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Assessing the mastery of local anesthesia by students by evaluating the amount used for single tooth extraction

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ABSTRACT

Local anesthesia is more commonly used in dentistry to facilitate a painless treatment experience for a patient during surgical procedures involving bone and soft tissue. Hence, to facilitate a painless treatment experience for a patient should know ideal requirements before administering a dose. This study aims to assess the mastery of local anesthesia by students by evaluating the amount used for single tooth extraction. In this retrospective study, data were obtained from hospital records. The data was obtained from the department of oral and maxillofacial surgery from June 2019 - April 2020. A total of 2100 patient details were evaluated. The collected data were tabulated and statistically analysed using SPSS software (Version 21: IBM Corporation NY USA). Descriptive statistics (frequencies and percentages) were calculated to explore the general features of the data. Pearson chi square test was done to statistically analyze the data. Patients of all age groups were included in this study. Around 14.5% of the patients were below 30 years, 40.7% of the patients were between the age of 30-50 years, and 55.2% of the patients were above 50 years old. Around 95.9%, 3.1%, 0.9% and 0.1 % were administered with 2, 3, 4 and 5 ml respectively, of which 55% and 45% were male and female patients respectively. Within the limits of this study, 95.9% were administered with 2ml for extracting a single tooth. 95.9% use ideal recommended dose and concentration for performing a single tooth extraction.

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INTRODUCTION

Local anesthesia is more commonly used in dentistry to facilitate a painless treatment experience for a patient during surgical procedures involving bone and soft tissue. Administering local anesthesia by injection is still the most common method used in dentistry. However, there is a constant search for ways to avoid the painful nature of the injection and find a more comfortable means of achieving local anesthesia for dental treatments (Kumar and Snena, 2016).

There are various local anesthetic agents available with the wide range of vaso-constrictive agents

which improves the efficiency and the duration of local anesthesia. Lignocaine with adrenaline is used in various concentrations in most of the dental procedures (Caviedes-Bucheli *et al.*, 2013; Jesudasan *et al.*, 2015). Local anesthetic agents are chemicals that reversibly block the transmission (Kanaa *et al.*, 2006; Kumar and Rahman, 2017) of the action potential of nerve membranes.

Dental procedures are often performed under local anesthesia; thus, drug-related complications are commonly encountered.

It is compulsory to evaluate the patient before treatment for choosing the proper local anesthetic agent. Various complications, including hypersensitivity, toxicity, overdosage, allergy, hematoma, trismus or paresthesia, can be observed during procedures. Therefore, dentists should be aware of the possible complications and management methods (Kumar, 2017b).

An essential requirement to success in dentistry is to achieve good quality local anesthesia (LA) (Haase *et al.*, 2008; Kumar, 2017a). Local anesthetic agents are normally associated with the absence of pain during surgical procedures in bone and soft tissue. There are various local anesthetic agents, lignocaine being the gold standard available with the wide range of vaso-constrictive agents that improve the efficiency and the duration of LA. If adrenaline is not added to lignocaine, vasodilating effect of lignocaine limits pulpal anesthesia to only 5-10 min (Yagiela, 1999; Rao and Kumar, 2018). 0.2mg Adrenaline in local anesthesia is a safe maximum dose in healthy patients, and it is recommended to limit the total dosage to 0.04mg in cardiac patients. The amount of local anesthesia should be kept to a minimum quantity. This is capable of producing adequate results.

Adrenaline acts on both α and β-adrenergic receptors (Oliveira *et al.*, 2004; Sweta and Abhinav, 2019). Drugs like adrenaline can cause a number of cardiovascular disturbances systemically. While most are short-termed, permanent injury may follow drug-induced ventricular fibrillation, cerebro-vascular or myocardial infarction accidents (Hersh *et al.*, 1995; Kumar and Snena, 2016). Management of pain is an important part of dentistry, especially while performing surgically invasive procedures. Dosage and technique of local anaesthesia administration are very important in successfully treating a patient.

Hence, one should know the ideal recommended concentration before administering the dose. This study aims to assess the mastery of local anesthesia by students by evaluating the amount used for single tooth extraction.

MATERIALS AND METHODS

In this retrospective study, data were obtained from hospital records of a private dental college and hospital to evaluate the mastery of local anesthesia by students by evaluating the amount used for single tooth extraction. Case records between June 2019 - April 2020 was reviewed. A total of 2094 patient details were evaluated from a total of 86000 patient records. The current study is in a university setting.

Ethical approval was obtained from the Institutional ethics community. The collected data were tabulated and statistically analysed using SPSS software (Version 21: IBM Corporation NY USA). Descriptive statistics (Frequencies and Percentages) were calculated to explore the general features of the data.

RESULTS AND DISCUSSION

Patients from the age group of 20 years were included in this study. Around 14.5% of the patients were between 20-30 years, 40.7% of the patients were between the age of 30-50 years, and 55.2% of the patients were above 50 years old Figure 1. Around 95.9%, 3.1%, 0.9% and 0.1 % were administered with 2,3, 4 and 5 ml respectively Figure 2. There were 55% and 45% male and female patients, respectively Figure 3. Association between age and amount of LA used for extraction of a single tooth was done using Chi square test (P-Value = 0.021) and was found statistically significant Figure 4.

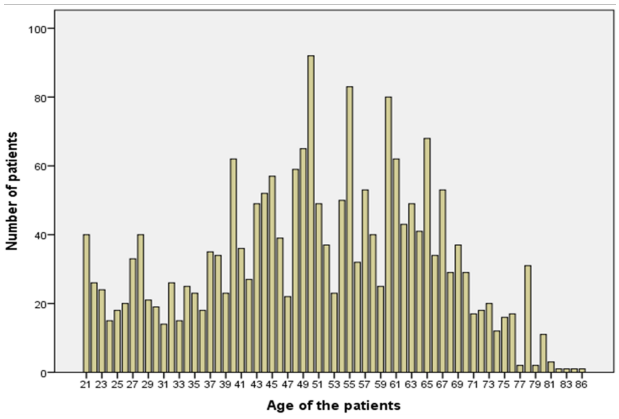

Figure 1: Bar graph depicts the age distribution of the patients who underwent single tooth extraction

From the results of this study, it is evident that 95.9% use ideal recommended dose and concentration for extracting a single tooth. Lignocaine is the gold standard, which is available in a wide range of vasoconstrictive agents that improves efficiency and duration of LA (Patturaja and Pradeep, 2016; Al-Delayme, 2014; Marimuthu *et al.*, 2018). The dura-

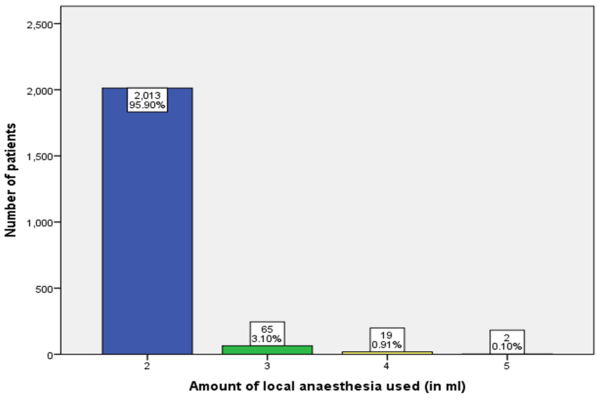

Figure 2: Bar graph depicts the amount of local anesthesia used (in ml) to the patients who underwent single tooth extraction

tion, as well as the depth of anesthesia, is prolonged by the usage of adrenaline. It is useful in minimizing the loss of blood in surgical procedures (Packiri, 2017). The presence of a vasoconstrictor in the anesthetic cartridge has a major influence on the duration of anesthesia (Kennedy *et al.*, 2001).

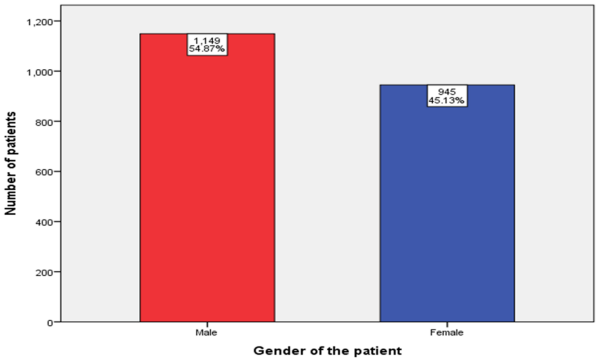

Figure 3: The graph depicts the number of male and female patients who underwent single tooth extraction

A comparison between two local anesthetic methods for surgical removal of a single tooth was performed in Dijla University of dentistry, Iraq (Christabel *et al.*, 2016). A total of 53 patients participated in their study. There was no correlation between age and sex with the amount of dosage administered. The improvements in agents and techniques for local anesthesia improve the patients' perceptions, comfort and acceptance during dental treatment (Patil *et al.*, 2017). Management of pain is an important factor for reducing the fear and anxiety associated with dental treatment. The amount of discomfort during procedures is due to the choice of the local anesthetic technique used (Rahman and Kumar, 2017; Jain *et al.*, 2019). To propose a comfortable and safe method during intraoral injections to anaesthetize the detention and surrounding hard and soft tissues during surgical extraction. This significantly prevents administering additional doses of LA (Abhinav *et al.*, 2019).

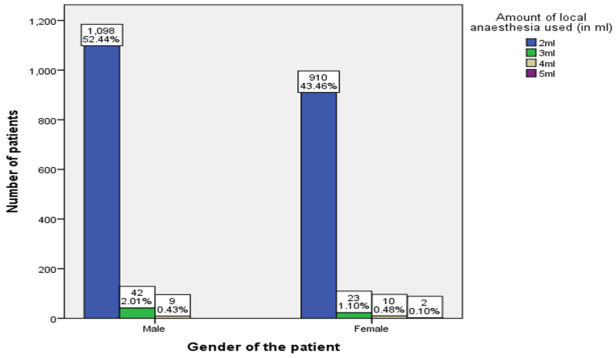

Figure 4: Bar chart showing the association between the gender of patients and the amount of LA used for extraction of a single tooth

The limitations of this study were limited population covered, uni-centric study - Other postoperative complications not observed and unequal distribution of male and female patients.

Figure 1, X-axis represents the age of the patients who underwent single tooth extraction, and Y-axis depicts the number of patients in the respective age group. Around 304 (14.5%) of the patients were between 20-30 years, 755 (40.7%) of the patients were between the age of 30-50 years, and 1041 (55.2%) of the patients were above 50 years old.

Figure 2, X-axis depicts the amount of local anesthesia used for a patient in ml and Y-axis depicts the number of patients who were given 2ml, 3ml, 4ml, 5ml, respectively. Majority of the patients, 2013 (95.90%) were administered only 2ml (the recommended dose) of LA.

Figure 3, X-axis represents the gender of the patient, and Y-axis represents the number of patients in the respective gender. 1149 (54.87%) patients were males, and 945 (45.13%) were females.

Figure 4, X-axis represents the gender of the patient, and the Y-axis represents the number of patients who underwent single tooth extraction. Association between gender and the amount of LA used was done using Chi square test and was found to be statistically significant. Pearson's Chi square value - 5.615, P-Value - 0.021 (< 0.05) meaning, of the 2013 patients (95.90%) who were administered 2 ml majority of them were males (1098 patients - 52.44%). The values are statistically significant because the number of male patients who reported was more than the number of female patients.

CONCLUSION

Within the limits of this study, 95.9% of patients were administered the recommended dose only for extracting a single tooth. From the result, it is evident that most of the students in this teaching hospital have mastered the art of administering local anesthesia.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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