

DENTISTS PERCEPTIONS ABOUT PRACTICES, UNDERGRADUATE TRAINING AND TRAINING NEEDS OF LOCAL ANESTHESIA

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ABSTRACT

The objective of this study was to assess dentists perceptions about safety and efficacy of their practices; their undergraduate training; and training requirements about local anesthesia (LA).

A prospective, questionnaire-based survey of 181 dentists from Lahore and Karachi was carried out. The questionnaire was designed to collect information about general dentists perceptions about their salient local anesthesia practices, the level of training provided to them at under-graduate level and the training needs at different levels of professional careers.

Sixty eight percent of the participants did not aspirate during inferior alveolar nerve block LA injections. Training in important LA nerve block injections was not provided to the majority of participants at the undergraduate level. Most of the participants felt that improvement in training of LA at under-graduate, post-graduate and continuing professional development levels were needed.

Serious shortcomings in the practice and training of safe and effective LA were noticed in this survey. In accordance with the need felt by the survey participants for improved teaching and training of LA, the curriculum for local anesthesia training should be revised and implemented.

Key words: *Dental local anesthesia training. Safety in dental local anesthesia. Dentists perception, Local anesthesia techniques.*

INTRODUCTION

Painless dentistry started with the removal of lower wisdom tooth using injection of a cocaine solution in the vicinity of the mandibular foramen by Halsted and Hall (1884).¹ Tremendous progress has since been made in the choice of drugs available, armamentarium and various techniques used to achieve safe and effective local anesthesia in oro-facial region. Present day dentistry is supposed to be painless and pain management is central to the success of any dentist. Indeed, many patients choose their dentist based on perceived ability to deliver painless dentistry.²

Safe and effective local anesthesia administration is dependent on the quality of training provided at the under graduate level. Training in local anesthesia is carried out by department of oral & maxillofacial

surgery at most of the dental institutions in USA & Puerto Rico and are standardized at most of the western institutions.³ Teaching and training of local anesthesia is carried out by departments of oral & maxillofacial surgery in dental schools of Pakistan as per guidelines of Pakistan Medical and Dental Council (PMDC) and Higher Education Commission (HEC).⁴ Undergraduate local anesthesia programs have been assessed in America³ and Europe⁵; however, no such studies have been done in other countries. Moreover, no assessment about the dentists perceptions of practices and training of local anesthesia has been found in our electronic and manual literature search. Feedback in Medical Education is the control of a system by reinserting into the system the results of its performance and holds a central position in curriculum planning.⁶ Such feedbacks are required from the end-users like dentists and dental students, as well as, the

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course providers to continually modify various training programs.

The purpose of this survey was to obtain feedback about the perceptions of some salient local anesthesia practices among the Pakistani dentists, the level of training provided to them during undergraduate studies and need for improvement of local anesthesia training at undergraduate, general dental practice and post-graduate levels.

METHODOLOGY

This study was designed as a prospective, questionnaire-based survey (Table 1). The survey was undertaken from May 2008 to August 2008. The questionnaires were distributed and collected in person from

dentists practicing in Lahore and Karachi. The dentists chosen were those available conveniently. Demographic data age, sex, years of experience as dentist, province of practice, present professional practice status and the place of work were recorded. The questionnaire (Table 1) was designed to collect information about general dentists perceptions of the following three areas:

- 1 Their salient local anesthesia practices.
- 2 The level of training provided to them at undergraduate level.
- 3 The training needs at different levels of professional careers.

TABLE 1: QUESTIONNAIRE USED FOR THE SURVEY

<i>Dear colleague</i>	Intra osseous injection <input type="checkbox"/>
We are conducting a survey to collect information about the training and practices of local anesthesia amongst general dental practitioners. All information will be confidential. Please answer by checking one or more alternatives wherever appropriate.	Extra oral mandibular nerve block <input type="checkbox"/>
Age _____ Gender: Male <input type="checkbox"/> Female <input type="checkbox"/>	4 Which LA block techniques have you been trained in BDS?
Graduation year _____	Inferior alveolar nerve block <input type="checkbox"/>
Years of Experience _____	Posterior superior alveolar block <input type="checkbox"/>
Designation;	Gow gates block <input type="checkbox"/>
Student <input type="checkbox"/> House surgeon <input type="checkbox"/> General dental practitioner <input type="checkbox"/>	Lingual nerve block <input type="checkbox"/>
Post graduate trainee <input type="checkbox"/> Specialist <input type="checkbox"/>	Vazirani akinosi block <input type="checkbox"/>
(please specify specialty) _____	Mental nerve block <input type="checkbox"/>
Private practice <input type="checkbox"/> Government practice <input type="checkbox"/>	Infra orbital nerve block <input type="checkbox"/>
Both <input type="checkbox"/>	Long Buccal nerve block <input type="checkbox"/>
Province of Practice:	5 Approximately how many training (lectures/ demonstrations) hours were allocated to local anesthesia (LA) during your dental school training?
Punjab <input type="checkbox"/> Sindh <input type="checkbox"/>	Up to 10 hours <input type="checkbox"/> 11-20 hours <input type="checkbox"/> Do not remember <input type="checkbox"/>
Balochistan <input type="checkbox"/> NWFP <input type="checkbox"/>	6 Do you feel you have been properly trained in the field of local anesthesia?
Please, answer by checking one or more alternatives wherever appropriate.	Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure <input type="checkbox"/>
1 How often do you get positive aspiration during inferior alveolar nerve block injection?	7 At what stage do you feel should undergraduate students be introduced to the local anesthesia training?
13-25 % <input type="checkbox"/>	First year <input type="checkbox"/> Second year <input type="checkbox"/> Third year <input type="checkbox"/> Final year <input type="checkbox"/>
26-35 % <input type="checkbox"/>	8 Would you support an increase in the number of training hours at BDS level to enable the institutions to offer more efficient local anesthesia training program?
Do not aspirate <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure <input type="checkbox"/>
2 How often do you get ineffective inferior alveolar block?	9 Do you perceive a need for training in local anesthesia at postgraduate level?
0-10% <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> Do not know <input type="checkbox"/>
11-20% <input type="checkbox"/>	10 Do you feel workshops on local anesthesia techniques will be useful for general dentists?
21-30% <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> Do not Know <input type="checkbox"/>
31-40% <input type="checkbox"/>	Thank you for your time and consideration, your input is much appreciated.
Not noted <input type="checkbox"/>	
3 What alternative LA technique will you use when inferior alveolar nerve block fails?	
Repeat inferior alveolar nerve block <input type="checkbox"/>	
Intra ligamental injection <input type="checkbox"/>	
Gow gates nerve block <input type="checkbox"/>	
Vazirani akinosi block <input type="checkbox"/>	

The salient local anesthesia practices were assessed through questions about safety and efficiency of local anesthesia injections. Safety in local anesthesia was analyzed by enquiring about the frequency of positive blood aspiration during administration of inferior alveolar nerve block through Question (Q) 1. Efficiency in local anesthesia was examined by enquiring about the frequency of ineffective inferior alveolar nerve block (IANB) and alternate local anesthesia techniques used (Table 2) on failure of IANB injection (Q 2& 3).

The perception of level of training provided to them at under-graduate level was assessed through questions about the training provided in local anesthesia block techniques at undergraduate level (Q 4), approximate number of training (lectures/demonstrations) hours (Q5) allocated to local anesthesia during the dental school training and if they were satisfied with the level of training provided to them (Q6).

The training needs at different levels of professional careers was assessed through questions about

the perceived appropriate academic year for introduction of local anesthesia training in the undergraduate curriculum (Q7) ; and if there was a need for increase in undergraduate training hours (Q8), local anesthesia training at postgraduate level (Q9) and local anesthesia techniques workshops for general dentists (Q10).

Data from the returned questionnaires were entered into SPSS. A descriptive data analysis was performed for mean, and frequency of identified variables.

RESULTS

A total of 181 (108 males & 73 females) participants, with a mean age of 29 years (21 to 65), returned the completed survey forms. Out of these, 117 participants were from Lahore, Punjab and 64 from Karachi, Sindh. About 56% of the participants had less than 5 years of experience, 31% had experience between 6 & 10 years and 13% had more than 10 years of experience. Forty percent of the participants were general dental practitioners, 18% were house surgeons, 15% each were post-graduate trainees and specialists; and 12% were final year students. Fifty eight percent of the survey participants were working in hospital set-ups, 22% were working in private clinics only and 20% were working in both the above set-ups.

A significant number of the participants (67%) reported that they do not aspirate blood during inferior alveolar nerve block injection (Fig 1). Seventy three percent of the participants perceived up to 10% unsuccessful inferior alveolar nerve block injection (Fig 2). Alternate local anesthesia techniques used by the survey participants on failure of inferior alveolar nerve block injections are given in Table 3.

Training in the use of Gow Gates mandibular nerve block, Vazirani Akinosi block, infra-orbital nerve block and posterior superior alveolar nerve block injections was not provided to the majority of participants at the undergraduate level (Table 4). Majority of the participants (60%) did not remember number of hours of local anesthesia under-graduate training, whereas, 28% were given up to 10 hours and 12% were given up to 20 hours of LA training. Fifty percent of the participants were satisfied with the quality of training provided at undergraduate level, whereas, 30% were not satisfied and 20% were not sure about the quality of training. Most of the participants (63%) felt that local anesthesia training should start in 3rd undergraduate year of a four years Bachelor of Dental Surgery program, whereas, 28% felt 2nd year, 7% felt 1st year and 2% felt 4th year will be appropriate for initiation of local anesthesia training. Majority desired improvement of training at under-graduate, post-graduate and continuing professional development levels (Table 5).

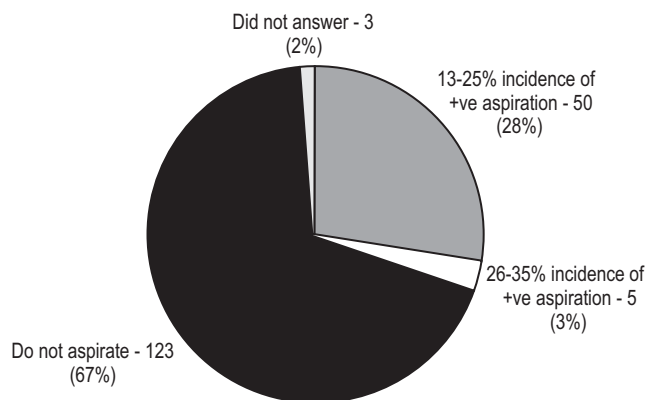


Fig 1: Frequency of Positive Blood Aspiration during Inferior Alveolar Nerve Block

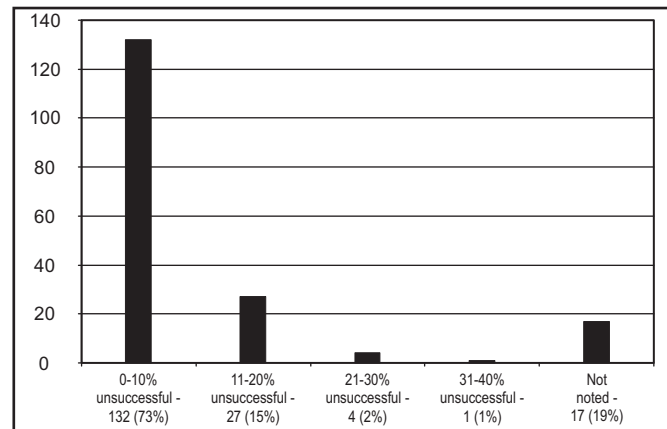


Fig 2: Reported Frequency of unsuccessful Inferior Alveolar Nerve Block

TABLE 2: LA TECHNIQUES USED FOR FAILED INFERIOR ALVEOLAR NERVE BLOCK (IAN)^{7,8}

Technique	Description	Indications
Repeat inferior Alveolar Nerve (IANB) block	Commonly used technique for anesthesia of inferior alveolar and lingual nerve.	Treatment of mandibular teeth or mandible
Gow Gates nerve block	A true mandibular nerve block anesthetizing all the branches of the mandibular branch of the trigeminal nerve.	Alternate to IANB. Failed IANB.
Vazirani Akinosi nerve block	Injection given with mouth closed for inferior alveolar and lingual nerve anesthesia.	Trismus, Macroglossia, Alternate to IANB. Failed IANB.
Intra-ligamental Injection	Deposition of solution in the cancellous bone of the alveolus by gaining access to the cancellous space through the periodontium.	Failed local anesthesia for either jaw
Intra-osseous injection	Deposition of LA in the cancellous bone of the alveolus by way of a perforation through the buccal cortical bone using drill.	Failed local anesthesia for either jaw

TABLE 3: REPORTED USE OF ALTERNATIVE LA TECHNIQUES WHEN IABN FAILS

Technique	Yes n (%)	No n (%)	Not Answered n (%)
Repeat inferior alveolar nerve block	131 (72)	48 (27)	2(1)
Intra-ligamental local anesthesia	109 (60)	70 (39)	2(1)
Gow Gates nerve block	23 (13)	156 (86)	2(1)
Vazirani Akinosi nerve block	8 (5)	171 (94)	2(1)
Intra-osseous injection	7 (4)	172 (95)	2(1)
Extra-oral mandibular nerve block	1 (1)	178 (98)	2(1)

TABLE 4: LOCAL ANESTHESIA BLOCK TECHNIQUES TAUGHT AT UNDERGRADUATE LEVEL

Technique	Yes n (%)	No n (%)	Not Answered n (%)
Inferior alveolar nerve block	166 (92)	13 (7)	2(1)
Gow gates block	40 (22)	139 (77)	2(1)
Vazirani Akinosi block	23 (13)	156 (86)	2(1)
Infra-orbital nerve block	66 (37)	113 (62)	2(1)
Posterior superior alveolar block	90 (50)	89 (49)	2(1)
Lingual nerve block	113 (62)	66 (37)	2(1)
Mental nerve block	112 (62)	67 (37)	2(1)
Long buccal nerve block	132 (73)	47 (26)	2(1)

TABLE 5: LOCAL ANESTHESIA TRAINING NEEDS REQUIREMENTS

Need for	Yes n (%)	No n (%)	Don't Know n (%)
Increased undergraduate training hours	152 (84)	17 (9)	12 (7)
Local anesthesia training at postgraduate level	124 (68)	26 (14)	31 (18)
Local anesthesia techniques' workshops for general dentists	164 (91)	9 (5)	8 (4)

TABLE 6: COMPLICATIONS SECONDARY TO INADVERTENT INTRAVASCULAR INJECTIONS^{12,13}

Local	Systemic
Skin blanching	Excitability
Blurring of vision	Tachycardia
Mydriasis	Tremor
Palpebral ptosis	Vomiting
Diplopia	Toxicity
Blindness (Temporary or permanent)	Cardiopulmonary collapse, Death

DISCUSSION

The study sample mainly consisted of general dental practitioners of around 29 years age with experience of around 6 to 10 years. The survey was conducted in the cities of Karachi and Lahore, which are the two most populous cities of Pakistan housing more than 50% of dental schools of Pakistan.⁹ The current survey sample doesn't include dentists of other cities from the provinces of Punjab and Sindh; and from Balochistan and North Western Frontier provinces of Pakistan. Moreover, the sampling was of convenience and does not fully cover the two cities surveyed. However, all the dental schools of Pakistan have to follow the guidelines on curriculum provided by Pakistan Medical and Dental Council, a federal statutory body which prescribes and monitors a uniform minimum standard of courses of training.⁴ More than 50%(87) of the participants were either house-surgeons, post-graduate trainees or specialists; indicating current or post-qualification affiliation with dental training institutions thus will be more current with the present training practices.

Prevention, recognition and management of potential complications related to local anesthesia; and selection of appropriate agent and technique to achieve local anesthesia for dental procedures are two of the top ten rated among forty six competencies in a validation survey among Canadian dentists.¹⁰ Inferior alveolar nerve block anesthesia, being one of the most commonly practiced local anesthetic technique in dentistry, was used to assess local anesthesia safety and efficiency.⁷ Local anesthesia injection in dentistry, if practiced while observing the prescribed safety measures, has a good safety record. One of the main safety measures to be observed during inferior alveolar nerve block is to avoid intravascular injection. Around 5–15% positive blood aspiration has been reported in the literature.¹¹ Local anesthesia intravascular injection can result in serious systemic, as well as, local complications (Table 6).^{12,13} Thus, aspiration before deposition of local anesthesia solution in the tissues is essential and accordingly the use of aspirating syringes for

dental local anesthesia has been mandated by ministry of health in Israel.¹⁴ Sixty seven percent (Fig. 1) of this survey participants did not practice aspiration during inferior alveolar nerve block injections; highlighting serious cause for concern about the safety of the injection.

Malamed identifies the inferior alveolar nerve block as the injection with the highest clinical failure rate, which he reports to be 15 to 20% when properly administered.⁷ Seventy three of the participants perceived the success rate of inferior alveolar nerve block to be above 90% (Fig. 2). Assessment of successful inferior alveolar nerve block can be subjective and success ratio indicated in this study is the retrospective perception of the dentists. Repeated inferior alveolar nerve block, Gow Gates mandibular nerve block, Vazirani Akinosi nerve block, Intra-osseous injection, Intra-ligamental local anesthesia, Buccal and Lingual infiltration anesthesia injections are the alternate techniques recommended in case of an unsuccessful inferior alveolar nerve block injection.⁸ Most of the survey participants in this study repeated inferior alveolar nerve block or used intra-ligamental injections in case of a failed inferior alveolar nerve block injection. Majority of the participants did not use other recommended techniques (Table 2).

American Dental Association (ADA) guidelines in the teaching of pain control and sedation to dentists and dental students recommend Posterior superior alveolar, Infraorbital, Nasopalatine, Greater palatine, Maxillary, Inferior alveolar/lingual, Mental/incisive, Buccal, Gow-Gates mandibular and Vazirani Akinosi closed mouth mandibular nerve block techniques as part of the predoctoral curriculum.¹⁵ A survey of 49 European dental schools providing undergraduate training reported all dental curricula included teaching of mandibular block anesthesia. The survey also reported instruction of infraorbital block anaesthesia (57%) and high tuberosity block anaesthesia (14%) techniques.⁵ Pakistan Medical & Dental Council and Higher Education Commission, the advisory and regulating bodies for dental education in Pakistan, as well as University of Health Sciences, curriculum provider and examination conducting body for eight dental schools of Punjab, Pakistan have used a blanket term like 'various administration techniques of local anesthesia to be taught at the undergraduate level of teaching'.^{4,16} Current survey mainly shows inferior alveolar nerve block, lingual nerve block, mental nerve block and long buccal nerve block techniques training was provided, whereas, other recommended techniques have not been taught by the dental schools of the survey participants at the undergraduate level (Table 3). Despite the shortcomings noted in safety, efficiency to address unsuccessful inferior alveolar nerve block injection, inadequate

local anesthesia block techniques training, as well as the desire for increased undergraduate training hours, half the participants were satisfied with their undergraduate training. At the same time, most of the survey participants recommended need for local anesthesia training at postgraduate level and local anesthesia techniques workshops for general dentists. This highlights lack of awareness among the survey participants of the current LA practice requirements; and local anesthesia teaching and training recommendations by various national and international authorities at the undergraduate level.^{3,4,10,15,16}

The authors feel that this inadequacy may partly be related to the shortcomings in the dental curriculum. Current curriculum, as recommended by Pakistan Medical & Dental Council, consists of four years of teaching and training. This includes first two years of basic sciences/pre-clinical instructions followed by two years of clinical teaching and training.⁴ The segregated method of teaching makes the transition from basic to clinical sciences abrupt and confusing because of lack of exposure to clinical environment during the early years; and is considered to deter clinical correlation of basic science knowledge into clinical training.¹⁷ Local anesthesia practice is part of a much bigger topic in the form of 'pain management' that encompasses around knowledge of anatomy, pharmacology and psychology. To overcome this discrepancy, vertical integration of the curriculum has been suggested so that didactic teaching of neuroanatomy, pharmacology and psychology should be correlated with clinical instruction of local anesthesia in the basic science years.¹⁸ One of the ways to improve vertical integration has been suggested in the recent past by Jenkins and Spackman.¹⁹ They presented a model of 'anatomical-clinical experience' whereby human cadavers were used in the preclinical years to teach LA practices during anatomy sessions. They concluded that this technique significantly reduced anxiety levels amongst the students related to their first clinical exposure with local anesthesia injections.

Current study of dentists feedback highlights several important aspects. There are serious shortcoming and lack of awareness in LA practice and safety standards. The practice of local anesthesia injection without aspiration can have serious systemic and local complications (Table 6) with imminent medico-legal implications. Techniques used to overcome unsuccessful inferior alveolar nerve block injection and local anesthesia block techniques taught at the undergraduate levels were also not up to the current recommended levels. Results show, as well as, survey participants felt a need for improvement in undergraduate, post-graduate and continuing education of local anesthesia. This study also shows Practitioners feedback as a useful tool

to assess current status of practice of a major stake holder in dentistry. The feedback can be used in curriculum planning for dental education. The study also highlights a need for local anesthesia curriculum revision.

REFERENCES

- 1 Matas R. The story of the discovery of dental anesthesia by nerve blocking: achievements of William Steward Halsted. *Surgery*: 1952, 32: 530-37.
- 2 Johnson TM, Badovinac R, Shaefer J. Teaching Alternatives to the Standard Inferior Alveolar Nerve Block in Dental Education: Outcomes in Clinical Practice. *Journal of Dental Education*: 2007, 71: 1145-1152.
- 3 Dower JS Jr: A Survey of Local Anesthesia Course Directors. *Anesth Prog*. 1998, 45(3): 91-95.
- 4 Higher Education Commission, Islamabad: Curriculum of B.D.S. – Prepared by PM&DC & HEC Islamabad; Released May 29, 2006. http://hec.gov.pk/components/com_bnvcontent/images/resources/2118_bds-2005.pdf; Access Date: May 11, 2009.
- 5 Brand HS, Kuin D, Baart JA: A survey of local anaesthesia education in European dental schools. *Eur J Dent Educ*, 2008, 12: 85-88.
- 6 Ende J: Feedback in clinical medical education. *J Am Med Assoc*. 1983, 250: 777-81.
- 7 Malamed SF. *Handbook of local anesthesia*. 5th ed. St. Louis: Mosby; 2004. p227, 237, 255, 261.
- 8 Madan GA, Madan SG, Madan AD; Failure of inferior alveolar nerve block: Exploring the alternatives. *J Am Dent Assoc*. 2002, 133: 843-46.
- 9 Pakistan Medical & Dental Council – Recognized Dental Colleges in Pakistan. <http://dev.plexushosting.com/PMDC/RecognizedDentalCollegesinPakistan/tabid/167/Default.aspx>; Access Date: May 11, 2009.
- 10 Gerrow JD, Murphy HJ, Boyd MA: Competencies for the beginning Dental Practitioner in Canada: A validity survey. *Journal of Dental Education*. 2006, 70: 1076-80.
- 11 Belmiro BCE, Freitas KCM, Canuto MR: Frequency of positive aspirations in anesthesia of the inferior alveolar nerve by the direct technique. *Med Oral Patol Oral Cir Bucal*. 2008, 13: E371-4.
- 12 Blanton PL, Jeske AH: Avoiding complications in local anesthesia induction – Anatomic considerations. *J Am Dent Assoc*. 2003, 134: 888-93.
- 13 Ngeow WC, Shim CK, Chai WL: Transient loss of power of accommodation in 1 eye following inferior alveolar nerve block: report of 2 cases. *J Can Dent Assoc*. 2006, 72: 927-931.
- 14 Lustig JP, Zusman SP: Immediate complications of local anesthetic administered to 1,007 consecutive patients. *J Am Dent Assoc*. 1999, 130: 496-99.
- 15 American Dental Association - Guidelines for Teaching Pain Control and Sedation to Dentists and Dental Students As adopted by the October 2007 ADA House of Delegates. Released October 1 2008. http://www.ada.org/prof/resources/positions/statements/anxiety_guidelines.pdf; Access date: May 11, 2009.
- 16 University of Health Sciences, Lahore – Syllabus for BDS final prof. Released April 3, 2009. http://221.120.210.195/downloads/curr_bds_final.pdf; Access date: May 11, 2009.
- 17 Topazian RG: Teaching local anesthesia in the diagonal curriculum. *J. Dent. Educ*. 1969, 33:374-76.
- 18 Hiatt NW: Correlation of teaching local anesthesia, neuroanatomy, pharmacology, and psychology. *J. Dent. Educ*. 1970, 34:179-81.
- 19 Jenkins DB, Spackman GK: A method for teaching the classical inferior alveolar nerve block. *Clin Anat*. 1995;8(3)231-34.