ORIGINAL ARTICLE

A Comparative Evaluation of Pain Perception and Comfort of a Patient Using Conventional Syringe and Buzzy System

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Abstract

Aim and objective: To evaluate the pain perception and comfort of patient during local anesthesia (LA) delivery using Buzzy system and conventional syringe.

Materials and methods: Fifty children aged 5 to 10 years were randomly divided into two groups, the main inclusion criteria being administration of LA for dental treatment. Parameters include Wong Baker face pain reading scale (WBFPRS) for subjective evaluation and pulse oximeter and face leg activity crying consolability (FLACC) scale for objective evaluation. The values obtained were statistically analyzed.

Results: FLACC score was higher in conventional group as compared to the Buzzy group, which was statistically significant.

Conclusion: External cold and vibration via Buzzy can reduce pain and anxiety during LA delivery.

Keywords: Buzzy system, Conventional syringe, Pain perception.

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Introduction

Pain management during invasive and noninvasive dental procedures is of outmost importance as pain could result in noncompliance and avoidance of treatment. As a result, there is a crucial need to cultivate methods that decrease pain during injection, preventing patients from avoiding dental treatment.

Dental fear is considered a hostile, psychological, emotional, or physiologic perception which result from a particular dental-associated provocation. Fear and pain are interconnected. Most people will tolerate severe pain before professional care is given with relation to pain.

In dental treatment, pain is more connected with invasive procedures, tooth extractions, and surgeries; however, it is also connected with noninvasive procedures. Local anesthetics are used in preventing and controlling the pain and are considered the safest and most effective drugs among all medicines for the prevention and management of pain. However, the process of administration of these drugs also ignites fear in the patients as many people have a fear of the needle which is used while injecting. Apprehension for pain even in children too young to talk is not frivolous: the effects of untreated pain impact medical outcomes and are remembered by preverbal children.[1]

Fear and anxiety-related behavior can be a major impairment to dental care and can adversely impact the patient's overall oral health. As a result, there is a crucial need to cultivate methods that decrease pain during injection, preventing patients from avoiding dental treatment.[2]

Since the invention of the Buzzy® device, hardly any studies have been conducted to examine its efficacy while delivering local anesthesia (LA) for dental procedures in pediatric patients.

Therefore, the main focus of this study will be on clinical comparison of pain perception and comfort of patient between conventional syringe and Buzzy system.

Materials and Methods

The present study was carried out in Department of Pedodontics and Preventive Dentistry, Mahatma Gandhi Dental College and Hospital, Sitapura, Jaipur. Since the study requires treatment intervention in the subjects; hence, an ethical clearance was obtained from the Ethical Committee.

Children visiting the department for dental treatment were the primary source of samples. Fifty children aged 5–10 years were selected for the study. The main inclusion criteria being administration of LA for dental treatment.

The inclusion and exclusion criteria for the study were as mentioned below.

Inclusion Criteria

- Healthy children with no systemic illness, allergies, etc.
- Cooperative child.
- Patient requiring infiltration LA for dental treatment.
- Children with proper parental consent.

Exclusion Criteria

- Children with known systemic disease.
- Children with behavioral management problem.

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- Children with known allergy to local anesthetic agents.
- Children below 5 years of age.

Study Methodology

After the final selection of patients, i.e., post the inclusion criteria and after obtaining written consent from the parent/caretaker, the samples were randomly divided into two groups.

Group I (conventional syringe group): 25 subjects

Group II (Buzzy group): 25 subjects

Before the commencement of the treatment, the procedure was fully explained to the patient in simple words, with the main criteria being administration of LA.

Group I (Conventional Group)

After the patient is seated on the dental chair, pulse oximeter was placed on the index finger and the child is asked to choose a face from the Wong-Baker FACES pain rating scale that best describes how he/she feels. Readings from the pulse oximeter and FLACC scale were noted in a costumed designed chart.

Local anesthetic (LOX × 2% adrenaline) is delivered using conventional 2-mL syringe in the area adjacent to the tooth requiring invasive treatment procedure. During this stage, readings from the pulse oximeter and FLACC scale were noted again. After the procedure, the child is asked again to choose a face from the Wong-Baker FACES pain rating scale.

Group II (Buzzy Group)

After the child is seated on the dental chair, child is first made familiar to the device by explaining how it works in simple words, then the child is allowed to play with Buzzy in order to familiarize with the device. The wings were kept in the freezer and once the child is ready, the frozen wing is attached to the device and Buzzy is placed extra-orally above the area/cheek where local anesthetic is to be delivered. Pulse oximeter was placed on the index finger and the child is asked to choose a face from the Wong-Baker FACES pain rating scale that best describes how he/she feels. Readings from the pulse oximeter and FLACC scale were noted in a custom-made designed chart.

Local anesthetic (LOX × 2% adrenaline) is delivered using conventional 2-mL syringe in the area adjacent to the tooth requiring invasive treatment procedure. During this stage, readings from the pulse oximeter and FLACC scale were noted again. After the procedure, the child is asked again to choose a face from the Wong-Baker FACES pain rating scale.

The parameters were assessed in each group at the beginning of visit, before the administration of LA and during the administration of LA and were recorded in a custom designed chart. The pulse oximeter reading was continuous and it was averaged out.

Statistical Analysis

The data were coded and entered into Microsoft Excel spreadsheet. Analysis was done using SPSS version 20 (IBM SPSS Statistics Inc., Chicago, Illinois, USA) Windows software program. Descriptive statistics included computation of percentages, means, and standard deviations. The unpaired *t* test and paired *t* test were used for quantitative data comparison of all clinical indicators. Chi-square test used for qualitative data whenever two or more than two groups were used to compare. Level of significance was set at $p \leq 0.05$.

Results

Fifty children in the age-group 5–10 years were included in the present study (Fig. 1). Of these, higher male patients were recorded in the conventional group (52.0%) as compared to Buzzy group (40%) which showed statistically nonsignificant result (Fig. 2).

The pulse rate and the oxygen saturation levels showed statistically nonsignificant result as both have same values even before and after the procedure (Fig. 3).

Wong-Baker FACES pain rating scale also showed statistically nonsignificant result (Fig. 4).

Objective evaluation was recorded using FLACC scale, which showed higher score in conventional group as compared to the Buzzy group and was statistically significant (Fig. 5).

Discussion

The outcome of dental fear and anxiety comes from different sources which can be considered as undesirable understandings consisting of hearing negative remarks from family, friends, and others. Needle-related procedures are considered as the main sources of pain and distress in children in different settings.[3]

Colares et al., in a cross-sectional study on 970 children between 5 years and 12 years old, found a prevalence of dental fear and anxiety of 14.4%.[4] The strongest fears are associated with injections.[5]

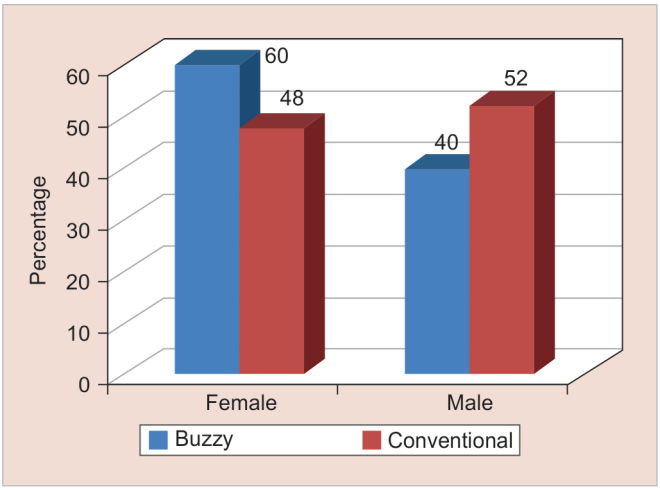

Fig. 1: Comparisons between the groups according to gender

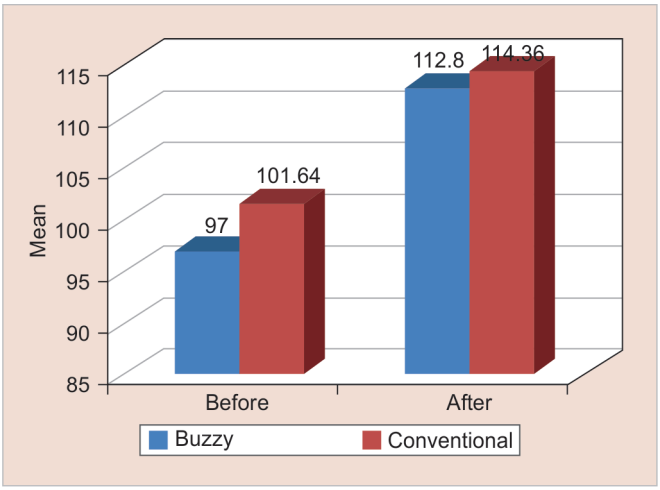

Fig. 2: Mean value of pulse rate between the two groups

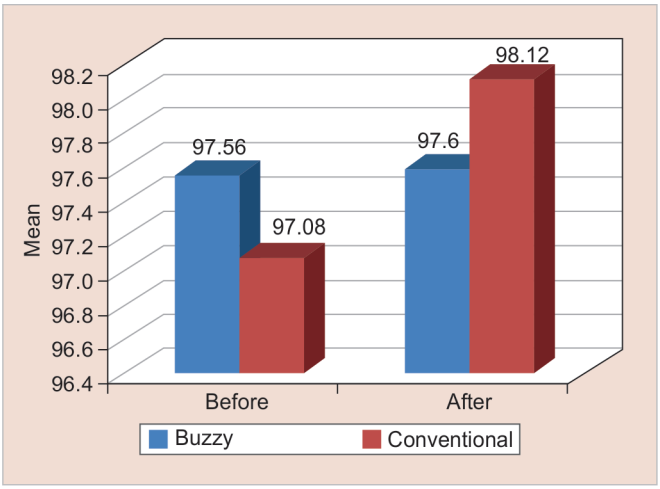

Fig. 3: Mean value of oxygen saturation between the two groups

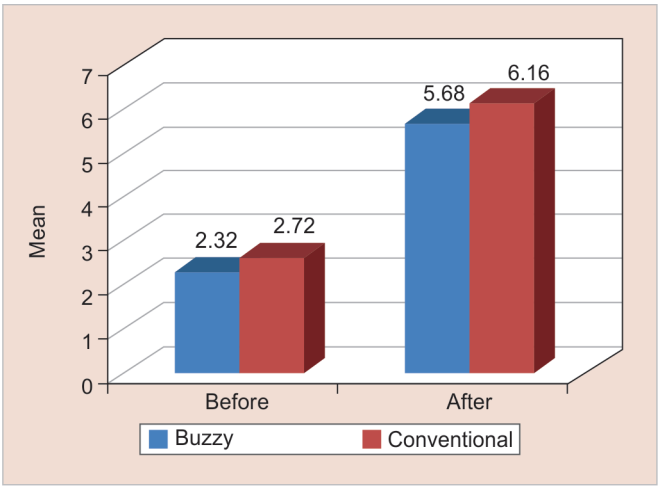

Fig. 4: Mean value of Wong-Baker faces pain rating scale among the two groups

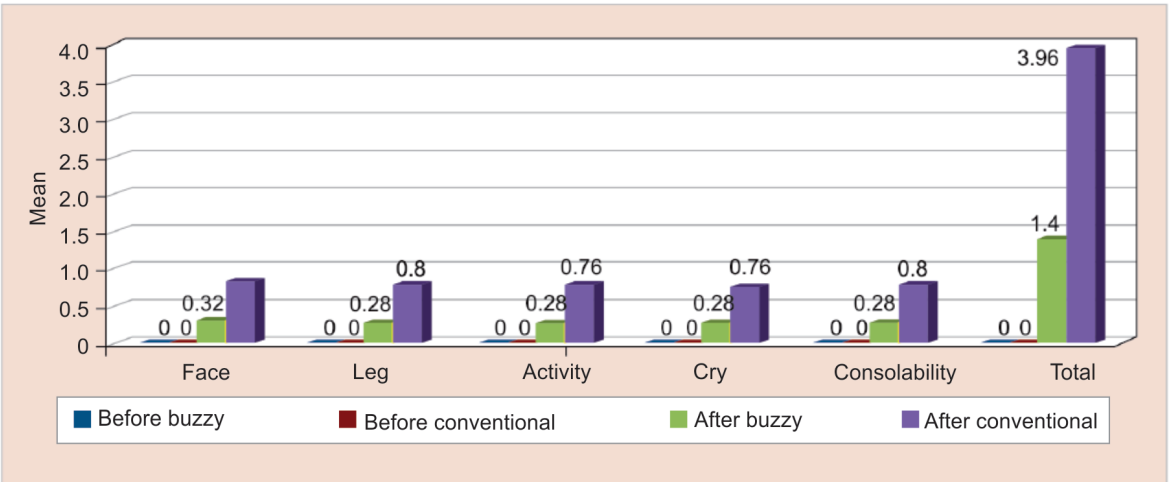

Fig. 5: Mean value of FLACC score between the two groups

Pain management during invasive and noninvasive dental procedures is of utmost importance as pain could result in noncompliance and avoidance of treatment.[6] Several methods are suggested to lower the discomfort of LA injection for dental procedures among which desensitizing the injection site is a recommended strategy.[7]

Buzzy® is an economical versatile, quickly vibrating plastic device designed like a bee, with cooled wings. It is hypothesized to work based on the gate control theory, which proposes that pain is conducted from the peripheral nervous system to the central nervous system via modulation through a gating system in the dorsal horn of the spinal cord.[8] The vibration component of this device will excite the A-beta fibers (fast nonnoxious motion nerves), which eventually block the A-delta (afferent pain receptive nerves).[9] The cold component on the contrary will excite the C fibers; and if applied prior to the pain stimulus, will block the A-delta pain signal as well. Buzzy® has been shown in some studies to be superior to placebo and to vapocoolants and analgesic creams.[10,11]

This study assessed the perception of pain in 50 children who were assigned either in a group that used Buzzy® device while delivering local anesthetic drug or in a group that did not use Buzzy® device and found that the use of Buzzy® was an effective method in reducing the pain perception during local anesthetic delivery.

Children of the age-group 5–10 years were included in this study since this age-group has been proposed as an age where cognitive development begins to manifest itself.[12] Similar age-group was used in the study conducted by Moadad et al.[13] and Inal et al.[14]

Demographically, more male patients were recorded in the conventional group as compared to the Buzzy group which showed statistically nonsignificant result which was in accordance with the studies conducted by ten Berge et al.[15] and El-Housseiny et al.[16]. However, it was in contrary to the study conducted by Taylor et al.[17]

Studies conducted by Beck and Weaver[18] and Guinot Jimeno et al.[19] have demonstrated the usefulness of pulse oximeter in measuring the degree of stress and anxiety in patients undergoing dental treatment; therefore, it was decided to use pulse oximeter in this study to measure the heart rate and oxygen saturation levels before and during the administration of LA. The result was statistically nonsignificant as both showed same values even before and after the procedure. This was in contrary to the studies conducted by Rayen et al.[20] and Alshathri et al.[21] The differences in the result may be due to the reason that the parameters in the mentioned studies were recorded at various intervals over a period of subsequent visits, while in our study we recorded the parameters in a single visit, just before and during local anesthetic delivery.

It may also be due to the differences in sample size that were used in the study.

The WBFPRS was utilized for subjective evaluation of pain as it is considered to be a simple scale for pain assessment in young children. The scores were recorded twice, before the administration of LA and after the administration of LA. This was done to evaluate pain from the child's own point of view. The result for this was also statistically insignificant, which could be attributed to the child's tendency to choose faces of higher score of the scale during the procedure because of the discomfort with the sensation of vibration and cold. The result was similar to the study conducted by Elbay et al.[22] and was in contrary to the study conducted by Alanazi and Pani[23] and Hegde et al.[24]

The rationale for using FLACC scale was based on the evidences from previous studies which showed reliability and validity of this scale in quantifying pain in young, cognitively intact children.[25–27] The FLACC score in this study showed higher score in conventional group as compared to Buzzy group and was statistically significant, which was in accordance with the study by Alanazi and Pani[23] and in contrary with the study conducted by Elbay et al.[22]

The result of the present study have shown that the external cold and vibration via Buzzy® can reduce pain and anxiety during local anesthetic delivery for various dental procedures.

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