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ASSOCIATION OF COMPLICATIONS WITH EXTRACTIONS USING LIGNOCAINE WITHOUT ADRENALINE IN PATIENTS WITH AND WITHOUT HYPERTENSION AGED BETWEEN 75-90 YEARS OF AGE - A CASE STUDY

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ABSTRACT

Local anesthetic agents are chemicals that reversibly block the transmission of the action potential of nerve membranes. An essential prerequisite to success in dentistry is to achieve good quality local anesthesia (LA). Local anesthetic agents are normally associated with absence of pain during surgical intervention in bone and soft tissue.The aim of this study was to determine whether lignocaine without adrenaline has any effect on hypertension patients. A total of 89000 cases were reviewed between June 2019 to March 2020 for patients who had undergone extraction using lignocaine without adrenaline in individuals.A sample size of 3

case sheets were reviewed for extractions using lignocaine without adrenaline . The data was obtained from dental treatment records of a private dental institute. Data was analysed using SPSS software and Mann-Whitney was done. The results showed that there's minimal usage of lignocaine without adrenaline in patients with hypertension. Within the limitations of the present study, there's minimal usage of lignocaine without adrenaline in patients with hypertension.

INTRODUCTION

Local anesthetic agents are chemicals that reversibly block the transmission of action potential of nerve membrane.[1] An essential prerequisite to success in dentistry is to achieve good quality local anesthesia (LA). Local anesthetic agents are normally associated with absence of pain during surgical intervention into the bone and soft tissue and there are many local anesthetic agents, lignocaine being the gold standard available with various selection of vasoconstrictive agents that brush up the clinical efficacy and the duration LA.[2].A common belief in medicine, dentistry ,and even among the patients is that the use of epinephrine is contraindicated in cardiovascular patients as epinephrine suddenly increases the blood pressure (BP) and heart rate (HR).On the other hand, some people studies have shown that the quantity of epinephrine in dental cartridges is so low that use of one to three cartridges of lidocaine with epinephrine is safe and has no considerable effect on the cardiac parameters like BP, HR, etc.

Lignocaine diffuses readily through interstitial tissues and lipid rich nerves, giving immediate onset of action .[3]Its vasodilating effect is more than that of prilocaine and mepivacaine whereas adrenaline prolongs the duration as well as the depth of anesthesia and it is effective in preventing or minimizing blood loss during surgical procedures. Due to vasoconstrictive effects of adrenaline, absorption of LA and systemic toxicity are reduced. If adrenaline is not added to lignocaine, vasodilating effect of lignocaine limits pulpal anesthesia to only 5-10 min.The safe maximum dose for a healthy patient is 0.2 mg of adrenaline and it is best to limit the total dose to 0.04 mg in cardiac patients. It should be kept to the least amount capable of producing adequate results. Adrenaline acts the moment on both α and β-adrenergic receptors and extensive adrenaline can cause a number of cardiovascular disturbances while most are short term, permanent injury or even death may follow drug induced ventricular fibrillation, myocardial infarction or cerebrovascular accidents.[4] Local anaesthesia is also known to be given while managing minor surgeries such as oral ranula.[5]

Hypertension is the systolic blood pressure (SBP) of ≥ 140mmHg or diastolic blood pressure (DBP) of ≥90mm Hg .More than 90% of causes of hypertension are not clear but there are certain regulatory systems of blood pressure as well as environmental factors which contribute in regulation of blood pressure.[6] Blood pressure is also regulated by cardiac output and heart rate.[7] Over one utmost apprehension of dental treatment for hypertensive expression of the genes which controlled these regulatory systems may contribute in high blood pressure.[8] Due to high prevalence of hypertension

globally,it is one of the most frequent disease seen in patients who are visiting the dental clinics and hospitals.

Raised BP remains the main cause of death globally, accounting for 10.4 million deaths per year .[9] When reviewing global figures, an estimated 1.39 billion people had hypertension in 2010 .[10] However, BP trends show a clear shift of the highest BPs from high-income to low-income regions ,with an estimated 349 million with hypertension in HIC and 1.04 billion in LMICs [11].The large disparities in the regional burden of hypertension are accompanied by low levels of awareness, treatment , and control rates in LMIC, when compared with HIC. In response to poor global awareness for hypertension (estimated 67% in HIC and 38% in LMIC) ,the ISH started a global campaign to increase awareness of raised BP, namely the May Measurement Month initiative .

Despite several initiatives, the currency of raised BP and adverse impact on cardiovascular morbidity and mortality are increasing globally, irrespective of income.[12] It is, therefore, condemning that population-based initiatives are applied to reduce the kJ global burden of raised BP, such as salt-reduction activities and improving the availability of fresh fruit and vegetables. High-normal BP is intentional to identify individuals who could benefit from lifestyle interventions and who would receive pharmacological treatment if compelling indications are present.Isolated systolic hypertension defined as elevated SBP(> 140 mmHg) and low DBP (<90 mmHg) is common in young and in elderly people.Isolated systolic hypertension is the most frequent form of essential hypertension seen in young individuals, including children, adolescents and young adults, However, it is also familiar in the senior citizens, in whom it reflects stiffening of the large arteries with an increase in pulse pressure (difference between SBP and DBP). The use of office and out of office BP measurements identifies individuals with white-coat hypertension, who have increase BP only in the office (non elevated ambulatory or home BP), and those with masked hypertension, who have non elevated BP in the office but elevated BP out of the office (ambulatory or home). These states are common among both untreated subjects and those treated for hypertension and about 10–30% of subjects that attend clinics because of high BP have white-coat hypertension and 10–15% have masked hypertension.

MATERIALS AND METHOD

This study was carried out by collecting patients' data from record management software from the private dental institute where we got approval for our research topic . We registered our research topic in a private dental institute in Chennai .Our project was evaluated and approved by the ethical committee of the private dental institute.The sample size that we have collected from the private dental institute was 6 of them were without local adrenaline.The inclusion criteria for this study are patient's extraction record using lignocaine without adrenaline,patient's age from 75- 90 years,patient with hypertension records ,record of tooth that has been extracted ,patients' photographs of extraction,review for post extraction complications(by calling

them).In this study , 3 of them such as 1 guide, 1 reviewer and 1 researcher will take part in this research.The data been collected from June 21st 2019 to March 21st 2020 for patients with hypertension who underwent extraction.The Data has been transferred into Statistical Package for the social sciences (SPSS)Software for statically results. A correlation test (Maan - Whitney test) was done.

RESULTS

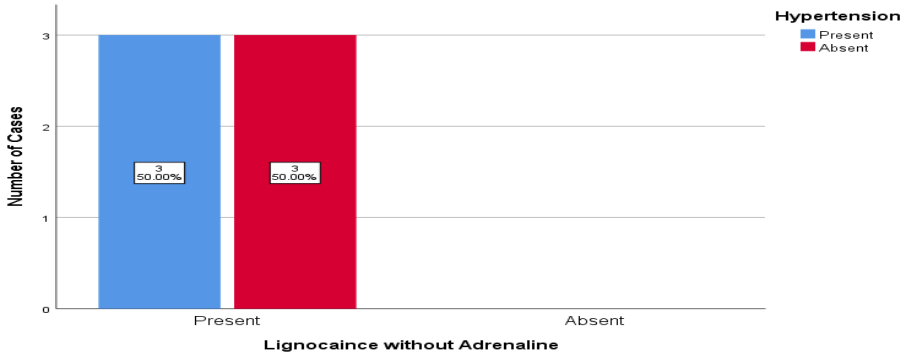
The final study sample size includes a total of 6 patients with and without hypertension who underwent extraction with lignocaine without adrenaline. Among the 6 Patients,of all 6 patients are male .(Figure 1) Patients aged around 75-84 years were reported the most for extraction without Lignocaine (Figure 2).Out of 6 patients who underwent extraction using lignocaine without adrenaline in both groups (with and without hypertension), only 2 patients had post extraction complications.(Figure 3).

DISCUSSION

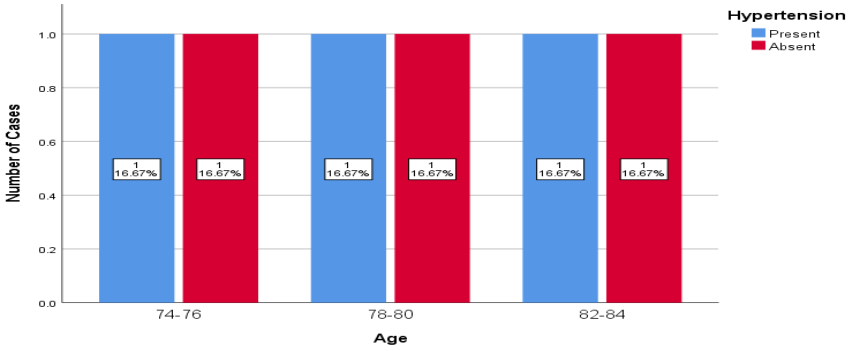
Healthy lifestyle alternatives can prevent or delay the onset of high BP and can reduce cardiovascular risk .[13] The first line of antihypertensive treatment is also known as lifestyle modification and modifications in lifestyle can also build up the effects of antihypertensive treatment. Lifestyle modifications should be included the following as hypertension is the most important risk factor for ischemic or hemorrhagic stroke.[14]Stroke can be largely prevented by BP control.BP should be reduced if >140/90mmHg and treated to a target <130/80 mmHg (<140/80 in elderly patients) [15].Antiplatelet treatment is routinely propose for ischemic but not hemorrhagic stroke and should be carefully considered in patients with hemorrhagic stroke only in the presence of a powerful indication.Lignocaine is the most commonly used in dentistry,even though there are many LA agents available in the market. Most of the time, LA agents are used with vasoconstrictors, though the concentrations may differ. The presence of a vasoconstrictor in the anesthetic cartridge has a vital influence on the life span of anesthesia.The capacity of vasoconstrictors to retard the systemic absorption of injected LA agents is the basis for their widespread use.[16]

Vasoconstrictors employed in local anesthetic solutions have the prospective for interacting with wide variety of drugs and physiological comeback associated with local anesthetic solutions containing a vasoconstrictor have included changes in heart rate and BP, dysrhythmias, ischemic changes (ST segment and T wave), the release of endogenous catecholamines, endocrine response to surgery and hypokalemia.[17] For the surgical soft tissue and bone interventions in the oral region, local anaesthetic agents with adrenaline as the vasoconstrictor used tend to root more post-operative pain than LA without adrenaline as the vasoconstrictor.There was significant rise in the mean pulse rate when 1:80000 adrenaline used whereas no significant change observed in 1:200000 used where significant cardiovascular effects were observed in the study as seen in the statistical analysis, there was significant rise in the mean pulse rate when 1:80000 adrenaline used whereas no significant change observed in 1:200000 used.

There was a significant rise in the systolic and diastolic BP when LA with 1:80000 adrenaline used while 1:200000 adrenaline did not bring any significant change. Elad et al. (2001)demonstrated significant cardiovascular changes 10 mins after the injection of lidocaine with the higher adrenaline concentration of 1:80000.[18] Gregorio et al. has reported after his study that it is important to stress that with articaine and other local anesthetic solutions in general, 1:100000 and 1:50000 epinephrine concentrations are associated with greater cardiovascular stimulation than 1:200000 epinephrine formulations.[19]LA with any of the concentration of adrenaline can be used on an adult healthy patient as the efficacy is not altered in both the solutions. But in elderly and cardiac patients, LA with 1:200000 adrenaline concentration is preferred.[20][21]Since the duration of anesthesia is significantly different for both the solutions, LA with 1:80000 is preferred in case of long procedure.[22][23] For hypertensive patients, some physicians advise LA without adrenaline but LA with 1:200000 could be used taking the advantage of adrenaline and avoiding complications as the adrenaline concentration is insignificant.[24,25]Extractions of third molars are required to avoid flap inclination between each teeth. [26] The most common procedure carried out by dentists is dental extraction , and it is a common model for evaluating the efficacy of analgesics for acute dental pain relief and it is often associated with swelling, pain, and trismus.[27–29]



Graph 1 The bar graph representing the gender distribution in case and control group(X-axis represents Presence and Absence of usage of Lignocaine without adrenaline and Y-axis represents Number of Cases ; Blue represents Present and Red represents Absent). Among the 6 patients,3 of them had hypertension and underwent extraction using lignocaine without adrenaline while the other 3 don't have hypertension but underwent extraction using lignocaine without adrenaline.



Graph 2 Graph bar depicting age involved in case and control group.(X-axis represents age and Y-axis represents number of cases ; Blue represents Presence of Hypertension ; Red represents Absence of Hypertension). Patients aged around 74-84 years were reported the most for undergoing extraction using lignocaine without adrenaline.

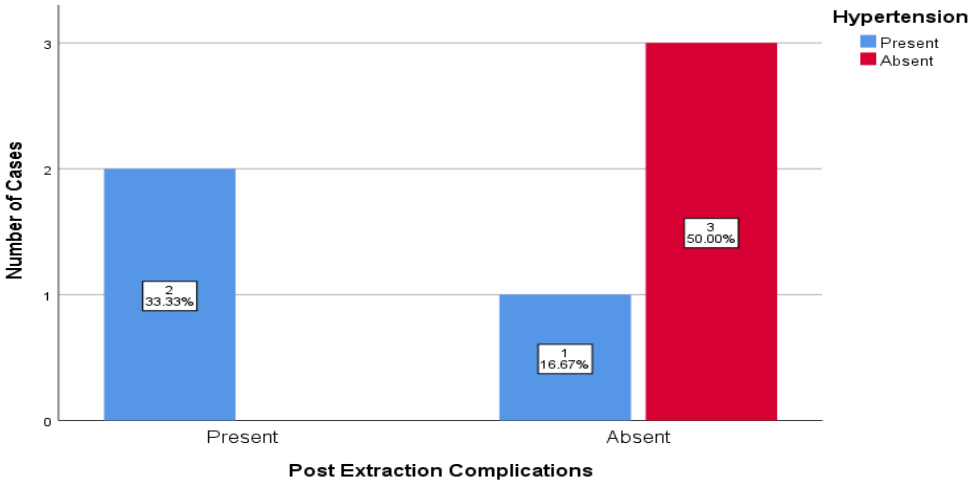


Figure 3 Bar graph depicting the comparison between post extractions complications of patients and presence or absence of hypertension (X-axis represents presence or absence of post extraction complications and Y-axis represents number of cases ; Blue represents presence of hypertension and Red represents absence of hypertension).Out of 6 patients who underwent extraction using lignocaine without adrenaline in both groups (with and without hypertension), only 2 patients had post extraction complications,which was statistically significant. (Mann Whitey test ; p =0.000- highly significant)

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AUTHORS CONTRIBUTION

YashilaPeriyasamycontributed to the study design, data collection and preparation of the manuscript

Bala Krishna contributed to the study design, data collection and preparation of the manuscript

SubhashiniChandrasekarcontributed to the study design, data collection and preparation of the manuscript

CONFLICT OF INTEREST

This research project is self funded. There is no conflict of interest.

CONCLUSION

When treating any patient taking medication, one should be aware of the potential medical complications and always use the least concentrated solution of vasoconstrictor that allows for deep anesthesia during a period of time. Lignocaine with no concentration of adrenaline will not compromise the profundity and success of anesthesia and would be safe for this group of patients.

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