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comparative evaluation of heart rate and blood pressure before and after dental extraction

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A B S T R A C T

Background: Heart rate and blood pressure play an important role to determine the cardiac health of the patient during the treatment. Significant alterations in these parameters enable us to take appropriate actions during emergencies and comprehend the potential risks associated with dental procedures. The objective of this study is to determine the changes in the heart rate and blood pressure of the patient before and after dental extraction. Through a thorough evaluation and analysis, researchers endeavour to discern whether there are discernible patterns of alterations in the vital signs in the patient following extraction.

Materials and method: A total of 60 patients were selected for the study out of which 34 were males and 26 were females. All the patients were in an age group of 17 till beyond 77 of the age. Prior to the procedure, blood pressure and heart rate were measured. Dental extraction of the tooth was subsequently performed, followed by post-operative measurement of blood pressure and heart rate.

Results: Significant difference in post operative pulse was noticed after extraction where there was decrease in post operative pulse. A decrease in post-operative blood pressure was observed, but these variations remained within the normal range.

Conclusion: The vital signs exhibited alterations before and after tooth extraction. Thus, it is concluded that various factors such as dental anxiety, stress, local anaesthesia alter the blood pressure and heart rate of a patient post dental extraction.

Keywords: heart rate ,blood pressure ,dental extraction

INTRODUCTION

The ideal tooth extraction is the painless removal of the whole tooth , or tooth-root , within minimal trauma to the investing tissues ,so that the wound heals uneventfully and no postoperative prosthetic problem is created(1).The measurement of the heart's contraction rate caused when wave of pulse is created after the left ventricle contracts is the arterial pulse whereas blood pressure is the force of the blood on the arterial wall. Patients often perceive dental extractions as a painful procedure that induces fear and anxiety, resulting in an increase in heart rate and pulse. Dental anxiety is characterized by a physical and/or emotional response to a perceived threat. This threat does not always have to be physically present, as the mere idea of an uncomfortable situation can provoke feelings of uneasiness and apprehension (2). On the other hand, after investigating the effect of local anaesthesia on BP and HR it was noted that injection of one cartridge of lidocaine with epinephrine slightly raised BP and HR (3). Thus, there are several factors such as physical and psychological stress, action of catecholamines in local anaesthetics cause increase in BP and HR during dental procedures.

MATERIALS AND METHOD

A total of 60 patients were evaluated out of which 34 were males and 26 were females at department of oral and maxillofacial surgery at karnavati school of dentistry, gujarat,bharat. All these patients were of the age group range of 17

to 77. These patients had to undergo extraction due to various underlying causes such as caries, periodontitis, orthodontic treatments, etc. A well-informed consent was obtained before measuring the vitals.

Inclusion criteria:

- Medically fit patients
- Undergoing extraction under local anaesthesia only
- No allergic reaction after administering anaesthesia
- Lignocaine hydrochloride & adrenaline bitartrate injection i.p local anaesthetic used.

Exclusion criteria:

- Paediatric patients
- Patients with underlying systemic conditions
- Mentally retarded and highly uncooperative patients

Blood pressure was measured using sphygmomanometer on right arm in sitting position . Pulse was measured using digital pulse oximeter.

RESULTS

+Table: Pre-Post comparison of Systolic Blood Pressure

Systolic Blood Pressure	Mean	SD	Mean difference	P value
Pre-operative	130.25	11.42	0.73	0.628
Post-operative	129.52	10.29		

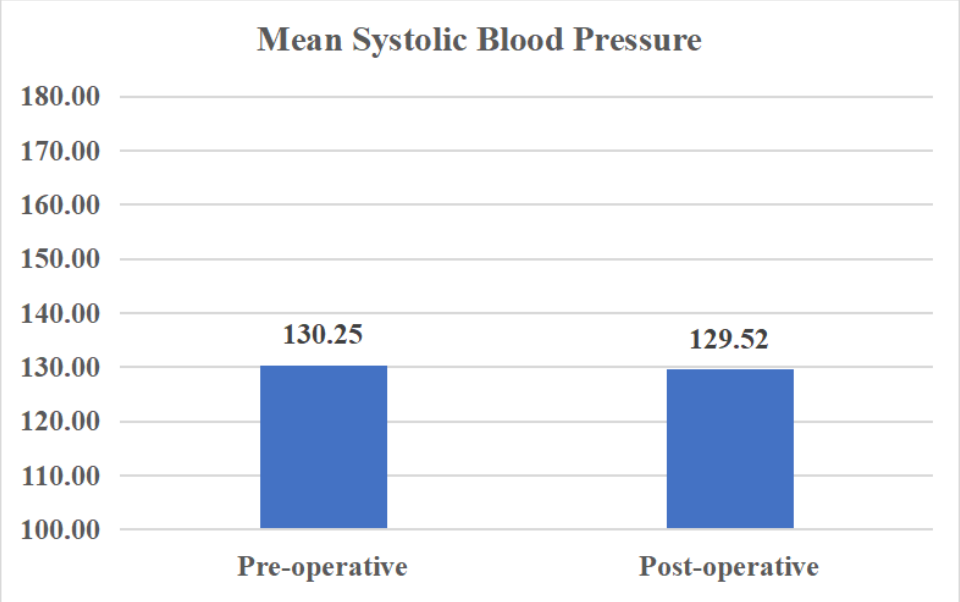


Table: Pre-Post comparison of Diastolic Blood Pressure

Diastolic Blood Pressure	Mean	SD	Mean difference	P value
Pre-operative	81.67	7.55	1.49	0.164
Post-operative	80.18	7.29		

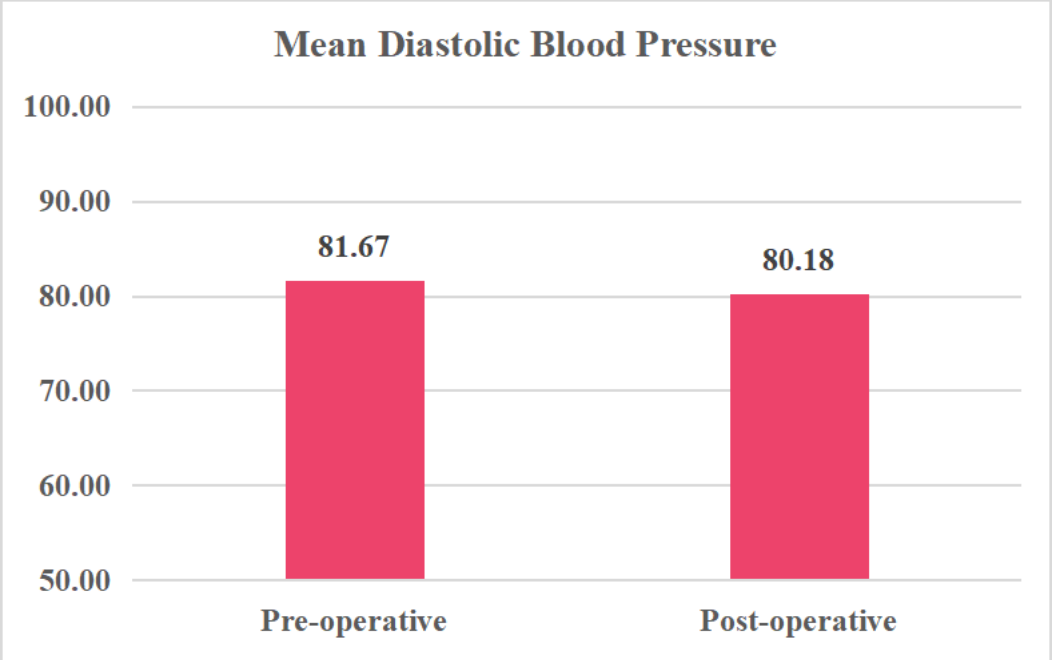
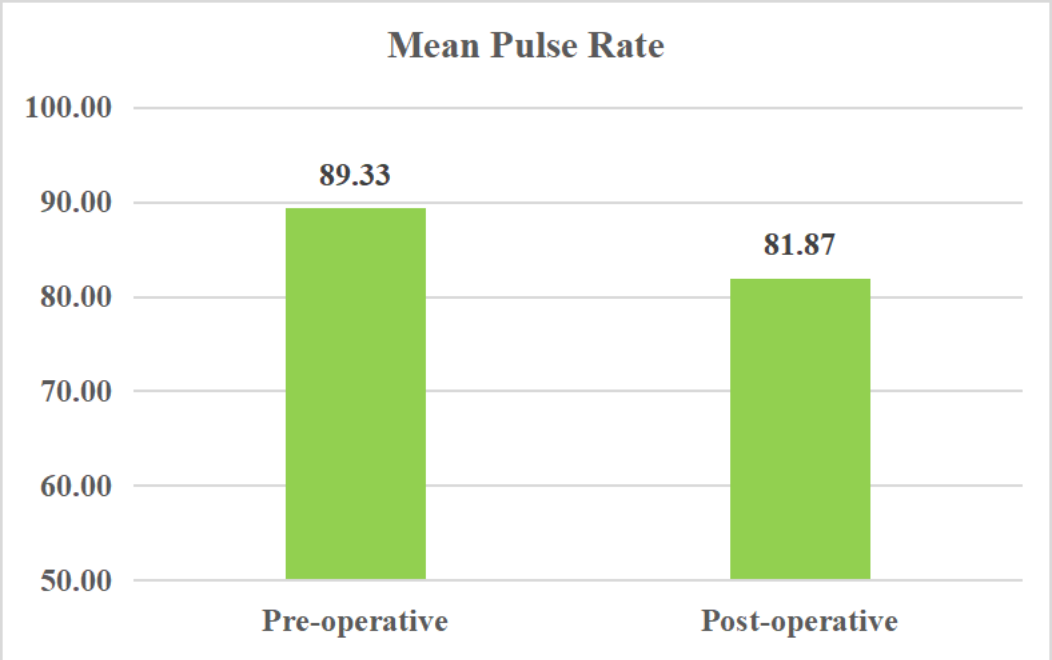


Table: Pre-Post comparison of Pulse Rate

Pulse Rate	Mean	SD	Mean difference	P value
Pre-operative	89.33	10.63	7.46	<0.001
Post-operative	81.87	10.62		



The collected data was entered in Microsoft excel spreadsheet. The entire data is statistically analyzed using Statistical Package for Social Sciences 26.0 for MS Windows. The data on continuous variable is presented as Mean & Standard Deviation (SD). The Shapiro-Wilk test was used to check the normality of the continuous variable. Paired t-test was used to check significant difference on dependent sample. Probabilities of greater than 0.05 considered as statistically not significant. Probabilities of less than 0.05 was accepted as statistically significant.

DISCUSSION

The measurement of the heart's contraction rate caused when wave of pulse is created after the left ventricle contracts is the arterial pulse whereas blood pressure is the force of the blood on the arterial wall. Normal mean value of systolic blood pressure is 120 mmHg with a range of 110-140 mmHg while normal mean value of diastolic blood pressure is 80 mmHg with a range of 60-80 mmHg.

Extractions are typically regarded as a painful procedure. Consequently, most patients are already anxious, which can significantly alter their blood pressure and pulse rate. Although it has been observed that there is only a temporary increase in these readings, which generally return to normal after the procedure is completed. This suggests that extraction procedures can alter the vital signs of the human body.

According to several research it has been concluded that any stress in response to extraction procedure leads to an increase in systolic blood pressure and heart rate but within safe limits.[4]

Tan Yeung, R'ong et al. ' did a study on differences in BP and pulse rate readings before and after extraction of the teeth. This study reported 75% of the patients had no significant changes in blood pressure, before and after extraction procedure. Even the pulse rate values did not show any significant changes in 92.5% of the patients.[5]

A study by Kumar et al.' also reported that the variations in blood pressure and pulse rate readings are common after a dental treatment, but they also claimed that these variations returned to normal almost immediately after the procedure. There was no harm observed due to these increased blood pressure and pulse rate values after a dental treatment procedure as extraction.[6] They also stated that anxiety and apprehension regarding dental procedures was the main reason for increase in bp values.[6]

Although some research suggests a correlation between dental extractions and elevated blood pressure readings, patients experiencing pain after extractions may not experience a complete resolution of discomfort, potentially leading to high blood pressure readings. The underlying causes of pain could include insufficient local anesthesia, diminished anesthesia effects due to periapical pathology, or psychological reasons such as anxiety. Consequently, the findings of such research may differ from those obtained from our data.

A similar study on evaluation of changes in blood pressure in patients submitted to dental surgery procedure was on 135 randomly selected patients by Polliana Keller De et al.'They reported that the variations in blood pressure readings were attributed to anxiety and stress caused by dental procedure. The study also reported that reduction of stress and control of anxiety for and during dental treatment are beneficial to limit the excess variation in blood pressure values.[7]

A significant difference in pre and post operative pulse was noticed post dental extraction. The result showed p value of <0.001 for pulse post extraction indicating a considerable importance of alteration of pulse.

There was difference in pre-operative and post operative systolic and diastolic blood pressure where the result inclined towards decrease in post operative blood pressure after dental extraction. The p value for systolic blood pressure on analysis was 0.6 and for diastolic blood pressure was 0.1 respectively.

This study was conducted at a dental institute that accommodates final-year students, interns, and postgraduates. Given the large number of individuals involved in blood pressure, heart rate measurements, and procedures, there is a significant risk of errors in the readings. These errors could potentially have influenced the overall results. However, the study remains highly relevant to clinical practice in surgical dental procedures.

CONCLUSION

Dental extractions can evoke fear and anxiety in patients, leading to an increase in blood pressure and heart rate immediately after the procedure. To ensure a stress-free extraction experience, it is crucial to adhere to proper techniques that minimize variations in blood pressure and heart rate. The existing research suggests that elevated blood pressure and heart rate are primarily attributed to anxiety and the administration of local anaesthesia.

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