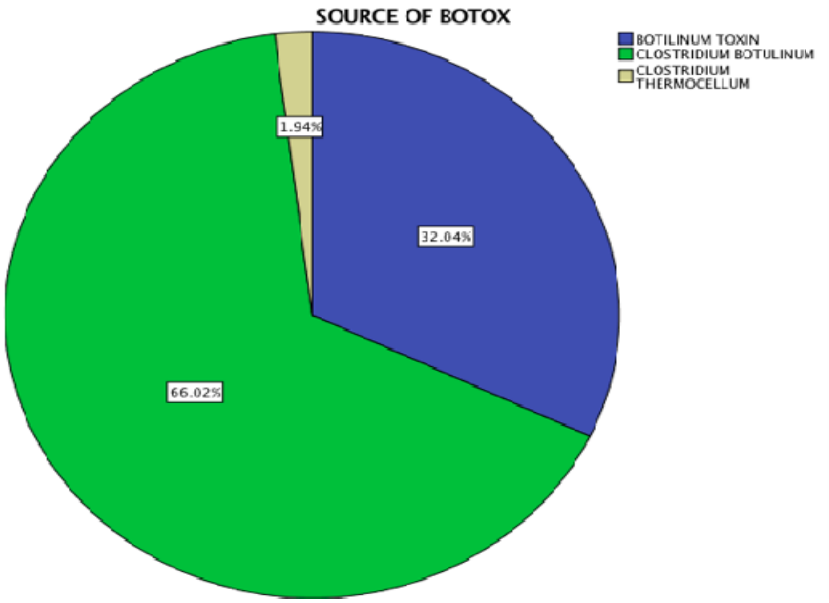

Fig. 3. Pie chart showing the knowledge of participants on the source of botox. 66.02% of the respondents chose *clostridium botulinum* as the source of botox (green). 32.04% of the respondents chose botulinum toxin (blue) and 1.94% of the respondents chose *clostridium thermocellum* as the source of Botox (yellow)

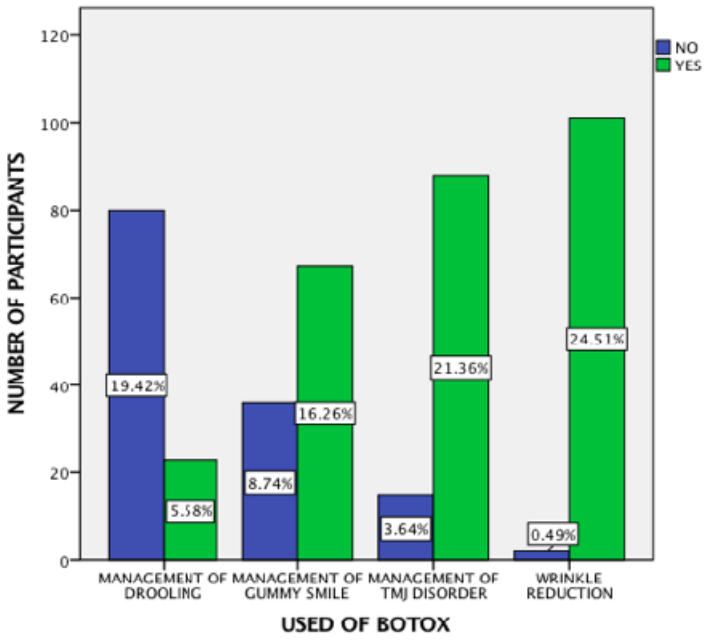

Fig. 4. Bar chart depicting knowledge of respondents on the use of botox. X axis represents the uses of botox and the Y axis represents the number of participants with their responses on the uses of botox. 24.51% of the respondents stated that Botox can be used for wrinkle reduction (green) and only 5.58% respondents stated that Botox can be used for management of droolings (green). Association between response of the participants and knowledge of respondents on the use of Botox was found to be statistically significant (Pearson Chi square value- 155.565; p =0.000) (p<0.05). Hence it is statistically significant

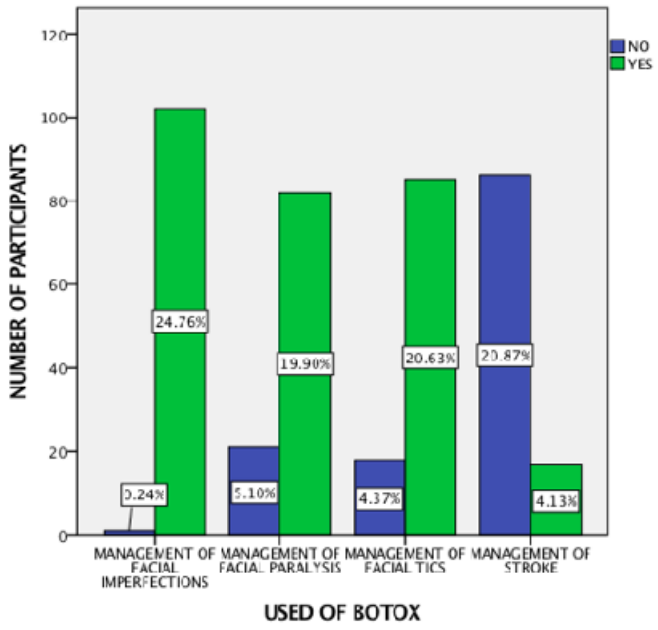

Fig. 5. Bar chart depicting knowledge of respondents on the use of botox on facial aesthetics. X axis represents the uses of botox and the Y axis represents the number of participants. 24.76% of the respondents stated that botox can be used for management of facial imperfections (green). Only 4.13% of respondents stated that botox can be used for management of stroke (green). Association between response of the participants and knowledge of respondents on the use of Botox for facial aesthetics was found to be statistically significant (Pearson Chi square value- 191.754; p =0.000) (p<0.05). Hence it is statistically significant

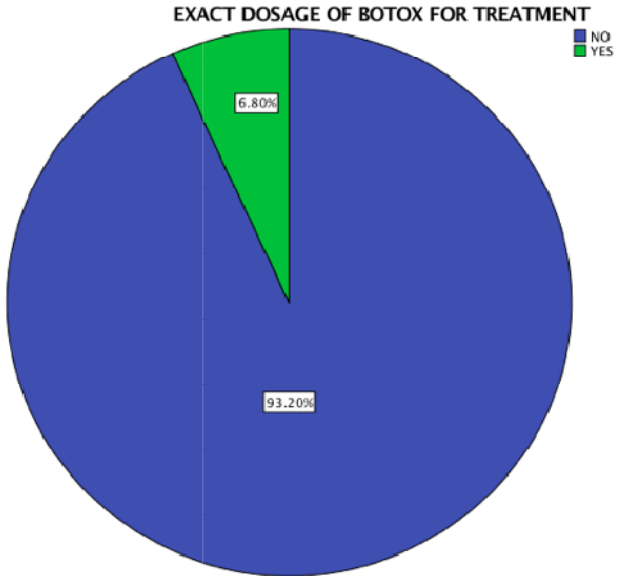

Fig. 6. Pie chart showing knowledge of respondents on the exact dosage of botox for treatments. Only 6.8% of the respondents knew the exact dosage of Botox for treatments (green) and 93.2% of the respondents does not have knowledge on the exact dosage of botox (blue)

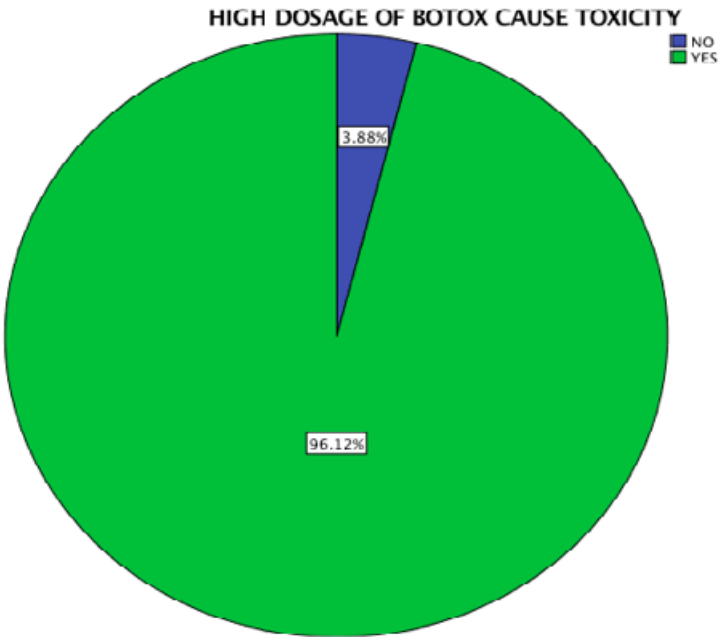

Fig .7. Pie chart showing knowledge of respondents on the high dosage of botox causing toxicity. 96.12% of respondents knew that high dosage of botox caused toxicity (green)

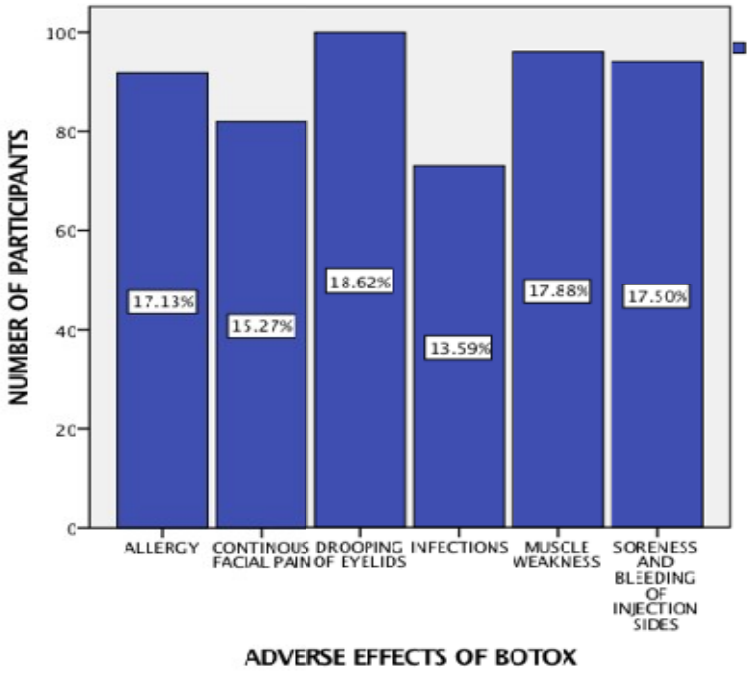

Fig. 8. Bar chart depicting the knowledge of respondents on the adverse effects of Botox. X axis represents the adverse effects of Botox and Y axis represents the number of participants with their responses.18.62% of the respondents stated that drooping eyelids were commonly seen as the adverse effects of Botox. Association between response of the participants and knowledge on adverse effects of Botox was found to be statistically significant (Pearson Chi square value- 43.263 p =0.000) (p<0.05). Hence it is statistically significant

In this study, findings obtained showed that the majority of the respondents agree that Botox should be administered in exact dosage and may have side effects on the affected area. Similar findings were also reported by Al Hamdan EM et al. and Imam S et al. [1,21]. Depending upon the area of injection, average doses of different Botox products would be different for each esthetic procedure [28]. The average lethal dose of Botox is considered to be 2500–3000 units which are approximately 100th of the lethal dose [29]. Increased in the dosage of the Botox above the average dose may result in toxicity.

Next, injections of Botox may cause few side effects. In this study drooping of eyelids was believed to commonly occur, which was contradictory with findings by Al Hamdan EM et al. In his study, allergy reaction was commonly believed to be a side effect of Botox [1]. These side effects usually occur less frequently in comparison to injection reactions. It is primarily due to temporary denervation of adjacent muscles outside of the treatment area [8]. The most common adverse effects are temporary weakness or paralysis of closed musculature. It usually resolves in several months or few weeks, depending on the site, strength of the injections, and the muscles on the involved area [22].

There were some limitations that were encountered in our study, which includes limited sample size and short duration of study time. Therefore, in future a bigger sample size should be used in order to obtain a better outcome. The high patient demand towards aesthetic dental treatment should encourage dentists to seek more knowledge of Botox and introduce them in dentistry.

4. CONCLUSION

Within the limits of study, association between response of the participants and knowledge on Botox was found to be statistically significant. According to our study, the majority of students showed an acceptable level of knowledge and awareness on Botox and its uses in facial aesthetics.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

This study is approved by the Institutional Review Board, Saveetha Dental College, Chennai, India.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Al Hamdan EM, Algheryafi AM, Al-Ghareeb FJ, Ashri NY. Knowledge and attitude of dentists towards the use of botulinum toxin and dermal fillers in dentistry, Riyadh, Saudi Arabia. J Cosmet Laser Ther. 2013;15:46–54.
2. Satriyasa BK. Botulinum toxin (Botox) A for reducing the appearance of facial wrinkles: a literature review of clinical use and pharmacological aspect. Clin Cosmet Investig Dermatol. 2019;12:223–8.
3. Gupta S, Gan J, Jain S. Efficacy of botulinum toxin in the treatment of convergence spasm. Strabismus. 2018; 26:122–5. Available:https://doi.org/10.1080/09273972.2018.1483952.
4. Sinha A, Hurakadli M, Yadav P. Botox and derma fillers: The twin face of cosmetic dentistry. Int J Contemp Dent Med Rev 2015;2015:131214.
5. Meunier FA, Schiavo G, Molgó J. Botulinum neurotoxins: From paralysis to recovery of functional neuromuscular transmission. J Physiol Paris. 2002;96: 105–13.
6. Shahlla I, Wajiha I, Sadia S, Ambreen Q, Najaf U, Nuzhat S, et al. Acquaintance of Botox: A cross-sectional survey among female students in Karachi, Pakistan. African Journal of Pharmacy and Pharmacology 2019;13:292–6. Available:https://doi.org/10.5897/ajpp2019.5060
7. Stupak HD, Maas CS. New procedures in facial plastic surgery using botulinum toxin A. Facial Plast Surg Clin North Am. 2003; 11:515–20.
8. Small R. Botulinum toxin injection for facial wrinkles. Am Fam Physician 2014;90:168–75.
9. Cox SE, Adigun CG. Complications of injectable fillers and neurotoxins. Dermatol Ther. 2011;24:524–36.

10. Anbu RT, Suresh V, Gounder R, Kannan A. Comparison of the efficacy of three different bone regeneration materials: An animal study. Eur J Dent. 2019;13:22–8.
11. Ashok V, Ganapathy D. A geometrical method to classify face forms. J Oral Biol Craniofac Res. 2019;9:232–5.
12. Ganapathy DM, Kannan A, Venugopalan S. Effect of coated surfaces influencing screw loosening in implants: A Systematic Review and Meta-analysis. World Journal of Dentistry. 2017;8:496–502.
13. Jain AR. Clinical and functional outcomes of implant prostheses in fibula free flaps. World Journal of Dentistry. 2017;8:171–6.
14. Ariga P, Nallaswamy D, Jain AR, Ganapathy DM. Determination of correlation of width of maxillary anterior teeth using extraoral and intraoral factors in indian population: A systematic review. World Journal of Dentistry. 2018;9:68–75.
15. Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test: An *in vitro* Study. World Journal of Dentistry. 2017;8: 477–82.
16. Ranganathan H, Ganapathy DM, Jain AR. Cervical and incisal marginal discrepancy in ceramic laminate veneering materials: A SEM Analysis. Contemp Clin Dent. 2017;8: 272–8.
17. Jain AR. Prevalence of partial edentulousness and treatment needs in rural population of South India. World Journal of Dentistry. 2017;8:213–7.
18. Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Navarasampatti Sivaprakasam A. Compatibility of nonoriginal abutments with implants: evaluation of microgap at the implant-abutment interface, with original and nonoriginal abutments. Implant Dent. 2019; 28:289–95.
19. Gupta P, Ariga P, Deogade SC. Effect of monopoly-coating agent on the surface roughness of a tissue conditioner subjected to cleansing and disinfection: A contact profilometric study. Contemp Clin Dent. 2018;9:S122–6.
20. Varghese SS, Ramesh A, Veeraiyan DN. Blended module-based teaching in biostatistics and research methodology: a retrospective study with postgraduate dental students. J Dent Educ. 2019;83: 445–50.
21. Imam S, Iffat W, Shakeel S, Qamar A, Usman N, Sultana N, et al. Acquaintance of Botox: A cross-sectional survey among female students in Karachi, Pakistan. African Journal of Pharmacy and Pharmacology. 2019;13:292–6.
22. Nigam PK, Nigam A. Botulinum toxin. Indian J Dermatol. 2010;55:8.
23. Srivastava S, Kharbanda S, Pal US, Shah V. Applications of botulinum toxin in dentistry: A comprehensive review. Natl J Maxillofac Surg. 2015;6:152–9.
24. Lang A. History and Uses of BOTOX® (Botulinum Toxin Type A). Prof Case Manag. 2004;9:109.
25. Persaud R, Garas G, Silva S, Stamatoglou C, Chatrath P, Patel K. An evidence-based review of botulinum toxin (Botox) applications in non-cosmetic head and neck conditions. JRSM Short Rep. 2013; 4:10.
26. Yoshimura DM, Aminoff MJ, Tami TA, Scott AB. Treatment of hemifacial spasm with botulinum toxin. Muscle Nerve. 1992; 15:1045–9.
27. Dressler D, Benecke R. Pharmacology of therapeutic botulinum toxin preparations. Disabil Rehabil. 2007;29:1761–8.
28. Kattimani V, Tiwari RVC, Gufran K, Wasan B, Shilpa PH, Khader AA. Botulinum toxin application in facial esthetics and recent treatment indications (2013-2018). J Int Soc Prev Community Dent. 2019;9:99–105.
29. Jaspers GWC, Pijpe J, Jansma J. The use of botulinum toxin type A in cosmetic facial procedures. Int J Oral Maxillofac Surg. 2011;40:127–33.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/59653