Effect of Calming Techniques on Health Parameters of Children Undergoing Upper Gastrointestinal Endoscopy and their Mothers' Satisfaction

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Abstract

Context: Upper gastrointestinal endoscopy is a critical diagnostic technique for gastrointestinal disorders. Therefore, proper child preparation is highly recommended to maintain the examination more acquainted more comfortable. **Aim:** Evaluating the calming techniques effect on health parameters of children undergoing upper gastrointestinal endoscopy and their mothers' satisfaction. **Research design:** The present study employed a quasi-experimental research design. **Setting:** This study was accomplished at the endoscopy unit at Benha University Hospital in Benha City. **Study sample:** A purposive sample of 106 children and their mothers. **Tools:** Five tools were adopted for data collection, *I:* Structured interview questionnaire sheet; *II:* Child Behavior Checklist; *III:* State Anxiety Scale; *IV:* Children Fear Scale; *V:* Mothers' Satisfaction Questionnaire. **Results:** After the calming technique intervention, it was observed that mild anxiety was prevalent among most children in the study group, in contrast to the control group where the majority of children in control group experienced severe anxiety immediately after calming technique intervention. Moreover, significant statistical differences were observed between the study group and the control concerning physiological parameters. Additionally, over three-quarters of mothers in the study group had an improved satisfaction level concerning upper gastrointestinal endoscopy one hour after upper endoscopy. **Conclusion:** This study could be concluded that calming techniques were effective in improving health parameters among children undergoing upper endoscopy in the study group compared to the control group. Also, mothers of children in the study group who received calming techniques, experienced high satisfaction level. **Recommendation:** Conducting educational programs periodically for nurses in the endoscopy unit concerning the different calming techniques methods that can be applied for children before upper endoscopy.

Keywords*:* Health Parameters, Calming Techniques, Children, Mothers' Satisfaction Level, Upper gastrointestinal endoscopy.

Introduction

Endoscopy is a common and effective technique for both diagnosis and treatment. Many gastrointestinal tract problems can be easily diagnosed and treated with upper gastrointestinal endoscopy. One of the most crucial factors is the child's anxiety level before the procedure **(Helin et al., 2020).**

Abdominal pain is the most frequent indication for endoscopy, followed by vomiting. Weight loss was also identified as a common reason for undergoing upper endoscopy. Also, it is used to detect infections, ulcers, and acid reflux **(Altamimi, et al., 2021).**

There are many factors that affect the choice of the appropriate technique used in preparing children for endoscopic examination. Children who undergo endoscopy often experience fear and anxiety related to separation from the parents, vascular access, may result in significant stress for the child and parent. It is crucial to explain the process to

children and their parents to reduce their anxiety, explain why the process is required, recognize potential risks and answer any questions they could have ***(Köse & Arıkan, 2020).***

Anxiety can be described as a complicated sequence of cognitive, emotional, and behavioral processes triggered by specific situations. This psychological effect might have an influence not only on children who are having medical procedures but also on everyone in the family. Excessive fear and anxiety may result in poor participation, prolonged procedure time, and possibly unintentional problems ***(Tran et al., 2021).***

One of the most essential responsibilities of pediatric nurses involves providing proper information regarding medical procedures such as endoscopic procedures to children and their families, and to provide physical and psychological assistance to the children and their parents. Therefore, the family should require proper clarification regarding the procedure and their responsibilities. Preparing the child for the procedure will improve his physiological and behavioral parameters, reduce his anxiety, and become more cooperative ***(Tehrani et al., 2022).***

Nurses utilize a variety of pediatric calming techniques to reduce the need for sedation and to reduce children's restlessness, discomfort, fear, and anxiety caused by unfamiliar settings. When choosing a pediatric calming technique, the nurse should consider all criteria, such as child age and particular clinical circumstances ***(Dong et al., 2019).***

Story books are developed in the shape of carton stories with various cartoon characters that seem attractive to children. Story books include detailed information about the medical procedures in simple, appealing, and easily understandable language. It relies on presenting information through pictures rather than words ***(Harrington et al., 2021).***

The physical environment could have a considerable impact on children's behavior. A bright, colorful space is more inviting than a normal clinical setting, which therefore contributes to pediatric comfort. The environment should be clearly specific to the child's age; older children may prefer a bright, vibrant environment ***(Chandra et al., 2019).***

The utilization of animated educational materials to educate children about hospital procedures has the potential to be more effective as children may view watching an animated video as a form of entertainment, which could help to decrease their anxiety levels. Animations have a potential to be more effective than other calming techniques where they allow for extensive and free dissemination ***(Szeszak et al., 2016)***.

Mothers' satisfaction is perceived as valuable indicator for quality improvement in healthcare settings. Also, mothers' satisfaction seen as a desirable outcomes of health care which includes several factors, including the setting, wait times, locations, and psychological aspects of care **(Abdeldafie & Abraham, 2017).**

Significance of the study

Upper gastrointestinal endoscopy has significant value in identifying and treating gastrointestinal problems in children. Children's anxiety level prior to endoscopy is a critical aspect that determines their willingness to accept the procedure ***(Isoldi et al., 2021).***

Upper gastrointestinal endoscopy in developing countries is an underutilized method in diagnosis and management for common and new gastrointestinal disorders. Moreover, information about the utility of gastrointestinal endoscopies in children is scarce and there is a need to raise the awareness of the diagnostic and therapeutic role of pediatric endoscopy in developing countries ***(Bortoluzzi et al., 2022).***

Appropriate child preparation prior to endoscopy improves the children's knowledge of the procedures, improves the child's physiological parameters, and alleviates anxiety and fear in both the child and the parents ***(Cam & Sebahat, 2021).***

Study aim

This study aims to evaluate the influence of calming techniques on health parameters of children undergoing upper gastrointestinal endoscopy and their mothers' satisfaction through:

- Assessing mothers' knowledge regarding upper gastrointestinal endoscopy.
- Assessing the influence of implementing calming techniques on children's physiological and behavioral parameters.
- Evaluating the effect of implementing calming methods on children's anxiety and fear concerning upper gastrointestinal endoscopy.
- Assessing mothers' satisfaction level in the study group following the implementation of calming techniques for their children.

Research hypotheses

1- The implementation of calming techniques for children in the study group is anticipated to result in a higher level of knowledge for their mothers when compared to those in the control group.

2- Implementing calming techniques for children in the study group is expected to lead to better physiological and behavioral parameters compared to the control group.

3- The application of calming techniques for children in the study group is anticipated to result in reduced fear and anxiety levels compared to the control group.

4-The implementation of calming techniques for children in the study group is anticipated to result in increased levels of satisfaction reported by their mothers following upper gastrointestinal endoscopy.

Operational Definitions:

Calming techniques:
Is considered methods used to help in reducing anxiety, stress, muscle tension, adjusting vital signs, child behavior and control pain through colored story books, animated video, booklet and guided imagery.

Health parameters:
Child health parameters represent the operation of a child body that useful in human health monitoring including physiological, behavioral and psychological parameters.

Gastrointestinal endoscopy:
Gastrointestinal endoscopy in children is a safe and effective diagnostic and therapeutic procedure for pediatric gastrointestinal diseases and usually associated with positive findings.

Mothers' satisfaction:
Is perceived as valuable indicator for quality improvement in healthcare settings. and seen as a desirable outcomes of health care which includes several factors, including the setting, wait times, locations, and psychological aspects of care.

Subject & Methods

Research design

To conduct the current research, a quasi-experimental research design was utilized.

Research setting

The current study was accomplished at liver and gastrointestinal endoscopy unit at Benha university Hospital in Benha City. Endoscopy unit was located at medical building of the hospital on the seven floors, comprises 2 rooms.

Study subjects

106 children and their mothers were purposefully selected as a sample. Children were allocated in 2 groups, each comprising 53 children and their mothers.

The inclusion criteria:

- children with ages from 8 to 16 years.
- the first time for performing upper endoscopy.
- communicate effectively and able to understand.
- children under diagnosis.

The exclusion criteria:

- children who experienced a delay in their development .
- children suffering from mental disabilities as down syndrome.
- unconscious children.
- sedated children.

The formula developed by ***Yamane (1967)*** was

utilized to calculate the sample size.

$$n = \frac{N}{1 + N(e)2}$$

Where:
N=total population
n=sample size
e=margin error (0.05)

Sample Technique:

The children were evenly distributed into two groups: group 1 (study group) comprised 53 children who were provided with calming techniques, which include information about upper endoscopy through (upper endoscopy animation video, upper endoscopy story book, upper endoscopy colored booklet and guided imagery) and routine care, group II (control) include the remaining 53 children who were provided with only routine care according to hospital policy.

Data collection tools:

The researchers used the following tools for gathering data of this study.

Tool one: A structured interview questionnaire sheet:

It was designed and written in Arabic language and included three parts:

Part I: Mothers' characteristics such as; age, education level, mother's work and residence**.**

Part II: Children characteristics such as; age, gender, birth order and education level.

Part III: Physiological parameters assessment sheet to assess vital signs and oxygen saturation of children.

Part IV: Mother's knowledge regarding upper gastrointestinal endoscopy. The researchers developed it after conducting a review of scientific literature as ***Tehrani et al., (2022).*** It was written in Arabic to assess mother's knowledge about upper endoscopy. It comprises 14 multiple choice questions that covered various aspects of upper endoscopy such as its definition, limitations, appearance, risks of upper endoscopy, physical and psychological preparation for the procedure.

Scoring system:

A score of (1) was given to the correct answers, while the incorrect or unknown answers received a score of (0).

Total scoring:

Inadequate knowledge: < 75%
Adequate knowledge: ≥ 75%

Tool two: Child Behavior Checklist (CBCL) adapted from **The Achenbach System of Empirically Based Assessment (ASEBA), created by Thomas & Leslie (2001)**. This tool is frequently employed to evaluate emotional and behavioral difficulties in children between 6 and 18 years. The CBCL's questions are presented in eight different categories; each one had sub items. depressed (14 sub items), withdrawn (9 sub items), somatic complaints (9 sub items), social problems (8 sub items), attention problems (9 sub items), thought problems (7 sub items), rule-breaking behavior (11 sub items), and aggressive behavior (20 sub items). The responses to the assessment are captured using a 3-point Likert scale where a rating of 0 denotes "Not True," a rating of 1 represents "Somewhat or Sometimes True," and a rating of 2 indicates "Very True or Often True." Participants are asked to provide rating for the behavior as it is presently occurring.

Scoring system

Interpretation of the total scores involves categorizing them as falling within the normal, borderline, or clinical behavior. Scores below the 93rd percentile indicate normal behavior, while scores falling between the 93rd and 97th percentile are considered borderline clinical. any scores greater than the 97th percentile denote the clinical range. Higher scores indicate greater problems.

Tool three: State Anxiety Scale:

It was adopted from ***Spielberger, (1970)*** and it measures the short-term state anxiety that is often situation-specific. It composed of twenty statements that prompt children to describe their current emotional state.

Scoring system:

Children respond by using 3-point Likert scale, with 1 indicating "rarely," 2 indicating "sometimes," and 3 indicating "often." The total scores range between 20 and 60 degrees. Therefore, the total level can be classified as mild anxiety > 60%, moderate anxiety 60>75% and severe anxiety≤ 75%

Tool four: Children Fear Scale

It was established by ***McMurtry et al., (2011)*** to gauge the level of fear experienced by children. The scale comprises a sequence of five gender-neutral faces, each depicting different levels of fear ranging from no fear (0) to extreme fear (4). By converting the scores to numerical values, the total score for the scale can range between 0 and 4.

0 =no fear, 1 = mild scared, 2 = moderate scared, 3 =moderate high scared, and 4 =extremely fear.

Tool five: Mothers' satisfaction questionnaire: (For children's mothers in the study group). The researchers reviewed the relevant literatures ***(Andersson et al., 2016)*** to develop this tool to measure mothers' satisfaction with calming techniques implemented for their children during upper endoscopy. It involved ten statements rated using 3 point-Likert scale; 1(Unsatisfied), 2 (Satisfied to somewhat) and 3 (Satisfied).

Scoring system

Total scores were between 10 and 30. So, the total level was categorized to low satisfaction level (>60%), moderate satisfaction level (60-75%), and high satisfaction level (≤ 75%).

Preparatory phase:

The authors reviewed the applicable literatures and recent studies to familiarize with the several characteristics of the study and establish the study tools.

Tools validity and reliability:

The study tools underwent a content validity review by a panel of three professors from the pediatric nursing field at Benha University's Faculty of Nursing for its applicability, clarity, and sequence. Cronbach's alpha test was used to compute the internal consistency of the measures. It was 0.89 for state anxiety scale, 0.86 for Children Fear Scale and 0.79 for Child Behavior Checklist.

Ethical considerations:

The researchers obtained permission from the hospital managers and endoscopy unit supervisors by submitting an official letter, as per the guidelines of the Ethical Research Committee of the Faculty of Nursing, Benha University. The study children and their mothers were informed of the voluntary nature of their participation. After that, each mother provided oral consent for participation in the study.

Pilot study:

To test the feasibility and objectivity of the study tools and determine the necessary time to complete them, a pilot study was conducted on 10% of the total sample (i.e., 10 children and their mothers). Some readjustments have been made such as; removing and adding some items. Consequently, children within the pilot study were not included in the real study sample.

Procedure for data collection:

The researchers utilized four phases to accomplish the study's objective: assessment, planning, implementation, and evaluation. These phases were conveyed from the earliest starting point of June 2022 until the end of December 2022, spanning 6 months.

Assessment phase:

During this phase, the researchers conducted interviews with children and their mothers to gather baseline data. They were attended to the study setting 3 days a week (Sunday, Tuesday and Wednesday) from 10 A.M. to 1 P.M., with 4 to 5 children and their mothers each day. First; the researchers interviewed children and their mothers, and explained the study aim before data collection. Then, the researchers fill the structured interviewing questionnaire sheet individually (tool I). Afterward, the researchers fill Child Behavior Checklist (tool II) children anxiety and fear scale (tool III) and (tool IV) for control group and study group and it took about 20 minutes. After that, the researchers fill questionnaire to assess mothers' level of knowledge regarding upper endoscopy, it took about 25 minutes.

Planning phase:

The upper gastrointestinal endoscopy calming techniques sessions were prepared by the researchers for children and their mothers based on the baseline data gathered during the evaluation phase.

Different methods of calming techniques {Upper endoscopy animation video, upper endoscopy storybook, booklet and guided imagery} all of these methods were prepared to improve children physiological and behavioral parameters, decrease children's level of anxiety and fear, and improve mother's knowledge and satisfaction level regarding upper endoscopy.

Different teaching methods were utilized for children and their mothers as flash cards to enhance good communication and encourage active recall. Also, brainstorming and demonstration were used. Moreover, teaching media (e.g., Power Point presentation with i-pad) were employed.

General objective of upper endoscopy calming techniques session was:

To improve children's behavioral and physiological parameters and decrease the level of fear and anxiety regarding upper endoscopy, and improve mother's satisfaction level regarding upper endoscopy.

Specific objectives of upper endoscopy calming technique session were:

-Define upper gastrointestinal endoscopy
-Identify limitation for performing upper gastrointestinal endoscopy
-List time needed for applying upper gastrointestinal endoscopy.
-Illustrate how upper endoscopy looked like.
-Discuss upper gastrointestinal endoscopy risks.
-Explain the physical preparation for upper gastrointestinal endoscopy.
-Explain methods of upper gastrointestinal endoscopy calming techniques.

Calming technique methods:

1- **The upper gastrointestinal endoscopy animation Video.**

Scenario of the upper gastrointestinal endoscopy animation video was prepared by the researchers. The animation video depicts the experience of a girl undergoing an upper endoscopy and has duration of 2 minutes and 35 seconds. The girl character was created to be representative of the typical child within the target audience of 8-16-year-olds, while a second character was established to depict the upper endoscopy nurse.

During the animation, the girl character speaks directly to the audience, providing a step-by-step explanation of the upper GI endoscopy procedure. The animation also includes additional information that is delivered through the nurse character's explanations to the girl before and during the upper endoscopy. The animation presents essential information on the upper endoscopy in a manner suitable for the target audience's age level. To ensure easy understanding, the conversation between the characters was kept simple and the technical terms were explained and interpreted by the girl character in a child-friendly manner.

2- **Upper endoscopy colored storybook** was equipped by the researchers in simple Arabic language using clear, descriptive, and colorful pictures. The story book was revised and modified by jury of experts. (for children from 8- 9 years)

3- **Upper endoscopy booklet (for children from 10- 16 years)**

Upper endoscopy storybook was created by the researchers in simple Arabic language maintained by clear, descriptive, and colorful pictures. Then it reviewed and improved by jury of experts. It contains information regarding, upper endoscopy definition, time needed for procedure completion, description, advantages and disadvantages, physical and psychological preparation before upper endoscopy.

4- **Guided imagery:** the researchers used this technique to reduce anxiety and fear. It includes the use of sensory engagement and behavioral and physiological responses to replace distressing memories with positive mental imagery. The technique is facilitated by an audio recording that guides children to imagine a pleasant setting, often with rich sensory experiences such as sounds and visual details.

Through guided imagery, children can create lifelike mental images that evoke a strong sense of presence and immersion in the imagined scenario. This ability to displace negative thoughts and emotions can aid in improving health parameters.

Implementation phase:

Once the initial assessment was completed and calming techniques session was constructed, the researchers started to classify the children accompanied their mothers into two equal groups group I (Study group) and group II (Control group) using a simple random sample. Whereas researcher started to write names of groups (study group and control group) on papers and put them in box then each child chose a paper. The child who chose the control paper became member in control group sample and the child who chose study paper became member of study group sample, then the researcher initiated the interviews with control group first to prevent sample bias, then study group.

The control group was given only the routine care according to hospital policy while different pediatric calming techniques as mentioned before were applied for each child in the study group in one session before upper endoscopy.

-The researchers applied the session individually for every child and his mother.

- The time of each session ranged between 35 and 45 minutes.

Evaluation phase:

Children's health parameters in both control and study group were evaluated one hour after upper endoscopy by using physiological parameter sheet (Tool I part III), child behavior questionnaire (Tool II), State Anxiety Scale (tool III), and Children Fear Scale (Tool IV). Mothers' knowledge was evaluated immediately after intervention (Tool I part IV). Also, the researchers evaluated the satisfaction level of mothers in study group one hour following upper endoscopy utilizing Tool V.

Data analysis

The data underwent coding and transforming into a particularly designed format for computer entry using SPSS (version 22). The mean and standard deviation were used to represent the normally distributed continuous data, while categorical data were presented as percentages and numbers. Comparing variables with categorical data was conducted utilizing the chi-square test. The reliability (internal consistency) was calculated using Cronbach alpha coefficient test. Statistical significance at $P<0.05$, highly statistical significance at $P\leq0.001$ while no significance at $P>0.05$.

Results

Table 1 clarified that more than one third of mothers in the study and control groups (37.8%&35.8%) are in the age group 30 <40. Concerning mothers' educational level, over two fifth (41.5%) of mothers in the control group had university education, and nearly two fifth (39.6%) of mothers in the study group had attended university.

As regard the residence, more than half (60.4%&54.7%), of mothers in the control and study groups were reside in urban area and less two thirds (64.2%&58.5%) of mothers in the control and study group were working.

Table 2 portrayed that the mean ages of the participating children were 10.4 ±3.1 & 11.1 ±3.0 for the study and control groups, respectively. Also, it was found that about three-fifth (60.4%) of children in the control group were females, and over half (54.7%) of children in the study group were females.

Concerning ranking of children, the present study discovered that over third (37.7%) of children in the control group were the first and less than half (45.3%) of the study group were the first. Moreover, it was found that, over two thirds (69.8%) of the control group were in primary school. Additionally, more than three-quarters (77.4%) of children in the study group were in primary school.

Table 3 demonstrated that the physiological parameters of respiration, pulse, and oxygen saturation exhibited statistically significant differences between the study and control groups, with a p-value of ≤0.05.

Table 4 indicated that prior to the intervention, approximately three-quarters of mothers in both the control group (73.6%) and the study group (77.4%) had inadequate knowledge.

Additionally, over three-quarters (79.2%) of mothers in the study group had sufficient knowledge one hour after upper endoscopy; whereas over two thirds (69.8%) of mothers in the control group exhibited inadequate knowledge.

Figure 1 portrayed that most (84.9%) children in the study group exhibited normal behavior one hour before upper endoscopy; while over two thirds (67.9%) of children in the control group were in the clinical range.

Figure 2 revealed that the most (88.7%) children in the study group exhibited normal behavior one hour after upper endoscopy; whereas over half (58.5%) of the control group children were in the clinical range.

Table 5 revealed that most control and study groups children (83.0% &84.9%) had severe anxiety before calming techniques intervention respectively. However, most children in the study group (84.9%) exhibited mild anxiety; whereas most children in the control group (81.1%) had severe anxiety immediately after calming techniques intervention.

One hour after upper endoscopy, about three-quarters (77.4%) of the study group children had mild anxiety and over three-quarters (79.2%) of the control group children exhibited severe anxiety.

Table 6 portrayed that, nearly two fifth (39.6% &45.3%) of children in the control and study groups were moderately scared before calming techniques intervention respectively. However, most children (81.1%) in the study group had no fear; whereas over two fifth (41.5%) of the control group were moderately scared immediately after calming techniques intervention,

One hour after upper endoscopy, most children (86.8%) in study group had no fear; whereas over two fifth (41.5%) of the control group were moderately high scared.

Figure 3 revealed that over three-quarters of mothers in the study group (77.4%) had high level satisfaction about upper endoscopy one hour after upper endoscopy; whereas less than one quarter (22.6%) of them exhibited moderate satisfaction level.

Table 7 specified a significant association between mother's knowledge and their satisfaction where the majority (85.7%) of mothers in the study group who had adequate knowledge had high satisfaction level. While, more than half (54.5%) of mothers who had inadequate knowledge had moderate level of satisfaction.

(Table 1): Percentage distribution of studied mothers according to their characteristics (n= 106)

Mother's characteristics	Control group (n=53)		Study group (n=53)		X^2	P-value
	No	%	No	%		
Age /years					0.251	0.958
<20	2	3.8	4	7.5		
20 <30	14	26.4	13	24.5		
30 <40	19	**35.8**	20	**37.8**		
≥ 40	18	34.0	16	30.2		
Mean ±SD	35.3 ±9.7		34.6 ±9.6			
Education level						
illiterate	3	5.7	2	3..8	1.224	0.854
read and write	4	7.5	6	11.3		
preparatory education	10	18.9	8	15.1		
secondary education	14	26.4	16	30.2		
university education	22	**41.5**	21	**39.6**		
Residence						
rural	21	39.6	24	45.3	0.352	0.442
urban	32	**60.4**	29	**54.7**		
Mothers' work						
housewives	19	35.8	22	41.5	0.521	0.331
working	34	**64.2**	31	**58.5**		

(Table 2). Percentage distribution of the studied children according to their characteristics (n=106).

Children's characteristics	Control group (n= 53)		Study group (n= 53)		X^2	P-value
	No	%	No	%		
Age (years)						
8 <10	20	37.7	22	41.5	1.557	**0.326**
10 <12	17	32.1	19	35.9		
12 – 16	16	30.2	12	22.6		
Mean ±SD	11.1 ±3.0		10.4 ±3.1			
Gender						
Female	32	**60.4**	29	**54.7**	1.339	**0.561**
Male	21	39.6	24	45.3		
Child ranking						
First	20	**37.7**	24	**45.3**	1.762	**0.312**
Second	18	34.0	17	32.1		
Third	15	28.3	12	22.6		
Child education						
Primary school	37	**69.8**	41	**77.4**	1.511	**0.304**
Preparatory school	16	30.2	12	22.6		

Table (3): Comparison between the study and control children according to their physiological parameters before upper endoscopy (n=106).

Children's physiological parameters	Control group (n= 53)		Study group (n= 53)		X^2	P-value
	No	%	No	%		
Respiration						
Normal	20	37.7	38	71.7	14.82	≤0.05
Abnormal	33	62.3	15	28.3		
Mean ±SD	26.59±8.50		19.47±10.35			
Pulse						
Normal	32	60.4	39	73.6	16.429	≤0.05
Abnormal	21	39.6	14	26.4		
Mean ±SD	122.47±14.35		85.47±18.35			
Temperature						
Normal	47	88.7	50	94.3	2.31	>0.05
Abnormal	6	11.3	3	5.7		
Mean ±SD	37.01±0.59		37.04±0.61			
Oxygen saturation						
Normal	30	56.6	46	86.8	7.19	≤0.05
Abnormal	23	43.4	7	13.2		
Mean ±SD	94.19±4.8		97.21±.1.6			

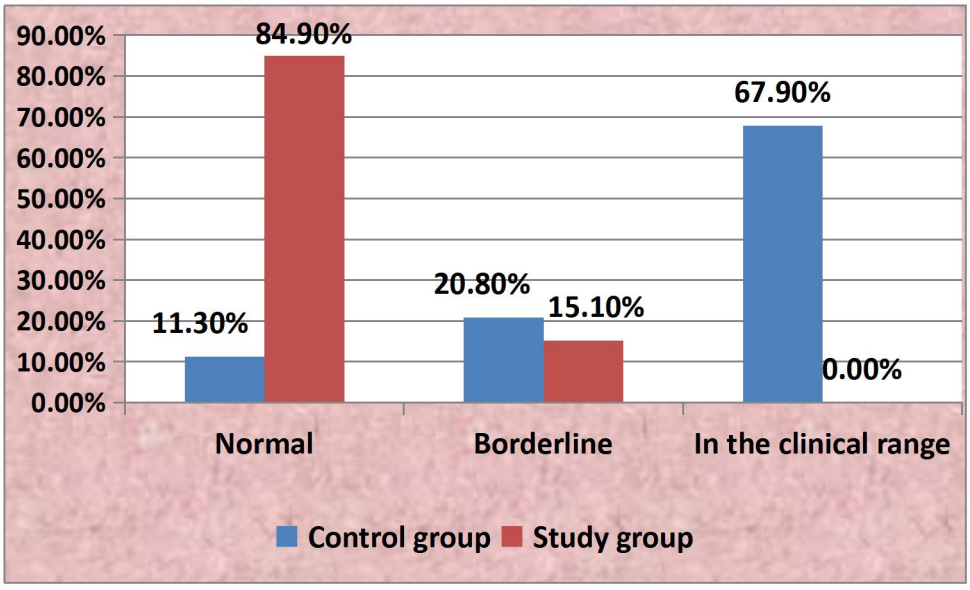

Figure (1): Distribution of children in the study and control regarding their behavior one hour before upper endoscopy (n=106).

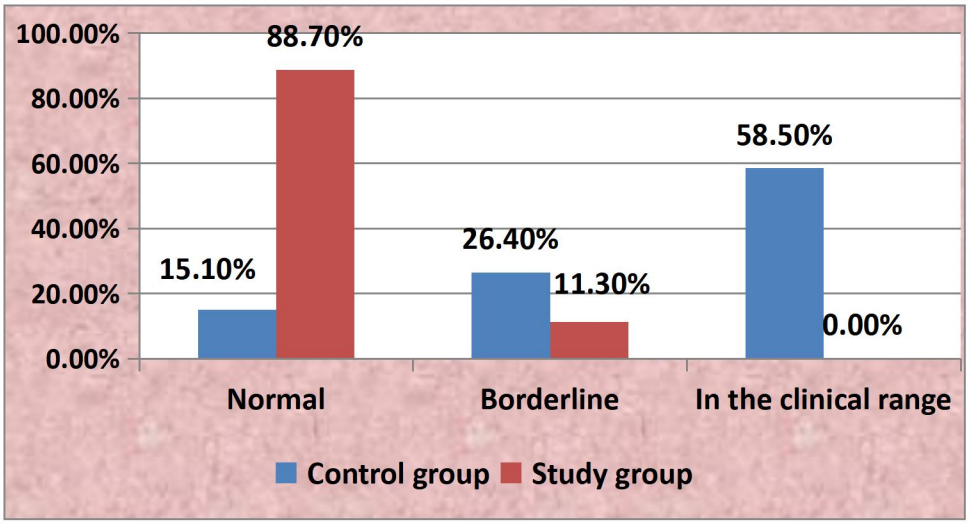

Figure (2): Distribution of children in the study and control regarding their behavior one hour after upper endoscopy (n=106).

Table (4): Total mothers' knowledge level regarding upper endoscopy before intervention, and one hour after upper endoscopy. (n= 106).

Mother's total knowledge level						
Phases of intervention	**Control group n= (53)**		**Study group n= (53)**		**X^2**	**P-value**
	No	**%**	**No**	**%**		
Pre intervention						
In adequate knowledge	39	**73.6**	41	**77.4**	0.063	0.829
Adequate knowledge	14	26.4	12	22.6		
One hour after upper endoscopy						
Inadequate knowledge	37	**69.8**	11	20.8	35.214	<0.001**
Adequate knowledge	16	30.2	42	**79.2**		

(**) Highly significant at p < 0.001 **No significant at p>0.05**

Table (5): Percentage distribution of the participating children according to their total level of anxiety before intervention, immediately following intervention and one hour after upper endoscopy (n= 106)

Total level of children anxiety						
Phases of intervention	**Control group (n= 53)**		**Study group (n= 53)**		**X^2**	**P-value**
	No	**%**	**No**	**%**		
Before calming techniques intervention						
Moderate anxiety	9	17.0	8	15.1	0.098	>0.05
Severe anxiety	44	**83.0**	45	**84.9**		
Immediately after calming techniques intervention						
Mild anxiety	2	3.8	45	**84.9**	90.167	<0.001**
Moderate anxiety	8	15.1	8	15.1		
Severe anxiety	43	**81.1**	0	0.0		
One hour after upper endoscopy						
Mild anxiety	1	1.9	41	**77.4**	87.000	<0.001**
Moderate anxiety	10	18.9	12	22.6		
Severe anxiety	42	**79.2**	0	0.0		

(**) Highly significant at p < 0.001 **No significant at p>0.05**

Table (6): Percentage distribution of the participating children concerning their fear level before intervention, immediately after intervention and one hour after upper endoscopy (n= 106)

Total level of children fear						
Intervention Phases	**Control group n= (53)**		**Study group n= (53)**		**X^2**	**P-value**
	No	**%**	**No**	**%**		
Before calming techniques intervention						
mild scared	4	7.5	2	3.7	1.671	>0.05
moderate scared	21	39.6	24	45.3		
moderate high scared	17	32.0	19	35.8		
extremely fear	11	20.8	8	15.1		
Immediately after calming technique intervention						
no fear	0	0.0	43	81.1	93.255	<0.001**
mild scared	4	7.5	10	18.9		
moderate scared	22	**41.5**	0	0.0		
moderate high scared	20	37.7	0	0.0		
extremely fear	7	13.2	0	0.0		
One hour after upper endoscopy						
no fear	2	3.7	46	**86.8**	94.212	<0.001**
mild scared	4	7.5	7	13.2		
moderate scared	20	**37.7**	0	0.0		
moderate high scared	22	41.5	0	0.0		
extremely fear	5	9.4	0	0.0		

(**) Highly significant at p < 0.001 **No significant at p>0.05**

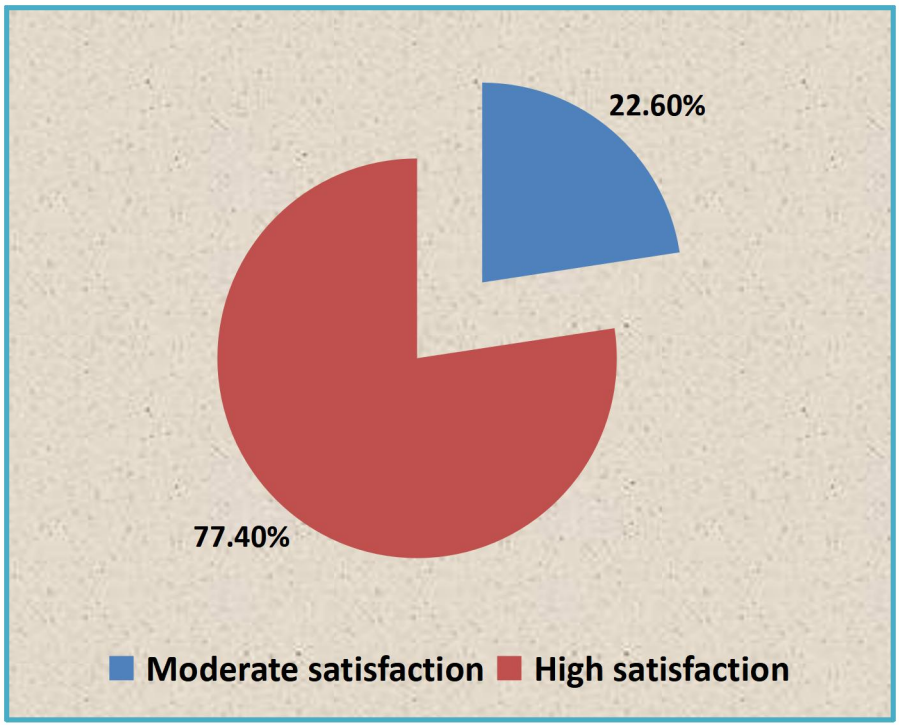

Figure (3): Mothers' total satisfaction level in study group regarding calming techniques applied to their children experiencing upper endoscopy. (n=53).

Table (7): Relation between mother's total knowledge and total satisfaction one hour after upper endoscopy in study group (n= 53)

Total satisfaction level	Total knowledge immediately after intervention				X^2	p-value
	Inadequate (n=11)		Adequate (n=42)			
	No	%	No	%		
Moderate satisfaction	6	**54.5**	6	14.3	5.158	0.022*
High satisfaction	5	45.5	36	**85.7**		

(*) A statistical significant at P < 0.05

Discussion

Children preparation for upper endoscopy can be accomplished by employing several calming techniques that assist them in coping with the stressful event. Calming children can be enhanced through efficient collaboration between nurses and mothers. Nurses are frequently given specific focus and attention in order to improve effective child calming and mother satisfaction by increasing mothers' engagement to provide appropriate care for their children **(Kada et al., 2019).**

The current findings revealed that the mean ages of children in the control and study

group were 11.1 ±3.0 & 10.4 ±3.1 respectively. Also, over half of the study group were females. **Çelikol et al. (2019)** found similar results regarding anxiety levels in children undergoing invasive procedures. The study involved participants with an average age of 9.73, and approximately half were female.

Regarding mothers' total knowledge level, we found that over three-quarters of mothers in the study group exhibited adequate knowledge one hour after upper endoscopy, whereas over two thirds of mothers in the control group exhibited inadequate knowledge. These findings were parallel to **Abdeldafie & Abraham, (2017),** who reported that giving explanation and information to parents in the study group positively affect parents' satisfaction and added that parents must have the freedom to inquire about their child's preparation and the procedures involved in endoscopy.

Our results showed that most children in the control and study groups had severe anxiety before the calming techniques intervention. In line with the findings of **Tehrani et al.'s (2022)** study, which aimed to evaluate the effect of a pre-endoscopy preparation program on children's anxiety and parental satisfaction, there was no statistically significant difference observed between the control and study groups. The researchers' point of view is that children anxiety children's anxiety arises due to several factors such as encountering unfamiliar surroundings, being separated from their parents, and undergoing painful medical.

The present study findings indicated that most children in the study group exhibited mild anxiety immediately after calming techniques intervention. This finding was parallel to **Volkan et al., (2022),** who performed a study in Turkey to examine the impact of educating children about endoscopy on their anxiety levels and salivary cortisol levels. The study revealed that the intervention group had significantly lower anxiety scores, improved recovery, and reduced cortisol levels. One possible explanation for this outcome is that children tend to be more engaged with and receptive to information that are presented in attractive manner.

According to total level of children's fear, nearly two fifth of the control group children were moderately scared before and after intervention. This result was parallel to **Ahmed et al., (2016),** whose results showed an increase in the fear level of the control group.

Additionally, our findings revealed that less than half of the study group was moderately scared pre intervention. This agreed with **Köse & Arıkan, (2020)** who conducted their study in Turkey to evaluate the impact of the cartoon-assisted endoscopy preparation package on children's anxiety and fear levels and stated that children in the study group had high level of fear pre intervention.

The results of this study align with the findings of **Farrier et al. (2020)**, who conducted research in Canada to evaluate the fear and pain experienced by children during medical procedures. The study indicated that based on children's reports, there was a significant decrease in fear levels immediately before the procedure in most cases.

Our findings demonstrated that most study group children had no fear immediately after the calming technique intervention, and there was a highly significant statistical difference between the study and control groups. These results were maintained by a study done by **Köse & Arıkan, (2020),** who found a statistically significant difference between the mean fear scores. As a consequence, adopting various calming techniques for children, getting acquainted them with the procedure, and providing chances for them to undergo the procedure in a quiet setting may help minimize their fears.

Concerning mothers' satisfaction concerning calming techniques provided to their children experiencing upper endoscopy; it was obvious that over three-quarters of mothers in the study group were highly satisfied about upper endoscopy calming techniques. This result was congruent with **Abdeldafie & Abraham, (2017)**, who examined the parental satisfaction level with the nursing care provided to children undergoing endoscopy in Sudan. Based on the findings, parents reported higher satisfaction levels with

the nursing care provided in hospitals that were better equipped and prepared to provide medical care. They also concluded that the majority of the studied sample saw that the provided information was better than their expectations.

On the same line, **Köse & Arıkan, (2020),** mentioned that, the mean satisfaction scores of the parents in the experimental group after endoscopy were higher compared to the control group.

Conclusion

The findings of the current study specified effectiveness of the calming techniques in enhancing health parameters among children undergoing upper endoscopy in the study group compared to the control group. Also, mothers of the study group children who underwent calming techniques, experienced high satisfaction level.

Recommendations

- Conducting educational programs periodically for nurses in the endoscopy unit concerning the different calming techniques methods that can be applied for children before upper endoscopy.
- The availability of Arabic booklet to all endoscopy units at different health care setting.
- Educating newly appointed nurses concerning different calming techniques and the benefits they provide.
- Further researches including larger sample are recommended to ensure generalization of the finding.

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