

Experiences of Students and Interns with Success Rate of Inferior Alveolar Nerve Block during Surgical and Endodontic Procedures

¹Arwa S Salem, ²Batoul M Alamer, ³Fatimah A Sheikh, ⁴Shorooq I Althogbi, ⁵Rafi A Togoo

ABSTRACT

Aim: This study aims to assess the opinion of dental students and interns about the success rates of inferior alveolar nerve block (IANB).

Materials and methods: A cross-sectional questionnaire-based study was conducted among dental students and interns in the College of Dentistry, King Khalid University, Abha, Kingdom of Saudi Arabia. Before the conduct of the study, ethical approval was taken from the Scientific Research Committee, King Khalid University, Abha. A questionnaire containing two sections was formulated; the 1st section included questions of age, gender, and academic year, while the 2nd section included 10 questions related to IANB.

Results: About 70% of the interns and 50.6% of dental students said that they always administered IANB while doing surgical and endodontic procedures in mandibular posterior teeth. When the respondents were asked about their awareness about alternative techniques (such as Gow–Gates technique and Vazirani–Akinosi) to classical IANB, the majority of interns (81.4%) and dental students (82%) were aware about these techniques although only theoretically, while 14.3% of interns and 11.2% of the dental students had practically used these alternative techniques.

Conclusion: It was concluded that IANB was the most frequently used technique during various surgical and endodontic procedures. About 52.9% of the interns and 42.7% of dental students had rarely faced IANB failure in clinics. Both the students as well as interns were aware of other alternative techniques, such as Gow–Gates and Akinosi techniques of mandibular block anesthesia although they did not practice these techniques much in their day-to-day practice.

Clinical significance: Effective IANB by interns and students for pain-free dentistry.

Keywords: Dental students, Failure, Inferior alveolar nerve block, Survey, Technique.

How to cite this article: Salem AS, Alamer BM, Sheikh FA, Althogbi SI, Togoo RA. Experiences of Students and Interns with

Success Rate of Inferior Alveolar Nerve Block during Surgical and Endodontic Procedures. *World J Dent* 2017;8(6):434-439.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Inferior alveolar nerve block is the most commonly used nerve block in the surgical and endodontic procedures of mandibular teeth.¹ Sometimes, there may occur failures in IANB due to various reasons, such as anatomical variations, bifid inferior alveolar nerve,² and increased bone density in elderly patients.³ The mylohyoid nerve may have a sensory component and, hence, may give accessory innervations.⁴ Other causes of the IANB failure include contralateral innervations of the anterior teeth,⁵ pulpitis/apical periodontitis, and patients' anxiety and fear.⁶

Other than surgical and endodontic procedures, IANB is quite important for procedures, such as periodontal surgery, dental implantology, and apicoectomy.⁷ Even the experienced clinician might face failure of IANB at times, with the failure rate ranging from 15 to 20%.⁸

It not only involves the patients' comfort and feel-good notions, but also the dentists' name and fame, as a successful and patient-friendly deliverer, that make anesthesia delivery so important. The patients rate the dentists based on previous experience of painless procedures.⁹

The problems and their impacts faced by students during their learning/training period may haunt them throughout their life. If not adequately solved in time, their performance gets impaired, which, in turn, affects their career opportunities and openings in an undesirable manner, in addition to hampering their day-to-day service accomplishments.

Thus, teaching the right technique of IANB and also the alternative techniques of classical IANB during their formative period of learning is most imperative in order that they achieve the cherished goal of not only successful deliverance, but also a bright prospectus in the professional career ahead.

Students' feedback is the pivotal/decisive factor in curriculum planning and never deserves to be ignored or demeaned. Such feedback is required from the end users, such as dentists, interns, and dental students as well as

¹⁻⁵Department of Pediatric Dentistry and Orthodontic Sciences King Khalid University College of Dentistry, Abha, Kingdom of Saudi Arabia

Corresponding Author: Arwa S Salem, Department of Pediatric Dentistry and Orthodontic Sciences, King Khalid University College of Dentistry, Abha, Kingdom of Saudi Arabia, Phone: +00966546690763, e-mail: dent.arwa@hotmail.com

the course providers to continually modify various training programs, with the essential aim of improvement to be obtained fully compatible with the demands and the requirements of the system and the society, with their respective perspectives not lost sight of.

Hence, a study was conducted to assess the opinion of interns and dental students about the success of IANB and its other related aspects.

MATERIALS AND METHODS

A cross-sectional questionnaire-based study was conducted among dental students and interns in the College of Dentistry, King Khalid University, Abha, Kingdom of Saudi Arabia. Before the conduct of study, ethical approval was taken from the Scientific Research Committee, King Khalid University, Abha. All dental students who were willing to participate in the study and were pursuing 4th, 5th, 6th

year, and internship of Bachelors in Dentistry Program were included in the study. A convenient sample of 159 was included in the study. A questionnaire (Appendix 1) containing two sections was formulated; the 1st section included questions on age, gender, and academic year, while the 2nd section included 10 questions related to IANB. The questions enquired about the frequency of administering IANB to the patients while performing endodontic/surgical procedures; their familiarity with alternative techniques to IANB; and about the frequency of failure of IANB faced in clinics. Furthermore, it enquired about the opinions on the common reasons for the failure of IANB as well as the commonly seen complications for the same. The internal validity of the questionnaire was assessed using Cronbach's alpha, which was found to be 0.8 (acceptable). The close-ended questionnaire was hand-delivered to the study participants, and the duly filled questionnaires were

APPENDIX 1: QUESTIONNAIRE

Age *Gender *Academic level*

4th year
5th year
6th year
Interns

Q1. How often do you administer IANB (inferior alveolar nerve block) for surgical or endodontic procedures in mandibular posterior teeth?*

Always
Very often
Often
Sometimes
Rarely
Never

Q2. In addition to classical IANB, are you aware of other alternative technique (Gow–Gates alternative technique and Vazirani–Akinosi alternative technique or other supplementary techniques)?*

Yes, and I use these techniques
Yes, but only theoretically
No, I have no information

Q3. How often have you experienced IANB failure in the clinic?*

Very often
Often
Sometimes
Rarely
Never

Q4. You experience IANB failure more often during*

Surgical procedures
Endodontic procedures
Procedure makes no difference

Q5. What do you usually do when you have an inferior alveolar nerve block failure?*

Call your supervisor
Try again with the same technique
Try again with another technique
Give the patient another appointment

Q6. What in your opinion is the most common cause of IANB failure?*

Wrong technique
Anatomical variation
Problem with solution
Patient anxiety and false response
Other

Q7. What is the most common complication you have observed after IANB?*

Hematoma
Trismus
Facial paralysis
Other
Never had any

Q8. Do you take into account the medical and previous dental history of the patient every time you administer an IANB?*

Always
Very often
Often
Sometimes
Rarely
Never

Q9. Do you think age affects the patient's response to pain after administration of IANB?*

Yes definitely
Yes probably
No definitely
No probably
Not observed

Q10. Do you think gender affects the patient's response to pain after administration of IANB?*

Yes definitely
Yes probably
No definitely
No probably
Not observed

collected the same day from the students as well as interns. To avoid the nonresponse bias, confidentiality of the responses was assured to the respondents. The data thus obtained were put to statistical analysis using Statistical Package of the Social Sciences version 19. Descriptive analysis was used for the frequency distribution of responses to various questions, and Chi-squared test was used for comparisons. Statistical significance was set at $p \leq 0.05$.

RESULTS

In the present study, the age of subjects ranged from 20 to 25 years; among the total subjects, 75.47% were females, while the rest (24.5%) were males; 55.97% were students and 44.02% were interns.

In the present study, the majority of interns (70%) and dental students (50.6%) said that they always administered IANB while doing surgical and endodontic procedures in mandibular posterior teeth. When the respondents were asked about their awareness about alternative techniques (such as Gow–Gates alternative technique and Vazirani–Akinosi) to classical IANB, the majority of interns (81.4%) and dental students (82%) were found to be aware about these techniques, but only theoretically. About 14.3% of interns and 11.2% of the dental students had practically used these alternative techniques (Table 1).

About 52.9% of the interns and 42.7% of dental students had rarely faced IANB failure in clinics (Table 2).

Table 1: Frequency distribution of responses to Q2 by interns and students

Q2	Group		Total Count (%)
	Interns Count (%)	Students Count (%)	
No I have no information	3 (4.3)	6 (6.7)	9 (5.7)
Yes and I use these techniques	10 (14.3)	10 (11.2)	20 (12.6)
Yes but only theoretically	57 (81.4)	73 (82.0)	130 (81.8)
Total	70 (100.0)	89 (100.0)	159 (100.0)

Chi-square = 0.71, $p = 0.70$, not significant

Table 2: Frequency distribution of responses to Q3 by interns and students

Q3	Group		Total Count (%)
	Interns Count (%)	Students Count (%)	
Never	2 (2.9)	17 (19.1)	19 (11.9)
Often	5 (7.1)	7 (7.9)	12 (7.5)
Rarely	37 (52.9)	38 (42.7)	75 (47.2)
Sometimes	24 (34.3)	26 (29.2)	50 (31.4)
Very often	2 (2.9)	1 (1.1)	3 (1.9)
Total	70 (100.0)	89 (100.0)	159 (100.0)

Chi-square = 10.48, $p < 0.05$, significant

Table 3: Frequency distribution of responses to Q4 by interns and students

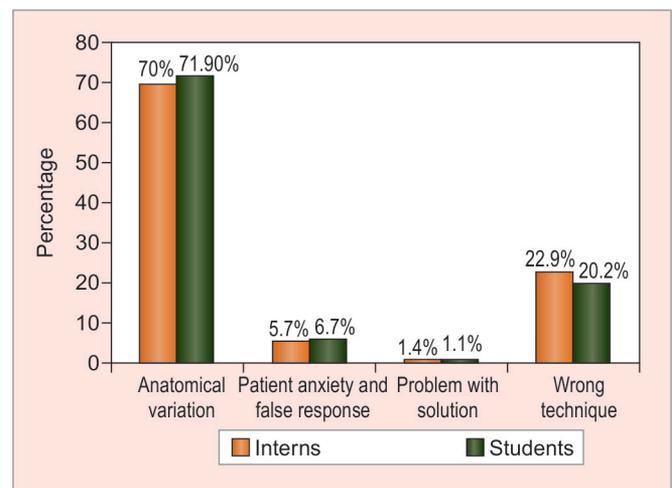
Q4	Group		Total Count (%)
	Interns Count (%)	Students Count (%)	
Endodontic procedures	29 (41.4)	25 (28.1)	54 (33.9)
Procedure makes no difference	29 (41.4)	48 (53.9)	77 (48.4)
Surgical procedures	12 (17.1)	16 (18.0)	28 (17.6)
Total	70 (100.0)	89 (100.0)	159 (100.0)

Chi-square = 4.22, $p = 0.24$, not significant

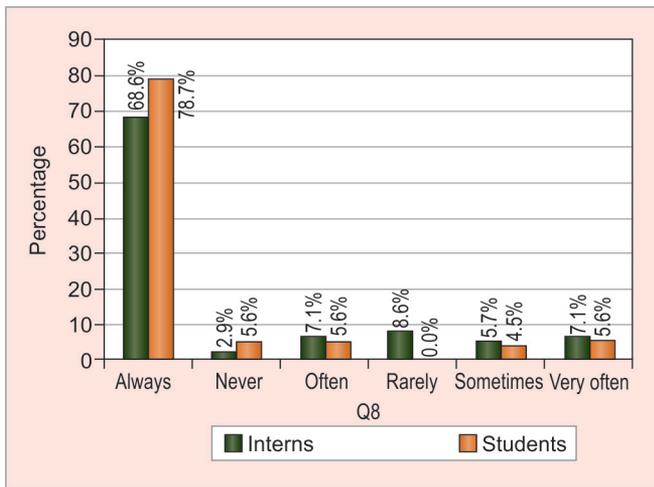
About 41.4% of interns and 53.9% of dental students felt that the type of procedure makes no difference to the failure of IANB (Table 3). About 48.3% of the dental students would call their supervisor in case of failure of IANB, while 47.1% try again with the same technique. Majority of interns (70%) and dental students (71.9%) believe that anatomical variation is the common cause for IANB failure; while 22.9% interns and 20.2% dental students said that the IANB failure was due to wrong technique (Graph 1). Most of the interns and students did not have any complications after delivering IANB to the patients, while 15.7% of interns and 18% of students faced hematoma in patients as a complication of IANB, and 11.4% of interns and 7.9% of students said that they observed trismus as the most common complication of IANB in patients. The majority of interns and students agreed that they took the medical and previous dental history from the patients before administering IANB to them (Graph 2).

DISCUSSION

In the present study , the majority of interns (70%) and dental students (50.6%) said that they always adopted IANB while doing surgical and endodontic procedures in mandibular posterior teeth. The IANB has been



Graph 1: Frequency distribution of responses to Q6 by interns and students



Graph 2: Frequency distribution of responses to Q8 by interns and students

documented in earlier studies as the most frequently used technique.¹⁰ The IANB, along with infiltration of lingual and long buccal nerves, anesthetizes the ipsilateral mandibular teeth and gingivae, body and inferior ramus of mandible, and anterior two-thirds of tongue and floor of mouth.¹¹

The results of the present study showed that most of the interns (81.4%) and dental students (82%) were found to be aware, though only theoretically, of the alternative techniques (such as Gow–Gates technique and Vazirani–Akinosi) to classical IANB, whereas just 14.3% of interns and 11.2% of the dental students had practically used these alternative techniques. These findings were in accordance with the previous study, wherein a lesser percentage of respondents used alternative techniques, such as Gow–Gates technique or the Vazirani–Akinosi technique.¹² It might have been due to the inadequate training with respect to alternative techniques as found in the earlier study.¹³

It has been recorded earlier that the Gow–Gates technique provides a much better anesthetic effect when compared with that of the conventional IANB technique,¹⁴ notwithstanding the fact that onset of anesthesia takes a little longer time (around 5–7 minutes).¹⁵

A closed-mouth mandibular nerve block technique was introduced by Akinosi.¹⁶ Both the Gow–Gates and Akinosi techniques cause anesthesia to larger areas, as the injection site is proximal to that of the conventional one. Akinosi technique is applied with the mouth being closed, and thus it is quite advantageous in cases of trismus.¹² Onset of anesthesia takes only 40 seconds in case of the Akinosi technique of providing mandibular anesthesia.¹⁶

In the present study, the majority (52.9%) of the interns and 42.7% of dental students had hardly faced IANB failure in clinics, while 34.3% of interns and 29.2%

of students seldom faced IANB failure. Around 10% of interns and 9% of students had faced IANB failure often or very often. These findings were in accordance with the findings of previous studies.^{10,17}

In this study, a considerable number of the interns (47.1%) said that they try again with the same (IANB) technique in case it fails when applied for the 1st time, whereas almost as many of students (48.3%) said that they ask for their supervisors' advice in such cases. These findings are indicative of the fact that neither the students nor the interns try the alternative techniques of anesthesia in cases of failure of the IANB technique; and in all probability, it might be due to their lack of expertise in the alternative techniques. These findings fairly match with the results of the previous study conducted on interns and students in Riyadh.¹³

In the present study, the majority of interns (70%) and dental students (71.9%) believe that anatomical variation is the common cause for IANB failure, while 22.9% interns and 20.2% dental students said that IANB failure was due to wrong technique. These results are similar to the findings of the previous study wherein the majority of students reported the same.¹³ These findings of the present study are similar to those mentioned in a previous study wherein the variation in the morphology of the ramus of mandible and that of mandibular foramen location were being cited as the causes for failure of the IANB. Nevertheless, the most common cause is found to be the wrong procedure of injection.¹⁸ Other causes of failure of IANB that have been documented include insufficient mouth opening (due to which the inferior alveolar nerve does not come in close approximation to medial wall of ramus), inappropriate needle insertion, the branches of cranial nerve V3 (which sometimes fail to get anesthetized by conventional IANB due to their origin being proximal to the site of injection),¹⁶ and chances of positive aspiration (which are more due to the insertion target being nearer to the neurovascular bundle).¹⁹

The results of the present study showed that 15.7% of the interns and 18% of students reported hematoma as the most common complication after IANB delivery; another 11.4% of interns and 7.9% of students stated trismus as the most common complication; whereas 5.7% of interns and 9% of students believed facial paralysis to be the most common complication in case of IANB. These findings were similar to the results of previous study.²⁰ In previous studies, the common complications of IANB that have been reported are trismus, caused by mucosa tear at the time of needle insertion/withdrawal²¹; needle breakage has also been found to be a common complication while administering IANB²²; facial paralysis that might occur due to a more posterior insertion of needle, resulting in deposition of anesthetic solution into parotid gland²³; and

hematoma has also been found as a complication due to the insertion of needle into a blood vessel followed by deposition of solution of anesthetic.²⁴

This study showed that 68.6% of the interns and 78.7% of students confirmed that they take down the medical and previous dental history from patients every time before administering the IANB. These findings establish the fact that most of the interns as well as students were aware of the significance of taking into account the medical and the past dental history before undertaking any dental procedure.

LIMITATIONS

- One of the limitations is the use of the convenient (nonprobability) sampling technique and a small sample size that may reduce the external validity and generalizing of the results.
- The effect of gender on perception about various aspects of IANB was not assessed.

CONCLUSION

It can be concluded that IANB is the most frequently used technique during various surgical and endodontic procedures. About 52.9% of the interns and 42.7% of dental students rarely faced IANB failure in clinics. The students as well as the interns were spotted as to be aware of other alternative techniques, such as Gow–Gates and Akinosi techniques of mandibular block anesthesia, though more theoretically than practically.

RECOMMENDATIONS

- The students/interns/dentists are required to be fully familiar with conventional as well as alternative techniques of mandibular nerve anesthesia, so that even if conventional IANB fails, the other methods can be applied appropriately.
- The staff of dental colleges should demonstrate all the methods of local anesthesia practically in clinics rather than only teaching them theoretically in the lecture rooms.
- Students should be taught to be optimally aware of the merits and the demerits of all the mandibular nerve block techniques, so that they are able to decide instantly and confidently, at the very moment of need, which might arise abruptly and uninvited, the best suitable technique while performing dental procedures on the mandibular teeth of a patient.
- Perfection of delivering local anesthesia should be imbibed in the students during their formative years such that the experience becomes part and parcel of their lifelong career, such that it will be beneficial not only in the process of their treating the patients

adequately and desirably well, but also for achieving excellence in their own career in dentistry.

- Dentists' knowledge about various mandibular as well as maxillary nerve block techniques should be refreshed/updated continuously through sustained dental education programs on a regular basis, so as to help them keep abreast with the ever-expanding knowledge.

CLINICAL SIGNIFICANCE

Effective IANB by interns and students for pain-free dentistry.

REFERENCES

1. Malamed, SF. Techniques of mandibular anesthesia. In: Malamed SF, editor. Handbook of local anesthesia. 4th ed. Noida: Harcourt Brace; 1997. p. 193-199.
2. Granollers M, Berini L, Gay C. Variations of the anatomy of the inferior nervous system. Bibliographic review. Ann Odontostomatol 1997;1:24-29.
3. Wong MK, Jacobsen PL. Reasons for local anesthesia failures. J Am Dent Assoc 1992 Jan;123(1):69-73.
4. Bennett S, Townsend G. Distribution of the mylohyoid nerve: anatomical variability and clinical implications. Aust Endod J 2001 Dec;27(3):109-111.
5. Yonchak T, Reader A, Beck M, Meyers WJ. Anesthetic efficacy of unilateral and bilateral inferior alveolar nerve blocks to determine cross innervation in anterior teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001 Aug;92(2):132-135.
6. Fleury AA. Local anesthesia failure in endodontic therapy: the acute inflammation factor. Compendium 1990 Apr;11(4):210, 212, 214.
7. Baart, JA.; Brand, HS. Local anaesthesia in dentistry. London: Blackwell Publishing Ltd.; 2009. p. 192.
8. Malamed, SF. Handbook of local anesthesia. St. Louis (MO): Elsevier Health Sciences; 2014.
9. Kohler BR, Castellón L, Laissle G. Gow-Gates technique: a pilot study for extraction procedures with clinical evaluation and review. Anesth Prog 2008 Spring;55(1):2-8.
10. Haas DA. Alternative mandibular nerve block techniques: a review of the Gow-Gates and Akinosi-Vazirani closed-mouth mandibular nerve block techniques. J Am Dent Assoc 2011 Sep;142(Suppl 3):8S-12S.
11. Rajvanshi H, Ernest S, Effendi H, Afridi S, Chhabra M, Kaur N. Failure of inferior alveolar nerve block (IANB) and techniques to avoid it. Eur J Biomed Pharm Sci 2016 Sep;3:207-210.
12. Johnson TM, Badovinac R, Shaefer J. Teaching alternatives to the standard inferior alveolar nerve block in dental education: outcomes in clinical practice. J Dent Educ 2007 Sep;71(9):1145-1152.
13. AlHindi M, Rashed B, AlOtaibi N. Failure rate of inferior alveolar nerve block among dental students and interns. Saudi Med J 2016 Jan;37(1):84-89.
14. Watson JE, Gow-Gates GA. A clinical evaluation of the Gow-Gates mandibular block technique. N Z Dent J 1976 Oct;72(330):220-223.

15. Malamed SF. The Gow-Gates mandibular block. Evaluation after 4,275 cases. *Oral Surg Oral Med Oral Pathol* 1981 May;51(5):463-467.
16. Akinosi JO. A new approach to the mandibular nerve block. *Br J Oral Surg* 1977 Jul;15(1):83-00387.
17. Goldberg S, Reader A, Drum M, Nusstein J, Beck M. Comparison of the anesthetic efficacy of the conventional inferior alveolar, Gow-Gates, and Vazirani-Akinosi techniques. *J Endod* 2008 Nov;34(11):1306-1311.
18. Madan GA, Madan SG, Madan AD. Failure of inferior alveolar nerve block: exploring the alternatives. *J Am Dent Assoc* 2002 Jul;133(7):843-846.
19. Gow-Gates G, Watson JE. Gow-Gates mandibular block: applied anatomy and histology. *Anesth Prog* 1989 Jul-Oct;36(4-5):193-195.
20. Nooh N, Abdullah WA. Incidence of complications of inferior alveolar nerve block injection. *J Med Biomed Sci* 2010;1: 52-56.
21. Wright EF. Medial pterygoid trismus (myospasm) following inferior alveolar nerve block: case report and literature review. *Gen Dent* 2011 Jan-Feb;59(1):64-67.
22. Ethunandan M, Tran AL, Anand R, Bowden J, Seal MT, Brennan PA. Needle breakage following inferior alveolar nerve block: implications and management. *Br Dent J* 2007 Apr;202:395-397.
23. Tzermpos FH, Cocos A, Kleftogiannis M, Zarakas M, Iatrou I. Transient delayed facial nerve palsy after inferior alveolar nerve block anesthesia. *Anesth Prog* 2012 Spring;59(1):22-27.
24. Khalil H. A basic review on the inferior alveolar nerve block techniques. *Anesth Essays Res* 2014 Jan-Apr;8(1):3-8.