Original Article

Effect of preoperative education on anxiety in children undergoing day-care surgery

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ABSTRACT

Background and Aims: There have been various methods tested for reducing preoperative anxiety in children, but very limited literature is available in the Indian scenario. Our aim was to analyse the effect of an informative video about the anaesthetic technique on preoperative anxiety in children. **Methods:** In all, 94 children were randomly allotted into two groups. Children in the study group were shown a peer modelling video depicting induction of general anaesthesia and recovery during the preanaesthetic check (PAC). Patients in the control group were given only verbal information during PAC. Anxiety was assessed on visual analog scale (VAS) for anxiety at two times. Baseline VAS score was recorded during PAC and preoperative VAS score was assessed prior to induction of anaesthesia. The VAS score was represented as median value. Data were analysed using the Mann–Whitney *U*-test for ordinal data and skewed quantitative data. Categorical data was analysed by using Chi-square test and t-test was applied for quantitative data. The significance threshold of *P* value was set at <0.05. **Results:** The median (interquartile range) preoperative VAS score was significantly lower in the study group [1 (0–1.3)] when compared with the control group [5 (3–5)] ($P < 0.001$). The mean preoperative pulse rate, mean preoperative systolic blood pressure and mean preoperative diastolic blood pressure were significantly lower in the study group when compared with the control group ($P < 0.001$). **Conclusion:** Multimedia information in the form of a peer modelling video helped reduce preoperative anxiety in children between 7 and 12 years of age.

Key words: Preoperative anxiety, smartphone, video, visual analog scale for anxiety

INTRODUCTION

Anxiety is an emotion characterised by an uncomfortable feeling of dread over anticipated events and may be associated with body's response in the form of sympathetic, parasympathetic and endocrine stimulation. It has been reported that 50%-75% of children undergoing surgery experience significant fear and anxiety preoperatively.[1] It begins as soon as the surgery is planned and increases to maximal intensity at the moment of entering the hospital.[2]

Preoperative anxiety in paediatric population may be detrimental as it produces abnormal haemodynamic responses, negative behaviours, high pain intensity score in the postoperative period and delayed wound healing.[3] This anxiety can be increased by patient's lack of knowledge of surgery to be performed and anaesthetic exposure. Preoperative anxiety can be considered as state anxiety which is a temporary feeling of threat, whereas trait anxiety is a generalised tendency of proneness to anxiety. Interventions directed at reducing anxiety in children in the preoperative period is a neglected issue and should be promoted to have a satisfactory surgical and anaesthetic experience. Preoperative anxiety can be reduced by various methods that include pharmacotherapy, provision of information and distraction.[1-4]

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Multimedia information containing anaesthesia induction to allay patient's anxiety has been successfully tried in adults[5] and is an attractive option in children with the advent of newer multimedia devices. We carried out this study to analyse the effect of an informative video about the anaesthetic technique on preoperative anxiety in children. We used a peer modelling video as a method of preoperative education.

METHODS

This prospective, randomised double-blind interventional study was approved by the Institutional Ethics Committee. The study was conducted over a period of 1 year in a tertiary care teaching hospital. 94 children in the age group of 7–12 years undergoing day-care surgery were included and randomised into two groups: study group (those who were shown the video in addition to verbal information) and control group (those who received only verbal information). Our primary objective was to compare visual analog scale (VAS) for anxiety in children in the two groups. The secondary objective was to study haemodynamic parameters (pulse rate and blood pressure) in both groups prior to induction.

Children with American Society of Anaesthesiologists 1 or 2 status undergoing day-care procedures were enrolled during the preanaesthetic check (PAC) at least 1 week prior to surgery. Informed consent was obtained from parents along with assent from children. Children who had undergone previous surgeries, those posted for emergency surgery and mentally challenged children were excluded. The self-report numeric VAS used for the study was a 10-cm long line on paper with 0 at one end and 10 at the other. Word anchors were displayed horizontally with 0 representing 'no anxiety', 2 for 'a little', 5 for 'medium', 8 'a lot' and 10 for 'worst imaginable'.[6] Anxiety was explained by the principal investigator (PI) in increasing intensity in terms of fear of parental separation, bodily injury and death. VAS of 1–4 depicted nervousness and fear of parental separation, VAS of 5–7 depicted fear of bodily harm and 8–10 depicted fear of death. This was explained in English, Hindi or the local language Marathi, whichever was the patient's mother tongue.

Clear instructions on how to mark a response on VAS on their own by encircling the applicable number were provided to the patients. Baseline anxiety was measured in all patients by the PI using VAS during the PAC. Baseline haemodynamic parameters such as pulse rate and blood pressure were recorded. Participants were then randomly allotted into either study group or control group using computer-generated random table numbers [Figure 1]. This was done by sealed envelope technique by an anaesthesiologist not involved in the study. All patients then proceeded to another room where the envelopes were opened by the second investigator and group allotment was revealed. At no point of time was the PI aware of the group allotment. Patients allocated to the study group were shown a peer modelling video containing information on the anaesthetic procedure and recovery and was explained the same in the language that the patient understood by the co-investigator. This 5-min peer modelling video had three clippings and was shown to children using a smartphone. The first clipping depicted a child in the preoperative holding area being counselled and escorted inside the operation theatre (OT) by the attending anaesthesiologist. After monitors were attached, intravenous (IV) line was secured. This was followed by IV induction. The second clip depicted attachment of monitors followed by placement of mask and inhalational induction. The child was shown

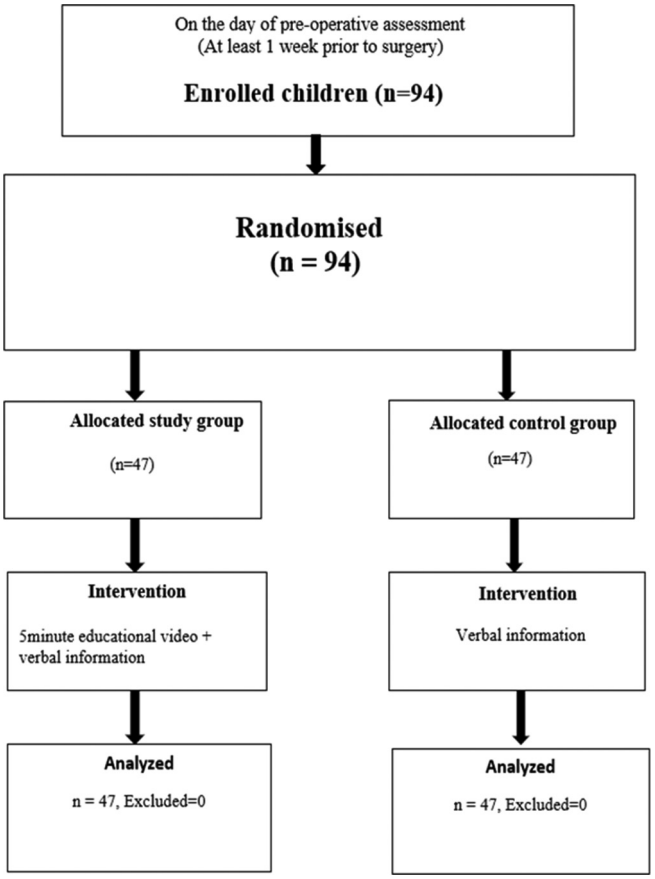

Figure 1: Consort chart

inflating a 'balloon' and eventually falling asleep. The third clip showed a child postoperatively in the ward sleeping comfortably with an oxygen facemask. Patients and their parents were then allowed to ask any queries regarding the video. Children in control group received only verbal information regarding anaesthesia induction and recovery. Children in both the groups were allowed to choose between inhalational or IV induction of anaesthesia a day prior to surgery during the preoperative visit. They were allowed to watch the video again if they wished to do so.

On the morning of surgery, patients were asked to mark their anxiety on the VAS 1 hour prior to surgery in the preoperative holding area by the PI. All children enrolled in the study were taken up as first case or early in the operative list. In those who preferred IV induction, EMLA was applied 45 min prior in the preoperative holding area. Children were escorted to OT with accompanying anaesthesiologist and monitors were attached. Preoperative pulse rate and blood pressure were recorded in OT. In those who preferred IV induction, venous access was secured in OT and proceeded with IV induction. Children who preferred inhalational induction were induced with incremental sevoflurane with oxygen; venous access was secured and proceeded with further induction. All children with VAS score more than 4 would receive oral midazolam 0.5 mg/kg 20 min prior to induction in the preoperative holding area.

Crandall *et al.*[6] studied pre- and post-education VAS as a measure of preoperative anxiety in children age 7–13 years posted for tonsillectomy and/or adenoidectomy. The mean pre-education anxiety score was 3.4 ± 2.7 and post-education anxiety score was 2.9 ± 2.8. Superiority margin was taken as the difference in the anxiety scores between two groups and was fixed at 2 to assume clinical significance. This is because a difference in VAS score of more than 2 changes the level of anxiety from mild to moderate and moderate to severe. The power of the study was considered 0.8 and the alpha error as 5%. Based on the above parameters, the sample size in each group was estimated to be 39. Assuming a 20% dropout rate, the sample size in each group was calculated as 47.

The quantitative data are represented as their mean ± standard deviation. Categorical and nominal data were expressed in percentage. The *t*-test was used for analyzing quantitative data, and categorical data were analysed using Chi-square test. Mann–Whitney *U*-test was used to calculate skewed quantitative data and ordinal data (VAS). The significance threshold of *P* value was set at <0.05. All analysis was carried out using MS Excel GraphPad software 2013 and SPSS version 21.0.

RESULTS

All 94 children provided complete data and were included in the analysis [Figure 1] Demographic data, baseline VAS score, baseline haemodynamic parameters and surgical characteristics were comparable in both groups [Table 1]. Preoperative VAS ranged from 0 to 3 in the study group and 0 to 10 in the control group. The median preoperative VAS score was significantly lower in the study group when compared with the control group ($P < 0.001$) [Table 2]. The mean preoperative pulse rate was found to be significantly lower in the study group when compared with the control group ($P < 0.001$) [Table 3]. The mean preoperative systolic blood pressure and mean preoperative diastolic blood pressure were significantly lower in the study group when compared with the control group ($P < 0.001$) [Table 3]. In the study group, 29 patients (61.70%) preferred inhalational induction and 18 patients (38.30%) preferred IV induction. In the control group, 25 patients (53.19%) preferred inhalational induction and 22 patients (46.80%) preferred IV induction.

Table 1: Demographic and surgical parameters in the two groups

Variables	Study group (*n*=47)	Control group (*n*=47)
Age (years)	9.4±1.6	9.2±1.9
Weight (kg)	22.8±3.9	20.8±3.7
Gender		
Males	31 (65.9)	32 (68.0)
Females	16 (34.0)	15 (31.9)
Surgery		
Laparoscopic Inguinal hernia repair	20	20
Laparoscopic orchiopexy	9	5
Cystoscopy	5	4
Lymphnode biopsy	7	8
Excision of cyst	4	9
Tongue tie release	2	1

SD – Standard deviation. Data are described as mean±SD for quantitative data and as numbers or number (%) for categorical data

Table 2: VAS score at various time points

Variables	Study group (*n*=47)	Control group (*n*=47)	*P*
Baseline VAS score	2 (2-3)	2 (2-3)	0.793
Preoperative VAS score	1 (0-1.3)	5 (3-5)	<0.001

VAS – Visual analog scale. Data are described as median (interquartile range)

Table 3: Haemodynamic parameters

Variables	Study group (*n*=47)	Control group (*n*=47)	*P*
Baseline pulse rate (beats/min)	81.6±5.1	82.5±5.1	0.46
Preoperative pulse rate (beats/min)	84.6±5.6	90.0±7.6	0.002
Baseline systolic blood pressure (mmHg)	106.8±4.4	107.1±3.3	0.65
Preoperative systolic blood pressure (mmHg)	106.0±5.6	110.7±4.3	0.001
Baseline diastolic blood pressure (mmHg)	68.1±3.0	68.7±4.2	0.77
Preoperative diastolic blood pressure (mmHg)	71.6±4.1	75.5±4.3	<0.001

SD – Standard deviation. Data are described as mean±SD

DISCUSSION

In this study, we aimed to investigate the effect of a non-pharmacological behavioural preparation programme of short duration which was reproducible, inexpensive and readily available as a preoperative tool to decrease anxiety in children. The baseline VAS recorded in the preoperative visit mostly represented trait anxiety, and the preoperative VAS recorded immediately before induction represented state anxiety. The preoperative VAS score ranged from 0 to 3 in the study group, whereas in the control group higher preoperative VAS scores up to 10 were recorded. The mean preoperative VAS score in the study group was significantly lower (less than 1, and much lower than the baseline anxiety when compared with the control group ($P < 0.001$). Usually, anxiety is high in the preoperative holding area. This proves the efficacy of our intervention. Thus, even a short educational video can significantly reduce preoperative anxiety. In both the groups, more number of patients preferred inhalational over IV induction. This is in accordance with a randomised study conducted in 2009[7] consisting of 158 children age 3–6 years posted for herniorrhaphy. The investigators showed a peer modelling video containing 12 scenes depicting a 5-year-old boy undergoing the same surgery to both experimental and control groups a week prior to surgery. Children in the experimental group received a copy of video to watch at home with an information booklet. The authors concluded that there was a significant reduction in anxiety in the experimental group when compared with the control group ($P < 0.02$).

However, contrary to our findings, a study[8] investigating the effect of a preoperative videotape on children's behaviour showed no difference in behaviours between experimental and control groups. Fifty-nine children age 2–10 years were allotted to either experimental or the control group. The experimental group received a 7-min teaching video that depicted children of the same age undergoing perioperative experiences. Difference in the findings could be due to selection of age group, their cognitive developments and coping skills.

Literature supports preoperative multifaceted preparation programmes as an effective intervention to reduce perioperative anxiety. However, these multifaceted programmes demand more time and resources. A systematic review on preoperative preparation in children[9] concluded that audiovisual interventions are a potentially useful tool in reducing perioperative anxiety and suggested that videos, multifaceted programmes and interactive games are most effective. The authors, however, concluded that a greater number of studies are required to conclusively answer the mechanisms of most effective audiovisual intervention.

In the era of day-care surgeries where the focus is on judicious use of sedative premedication to enhance recovery, this peer modelling video as a behavioural intervention to reduce anxiety may prove to be an important modality. Quantifying the anxiety helped us to discern which children would benefit from preoperative sedation.

We chose the self-report numeric VAS for anxiety as it is a simple and easy test to understand as well as reliable for the measurement of preoperative anxiety.[6,10] Kindler *et al.*[11] reported that there was significant and positive correlation between VAS and Speilberger State trait Anxiety Inventory (STAI), $r = 0.64$, $P < 0.001$ when used to assess anxiety preoperatively. Although State-Trait Anxiety Inventory – Children (STAIC) is considered a gold standard for measurement of anxiety, it is complex, lengthy, difficult to understand and interpret in paediatric age group and often requires help of a psychologist.[12] Most children develop the ability to understand the self-report between the ages of 3 and 7 years.[13,14] Modified Yale Preoperative Anxiety Scale (mYPAS) is a valid, observational anxiety scale which comprises activity, vocalisation, emotional expression and state of apparent arousal

and is modified to be applied in the age group of 2–12 years. It requires a dedicated observer (either a psychologist or a trained observer) for assessment of behaviour at the time of entering OT and introduction of mask. However, where human resources are limited, it becomes difficult to assign a dedicated observer for assessment of anxiety. Hence, it was not feasible to use this scale in our setup.

Choosing age-appropriate behavioural intervention is also important.[15] Age group between 7 and 12 years was chosen as since any intervention in the form of preparatory education is most effective in the concrete operational stage of development (7–12 years) according to Piaget's theory.[16]

Kain *et al.*[17] conducted an experimental study using a preoperative preparatory programme providing perioperative information, tour to hospital and role play. The programme was modified according to age and conducted over a period of 1–7 days. They found that patients 6 years and above were least anxious if the programme commenced more than 5–7 days before surgery ($P < 0.04$), which is in accordance with our study. They also highlighted limitations of current behavioural programmes as most preparation programmes do not include enhanced coping skills and modelling.

The concept of distraction technique as a non-pharmacological premedicant in children scheduled for surgery has been established in Scandinavian countries and some of the countries in Europe and the United States. We intended to use this peer modelling video as a method of providing educational information and not as a distraction technique. This concept has not been adequately studied in the Indian context.

We used a smartphone to deliver video information. These devices are very trendy and appealing among children nowadays and can serve as an effective tool for delivering educational information.

There were certain limitations to this study. Anxiety related to surgery and/or anaesthesia cannot be separated. As we had focussed mainly on anaesthetic induction and recovery, anxiety on account of surgery was not addressed. Assessment of parental anxiety, which can impact child's anxiety, was not done. The preference of IV or inhalational induction was assessed only after the intervention. It could have been administered before and after the video information. This would have assessed the impact of the video information on the preference of anaesthesia technique. 'VAS of 1–4 depicted nervousness and fear of parental separation, VAS of 5–7 depicted fear of bodily harm and 8–10 depicted fear of death'. This categorisation used has not been validated. However, it was only used to explain different forms of anxiety to the children and anxiety was measured using the self-report numeric VAS.[6] Anxiety is maximum at parental separation and induction of anaesthesia. In this study, anxiety was not assessed at these times. mYPAS would have been an ideal tool to assess anxiety at these time points. However, owing to limited resources and lack of trained personnel, it was not feasible to use it in our study. Furthermore, postoperative behaviour and long-term follow-up to assess impact of intervention on psychological behaviour was not part of this study. Further studies assessing the impact of this simple intervention should be encouraged in resource-poor settings.

CONCLUSION

This non-pharmacological behavioural educational intervention in the form of a peer modelling video helped to reduce preoperative anxiety in children between 7 and 12 years of age.

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Conflicts of interest

There are no conflicts of interest.

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