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MANAGEMENT OF TOOTH EXTRACTION WITH LOCAL ANESTHESIA IN ELDERLY WITH DIABETES MELLITUS AND OBESITY: LITERATURE REVIEW

(MANAJEMEN EKSTRAKSI GIGI DENGAN ANASTESI LOKAL PADA LANSIA DENGAN DIABETES MELLITUS DAN OBESITAS : LITERATURE REVIEW)

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ABSTRACT

Dental health in the elderly is significantly influenced by aging and systemic conditions such as diabetes mellitus and obesity, which increase the risk of complications during dental procedures, particularly tooth extraction. . Diabetes can impair wound healing and heighten susceptibility to infection, while obesity is associated with increased procedural risks. Proper management of local anesthesia and a comprehensive medical approach are key to the success of tooth extraction procedures in elderly patients with diabetes mellitus and obesity. This literature review aims to analyze the role of local anesthesia in the management of tooth extraction in elderly patients with diabetes mellitus and obesity.This study uses a literature review method to evaluate and synthesize research on local anesthesia in dental

procedures for patients with hypertension, diabetes, and obesity in older people. Articles used were sourced from databases such as Google Scholar, PubMed, Science Direct, and ResearchGate, covering publications from 2000 to 2023. The selected literature focuses on the effects of local anesthesia on related medical conditions and its implications in dental practice for elderly patients. Tooth extraction management in elderly patients with diabetes mellitus and obesity requires a cautious approach, including blood sugar control, appropriate local anesthesia selection, and careful monitoring of vital signs to prevent complications. Effective communication between the dentist and the patient is crucial to reduce anxiety, while intensive post-operative care and pain management are also critical in the recovery process. With the right approach, the extraction procedure can be performed with minimal complications in elderly patients with these medical conditions.

Keywords: diabetes mellitus; local anesthesia; obesity; tooth extraction

ABSTRAK

Kesehatan gigi pada lansia sering terpengaruh oleh penuaan dan kondisi medis, seperti diabetes mellitus dan obesitas, yang dapat memperburuk masalah kesehatan mulut. Diabetes meningkatkan risiko infeksi dan memperlambat penyembuhan luka, sementara obesitas memperburuk risiko komplikasi pada prosedur medis, termasuk ekstraksi gigi. Pengelolaan anestesi lokal yang tepat dan pendekatan medis yang komprehensif menjadi kunci keberhasilan prosedur ekstraksi gigi pada lansia dengan diabetes mellitus dan obesitas.Penelitian ini menggunakan metode literature review untuk mengevaluasi dan mensintesis penelitian terkait anestesi lokal pada prosedur kedokteran gigi pada pasien dengan hipertensi, diabetes, dan obesitas pada lansia. Artikel yang digunakan diambil dari berbagai sumber seperti Google Scholar, PubMed, Science Direct, dan ResearchGate dengan rentang tahun publikasi 2000 hingga 2023. Literatur yang terpilih difokuskan

pada efek anestesi lokal terhadap kondisi medis terkait, serta implikasinya dalam praktik kedokteran gigi pada pasien lansia.Manajemen ekstraksi gigi pada pasien lansia dengan diabetes mellitus dan obesitas memerlukan pendekatan yang hati-hati, termasuk pengendalian gula darah, pemilihan anestesi lokal yang tepat, dan pemantauan tanda vital yang cermat untuk mencegah komplikasi. Komunikasi yang baik antara dokter gigi dan pasien sangat penting untuk mengurangi kecemasan, sementara perawatan pascaoperasi yang intensif dan pengelolaan rasa sakit juga menjadi bagian penting dalam proses pemulihan. Dengan pendekatan yang tepat, prosedur ekstraksi dapat dilakukan dengan risiko komplikasi yang minimal pada pasien lansia dengan kondisi medis tersebut.

***Kata kunci**: anestesi lokal; diabetes mellitus; esktraksi gigi; obesitas*

INTRODUCTION

In old age, dental health often declines due to aging, affecting teeth' strength and supporting tissues.[1] In addition, older people often face various medical conditions that affect dental health, including diabetes mellitus, which can worsen oral health problems, such as infections and slower wound healing.

Diabetes mellitus is one of the most common metabolic diseases suffered by older people.[2] This condition affects the body's metabolism and is at high risk of causing complications in body tissues, including the mouth. Patients with diabetes are more susceptible to infection and periodontal disease and have a slower wound-healing rate. It is undoubtedly a challenge in dental care management, especially in tooth extraction procedures that require optimal post-operative recovery.

Obesity is also a health problem that is increasingly widespread among older people and can worsen the risks associated with medical procedures, including tooth extraction.[3] Obese patients tend to have cardiovascular problems, respiratory disorders, and resistance to anesthesia, which have the potential to increase the risk of complications. Therefore, anesthetic management in obese patients must be carried out carefully, taking into account the

appropriate dose and type of anesthesia to minimize the risk.

Local anesthesia is the primary choice for tooth extraction in elderly patients because it is safer than general anesthesia. Local anesthesia blocks pain in a specific area without affecting the patient's consciousness.[4] However, the use of local anesthesia in elderly patients with medical conditions such as diabetes and obesity requires a more careful approach, including proper dosing and close monitoring during the procedure. The available literature shows that the success of tooth extraction procedures in elderly patients with diabetes mellitus and obesity is highly dependent on good anesthetic management and comprehensive medical care. Therefore, it is vital to understand the challenges dentists and medical teams face in providing optimal care for elderly patients with these medical conditions. This literature review will examine various studies related to the management of tooth extraction in elderly patients with diabetes mellitus and obesity and identify the best approach to managing local anesthesia in this patient group.

METHOD

The design of the scientific article creation used is a literature review and a search for published articles on Google Scholar, PubMed, Science Direct, and Research Gate using predetermined keywords, namely local anesthesia, teeth, and hypertension. A literature review is a research method to evaluate, identify, and synthesize existing research results.[5] The materials and methods of this research were taken from various literature on dental anesthesia for diabetes and obesity in older people. The literature was taken from journals. This discussion was conducted over a long period due to the limited number of journals that can be accessed for the title of this scientific article.

RESULT

This literature review identified and analyzed relevant studies addressing the use of local anesthesia in dental procedures, particularly tooth extraction, among elderly patients with systemic conditions such as diabetes mellitus and obesity. The findings from the selected articles are summarized in the Table 1 focusing on study characteristics, anesthetic agents used, patient outcomes, and clinical considerations for safe dental management in medically compromised elderly populations.

Table 1. Results of literature review

No	Article Title	Author (Year)	Method	Research Results
1	Evaluation of Healing Process and Blood Sugar Level Following Local Anesthetic Infiltration with and Without Vasoconstrictor for Extraction of Maxillary Teeth in Diabetic Patients: Double Blind Randomized Controlled Clinical Trial	Saad, Tarek Abd Elbary Abd Elatife (2023)[6]	A total of 40 patients with controlled diabetes who required tooth extraction were randomly and equally divided into two groups, namely group A (anesthetized with Mepivacaine hydrochloride 30 mg (3%) without vasoconstrictor) and group B (anesthetized with Mepivacaine hydrochloride 20 mg (2%) with vasoconstrictor Levonordefrin hydrochloride 0.06 mg). The involved teeth were extracted atraumatically. Blood glucose levels were measured before and 30 minutes after extraction, and healing of the extraction socket was evaluated at 24 hours, 4 days, 7 days, 14 days, and 21 days using the Landry wound healing index.	Vasoconstrictors contained in local anesthetics can increase blood sugar levels and slow healing of the extraction socket wound in the first two weeks after extraction; however, the use of local anesthetics with vasoconstrictors is still safe in patients with controlled diabetes.
2	Local anesthesia with epinephrine is safe and effective for oral surgery in patients with type 2 diabetes mellitus and coronary disease: a prospective randomized study	Santos-Paul, M. A. D., Neves, I. L. I., Neves, R. S., & Ramires, J. A. F (2015)[7]	This was a prospective randomized study with 70 patients with type 2 diabetes (T2DM) who had coronary heart disease and underwent oral surgery. The study was double-blind regarding glycemia measurement. Blood glucose levels were monitored continuously for 24 hours using the MiniMed Continuous Glucose Monitoring System. Patients were randomly divided into two groups: 35 patients received 5.4 mL of 2%	Administration of 5.4 mL of 2% lidocaine with epinephrine did not cause hyperglycemia and had no significant effect on hemodynamic parameters or anxiety. However, lower blood glucose levels were observed. This is the first report using continuous blood glucose monitoring to demonstrate the benefits and absence of side effects of local anesthesia with epinephrine in

			lidocaine, and 35 patients received 5.4 mL of 2% lidocaine with 1:100,000 epinephrine. Hemodynamic parameters (blood pressure and heart rate) and anxiety levels were also evaluated.	patients with type 2 diabetes mellitus and coronary heart disease.
3	Management of an emergency tooth extraction in diabetic patients on the dental chair	Gazal, G. (2020)[9]	The review also included reports from the World Health Organization (WHO) and the American Diabetes Association (ADA). Articles were selected by reviewing the titles, abstracts, and bibliographies of the selected articles. Keywords used to search for relevant articles included hyperglycemia and infection, tooth mobility and bone loss, tooth extraction, slow healing sockets, safe blood glucose levels for tooth extraction, principles of care for diabetic patients in the dental chair, awareness, and Saudi Arabia. These words were used separately and together to ensure a comprehensive literature search.	A fasting blood glucose level of 180 mg/dL is the cut off point for selective tooth extraction. However, a random blood glucose level of 234 mg/dL (13 mmol/L) is the cutoff point for emergency tooth extraction. Tightly controlled diabetic patients (blood glucose levels below 70 mg/dL) are susceptible to hypoglycemia.
4	The healing of dental extraction sockets in patients with Type 2 diabetes on oral hypoglycaemics: a prospective cohort	Huang, S., Dang, H., Huynh, W., Sambrook, P. J., & Goss, A. N. (2013)[9]	Candidate patients referred for tooth extraction were divided into two groups: known diabetics and non-diabetics without conditions associated with poor healing. All patients were checked for random blood glucose (BGL). Tooth extraction was performed under local anesthesia. Cases of	The traditional view that diabetics have slower healing is not proven. Type 2 diabetics taking oral hypoglycemic drugs should be treated the same as non-diabetic patients for tooth extraction procedures.

			delayed healing were identified and statistical evaluation was performed to determine risk factors.	
5	An influence of adrenaline (1:80,000) containing local anesthesia (2% Xylocaine) on glycemic level of patients undergoing tooth extraction in Riyadh	Khawaja, N. A., Khalil, H., Parveen, K., Alghamdi, A. M., Ra'ed, A. A., & Sa'ad, M. A. (2014)[10]	A total of 60 patients were randomly selected, consisting of 30 healthy patients and 30 patients with a history of diabetes in Riyadh city. First, blood glucose levels were measured before administering local anesthesia containing adrenaline after taking their medical history using Glucocheck as directed. Then, blood sugar levels were recorded after administering local anesthesia containing adrenaline at a concentration of 1:80,000. Blood sugar levels were also checked 5 minutes after the tooth extraction procedure.	No significant results were found after administration of local anesthesia containing adrenaline in healthy and diabetic patients ($p > 0.05$). However, there was a significant change ($p < 0.05$) in diabetic patients who did not take hypoglycemic drugs, with an increase in blood sugar levels after tooth extraction.
6	Effect of painless STA on tooth extraction of elderly patients with periodontal diseases	Feng, L., Wang, H., & Lin, M. (2018)[11]	This study was conducted on 116 elderly people with periodontal disease who needed tooth extraction. The participants were divided into two groups: a group that received STA anesthesia and a group that received conventional anesthesia.	Patients using STA reported lower levels of pain compared to patients using conventional anesthesia.
7	Effect of local anesthetic lidocaine 2% with a combination of adrenaline 1: 80,000 on blood sugar levels before and after anesthesia procedures	Riza, A., & Anugrah, I. (2023)[12]	This is an experimental study with a single-group pretest-posttest research design. A total of 40 patients were given a pretest and posttest to determine their blood sugar levels	Administration of local anesthetic lidocaine 2% combined with adrenaline 1:80,000 increased blood sugar levels in subjects, and the increase in blood

	at Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Universitas Sumatera Utara		before and after being given 2% lidocaine with 1:80,000 adrenaline.	sugar levels was higher in male subjects than in female subjects.
8	Analysis Of Local Anesthesia With Adrenaline In Diabetic Patients Undergoing Extractions	Bhoosreddy, S., Gondhalekar, M. R., Naphade, M. V., Gondhalekar, R. V., Bhoosreddy, A., & Naphade, U. M. (2022)[13]	A total of 40 patients were enrolled, with an age group ranging from 30 to 70 years. The subjects were divided into 2 groups: Group A consisted of healthy individuals, and Group B consisted of individuals with type II diabetes. Lignocaine with adrenaline (1:80000) was used as the local anesthetic agent. Immediately after administration of local anesthesia, peripheral blood glucose estimation using a glucometer was repeated. Further readings were taken 20 minutes after administration of local anesthesia.	Variation of blood glucose levels in healthy patients and diabetics given lignocaine with adrenaline. In group A, the average blood glucose level before administration of L.A. was 86.52, while in group B the average glucose level was 202.36. After 20 minutes of administration of L.A., the average blood glucose level in group A became 102.38, while in group B it became 238.38. The use of L.A. containing adrenaline should be done with caution in patients with type 2 diabetes.
9	Effect of Local Anaesthesia with and without Adrenaline on Blood Glucose Concentration in Patients Undergoing Tooth Extractions A Comparative Study	Nair, V. S., Anusuya, N., Sankar, K., Sathiyanathan, D., Sane, V. D., & Kanagasabapathy, T. (2022)[14]	This study was conducted on 100 patients who required multiple tooth extractions. At the first appointment, extractions were performed using lignocaine without adrenaline (plain), and at the second appointment, extractions were performed using lignocaine containing adrenaline (1:200,000). Blood glucose levels were measured serially at equal intervals on both occasions.	There was a significant difference in blood glucose levels in patients after administration of lignocaine with adrenaline before and after 10/20 minute intervals ($P < 0.05$). Continuous vigilance and caution are advised when using lignocaine with adrenaline in patients with diabetes mellitus.
10	Anesthesia in Diabetes Mellitus	Wisudarti, C. F. R., Widyastuti, Y., &	Literature review research is the process	Anesthesia management in

		Krisdiyantoro, N.(2016)[15]	of collecting and analyzing literature related to a research problem. Literature review aims to obtain relevant theories and information, and to ensure that the problem being studied has not been discussed before.	patients with diabetes mellitus (DM) aims to control blood sugar, prevent hypoglycemia or hyperglycemia, and avoid complications such as ketoacidosis and hyperglycemic hyperosmolar syndrome. The selection of drugs and anesthetic techniques is adjusted to metabolic conditions and the type of surgery. In general anesthesia, it is necessary to pay attention to Stiff Joint Syndrome and gastroparesis which can complicate intubation. Good preparation is expected to produce optimal outcomes.
11	Anaesthetic management of patients with diabetes mellitus	McAnulty, G. R., Robertshaw, H. J., & Hall, G. M. (2000)[16]	Literature review research is the process of collecting and analyzing literature related to a research problem. Literature review aims to obtain relevant theories and information, and to ensure that the problem being studied has not been discussed before.	Diabetic patients are at increased risk for perioperative mortality and morbidity after major surgery, and often have other comorbidities. In recent years, evidence has shown that good glycemic control, both short-term and long-term, can improve post-operative outcomes. Attention to the management of the disease itself and associated conditions, such as hypertension, can reduce the devastating consequences of microvascular and macrovascular complications. In addition, a more

				aggressive approach to glycemic control during the perioperative period has resulted in improved wound healing, lower morbidity, and shorter hospital stays. The 'permissive hyperglycemia' approach is no longer accepted by anaesthetists as being in the best interests of the patient.
12	Considerations for the Use of Local Anesthesia in the Frail Elderly: Current Perspectives	Cuvillon, P., Lefrant, J. Y., & Gricourt, Y. (2022)[17]	Literature review research is the process of collecting and analyzing literature related to a research problem. Literature review aims to obtain relevant theories and information, and to ensure that the problem being studied has not been discussed before.	For the operative period, local anesthesia (or analgesia) should be the first choice if possible for frail elderly patients. In this context, the concentration of local anesthetic and the volume administered should be reduced to reduce the risk of systemic toxicity. For lidocaine, the optimal concentration is probably 10 mg.mL−1 without exceeding a dose of 4–5 mg.kg-1. In this setting, many surgical procedures can be performed under local anesthesia, minimizing the risk of post-operative decompensation.
13	Diabetes mellitus: anaesthetic management	Robertshaw, H. J., & Hall, G. M. (2006)[16]	Literature review research is the process of collecting and analyzing literature related to a research problem. Literature review aims to obtain relevant theories and information, and to ensure that the problem being studied has not	Patients with type 1 diabetes always require insulin administration, while patients with type 2 undergoing moderate or major surgery will require conversion to an insulin regimen during the perioperative period.

				been discussed before.	Good glycemic control is associated with a reduced risk of infection, so blood glucose levels are usually maintained below <10 mmol/l. However, the ideal range of blood glucose during the perioperative period has only recently been established in cardiac surgery patients. Continuous insulin infusion has been shown to provide better glycemic control than intermittent regimens, and combined glucose-insulin-potassium regimens have the advantage of safety. Blood glucose levels should be monitored regularly and carefully controlled, which is the key to successful perioperative management.
14	The use of the mandibular infiltration anesthetic technique in adults	Meechan, J. G. (2011)[18]		The authors reviewed articles describing randomized controlled trials of mandibular infiltration anesthesia techniques in healthy participants.	Mandibular infiltration anesthesia technique can produce anesthesia in adult mandibular teeth. Its success depends significantly on the dose and choice of anesthetic solution; 4 percent articaine with 1:100,000 epinephrine is more effective than 2 percent lidocaine with 1:100,000 epinephrine. The combination of buccal and lingual infiltration increases the success in the mandibular incisor

				area. The success of the infiltration anesthetic mechanism in the mandibular first molar appears to depend on the position of the mental foramen.
15	Obesity, obstructive sleep apnoea, and diabetes mellitus: anaesthetic implications	Candiotti, K., Sharma, S., & Shankar, R. (2009)[19]	Literature review research is the process of collecting and analyzing literature related to a research problem. Literature review aims to obtain relevant theories and information, and to ensure that the problem being studied has not been discussed before.	Pre- and perioperative anesthetic considerations for diabetic patients in ambulatory surgery do not differ significantly from those for inpatient procedures, except that almost all outpatient procedures allow for rapid resumption of food intake after surgery. This allows routine diabetes medications to be resumed in a timely manner. However, medications should not be resumed at normal doses until the patient has recovered sufficiently to maintain a good diet. While this is true for all patients, special attention should be paid to patients with severe diabetes who have difficulty eating. In general, although patients with significant autonomic dysfunction and those who are more likely to exhibit hemodynamic instability require extra attention, outpatient surgery can be considered safe for most diabetic patients.

DISCUSSION

Management of tooth extraction in

elderly patients with diabetes mellitus and obesity requires a careful and planned approach. Elderly patients, especially those with a history of diabetes mellitus and obesity, are at risk of complications that can affect the healing process and post-operative recovery.[19] Therefore, dentists must thoroughly evaluate the patient's medical condition before performing a tooth extraction procedure. Diabetes mellitus can affect the body's ability to regulate blood sugar levels,[16] while obesity can increase the risk of infection and slow the healing process. A thorough health examination before the procedure is a critical first step in managing tooth extraction in elderly patients.

In patients with diabetes mellitus, blood sugar level management is crucial to prevent post-operative complications. As in the study by Saad, who conducted sample selection by only selecting those who agreed to monitor and record blood sugar levels during the trial.[6]

Uncontrolled blood sugar levels can increase the risk of infection and slow wound healing. It follows research by Santoas-Paul et al.,7 which explains that a fasting blood glucose level of 240 mg/dl is critical for dental treatment. When blood glucose levels reach 240 mg/dl, warning signs of diabetes begin to appear. These signs include tingling in the hands or feet, nausea, vomiting, diarrhea, and dizziness. Emergency tooth extraction at a blood glucose level of 240 mg/dl will cause severe infection and slow socket healing because the blood begins to form high ketone concentrations. Therefore, the dentist must ensure the patient's blood sugar levels are well-controlled before the extraction procedure. In addition, the administration of local anesthesia must also be considered carefully because some local anesthetics can interact with drugs used to control diabetes. The administration of local anesthetics such as lidocaine or bupivacaine must be done in the correct dose so as not to interfere with the stability of the patient's blood sugar.

Obesity in elderly patients is also a risk factor that needs to be considered. Obesity can affect blood circulation and the body's ability to fight infection. Patients with obesity often have decreased breathing capacity, which can increase the risk of complications during tooth extraction procedures. It is in line with research by Riza and Anugrah[12], which explains that the increase in blood sugar levels before and after anesthesia procedures is higher in male subjects compared to women. Men have a higher risk of developing diabetes faster than women. The distribution of body fat influences this difference in risk. In men, fat accumulation is concentrated around the

abdomen, triggering central obesity, which is more at risk of triggering metabolic disorders. It is also related to the body's ability to regulate sugar levels in several disrupted organs. This condition is related to excess fat in several body organs, such as the liver and muscles, which tend to occur in men. Fat distribution plays an essential role in the occurrence of diabetes. In men, more fat accumulates around the waist and liver, while women have more safe subcutaneous fat stored in the thighs and hips. Therefore, careful monitoring of vital signs, such as blood pressure, heart rate, and oxygen saturation, is essential. Local anesthetics used in obese patients should be chosen carefully to avoid unwanted reactions. Lower doses of local anesthetics or dose adjustments may help reduce the risk of side effects in obese patients.

During the extraction procedure, it is essential to minimize stress and anxiety in elderly patients. Older people often have higher levels of anxiety, which can affect tolerance to the procedure. It is in line with the research of Khawaja et al.[10], which explains that although epinephrine is essential in the management of dental procedures, the absence of epinephrine in local anesthesia will reduce the effect of anesthesia and increase patient stress, which will cause endogenous epinephrine secretion, which can increase blood glucose levels. To overcome this, it is necessary to use local anesthetics containing adrenaline, which can reduce endogenous adrenaline secretion. Therefore, good communication between the dentist and the patient is very important. Explanation of the procedure, potential risks, and steps to reduce pain can help reduce patient anxiety. In addition, proper local anesthesia techniques, such as administering anesthesia gradually or with the help of an aid, can help relieve pain and discomfort during the procedure. With this approach, elderly patients will feel calmer and can undergo the procedure better.

After extraction, attention to patient recovery is critical. Older people with diabetes and obesity require more intensive monitoring to ensure optimal wound healing and prevent infection. Proper post-operative care includes pain management, blood sugar control, and antibiotics if needed. Patients must also be given clear instructions regarding post-operative wound care, including maintaining oral hygiene and signs of infection to watch out for. With a careful approach and proper management, tooth extraction in elderly patients with diabetes mellitus and obesity can be performed with minimal risk of complications. It is in line with Saad's research,6, which explains that with post-operative guidelines, oral hygiene teaching was repeated for all participants. All

participants received local anesthetic injections according to the specified group, and the involved teeth were extracted traumatically while implementing a stress reduction protocol during the procedure. Finally, all participants were prescribed amoxicillin 500mg (Misr Co., October pharma. S.A.E., Egypt) to be taken 3 times daily for 7 days and brufen 400mg (Abbott Laboratories Limited, UK) to be taken 3 times daily for 5 days.

CONCLUSION

Management of tooth extraction in elderly patients with diabetes mellitus and obesity requires a careful approach, including blood sugar control, appropriate local anesthetic selection, and careful monitoring of vital signs to prevent complications. Good communication between the dentist and the patient is essential to reduce anxiety, while intensive post-operative care and pain management are also important parts of the recovery process. With the right approach, extraction procedures can be performed with minimal risk of complications in elderly patients with these medical conditions.

CONFLICT OF INTEREST

The authors reported no potential conflict of interest.

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