CHANGES IN THE PATIENT'S VITAL SIGNS RELATED TO THE TOOTH REMOVAL PROCEDURE

(PERUBAHAN TANDA VITAL PASIEN SEHUBUNGAN DENGAN TINDAKAN PENCABUTAN GIGI)

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JHDS.unjani.ac.id/jite
Doi: 10.54052/jhds.

Article History
Received:22/05/2022
Accepted: 29/05/2022

ABSTRACT

Tooth extraction is the act of removing a tooth from its socket. Before tooth extraction, it is necessary to examine the patient's vital signs, including blood pressure, pulse, respiratory rate, body temperature, and oxygen saturation, to identify abnormalities that may affect treatment and healing. The administration of local anaesthetics and tooth extraction procedures can cause stress and disrupt the patient's systemic condition, affecting the patient's vital signs. This study aimed to determine the changes in the patient's vital signs that occurred during tooth extraction treatment, namely before, during, and after tooth extraction. This research method measures the patient's vital signs consisting of blood pressure, pulse, respiratory rate, body temperature, and oxygen saturation before, during, and after tooth extraction. The data obtained were then analyzed statistically using the one-way

ANOVA method and continued with the Tukey-Kramer post hoc test. Thirty-three data met the inclusion criteria, with subjects consisting of 39.4% males and 60.6% females. The data analysis results showed a significant decrease in the patient's body temperature between the procedure and after the tooth extraction and a substantial reduction in oxygen saturation between the patient before and during the tooth extraction. However, no significant changes were found in the patient's blood pressure, pulse, and respiration, either before, during, or after the tooth extraction procedure. Conclusion: Body temperature can decrease after tooth extraction, and oxygen saturation can decrease during tooth extraction.

Keywords: anesthesia; tooth extraction; vital signs

ABSTRAK

Pencabutan gigi yaitu tindakan mengeluarkan gigi dari soketnya. Sebelum dilakukan tindakan pencabutan gigi, diperlukan pemeriksaan tanda vital pasien, yang terdiri dari tekanan darah, nadi, laju pernafasan, suhu tubuh, dan saturasi oksigen untuk mengidentifikasi abnormalitas yang dapat mempengaruhi perawatan dan penyembuhan. Tindakan administrasi anestesi lokal dan prosedur pencabutan gigi dapat menyebabkan timbulnya stres dan menggangu keadaan sistemik pasien, yang dapat mempengaruhi tanda vital pasien. Tujuan dari penelitian ini yaitu untuk mengetahui adanya perubahan tanda vital pasien yang terjadi pada saat perawatan pencabutan gigi, yaitu sebelum, selama, dan setelah tindakan pencabutan gigi. Metode penelitian ini yaitu dengan cara mengukur tanda-tanda vital pasien yang terdiri dari tekanan darah, nadi, laju pernafasan, suhu tubuh, dan saturasi oksigen yang dilakukan sebelum, selama, dan setelah tindakan

pencabutan gigi. Data yang diperoleh kemudian dianalisis secara statistik dengan metode one-way Anova, dan dilanjutkan dengan uji lanjut Tukey-Kramer post hoc test. Didapatkan 33 data yang memenuhi kriteria inklusi, dengan subyek terdiri dari 39,4% laki-laki dan 60,6% perempuan. Hasil dari analisis data yaitu terdapat penurunan yang signifikan pada suhu tubuh pasien antara saat dilakukan tindakan dan setelah dilakukan tindakan pencabutan gigi, serta penurunan saturasi oksigen yang signifikan antara sebelum dan di saat dilakukan tindakan pencabutan gigi pada pasien. Namun tidak ditemukan perubahan yang signifikan pada tekanan darah, nadi, dan respirasi pasien, baik sebelum, saat tindakan, maupun setelah tindakan pencabutan gigi. Suhu tubuh dapat mengalami penurunan setelah tindakan pencabutan gigi, dan saturasi oksigen dapat mengalami penurunan saat dilakukan tindakan pencabutan gigi.

Kata kunci: *anestesi; pencabutan gigi; tanda vital*

INTRODUCTION

Tooth extraction is one of the most common treatments performed by dentists. Before tooth extraction, it is necessary to check the patient's vital signs, including blood pressure, pulse, respiratory rate, and body temperature. The purpose of examining vital signs is to identify abnormalities, both diagnosed and undiagnosed, which may affect treatment and healing, and to obtain baseline values as a comparison when there is an emergency during treatment.[1, 2, 3]

Blood pressure is the force the patient's circulating blood exerts on the walls of their vasculature. Blood pressure is normal if the systolic is 90-120 mmHg and diastolic is 60-80 mmHg. The patient's baseline blood pressure can vary significantly from one person to another. An increase in blood pressure is called hypertension, while a decrease in blood pressure is called hypotension.[1,2]

Heart rate is the number of patients' heartbeats per minute. It can be calculated manually by palpating the patient's pulse or through an external or internal monitor. The heart rate is said to be normal if it is 60 to 100 beats per minute for healthy adults. A heart rate of more than 100 is called tachycardia, while less than 60 is called bradycardia.[1,2]

Body temperature is controlled by the hypothalamus and varies throughout the day based on circadian rhythms and environment. The temperature value is said to be normal at 36^{o}C to 38^{o}C.[1,2] If the body temperature decreases, it is called hypothermia (generally less than 35^{o}C). On the other hand, increased body temperature (above 38^{o}C) is called hyperthermia or fever. Causes of hyperthermia/fever can be infectious or non-infectious.[1]

Respiratory rate is the number of breaths the patient breathes in one minute. The respiratory rate is unique because the patient can have conscious control of the respiratory rate. Normal respiratory rate ranges from 12 to 20 breaths per minute. If the respiratory rate increases (tachypnea) or decreases (bradypnea), it can be an early indicator of the patient's status but can be influenced by several factors.[1]

Oxygen saturation (SaO_2) measures the haemoglobin saturation fraction relative to the total haemoglobin being examined. The normal range of oxygen saturation is 95-100%. Pulse oximetry can measure oxygen saturation, which provides an approximate view of arterial SaO_2. SaO_2 of less than 92% is called hypoxia. There are several causes of hypoxia, including environmental and pathological conditions.[1,4]

Vital signs can be affected by various factors, and there are many situations where vital signs become less reliable. Abnormalities of critical signs can be an indicator of the presence of an underlying pathological condition, related to treatment, or due to the environment.[1]

Tooth extraction procedures and administration of local anaesthetics can cause stress, disrupt the patient's systemic condition, and may cause changes in vital signs. The changes occur within normal limits of physiological homeostasis and do not cause adverse events associated with these changes in vital signs.[2] To prevent the potential for severe reactions from occurring, dentists are advised to monitor the patient's medical condition.[5]

A study in 2019 evaluated the magnitude of changes in vital signs during three different dental treatments, namely supragingival scaling, dental restorations under local anesthesia, and exodontia under local anaesthesia, in 150 dental treatments. Based on the results of this study, it is known that the respiratory rate can increase temporarily during injection of local anaesthetics and some dental procedures, especially exodontia. The increase in systolic blood pressure and heart rate during exodontia is tolerable in healthy patients.[6]

Based on the above, the authors are interested in knowing the relationship between tooth extraction treatment and

changes in the patient's vital signs. This study aimed to determine changes in the patient's vital signs that occurred during tooth extraction treatment, namely before the procedure, during the administration of local anaesthesia, and after the tooth extraction procedure. The results of this study are expected to be a reference for dentists to pay more attention to the patient's vital signs in connection with tooth extraction.

METHOD

This study is a descriptive study to obtain data regarding changes in the patient's vital signs related to tooth extraction. The subjects of this study were patients who underwent tooth extraction using local anaesthesia at RSGM Unjani in September 2021. The study's object was the patient's blood pressure, pulse, temperature, breathing, and oxygen saturation. The tools include digital sphygmomanometer Omron®, pulse oximetry Yuwell®, thermometer non-touch Xiaomi®, and stopwatches.

The study begins by asking for the patient's consent to be checked for vital signs before the tooth extraction procedure, during local anaesthesia, and after the tooth extraction was completed. Two people reviewed vital signs. The first person is in front of the operating room entrance to check vital signs before and after the tooth extraction procedure The second person is in the operating room, who will check vital signs as the patient is extracted, precisely when the local anaesthetic is being injected. All data were collected and statistically processed using the one-way Anova test and the Tukey-Kramer post hoc test. The statistical processing is done with the help of Microsoft Excel.

RESULT

Thirty-three subjects met the inclusion criteria, consisting of 13 men and 20 women (Table 1), with the number of patients under 45 years old as many as 16 (48.5%), ages 46 to 65 years as many as 17 (51.5%), and no patient was older than 65 years (Table 2).

Table 1. Characteristics of research subjects by gender

Gender	Frequency	Percentage (%)
Male	13	39,4%
Female	20	60,6%
Total	33	100%

Table 2. Characteristics of research subjects based on age

Age	Frequency	Percentage (%)
Age ≤ 45 years	16	48,5%
Age 46-65 years	17	51,5%
Age > 65 years	0	0%
Total	33	100%

The descriptive results of the average patient's vital signs, including blood pressure, pulse, temperature, respiration, and oxygen saturation calculated before, during, and after tooth extraction, and the p-value are shown in Table 3.

Table 3. One-way Anova test results for patient's vital signs

No.	Vital signs	Preoperative	Intraoperative	Postoperative	P-value
1	Systolic blood pressure	127,9	136,8	132,0	0,227
2	Diastolic blood pressure	79,8	80,4	83,8	0,259
3	Pulse	80,7	75,8	77,0	0,236
4	Temperature	36,6	36,7	36,5	0,015
5	Respiration	20,4	16,3	20,3	2,529
6	Oxygen saturation	98,0	96,4	96,9	0,049

Table 3 above describes the average systolic blood pressure before tooth extraction as 127.9 mmHg, 136.8 mmHg, and after a tooth extraction is 132.0 mmHg. The one-way ANOVA statistical test showed a p-value > 0.05, meaning there was no significant difference in the mean systolic blood pressure in patients before, during, and after tooth extraction.

Table 3 above also describes patients' average diastolic blood pressure before tooth extraction as 79.8 mmHg, during extraction is 80.4 mmHg, and after a tooth extraction is 83.8 mmHg. The one-way ANOVA statistical test showed a p-value > 0.05, meaning there was no significant difference in the mean diastolic blood pressure in patients before, during, and after tooth extraction.

Table 3 above describes the description of the patient's average pulse before tooth extraction as 80.7 times/minute, during extraction is 75.8 times/minute, and after a tooth extraction is 77.0 times/minute. The one-way Anova statistical test showed a p-value > 0.05, meaning that there was no significant difference in the average pulse rate in patients before, during, and after tooth extraction.

Table 3 above also describes the description of the patient's average temperature before tooth extraction as 36.6°C, during the extraction procedure 36.7°C, and after a tooth extraction is 36.5°C. The one-way ANOVA statistical test showed a p-value <0.05, meaning that there was a significant difference in the average temperature of the patients before, during, and after tooth extraction.

Table 3 above describes the patient's average respiratory rate before tooth extraction as 20.4 times/minute, during extraction is 16.3 times/minute, and after a tooth extraction is 20.3 times/minute. The one-way ANOVA statistical test showed a p-value > 0.05, meaning that there was no significant difference in the average respiratory rate in patients before, during, and after tooth extraction.

Table 3 above also describes that the average oxygen saturation of patients before tooth extraction is 98.0%, during extraction is 96.4%, and after a tooth extraction is 96.9%. The one-way ANOVA statistical test showed a p-value <0.05, meaning that there was a significant difference in the average oxygen saturation of the patients before, during, and after tooth extraction.

Statistical results that showed significant temperature and oxygen saturation differences were then carried out with a Tukey-Kramer post hoc test with the help of Microsoft Excel to determine more precisely which group had the difference.

The results of the Tukey-Kramer post hoc test regarding the temperature difference are shown in Table 4.

Table 4. Tukey-Kramer post hoc test results for the difference in temperature

Comparison	Abs. Mean diff	Q critical value	Significant
Preoperative vs Intraoperative	0.160606061	0.1836	No
Intraoperative vs Postoperative	0.221212121	0.1836	Yes
Preoperative vs Postoperative	0.060606061	0.1836	No

Based on Table 4 above, it can be concluded that there is a significant difference in temperature in patients between the time of extraction and after tooth extraction, which has decreased. There was no significant difference in temperature before and during tooth extraction

The results of the Tukey-Kramer post hoc test for differences in oxygen saturation are shown in Table 5.

Tabel 5. Tukey-Kramer post hoc test results for differences in oxygen saturation

Comparison	Abs. Mean diff	Q critical value	Significant
Preoperative vs Intraoperative	1.606060606	1.57	Ya
Intraoperative vs Postoperative	0.515151515	1.57	Tidak
Preoperative vs Postoperative	1.090909091	1.57	Tidak

Based on Table 5 above, it can be concluded that there is a significant difference in oxygen saturation in patients between before and during tooth extraction, which is a decrease. Between the time and after the tooth extraction, there was no significant difference in oxygen saturation before and after the extraction.

DISCUSSION

Body temperature is the difference between the amount of heat produced by the body and the amount of heat lost to the external environment. Body temperature is

regulated by the hypothalamus, where the anterior hypothalamus controls heat release, and the posterior hypothalamus controls heat production.[7] The primary source of heat production in the body is metabolism. Heat is generated by all cells in the human body by converting metabolic energy into mechanical and thermal energy.[7]

Several factors can affect body temperature, including exercise, environmental temperature, diurnal variations, age, gender, thyroid hormone, humidity, drugs, caffeine, smoking, obesity, stress, food intake, alcohol, etc. Tooth extraction increases the patient's anxiety, and post ganglion neurons trigger the release of epinephrine hormones and norepinephrine (NE) when a person experiences stress. It results in an increase in cell metabolism in the body, which increases body temperature. Thermoregulation in humans is a complex process under the control of the central nervous system, and core and peripheral temperatures in humans will respond differently to stress.[7] After the tooth extraction procedure, the stress decreases so that the body temperature can fall again.

Oxygen saturation is the percentage of haemoglobin bound to oxygen in the arteries.[1,4] several factors affect oxygen saturation in the blood, including stress and anxiety. A study conducted by eHealthMe in October 2021 reported that 419 people with stress and anxiety experienced a decrease in oxygen saturation, especially in women aged over 60 years.[4] A preliminary study conducted by Aeschliman et al. (2003) showed that tooth extraction could increase physiological stress, thus potentially causing changes in oxygen saturation in the blood, which is decreased.[8] Research conducted by Ize-Yamu et al. (2018) showed a significant decrease in peripheral oxygen saturation (SpO_2) during tooth extraction and pulpotomy in pediatric patients up to 90%.[9] These studies are in line with the results of our research. Therefore, managing stress in dental practice helps maintain blood gas balance.[8]

CONCLUSION

Based on the results of the analysis of the research, there are several conclusions, including the following:

1. There is a significant change in body temperature in patients with tooth extraction, namely a decrease between the time of tooth extraction and after tooth extraction.
2. There is a significant change in oxygen saturation in patients with tooth extraction, which is a decrease between before the tooth extraction procedure

and when the tooth extraction procedure is performed.

3. There was no significant change in the patient's blood pressure, pulse, and respiration, either before, during, or after the tooth extraction procedure.

CONFLICT OF INTEREST

We declared that there is no conflict of interest potential commercial background in this research.

ACKNOWLEDGEMENT

Our gratitude goes to the Rumah Sakit Gigi dan Mulut Unjani professionals who have helped with this scientific research. This research has also been connected with the LPPM Jenderal Achmad Yani University funding 2021.

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