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Research Article

**PERCEPTION OF DENTISTS ABOUT TRAINING NEEDS OF  
LOCAL ANESTHESIA AMONG UNDERGRADUATE  
STUDENTS**Dr Sajal Khan<sup>1</sup>, Dr Hassan Mahmood<sup>2</sup>, Dr. Samia Rasool<sup>3</sup><sup>1</sup> Nishtar Institute of Dentistry, Multan<sup>2</sup> Senior Dental Surgeon THQ Hospital Burewala<sup>3</sup> University Medical and Dental college, Faisalabad**Article Received:** September 2020    **Accepted:** October 2020    **Published:** November 2020**Abstract:**

**Aim:** 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).

**Place and Duration:** The survey was conducted in the Nishtar Institute of Dentistry, Multan for one-year duration from August 2019 to August 2020.

**Methods:** The prospective survey was carried out on the basis of a survey of 181 dentists from Multan. The questionnaire aims to gather information on dentists' perceptions of general leading local anesthesia practices, their undergraduate level of education, and training needs at different career levels.

**Results:** Sixty-eight percent of participants did not aspirate with the inferior alveolar nerve block injection in LA. Most of the undergraduate students have not received training in important nerve blocking injections in LA. Most of the participants felt that education in Los Angeles should be improved at the undergraduate, graduate and continuing levels.

**Conclusion:** The study found serious shortcomings in safe and effective practices and training in LA. Due to the need to improve education and training in LA, the local anesthesia training program should be reviewed and implemented.

**Keywords:** Education in the field of dental local anesthesia. Safety in dental local anesthesia. Dentist's perception. Local anesthesia techniques.

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**INTRODUCTION:**

Painless dentistry began with the extraction of the lower wisdom tooth by Halsted and Hall (1884) injecting a cocaine solution around the jaw opening<sup>1-2</sup>. Since then, tremendous progress has been made in the selection of available drugs, an arsenal and various techniques to achieve safe and effective local anesthesia in the orofacial area. Dentistry today must be painless, and pain management is critical to the success of any dentist. In fact, many patients choose a dentist based on their perceived ability to perform painless dentistry<sup>3-4</sup>.

The safe and effective use of local anesthesia depends on the quality of undergraduate education. Local anesthesia training is provided by the Oral and Maxillofacial Surgery Department at most US and Puerto Rico dental facilities, and is standardized in most Western facilities. Teaching and training in local anesthesia is provided by the oral and maxillofacial surgery departments of Pakistan Dental Schools in accordance with the guidelines of the Pakistan Medical and Dental Council (PMDC) and the Higher Education Commission (HEC)<sup>5-6</sup>. Local anesthesia degree programs have been evaluated in America and Europe; however, such studies have not been carried out in other countries. In addition, our electronic and manual literature review failed to find an assessment of dentists' perceptions of local anesthesia training and practice. Feedback in medical education is the control of the system by transferring achievement results to

the system and it is central to curriculum planning<sup>7-8</sup>. Course providers as well as end users such as dentists and dental students must continually change their various educational programs through these responses<sup>9</sup>.

The purpose of this study was to provide feedback on the insights of some leading Pakistani dentists on local anesthesia, their undergraduate education, and the need to improve their undergraduate local anesthesia education, general and postgraduate dental practice.

**METHODOLOGY:**

This study was designed as a prospective questionnaire-based questionnaire (Table 1). The survey was conducted in Nishtar Institute of Dentistry, Multan for one-year duration from August 2019 to August 2020. The surveys were carried out and collected by dentists working in Multan. Selected dentists were readily available. Demographic data were recorded: age, gender, years of work experience as a dentist, voivodship of practice, current status of professional practice and place of work. The questionnaire (Table 1) aims to gather information about the perceptions of general dentists in the following three areas:

1. Your most important uses for local anesthesia.
2. The level of education provided to them at the undergraduate level.
3. Training needs at various levels of professional career.

TABLE 1: QUESTIONNAIRE USED FOR THE SURVEY

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

The most important local anesthetic practices were assessed through questions about the safety and efficacy of local anesthetic injections. Safety under local anesthesia was analyzed by asking about the frequency of positive blood aspiration during administration of inferior alveolar nerve block with question (Q) 1. The effectiveness of local anesthesia was assessed by asking about the frequency of inferior alveolar nerve block (IANB) and alternative local anesthesia techniques (Table 2) in case of IANB injection failure (Q 2 and 3).

The perception of the level of training at the undergraduate level was assessed on the basis of questions about training conducted in techniques of blocking local anesthesia at the undergraduate level (K 4), the approximate number of training hours (lectures / demonstrations) (Q5) devoted to local anesthesia during training at the dental school and were they satisfied with the level of training provided to them (Q6).

Training needs at different career levels were assessed by asking about the academic year seen as suitable for introducing local anesthesia training into an undergraduate program (Question 7); and if there was a need to increase the number of hours of undergraduate training (Q8), postgraduate training in local anesthesia (Q9) and workshops in local anesthesia techniques for general dentists (Q10).

The data from the returned questionnaires were entered into the SPSS. Descriptive data analysis was performed for the mean and frequency of the identified variables.

### RESULTS:

A total of 181 (108 men and 73 women) participants, with a mean age of 29 (21 to 65), returned the completed questionnaire forms. Of these, 117 participants were from Multan, Punjab and 64 from Karachi, Sindh. About 56% of participants had less than 5 years of experience, 31% had between 6 and 10 years of experience, and 13% had more than 10 years of experience. 40% of participants were general practitioners, 18% home surgeons, 15% postgraduate trainees and specialists; and 12% were final-year students. Fifty-eight percent of respondents worked in hospitals, 22% worked only in private clinics, and 20% worked in both of the above configurations.

A significant number of subjects (67%) stated that they did not draw blood during the injection of the inferior alveolar nerve block (Fig. 1). Seventy-three percent of participants saw up to 10% of ineffective inferior alveolar nerve block injections (Fig. 2). Table 3 lists alternative local anesthetic techniques used by study participants for inferior alveolar nerve block injection failure.

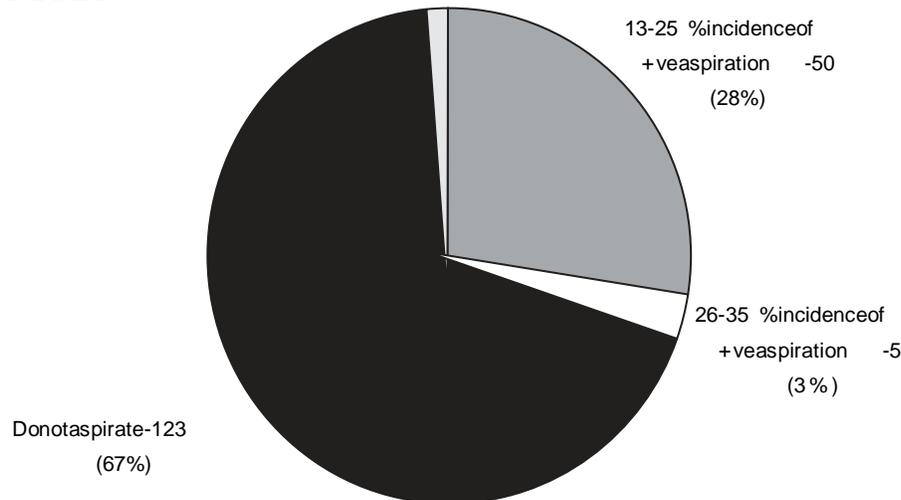


Fig 1: Frequency of Positive Blood Aspiration during Inferior Alveolar Nerve Block

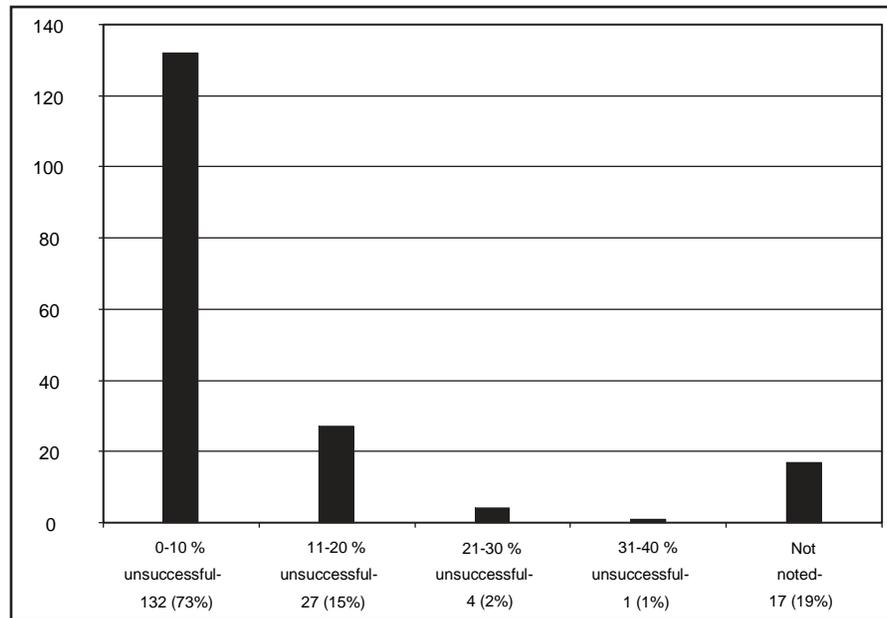


Fig 2: Reported Frequency of unsuccessful Inferior Alveolar Nerve Block

Most of the undergraduate students were not trained in the use of Gow Gates' mandibular nerve block, Vazirani Akinosi block, orbital nerve block, and superior posterior alveolar nerve block (Table 4). Most of the respondents (60%) did not remember the number of hours of postgraduate training in local anesthesia, while 28% received up to 10 hours and 12% up to 20 hours of training in LA. Fifty percent of participants were satisfied with the quality of training provided at the undergraduate level, 30% were not satisfied and 20% were unsure about the quality of the training. Most participants (63%) thought local anesthesia training should start in the third year of the undergraduate studies of the four-year Bachelor of Dental Surgery program, while 28% considered the second year, 7% the first year and 2% the fourth year. suitable for starting local anesthesia training. Most expected improvement in education at the undergraduate, postgraduate and continuing levels (Table 5).

TABLE 2: LA TECHNIQUES USED FOR FAILED INFERIOR ALVEOLAR NERVE BLOCK (IAN)

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 undergraduatetraining hours	152 (84)	17 (9)	12 (7)
Local anesthesia trainingat 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

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 test sample consisted mainly of GPs approximately 29 years of age with experience ranging from approximately 6 to 10 years. The study was conducted in the Multan, which are the two most populous cities in Pakistan, with over 50% of Pakistani dental schools. Moreover, the selection of the sample was convenient and does not fully cover the two analyzed cities. However, all dental schools in Pakistan must adhere to the curriculum guidelines provided by Pakistan Medical and Dental Council, a federal statutory body that defines and monitors a uniform minimum standard of training courses. Over 50% (87) of the participants were home surgeons, postgraduate trainees or specialists; the indication of belonging to the current or post-qualification in dental education institutions will therefore be more relevant for current training practices.

Prevention, diagnosis and management of potential complications related to local anesthesia; and the selection of an appropriate local anesthetic agent and technique for dental procedures are two of the top ten competencies found in the forty-six competencies in a validation study conducted among Canadian dentists. Inferior alveolar nerve block anesthesia, one of the most commonly used local anesthesia in dentistry, was used to evaluate the safety and effectiveness of local anesthesia<sup>9-10</sup>. The performance of local anesthesia in dentistry, when practiced with the recommended safety precautions, has a good safety record. One of the main safety precautions to be taken during inferior alveolar nerve block is to avoid intravascular injection. About 5–15% of positive blood aspirations are described in the literature. Under local anesthesia, intravascular injection may cause serious systemic and local complications (Table 6). Therefore, aspiration before embedding the local anesthetic solution in the tissues is essential and therefore the Israeli Ministry of Health has ordered the use of aspiration syringes for local anesthesia<sup>1</sup>. Sixty-seven percent (Fig. 1) of respondents did not practice aspiration during injections of inferior alveolar nerve block; to highlight serious concerns about injection safety<sup>11-12</sup>.

The authors believe that this inadequacy may be partly related to shortcomings in the dentistry curriculum. The current curriculum, as recommended by the Pakistan Medical & Dental Council, covers four years of teaching and training. This includes the first two years of basic science / preclinical instruction, followed by two years of clinical teaching and training. The separate teaching method makes the transition from basic science to clinical science abrupt

and confusing due to a lack of contact with the clinical environment in the early years; and is believed to affect the clinical correlation of basic science with clinical training<sup>13-14</sup>. The practice of local anesthesia is part of a much larger topic in the form of "pain management" that includes knowledge of anatomy, pharmacology and psychology.

To overcome this discrepancy, a vertical integration of the curriculum was proposed, so that the didactic teaching of neuroanatomy, pharmacology and psychology would be correlated with the clinical instruction of local anesthesia during the years of basic education. One way to improve vertical integration was recently suggested by Jenkins and Spackman. They presented a model of an 'anatomic-clinical experience' whereby human cadavers were used in the pre-clinical years to teach practice in LA during anatomy sessions. They concluded that this technique significantly reduced levels of anxiety among students associated with their first clinical exposure to local anesthetic injections.

The current dentist opinion poll highlights several important aspects. There are serious shortcomings and a lack of awareness of Los Angeles' safety practices and standards<sup>15</sup>. The practice of injecting local anesthesia without aspiration may be associated with serious systemic and local complications (Table 6) with inevitable medical and legal implications. Techniques used to overcome ineffective injection of inferior alveolar nerve blockade and local anesthetic blocking techniques taught in undergraduate studies were also not at the current recommended levels. The results also show that study participants felt the need to improve their undergraduate, postgraduate and continuing studies in local anesthesia. This study also shows the views of practitioners as a useful tool to assess the current state of the practice of an important page in dentistry. Feedback can be used in the planning of the dental education curriculum. The study also highlights the need to revise the local anesthesia curriculum.

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