EFFECT OF EXTRACTION ON BLOOD PRESSURE IN 6-12 YEARS OLD SAUDI CHILDREN: AN INVIVO PRELIMINARY STUDY

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ABSTRACT

The aims of this study were to: 1) investigate the changes that occurred in blood pressure during the exodontias procedure, 2) observe the presence of any clinically significant changes over time and 3) correlate the changes with age, sex, past experience and jaw. The blood pressure prior to, during local anesthesia administration, during extraction procedure and 10 minutes after exodontia were recorded on 18 healthy Saudi children with age ranging from 6-12 years, using Electronic vital sign monitor. The overall result showed an increase in blood pressure during extraction procedure. When compared with gender, males showed a mean increase of 10-90 ± 2.58mm Hg) in systolic whereas females showed (5.55 ± 0.55 mm Hg). Alteration in diastolic blood pressure was also observed in both sexes. The increase in systolic blood pressure was more in the upper jaw than in the lower jaw. However, the increase was not statistically significant. The mean increase in blood pressure was also observed in both age group (6-8 and 9-12 years) whereas children with no past experience showed high score of mean increase in blood pressure. Furthermore, the results also indicated the effect of stress and fear of injection in children. Therefore, it is concluded that exodontias procedure has an effect on the cardiovascular system, which suggested that extraction was the most stressful part of the procedure.

Key words: Exodontia (Extraction), blood pressure (systolic & diastolic)

INTRODUCTION

It has been observed that the patients demonstrate a physiological stress response during routine dental check-ups and treatment and this is very much true in case of children. Because of the stress, alteration occurs in blood pressure. Tooth extractions are performed daily and the anxiety that precedes dental procedure is well documented1-4. Several studies have been conducted on the haemodynamic changes that occur during restorative procedures, tooth extraction and minor oral surgery5-15. But the same information is scarcely available for children in the literature16, until now there has been no published reports on Saudi children. A study done by Paramaesvaran and Kingon7 on 60 patients with age range between 13-89 years reported that alteration in blood pressure was significant over time. Similarly, a study by Meyer12 reported that changes in haemodynamics were observed during minor oral surgery procedure. Table 1 shows the normal values of blood pressure (Systolic and Diastolic) of different age groups in children.

The study aimed firstly, to evaluate the changes that occurred in blood pressure prior, during local anesthesia, during extraction and 10 minutes after the procedure, secondly to see any significant changes...
TABLE 1. NORMAL VALUES OF BLOOD PRESSURE IN CHILDREN

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Systolic Blood Pressure (mm Hg)</th>
<th>Diastolic Blood Pressure (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 years</td>
<td>90</td>
<td>60</td>
</tr>
<tr>
<td>4-7 years</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>8-12 years</td>
<td>110</td>
<td>60</td>
</tr>
<tr>
<td>13-16 years</td>
<td>120</td>
<td>70</td>
</tr>
</tbody>
</table>

Kelly SJ. Pediatric Emergency Nursing Norwark C.T. Appleton & Lange, 2nd Ed. 1994

over time and finally to correlate the changes with age, sex, jaw and past experience.

MATERIALS AND METHODS

Before the commencement of the study, Ethical approval was taken from the College of Dentistry Research Center, King Saud University, Eighteen healthy Saudi children agreed to participate in the study. Written informed consent was obtained from each child’s parent and details of the procedure were explained. The experimental group consisted of those children who required extraction of primary molar tooth. Uncooperative children, medically compromised patients and handicapped children were excluded from the study. All patients were ASA class I. Personal history of all the patients was recorded with their previous dental experience.

Electronic vital sign monitor (Pace Tech, Inc. Clear Water, F134615) was used to record the blood pressure, for further standardization of the readings the cuff was kept on the patients arm throughout the procedure. Local anesthesia injection used in the subjects was Lidocaine HCL 2% with Epinephrine 1: 100,000 (By Novocol Pharmaceutical of Canada). The administration of local anesthesia (Inferior dental nerve block in the lower jaw and infiltration anesthesia in the upper jaw) and dental extraction was carried out by the same operator for all the subjects. Topical anesthetic gel was also used to minimize the pain from the needle, thus not affecting the results.

The blood pressure reading were documented by the same dental assistant and was calibrated before the actual study on five patients. The recordings were taken as:

1. Base line systolic and diastolic blood pressure was recorded 10 minutes before the local anesthesia injection
2. During local anesthesia administration
3. During the extraction procedure
4. Ten minutes after the extraction

All the information was entered into the computer utilizing FOXPRO program. Statistical package for social science (SPSS version 9.0) was employed to calculate the descriptive statistics of blood pressure with age, gender, past experience and jaw. Two-way repeated measure analysis of variance was utilized with age, gender, past experience, jaw as between factor and time as within factor.

RESULTS

A total of 18 patients participated in the study, 12 males (66.6%) and 6 females (33.4%). The mean age of the children was 8.5 (SD ± 1.89) years ranging from 6 to 12 years. The result showed that changes in systolic and diastolic blood pressure were highly significant (< 0.01) over time.

It was noticed that the females showed tendency of high systolic blood pressure than males in all the variables (Fig. 1) but was observed opposite in diastolic blood pressure (Fig. 2). The relationship between mean of blood pressure (Systolic and diastolic) with upper and lower jaw is shown in figures 3 & 4. It was observed that generally children with extraction in the lower jaw showed higher values as compared with the upper jaw.

When blood pressure was compared with age, children from 9-12 years of age had higher scores of systolic and diastolic blood pressure than 6-8 years old. The blood pressure increased before the procedure, till the extraction phase and was then lowered after the procedure (Fig. 5 & 6).

It was not surprising to see that the children with no past experience of tooth extraction showed higher level of systolic and diastolic blood pressure before and during the procedure (Fig. 7 & 8).

Analysis of variance with repeated measure (ANOVA) was used to test the significance, which showed changes with respect to time whereas no
Figure 1. Mean systolic blood pressure in relation to sex.

Figure 2. Mean diastolic blood pressure in relation to sex.

Figure 3. Mean systolic blood pressure in relation to jaw.

Figure 4. Mean diastolic blood pressure in relation to jaw.

Figure 5. Mean systolic blood pressure in relation to age.

Figure 6. Mean diastolic blood pressure in relation to age.
interaction was seen between systolic and diastolic blood pressure within the between the subjects.

**DISCUSSION**

The present study provided an overview about the effect of extraction on blood pressure in Saudi children. Exodontia is considered to be the most stressful experience for children. The findings of the study showed, that a positive correlation exists between time and blood pressure during the extraction procedure, which are similar to the results of the studies by Paramaesvara and Kingon, Abraham-Inpijn et al, Mochizuki et al, and Kamejura et al. In the study group it was observed that there was a slight increase in blood pressure at the time of local anesthesia administration from the base line readings, which peaked during the extraction procedure, later after 10 minutes all these parameters decreased to normal.

Previous studies have documented that 10 minutes are sufficient for the cardiovascular parameter to decrease to normal values. Similar findings were documented in another study which in turn support the results of our study. But, Beck and Weaver in their study concluded that during the anticipated high stress dental appointments blood pressure remained constant.

In the present study a slight drop in diastolic blood pressure was observed during extraction procedure, which could be due to the stress, fear of the procedure or local anesthesia, anyhow this decrease was not significant. Meechan et al, Meechan and Rawlins, Jurevic et al and Toals in their studies reported that Epinephrine has a number of haemodynamic effects and it has shown decrease in diastolic blood pressure in adult patients undergoing oral surgery.

An interesting finding was observed that children with past extraction experience, demonstrated a constant increase in blood pressure over time whereas children with no previous experience of tooth extraction showed increased level of systolic blood pressure at the base line recording, which then lowered at the time of local anesthesia administration. So this decrease in systolic blood pressure is in accordance with the study done by Paramaesvaran and Kingon. This decrease in systolic blood pressure during local anesthesia administration is due to trigeminal-vasovagal-reflex, which results from the fear of pain from the needle. Meyers in his study found that injection and extraction increased blood pressure more than by injection alone. Similar results were concluded in the present study. Meyers also explained that this alteration in blood pressure is due to emotional stress and not a pharmacological effect.

The method employed in this study was almost similar to Paramaesvaran and Kingon and Mochizuli et al. They used automatic digital sphygmomanometer whereas in this study electronic vital sign monitor was utilized. In literature search, no such study on children has been documented. Though the sample size was small but the results did detect alterations in blood pressure. The sample size was chosen as studies using this methodology had shown changes in blood pressure in adult patients.
CONCLUSIONS

Within the limitation of this study, following conclusions are drawn;

- The effect of time on blood pressure is statistically significant ($p < 0.01$)
- The increase in cardiovascular parameters that extraction caused the most anxiety.
- Extraction of tooth is an invasive procedure; this shows that invasiveness of treatment plays an important role in affecting blood pressure.
- The decrease in systolic blood pressure during anesthesia and diastolic blood pressure during extraction in children with no past extraction experience was unexpected.
- Females showed high range of blood pressure when compared with the male subjects.
- Children with lower tooth extraction exhibited higher values of blood pressure than the upper tooth extraction.
- Children with no previous exodontias experience showed higher cardiovascular parameters.

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REFERENCES