e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2024; 14(9); 87-90

Original Research Article

Use of Smartphones to Reduce Preoperative Anxiety in Children before Anaesthesia

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Received: 18-06-2024 / Revised: 21-07-2024 / Accepted: 26-08-2024
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Conflict of interest: Nil

Abstract:

Background and Aim: Preoperative paediatric anxiety is a common phenomenon usually associated with surgery and has a negative effect on postoperative recovery. Like higher postoperative pain, emergence delirium, uncooperative behavior, and higher doses of sedation or preoperative analgesia. This study aims to reduce preoperative anxiety in children undergoing surgeries under anaesthesia using smartphone as a distraction technique.

Material and Method: This blinded randomized clinical trial included 40 children aged 3 to 12 years undergoing a planned surgical intervention at a GMERS general hospital randomized into experimental (n = 20) and control (n = 20) groups. The video was shown on a smartphone to children in the experimental group preceding a planned surgical procedure. The control group was posted for surgery without intervention.

Results: There was statistically significant reduction in mYPAS score in experimental group compared to control group.

Conclusion: Smartphone can be used to reduce preoperative paediatric anxiety as a distraction technique.

Keywords: Anxiety, Children, postoperative Recovery, Smartphone.

Introduction

Every year, more than 2 million children undergo surgical procedures. Children, their parents, and the guardians who care for them and the perioperative is more stressful. Children may experience anxiety and fear of surgery, pain, separation from parents, unfamiliar environment, the unknown, unpleasant sensory stimulation, and loss of autonomy and control. [1,2]

In the immediate preoperative period, which corresponds to 24 hours before surgery, discomfort is more for the children and their family, regardless of the type of surgery, outpatient or hospital approach and cultural context in which the child is admitted. In addition, the susceptibility of the child, lack of understanding about the surgical procedure, unknown hospital environment, fear of physical trauma, and separation from their parents and feelings of sadness may contribute to such discomfort. [3,4] Several evidence indicate age and temperament of the child, behavioral problems during health care, previous surgery and hospitalization, level of parental education and maternal anxiety as factors associated with preoperative anxiety in children. [5,6] Anxieties in children arise due to their misinterpretation of healthcare surroundings. Anxiety manifestation varies as children transition through different stages of physical, emotional, and psychological development. Parental separation and induction of anesthesia have been implicated as the most stressful periods for children during their surgical experience. Anxiety is a frequent feeling among children in the preoperative period. Anxiety before surgery is a widespread issue among children and has been linked to various negative behaviors during the surgical experience.

Research indicates that as many as 65% of children experience considerable anxiety during the preoperative period. These anxiety responses are believed to stem from the child's fears of being separated from their parents and home, feeling a lack of control, encountering unfamiliar routines, surgical instruments, and hospital procedures. [7-9] As acute stress source, anxiety induces functional changes in the central nervous system, increases the deleterious effects on the child's body when

associated with other perioperative stressors produces negative behaviors and high pain intensity scores in the postoperative period. In addition, anxiety causes sleep disturbances, nausea, fatigue, and inadequate responses to anesthesia and analgesia leading to higher costs for the health services and family. [10]

Increased anxiety, disturbances in eating and sleeping, as well as increased pain and analgesic use; continue to be psychological problems during postoperative period too. Parents are also anxious and their concern about the competency of staff, possible complications and how to support their child. Unfamiliarity of surroundings, role expectations, added to parental stress and anxiety can transmit to their children. [11,12]

The literature revealed the effects of preoperative pediatric anxiety as contributory to the manifestation of numerous postoperative psychological behavioral changes such feeding and sleeping problems, bedwetting, withdrawal and apathy, and these symptoms exist up to 2 weeks after surgery. [13,14]

To reduce child anxiety, sedatives and anti- anxiety drugs are regularly administered before surgery. However, these may prolong patient recovery and have many negative side effects. Therefore, a various non-pharmacological interventions is paid increasing attention for reduction of preoperative anxiety such as music therapy, music medicine interventions, and visual imagery technique. [15]

Readily available smartphones can be used as distraction method. Most children like to play with smartphones, listening to music, watching videos or playing video games. Moreover, it has the double advantage of distraction and shielding view of a harsh-looking operating theatre. This study aims to reduce preoperative anxiety in children undergoing surgeries under anaesthesia using smartphone as a distraction technique.

Material and Methods

After obtaining approval from research ethical board, GMERS medical college and hospital Junagadh and consent from the parents, a 40 non premedicated children aged 3-12 years posted for surgery under anaesthesia were enrolled in the study. The study was conducted from March 2024 to August 2024 over a period of six month. All children of either sex aged 3-12 years, American Society of Anesthesiologists (ASA) category I or II undergoing surgery under anaesthesia were included in the study. Children with uncooperative parents, with impaired mental status, on any psychotropic drugs, or with sepsis and hypotension were not included in the study. During pre-anaesthetic visit, one day before surgery, we established good rapport with the children and their parents. Then the children were introduced to the smartphone and offered the choice of viewing animated videos and playing video games. On the day of surgery, in the pre-anaesthetic room the mYPAS score is measured by rating doctor then children were given the smartphone to hold and play for around 20 minutes. 20 minutes later the mYPAS was recorded by the rating doctor who had thorough understanding of and training in assessing child's anxiety. The child was then transported without parental presence from the preoperative room to the operating theatre with continued use of smartphone. The rating doctor again recorded the mYPAS. The child was placed on the operating table in the operating theatre with routine monitor attached. Our study ended here.

In non-interventional group children were not offered smartphones in Pre anaesthesia room and mYPAS score is measured by rating doctor. The outcome measured in the study is represented by Preoperative anxiety in the child and was measured using m-YPAS score. The m-YPAS is an observational scale including 5categories of child behaviour including activity (score range, 1-4), vocalizations (score range, 1- 6), emotional expressivity (score range, 1-4), state of apparent arousal (score range, 1- 4), and use of parents (score range, 1-4). These categories are weighted differently, and the overall score is calculated os that the range of the total score of each child varies from 23.33 (minimum anxiety) to 100 (maximum anxiety).

Outcome variables: with successful distraction there's no sign of anxiety using smartphone distraction or failed distraction requiring administration of anxiolytic premedication.

Statistical Analysis: The recorded data was compiled and entered in a computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were described as means and standard deviations or median and interquartile range based on their distribution. Qualitative variables were presented as percentages. For all tests, level of confidence and level of significance were set at 95% and 5% respectively.

Results

For each group, we calculated mean age, relative frequency of sexes mean mYPAS at initial and mean mYPAS score at post interventional assessment. The differences between the means were tested with an analysis of variance, and the differences between the relative frequencies were tested using the appropriate statistical test. Level of Significance was set at $P < 0.05$. Forty children participated in the study, of which 20 were assigned to the experimental group and 20 to the

control group. The mean [SD] age of the children was 7.4 [5.5] years. 19 children (47.5%) were female. The Table shows the differences between the children in the 2 groups. Because the differences were not statistically significant, so both groups can be considered to be homogenous with regard to all the considered variables. (Table 1) The mean m-YPAS scores of Preoperative anxiety at the initial test did not show significant difference between the 2 groups. At second measurement, the mean (SD) m-YPAS score for the experimental group was 37.66 (4.956), whereas the mean (SD) score in the control group was 60.74 (6.089). The 23.08-point difference between the means was statistically significant (P = 0.0001).

Table 1: Difference between Study and Control groups

Characteristics	experimental group	control group	p value
Pre interventional score mean (SD)	81.33 (5.567)	87.83 (6.414)	1.0
post interventional score mean (SD)	37.66 (4.957)	60.74 (6.089)	<0.0001

*** Indicate statistically significance at p≤0.05**

Discussion

A significant number of children undergo surgery. A number of preoperative anxieties reducing intervention strategies, both pharmacological and non-pharmacological interventions, have been employed. Each intervention has its own benefits and limits. Anxiolytic premedication with midazolam has proven effective but it has got various disadvantages like delay in emergence, recovery and discharge, increased incidence of maladaptive behavioural changes post-surgery and amnesia. [15]

Concerning parental presence during induction of anaesthesia, the benefits of it would be less pre-operative sedation and less fear and anxiety during parent's separation. But the presence of parents during anaesthetic induction may change operating room routines, increase the number of people in the room and cause adverse reaction on parents and moreover, parent's anxiety may worsen child's anxiety, prolong induction time and promote additional stress on the anaesthesiologist. [16] Kain et al. [10] compared the efficacy of programme allowing the presence of parents during anaesthetic induction with midazolam as preanesthetic medication and had observed that children belonging to the midazolam group had significantly less anxiety.

With this experimental study, we wanted to test the effectiveness of a new method to reduce Preoperative anxiety in children by smartphone distraction.

In our study, we are using smartphone as a distraction technique to reduce pre-operative anxiety in children. Smartphone has many effects on children. Apart from causing distraction and disruption, smartphone also have many harmful effects. Despite of all these effects, we believe that our study will not harm the children as we are giving smartphone for a total time of less than 2 hours. If effective, this method would help to reduce Preoperative anxiety in children. Even in those PHCs with reduced staff and economic resources, and would allow a higher number of children to receive effective non-pharmacological interventions to reduce Preoperative anxiety. Non-pharmacological interventions improve children's cooperation and contribute to containing health costs, as they are usually cheaper than medications. Also, some non- pharmacological interventions are as effective as drugs in reducing Preoperative anxiety, therefore, their use may help to avoid the adverse effects of some medications.

This study showed that children who received the intervention had significantly lower mean values of Preoperative anxiety than control children before entering the Operating room, although their initial mean values of Preoperative anxiety were nearly identical. The results of our study were in accordance with that found out by a study by Bachaspatimayum J et al [1] who also showed that smartphones are effective to reduce preoperative anxiety in children and better postoperative outcome. Because the 2 study groups did not differ significantly with respect to other relevant variables, such as age, sex. The lower Preoperative anxiety observed in the experimental group can be attributed to the smartphone. However, the smartphone has been shown to be effective only prior to elective surgical interventions. Therefore, it cannot be recommended in children who are undergoing emergency surgical procedures.

Lastly, smartphones are readily available, easy to implement and portable. Moreover, smartphone is owned by many people even the parents hence the hospital doesn't have to provide additional devices and distraction with smartphone is pleasurable as it is familiar for most of the children and can be trained easily within half an hour even if it is unfamiliar.

Conclusion

The use of smartphone which is readily available, easily implemented and portable, as a distraction technique is effective in reducing preoperative anxiety in children without using anxiolytic medication. If smartphones given especially just

before giving preoperative medications, the child will experience very less anxiety or no anxiety and that could reduce the post-operative hospital stay and improve postoperative outcome status of the child

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