



Incidence Of Inferior Alveolar Nerve Block Failure Among Dental Students

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Abstract

Introduction: Today, the inferior alveolar nerve block (IANB) is commonly used to induce local anesthesia for various applications throughout modern dentistry. However, IANB failure rates can be substantial and often cannot be overcome with a repeat IANB injection. The aim of the study is to assess the incidence of inferior alveolar nerve block failure among undergraduate dental students during their practice.

Materials and Methods: The study was carried among 150 UG students in Saveetha Dental College. Each student was asked to independently fill the survey which consisted of questions related to inferior alveolar nerve block failure.

Results: 80% of the students administer inferior alveolar nerve block and majority of the students prefer this particular nerve block for the extraction of Mandibular posteriors. When the correlation was done between year of study of the undergraduate dental students and the success rate of inferior alveolar nerve block the interns had a higher success rate compared to the students, P value was 0.003 which was statistically significant.

Conclusion: Though most of the students seem to be aware of inferior alveolar nerve block, its effectiveness and its success rate, third year students chose infiltration due to lack of practice and nerve block failure

Keywords: dental students, inferior alveolar nerve block, Mandibular posteriors, alternative techniques, local anaesthesia, failure

Introduction

The inferior alveolar nerve block is the most common nerve block utilised in mandibular surgical and endodontic treatments (1). Inferior alveolar nerve block (IANB), also known as mandibular nerve block, is the most commonly used and possibly one of the most important technique sensitive procedure in dentistry. IANB is usually performed together with infiltration of long buccal nerve and lingual nerve(2). This will anesthetize the mandibular tooth till the midline, Body of the mandible, inferior portion of the ramus, floor of the mouth and anterior 2/3rd of tongue and buccal mucoperiosteum of the ipsilateral

side (3). Unfortunately, it also proves to be with higher percentage of failure rate even when administered properly.

Failures in IANB can happen for a variety of causes, including anatomical variations, bifid inferior alveolar nerve (4,5), and increased bone density in elderly people. (1) The sensory component of the mylohyoid nerve may result in supplementary innervations. Contralateral innervations of the anterior teeth, (6) pulpitis/apical periodontitis, and patients' worry and panic are further causes of IANB failure.(7) Besides surgical and endodontic operations, IANB is critical for periodontal surgery,

dental implantology, and apicoectomy. Even the most experienced physician may have IANB failure at times, with a failure rate of 15 to 20%. (7,8) It is not only the patients' comfort and positive feelings that make anaesthesia administration so crucial, (9) but also the dentist's name and reputation as a successful and patient-friendly deliverer. Patients give dentists a rating based on their previous painless experiences. (10)

Inferior alveolar nerve block failure has been associated with various technical errors, pathological processes (like trismus), infection, inflammation, previous surgery and psychological causes like fear, anxiety and apprehension. (11) Poor technique has been reported to be the foremost common reason for failure of conventional IANB. (12) Specifically, poor technique may be related to inadequate mouth opening, incorrect needle placement (too anterior or posterior), or failure to give enough time for the anesthesia to work (13).

Both the Gow-Gates technique and the Vazirani-Akinosi technique mainly involves anesthetizing the inferior alveolar nerve, lingual nerve, and long buccal nerve with a single injection (14) In a 2010 study, Aggarwal et al (14) (15) observed a significantly better success rate for mandibular molar anesthesia with the Gow-Gates technique (52%) than with conventional IANB (36%), with an intermediate success rate (41%) for the Vazirani-Akinosi technique, and a relatively poor success rate (27%) for infiltrations. (14,15) . Also, Jung et al (10) found that buccal-plus-lingual infiltrations could provide satisfactory anesthesia in 32-67% of patients (16) if lidocaine was used, and in 57-92% of patients if articaine even without the utilization of ordinary IANB. (17) Students' difficulties and their consequences during their learning/training time may follow them for the rest of their lives. If not properly resolved in a timely manner, their performance suffers, which has an unfavourable impact on their career chances and openings, as well as their day-to-day service accomplishments. (18)

The aims of this study were to assess IANB failure rate among dental students and interns, to report the causes of failure, to assess the awareness of alternative techniques, and to assess IANB-related complications.

Materials And Methods:

An online questionnaire was prepared and circulated among the dental student population. This questionnaire was prepared using google docs. The questionnaire consists of 12 questions. 150 is the sample size. It was an online setting where two reviewers are involved in this study for the validity checking of the questionnaire. The data was collected, verified, tabulated and analysed. All statistical analysis was done using SPSS by IBM. The statistical chi square test was done, where if the p value is found out to be less 0.005, it is statistically significant. The data was imported to SPSS and therefore the descriptive statistics with frequency analysis was done. The obtained data were represented graphically as bar charts. The dependent variables considered for the study are dental students, nerve block, surgeries, extraction, infiltration and the independent variables are the gender and age of the student. No patient was given more than the recommended dosage of LA ie: 7mg/kg body wt.

Results:

The overall response for every question and therefore the percent analysis were calculated for every question. Data was mentioned through the questionnaire online form. 62.42% of the students are female and 37.58% of the students are male [Figure 1]. 97.32% of the students are aged between 20-25 and 2.68% of the students are aged between 18-20% [Figure 2]. 84.56% of the students know that infiltration is not as effective as inferior alveolar nerve block and 15.44% of the students think that infiltration is as effective as an inferior alveolar nerve block as they haven't experienced any failure in their infiltration techniques yet. [Figure 3]. 77.85% always administer an inferior alveolar nerve block, 16.11% of the students sometimes administer an inferior alveolar nerve block and 6.04% of the students never administer an inferior alveolar nerve block and third years mostly preferred infiltration over an inferior alveolar nerve block because they feel that infiltration do not need precision like the nerve block for an extraction [Figure 4]. 57.72% call the chief surgeon in charge, 39.6% of the students try again with the same technique and 2.68% of the students give the patient another appointment. Third years usually were advised to call the chief surgeon incase of an inferior alveolar nerve block failure whereas most of the fourth years called the chief surgeon or gave the

patient another appointment. Most of the interns usually tried again with the same technique [Figure 5]. 59.06% of the students knew the Vazirani–Akinosi technique and used it regularly and 40.94% of the students only knew Vazirani–Akinosi

technique theoretically but haven't practiced it yet [Figure 6]. Association was done using Chi Square correlating year of study and few responses (p value<0.05 was considered statistically significant) as shown in Figure 7 and Figure 8.

Fig 1: shows the gender distribution among the sample population. 62.42% participants are female students and 37.58% of the participants are male students.. Blue denotes the participants who are female students and purple denotes the participants male students

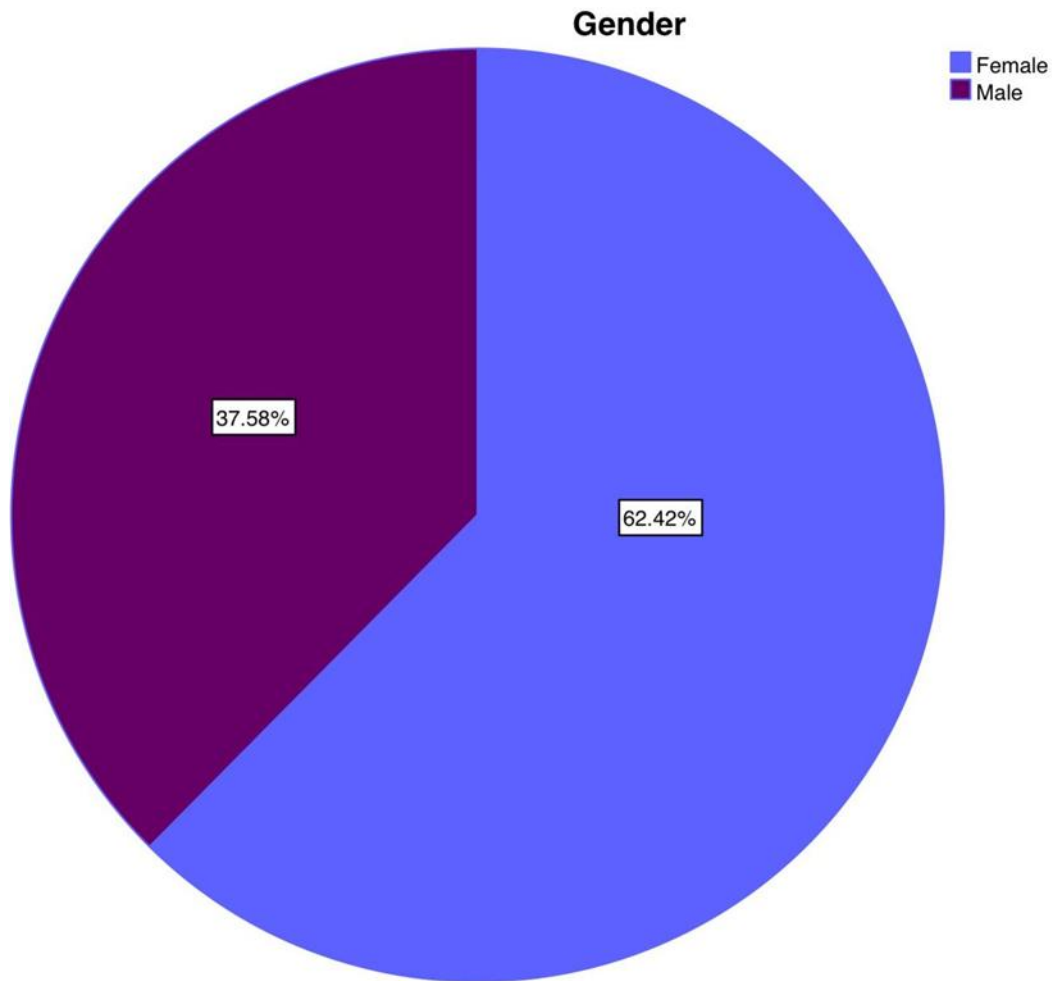


Fig 2: shows the age distribution among the sample population. 97.32% participants are 20-25 years old and 2.68% of the participants are 18-20 years old. Green denotes the participants who are 20-25 years old and blue denotes the participants who are 18-20 years old

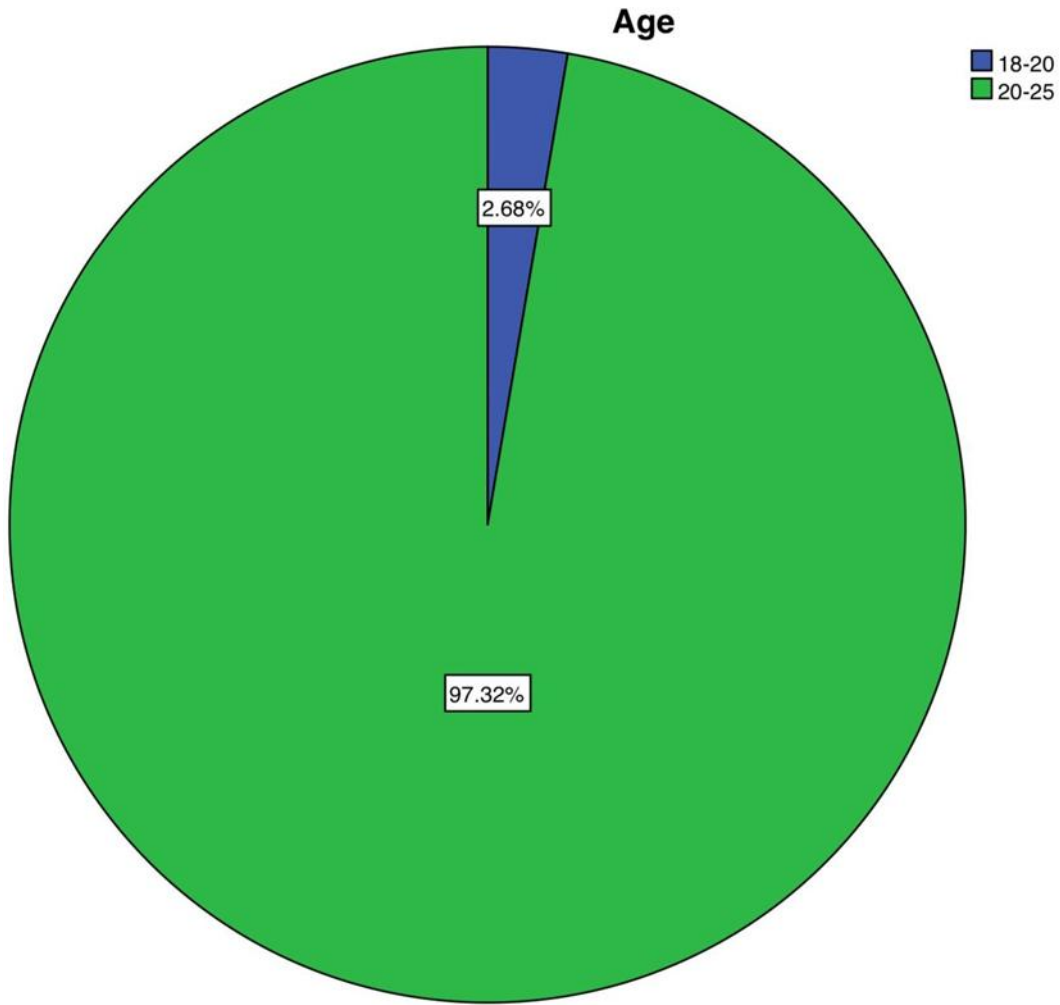


Fig 3: shows the response of students if they think infiltration is as effective as inferior alveolar nerve block. 84.56% students know that infiltration is not as effective as inferior alveolar nerve block and 15.44% feel that infiltration is as effective as inferior alveolar nerve block. Orange denotes the students who know that infiltration is not as effective as inferior alveolar nerve block and Green denotes the students who feel that infiltration is as effective as inferior alveolar nerve block

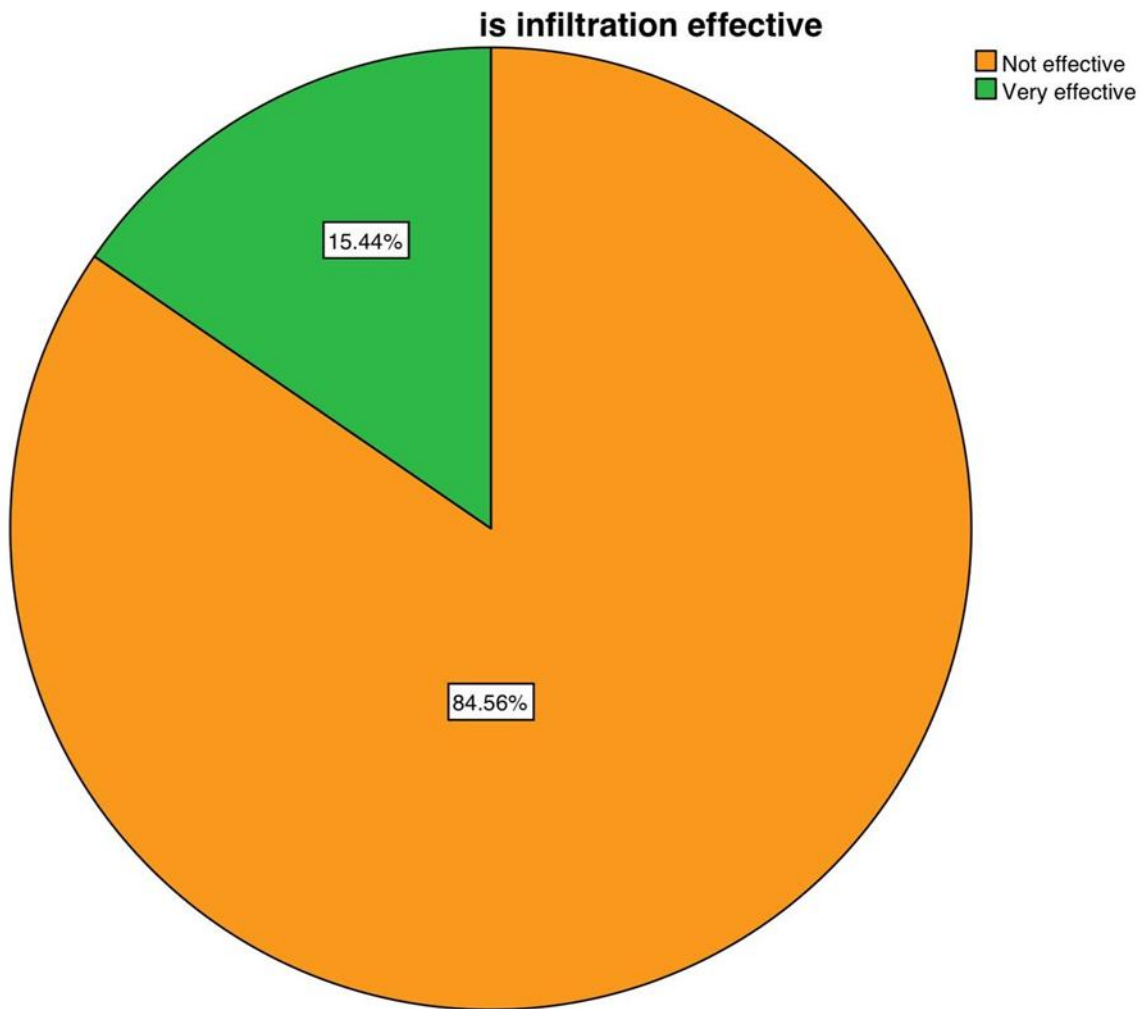


Fig 4: shows the response of students on how often they administer an inferior alveolar nerve block for an extraction of a Mandibular posterior tooth. 77.85% always administer an inferior alveolar nerve block, 16.11% of the students sometimes administer an inferior alveolar nerve block and 6.04% of the students never administer an inferior alveolar nerve block. Pink denotes the students who sometimes administer an inferior alveolar nerve block, Green denotes the students who never administer an inferior alveolar nerve block and Blue denotes the students who always administer an inferior alveolar nerve block

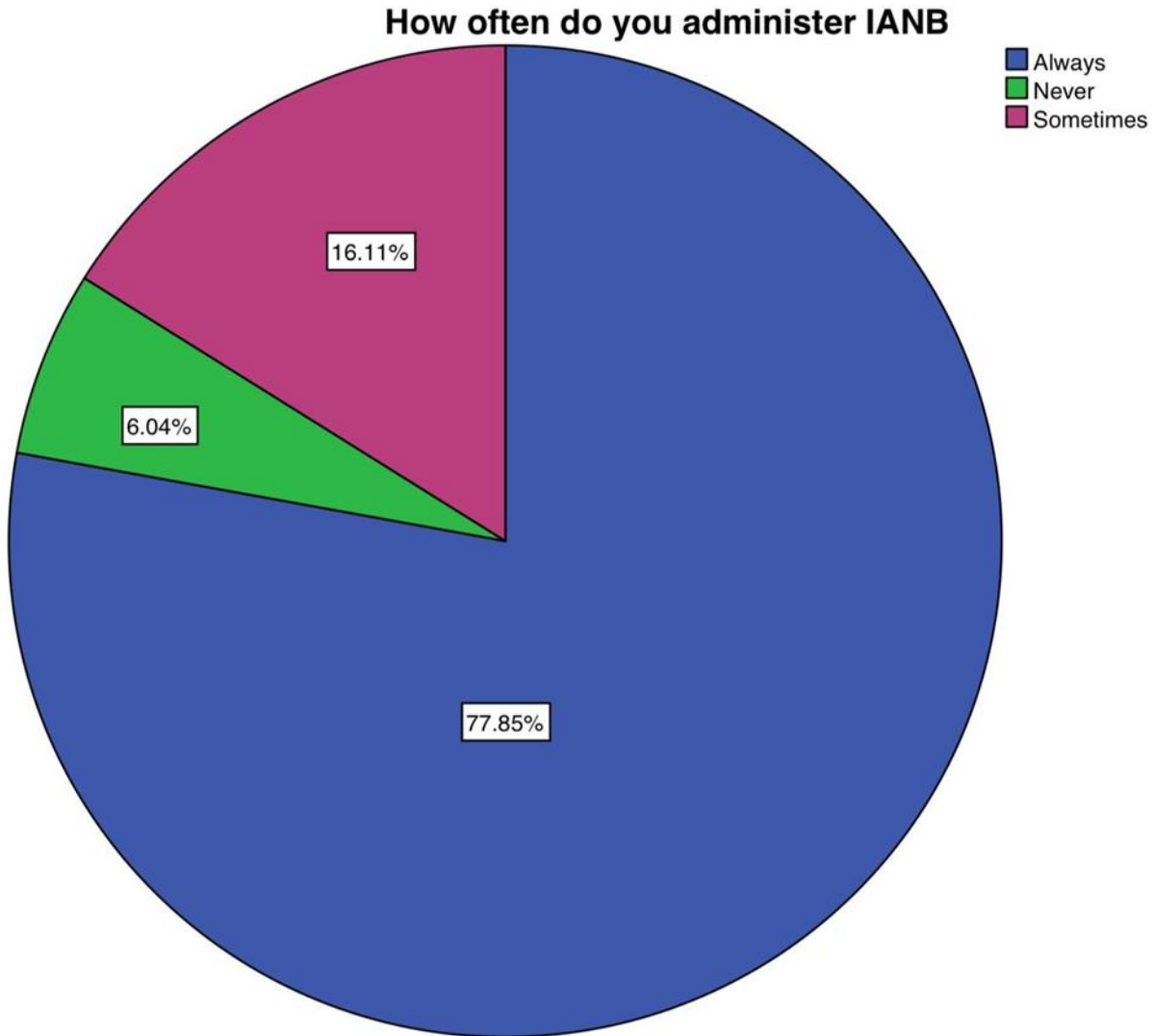


Fig 5 : shows the response of students on how they manage an IANB failure. 57.72% call the chief surgeon in charge, 39.6% of the students try again with the same technique and 2.68% of the students give the patient another appointment. Pink denotes the students who try again with the same technique, Green denotes the students who give the patient another appointment and blue denotes the students who call the chief surgeon in charge

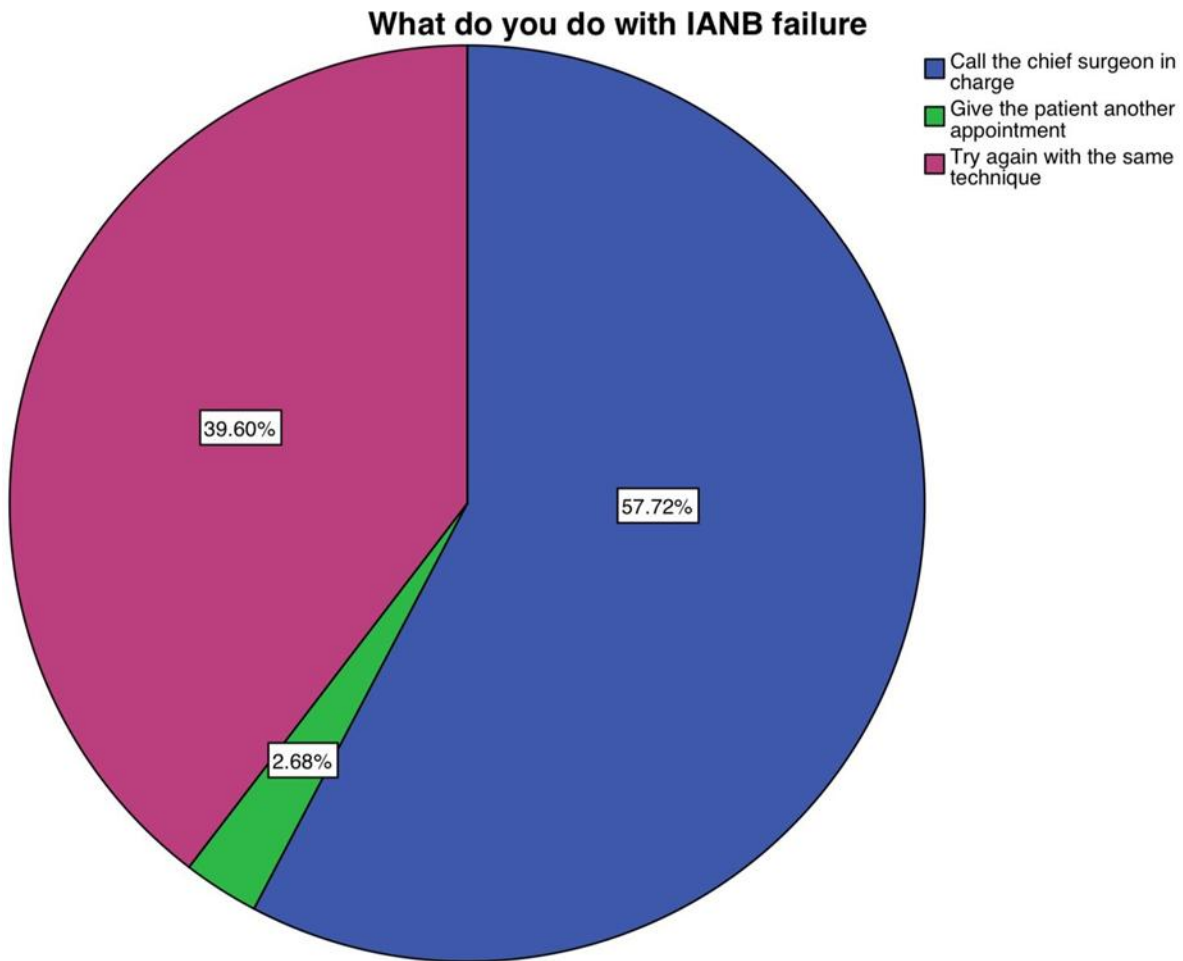


Fig 6: shows the response of students if they knew an alternative technique like the Vazirani–Akinosi technique. 59.06% of the students knew the Vazirani–Akinosi technique and used it regularly and 40.94% of the students only knew Vazirani–Akinosi technique theoretically but haven't practiced it yet. Pink denotes the students who only knew Vazirani–Akinosi technique theoretically but haven't practiced it yet and blue denotes the students who knew the Vazirani–Akinosi technique and used it regularly

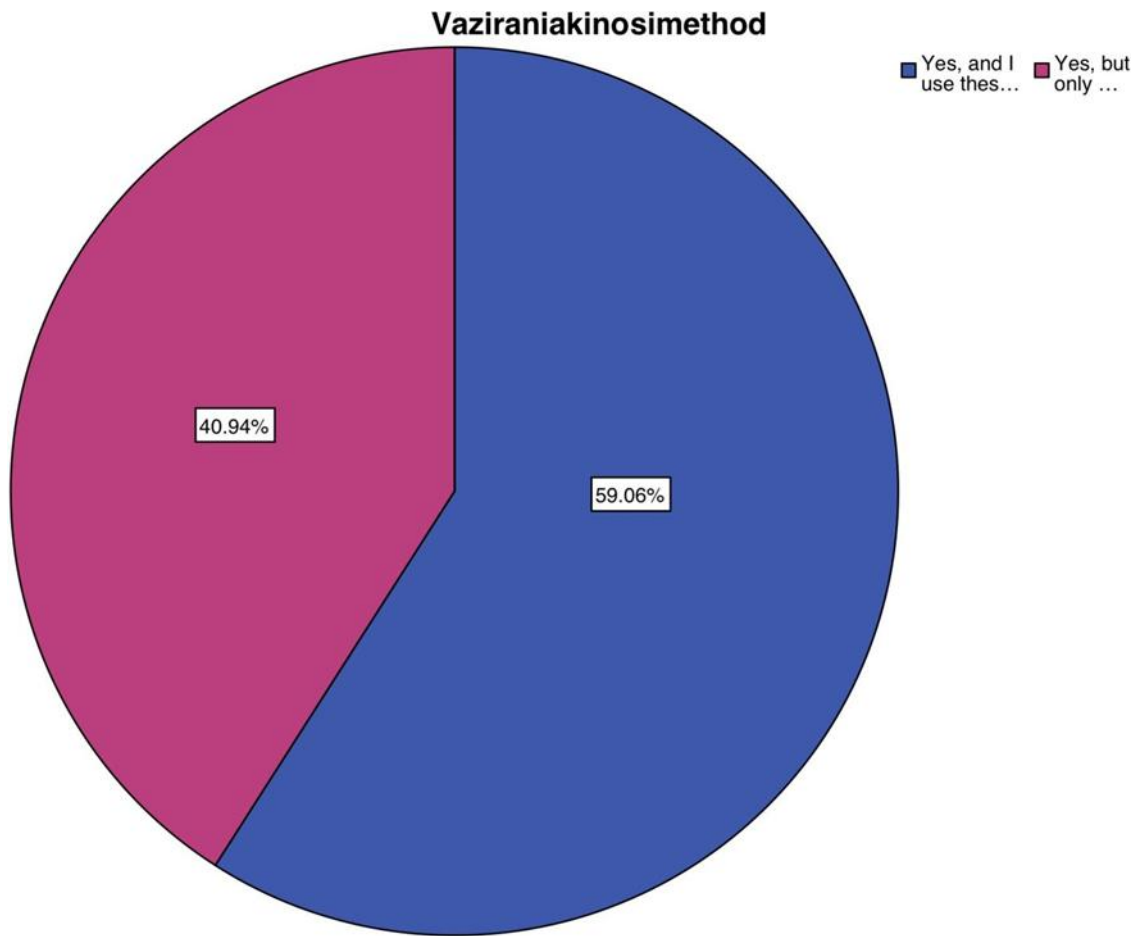


Fig 7: The bar graph represents the association between the year of study of the students and what complication they have faced during an inferior alveolar nerve block failure. X axis represents the year of study of the student and Y axis represents the percentage of the sample population. Blue denotes the students whose patients have had hematoma during an inferior alveolar nerve block failure and Green denotes patients whose patients haven't had any complications during an inferior alveolar nerve block failure. Chi square test was done and the association was found to be statistically significant. Pearson chi square value : 13.087, df:2 , p value: 0.01 ($p < 0.05$). Hence, statistically significant. Majority of the third years have experienced hematoma after IANB administration.

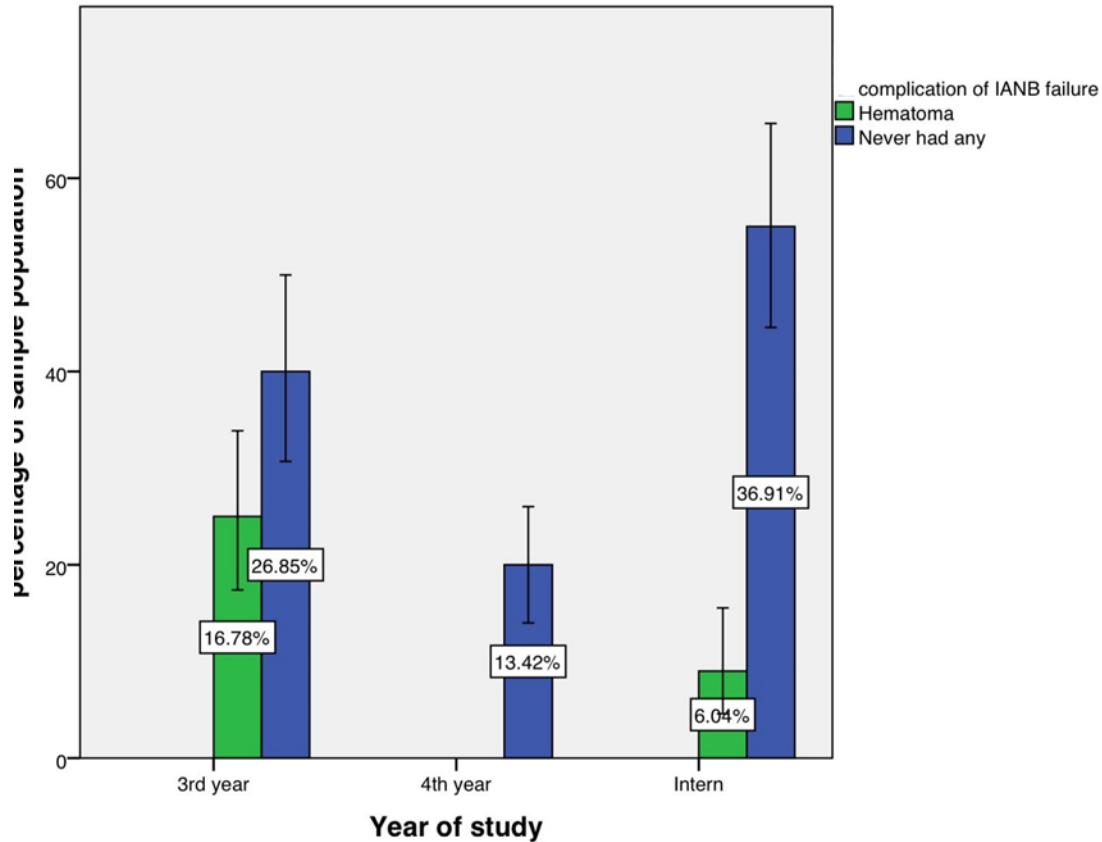
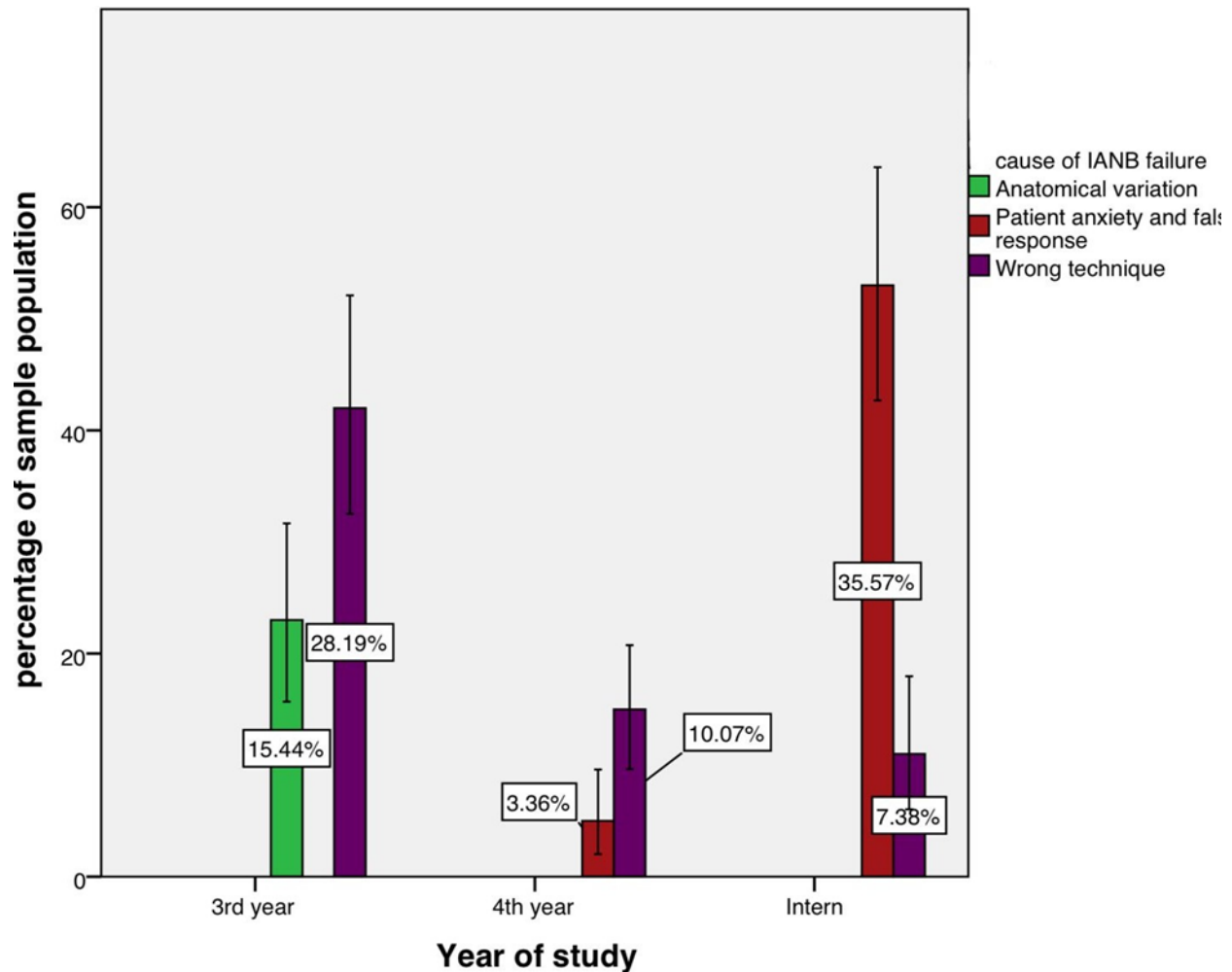


Fig 8: The bar graph represents the association between the year of study of the students and what they think could be a cause of an inferior alveolar nerve block failure. X axis represents the year of study I'm of the student and Y axis represents the percentage of the sample population. Green denotes the students who think it could be an anatomical variation, Red denotes the students who think it could be patient anxiety and false response, pink denotes students who think it could be wrong technique and blue denotes students who think it could be all of the factors above for an inferior alveolar nerve block failure. Chi square test was done and the association was found to be statistically not significant. Pearson chi square value : 13.132, df:4, p value: 0.04 ($p > 0.05$). Hence, statistically significant. Majority of the interns think wrong technique could be the reason for an inferior alveolar nerve block failure



Discussion:

In this study, interns (60%) and final year students (24%) said that they always preferred IANB while doing extractions in mandibular posterior teeth.

The IANB, along with infiltration of lingual and long buccal nerves, anesthetizes the ipsilateral mandibular teeth and gingiva, body and inferior ramus of mandible, and anterior two-thirds of tongue, and floor of mouth.(3,18)

The results of the present study showed that most of the interns and dental students were found to be aware , though only theoretically (40.9%), of the alternative techniques (such as Gow–Gates technique and Vazirani– Akinosi) to classical IANB, whereas (59.06%) of interns and dental students had practically used these alternative techniques [Figure 6]. These results were in compliance to the previous study, where a lesser percentage of respondents used various techniques resembling the Gow–Gates technique or the Vazirani–Akinosi technique.

It might have been due to the hesitancy to use alternative techniques as found in the earlier study.(19)

It has been recorded earlier that the Gow–Gates technique provides how better anesthetic effect as compared there upon of the normal IANB technique,[14] notwithstanding the actual fact that onset of anesthesia takes slightly longer time (around 5–7 minutes).A closed-mouth mandibular nerve block technique was introduced by Akinosi. 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 completed with the mouth being closed, and hence it's helpful in cases of trismus.

The akinosi technique provides a rapid onset of anaesthesia in about 40 seconds.(6) In the present study, 20% of the interns dental students had hardly faced IANB failure in clinics, while 64.10% of interns and dental students seldom faced IANB failure. Around 10% of interns and 15.2% of students had faced IANB failure often or very often. These results were in compliance with the findings of previous studies.(9,10)

In the present study, 39.6% of the dental students said that they struggle again with an equivalent (IANB) technique just in case it fails when applied for the first time, whereas almost as many of students, almost 38.2% of the students said that they ask for their chief surgeon in charge for their advice in such cases. These findings are indicative that the interns try the alternative techniques of anesthesia in cases of failure of the IANB technique; whereas the third years don't try an alternate technique which might be due to their lack of expertise in the alternative techniques.

In the present study, 48.9% of interns and dental students believe that wrong technique is the common cause for IANB failure, while 35.57% of dental students said that IANB failure was due to patient anxiety. These results are similar to the findings of the previous study wherein the majority of students reported the same. (12) 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 which of mandibular foramen location were being cited because of the causes for failure of the IANB. the causes for failure of the

IANB. Never-theless, the most common cause is found to be the wrong procedure of injection.18 Other causes of failure of IANB that are documented include insufficient mouth opening, inappropriate needle insertion etc.

The results of the present study showed that about 22.81% of the dental students reported hematoma as the most common complication after IANB delivery and they mostly happen to be students from third year of study. These findings were in compliance with the results of the previous study. (20) Mucosal tear leading to trismus is one of the common complication upheld by previous studies (21); needle breakage has also been found to be a standard complication while administering IANB.(20)

Hematoma has also been found as a complication caused by the insertion of needle into a vessel followed by deposition of solution of anesthetic. (11)

Our team has extensive knowledge and research experience that has translate into high quality publications(20),(21),(22),(23),(24–33) (34),(35–37).(38,39)

Conclusion:

In conclusion, these results of the present study indicate that the dental curriculum at Saveetha dental college is good in coverage of techniques and can be employed when an IANB fails or is contraindicated. To decrease the IANB failure rate, instruction related to anatomical landmarks, anatomical variation, and pre-IANB aspiration should also be educated.

Enhance education of alternatives to IANB, such as the Gow-Gates and Akinosi techniques, both theoretically and clinically, in the anesthesia courses of the dental curriculum; enhance knowledge of anatomical landmarks for IANB administration; train students how to select the most appropriate alternative technique; increase supervision and training of various techniques; and it should be emphasized that aspiration is mandatory before any anesthetic technique, including conventional IANB are some of the recommendations.

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