

Investigating The Effect of Psychological Variables On Postoperative Pain In Children

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Abstract

Background and Purpose: Despite the progress of pain management in children, the prevalence of postoperative pain remains a caring challenge. Given the multidimensional nature of pain and the effect of various factors on pain, the need to identify risk factors in preventing postoperative pain is felt. The purpose of this study was therefore to investigate the effect of psychological variables on postoperative pain in children

Methods: This study was conducted following a descriptive-correlational study design. The samples of the study were 171 children aged 6-13 years who were conveniently selected from the selected children's hospital in Tehran according to the inclusion criteria. Data were collected using the "demographic questionnaire", "Child Pain Anxiety Symptoms Scale (CPASS)", the Spielberger's State-Trait Anxiety Inventory (STAI), and "Coping Strategies Questionnaire (CSQ)" and analyzed using SPSS21 software.

Results: Most of the 171 children participated were boys (65.5%) with a mean age of 9.58 years. The most common type of surgery was abdominal (53.2%), with an average surgery duration of 134.29 minutes. The results of regression analysis showed that postoperative pain was positively affected by child and parent anxiety and negatively affected by coping strategies. The postoperative pain increased 0.31 and 0.30 per unit increase in child and parent anxiety, respectively, and decreased 0.14 per unit increase in coping strategies.

Conclusion: Based on the confirmation of the relationship between child and parent psychological variables on postoperative pain, identifying children at risk and presenting psychological interventions can be an effective step for managing postoperative pain and improving child and family comfort.

Introduction

Surgery is a painful, stressful, and traumatic situation for children (1). Pain is a common problem in children after surgery (2). The incidence of postoperative pain in various surgeries has been reported between 40 and 84% (3-5). Despite advances in technology in pain management and preoperative care, the reported acute postoperative pain level remains high (2). In Iran, pain has also been reported as the most common postoperative complication (6).

Pain is a multidimensional mental concept that is influenced by neurological, psychological, social, cognitive, and behavioral factors (7). Studies have found various factors effective in pain. Nikolajsen found child anxiety, preoperative pain intensity, parental pain disaster, and child coping (8), Rabbitts found preoperative sleep disorders and parental pain disaster (2), and Hofmann found preoperative pain anxiety effective in postoperative pain in children (9). Evidence suggests that negative affective reactions are an important factor in postoperative pain that has significant physiological and psychological consequences if not managed well (10, 11).

Postoperative acute pain with disruption in various body systems leads to a cascade of physiological events such as increased postoperative pain, chronic and lasting pain, as well as psychological events such as restlessness, fatigue, difficulty concentrating, irritability, disturbed sleep, and maladaptive behaviors (12). These consequences can even lead to suicide in younger children (7). On the one hand, following these complications, the recovery and wound healing period is prolonged, the length of stay and costs are increased, and satisfaction is reduced. Uncontrolled pain can also cause psychological consequences (anxiety, fear, and depression) and cognitive and behavioral disorders in children, and decrease their quality of life. Inadequate pain management in children, however, has always been a caring challenge, and studies have reported the lack of skills in pain assessment and cognition as the most important factor (13). However, most types of pain are predictable and identifying the factors affecting pain is one of the prevention strategies.

Based on the evidence, the issue of pain prevention remains largely ignored in the country, and most studies have focused on the treatment of postoperative pain, including studies investigating the effect of various types of pharmacological and non-pharmacological interventions on postoperative pain reduction (14). However, most children suffer from anxiety before surgery (15, 16). Even their parents are restlessness and anxious due to the child restlessness caused by care such as NPOs and interventions such as injections of drugs and serum, as well as fears of surgical procedure, and their child's recovery (12, 17). Therefore, attention to preoperative psychological distresses and its effect on postoperative pain seem to be necessary (18). Since inadequate pain management in the country is related to factors such as poor care team knowledge, lack of guidelines, and fear of drug use (19), identifying risk factors is predicted to increase care team awareness and better management of pain in children under such circumstances. The aim of this study was therefore to investigate the effect of psychological variables on postoperative pain in children. It is hoped that specialists will use the results as guidance in preoperative clinical care and postoperative pain improvement.

Methods

This study was conducted following a descriptive-correlational study design. It investigated the effect of psychological variables on postoperative pain in children aged 6-13 years hospitalized in the selected children's hospital in Tehran. Samples were selected conveniently from among the children hospitalized for elective surgery. Considering the mean effect size of 0.3 and chi-square test statistic, the number of samples was calculated to be 171.

The tools used included four questionnaires. "Demographic characteristics questionnaire" was in two parts related to parent characteristics (age, sex, occupation, family monthly income, and education level) and child characteristics (age, sex, type of surgery, duration of surgery, and pain experience before surgery). Pain severity was assessed using the Numerical Rating Scale (NRS) (0 = no pain, 10 = most severe pain). According to previous studies, moderate to severe pain was considered equal to or greater than 4 (20). A numerical rating scale is recommended to evaluate the severity of acute postoperative pain. The validity and reliability of these instruments have been confirmed in various studies (21). The

“Child Pain Anxiety Symptoms Scale (CPASS)” is designed for the age group of 6 to 18 years and consists of 20 items rated on a 6-point Likert scale ranging from zero (never) to five (always). The total score of the instrument ranges from zero to one hundred and higher scores indicates greater pain anxiety. The validity and reliability of this questionnaire has been confirmed in various studies (10, 22). The Spielberger’s State-Trait Anxiety Inventory (STAI) is made up of two parts. The State part consists of 20 items expressing state anxiety that characterizes one's feelings at the moment of response. The trait part consists of 20 items expressing trait anxiety that encompasses individuals’ general feelings. Each item is rated on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always). Scores in each part ranges from 20 to 80. Higher scores indicate greater anxiety. The Persian version of the tool has been used in previous studies and its validity and reliability have been proven (23). The “Coping Strategies Questionnaire” (CSQ) includes 50 questions on patient self-testing of cognitive and behavioral strategies to cope with pain. It consists of the two dimensions of cognitive strategies with 6 subscales including ignoring pain sensations, reinterpreting pain sensations, diverting attention, coping self statements, catastrophizing, and praying or hoping, and behavioral strategies with two subscales including increasing activity level and increasing pain behavior as well as two questions at the end of the questionnaire to determine the effectiveness of control over pain and the ability to decrease pain. It is rated on a 7-point Likert scale ranging from zero (never do) to 6 (always do). The total score ranges from zero to 300. A higher score indicates an increase in one's pain coping. The instrument has sufficient reliability and validity (24).

In order to determine the validity of the instruments in the present study, face validity and content validity were assessed. The tools were reviewed by ten faculty members of Shahid Beheshti University of Medical Sciences for their relevance and simplicity, and changes were applied. In order to assess the face validity, the tools were given to ten children and their parents to check the items for simplicity and comprehensibility, and after collecting the comments and making changes, the final version was approved. Internal consistency reliability and stability were used to determine the reliability of the instruments in the present study, and the *inter-observer correlation coefficient* was used to determine the visual analog scale (VAS) (Table 1).

Data were collected by the researcher after obtaining a code of ethics and a letter of introduction from Shahid Beheshti University of Medical Sciences (code of ethics: IR.SBMU.PHNM.1397.51). After these steps, the researcher visited the research environments every day for approximately 3 months and after submitting the letter of introduction and based on the inclusion criteria began to collect the samples using convenience sampling. Before the participants entered the study, the purpose and method of the study and confidentiality of their information were described, informed consent was obtained from all of participants and then all the participants were provided with data collection tools if they were willing to participate in the study. When the questionnaire was completed by the child and parents, the researcher was present to answer any questions they might have. After completion, the questionnaires were collected by the researcher.

Data analysis was performed by using SPSS21 software. At first, the description of variables was shown as frequency and mean. Then the correlation between independent and dependent variables was determined, and the significant variables at the level of less than 0.05 were analyzed using linear regression.

Findings

In the present study, out of 171 subjects, 112 were boy (65.5%) and 59 were girl (34.5%) with the mean age of 58.5 years. The most frequent surgery was abdominal surgery (91 subjects, 53.2%) followed by genitourinary surgery (51 subjects, 29.8%). Other surgeries included 29 patients (17%) and the average duration of surgeries was 134.29 minutes. 87 (50.8%) of the children experienced preoperative pain, of which 38 (22.2%) had moderate pain, 31 (18.1%) had severe pain, and the rest had mild pain. Mothers with a mean age of 34.3 were mostly housewives (80.1%) and had a bachelor's degree (45%). Participants' fathers, with an average age of 39.6, were mostly self-employed (48.5%) and had high school diploma and education level less than a high school diploma (76%) (Table 2).

Also in Table 2, children preoperative anxiety was reported with the mean and standard deviation of 53.66 ± 21.28 and parent anxiety in the two dimensions of state and trait anxiety was also reported with the mean and standard deviation of 47.85 ± 14.15 and 30.15 ± 12.43 , respectively. Also, child coping with both cognitive and behavioral dimensions was reported with the mean and standard deviation of 127 ± 14.93 and 84.30 ± 18.54 , respectively.

Table 3 showed that there was no correlation between demographic information, age, sex, type of surgery, and preoperative pain with postoperative pain. But there was a positive correlation between the variables of child anxiety and parent anxiety with acute postoperative pain and a negative correlation between child coping and acute postoperative pain. In Table 3, the results of the regression analysis also showed that anxiety had a positive effect on the rate of postoperative pain. The postoperative pain increased 0.31 and 0.30 in children per unit increase in child and parent anxiety, respectively. However, coping strategies had a negative effect on the rate of postoperative pain. The postoperative pain decreased -0.14 per unit increase in coping strategies. $R^2 = 28$ was also reported, which means that 28% of postoperative pain was explained by these three variables (Table 3).

Discussion

The aim of this study was to investigate the effect of psychological variables on postoperative pain in children hospitalized in the selected children's hospital in Tehran. The results of the present study showed that most children experienced moderate to severe postoperative pain, and the variables of child anxiety and parent anxiety were a positive predictor of postoperative pain and coping strategies variable was a negative predictor of postoperative pain. With increasing the child and parent preoperative anxiety, the postoperative pain increased in children, and as the child preoperative coping increased, the postoperative pain decreased in children.

Postoperative pain is a common complication in children (2, 25, 26) that is influenced by various factors such as mental status (27). Anxiety is the most common emotional factor and predictor of moderate to severe postoperative pain (16). The results of this study showed that children had high level of preoperative anxiety and that anxiety was a predictor of postoperative pain in children. Similarly, in two consecutive studies, Robitz et al. have shown that child anxiety is a potential contributor to postoperative pain (2, 28). In several studies, anxiety has been reported as a variable affecting acute (15, 29, 30) and chronic (28, 31) postoperative pain intensity. Therefore, it can be said that preoperative anxiety as a psychological factor can lead to a cascade of physiological events such as increased postoperative pain. Anxiety is an emotional state characterized by feelings of tension, worry, and increased activity of the autonomic system, leading to a physical and psychological response in the individual (15). In anxiety disorder, as a result of various stimuli, the activity of the sympathetic system increases and the body copes with pain later (31). For this reason, increased postoperative pain has been observed. Preoperative pain is one of the major causes of anxiety in children, and studies have shown that pain anxiety accounts for a greater proportion of postoperative pain outcomes rather than anxiety alone (10). This is in line with the results of the present study. Pain anxiety represents cognitive, emotional, behavioral, and physiological responses in predicting or experiencing pain and significantly predicts postoperative acute pain (9). Children have experienced preoperative pain because of the nature of the need for surgery. During this time, the anxiety caused by pain makes them more sensitive to pain perception and to increase the severity of postoperative pain (27). Therefore, pain anxiety as a psychological component is projected to be a predictor of postoperative pain in children.

Postoperative pain is not only influenced by child anxiety, but evidence has also shown that parent anxiety and postoperative pain are also positively correlated, with parents with high level of anxiety reporting more pain in their children (1, 32, 33). Furiter et al. showed that parent anxiety increases children anxiety, which in turn activates the pain perception system in child. Therefore, it is predicted that parent anxiety may indirectly affect the postoperative pain in children. Similarly, in a study conducted on children less than 18 months to determine whether parent anxiety is associated with postoperative pain in children (34), Rosenberg et al. showed that children with highly anxious parents were at greater risk for postoperative pain (33). The results of the present study also showed that parental anxiety was a predictor of postoperative pain in children. In this regard, previous studies have also shown that there is a positive relationship between children's pain and parental anxiety. Increased parental anxiety may increase postoperative pain in children (1, 32). Studies have shown that psychological changes in parents affect children's health (35). When children undergo surgery, many parents feel anxious about the threat to their child. Anxiety may be experienced before, during, or after a child's surgery, most related to the child's fear of pain or discomfort and the uncertainty of the consequences. However, moderate levels of such anxiety may increase alertness and lead to beneficial behaviors. But when parental anxiety is overwhelming, it can become a barrier to child care. On the other hand, it can lead to distress and anxiety in children as well as delay in the development of the children's nervous system, and also activate the pain perception system in children (33), and generally change the child's quality of life.

Based on the evidence, parental anxiety may be of the two types of state anxiety or trait anxiety. Anxiety is a temporary emotional state in which one feels tense and conflicted and loses control of the situation (36). In the present study, parents mostly had state anxiety and reported states such as anger, nervousness, fear, hesitation, restlessness, and unrest. Consistent with these results, numerous studies have shown that parental anxiety is mostly a kind of state anxiety when a procedure or painful event occurs for the child (36, 37). Parents are sometimes unaware of their child due to different hospital rules and may be anxious and concerned about their child's dependence and inability to take care of himself/herself. In such situations, states such as anger, nervousness, fear, hesitation, restlessness, and unrest indicating their anxiety seem logical.

In addition to the above-mentioned items, coping is one of the other psychological variables that is effective in pain management as a coping mechanism. The results of this study showed that children had a lower level of coping strategy, and there was a negative correlation between child coping and postoperative pain, such that decreased coping increases the pain in children. Consistent with these results, previous studies have also confirmed this negative association (38, 39). Following the experience of pain, people evaluate the pain in a coping or uncoping way. Those children who have experienced the pain have a negative evaluation of pain. They are frequently involved with negative perceptions of the problem of pain and negative expectations about its consequences. So, because of their disastrous sense of pain, they perceive it more severely (40). On the other hand, high level of anxiety in children can also be a barrier to child coping. Anxious children are unable to control the situation and use less coping mechanisms (41). The results of the study of children's coping behaviors in both cognitive and behavioral dimensions showed that the highest score was related to the disaster dimension, pain assessment, and increasing pain behaviors which could justify a lower level of coping strategy in children. Since surgery is an unforeseen occurrence in children, it is therefore difficult to adopt a procedure to overcome this condition and it seems reasonable to have a lower coping level.

Conclusion

Investigating the effect of psychological variables including child anxiety, parent anxiety, and child coping on postoperative pain and confirming the relationship, identifying children at risk and presenting psychological interventions can be an effective step in managing postoperative pain in children and promoting child comfort.

Limitations And Strengths Of Research

A limitation of this study is the small sample size, limiting the generalizability of the results. Therefore, further studies are recommended in the larger population. In addition to the measured variables, it is also suggested to investigate the relationship between other psychological variables and child pain.

Declarations

Ethics approval and consent to participate: Data were collected by the researcher after obtaining a code of ethics and a letter of introduction from Shahid Beheshti University of Medical Sciences (code of ethics: IR.SBMU.PHNM.1397.51). After these steps, the researcher visited the research environments every day for approximately 3 months and after submitting the letter of introduction and based on the inclusion criteria began to collect the samples using convenience sampling. Before the participants entered the study, the purpose and method of the study and confidentiality of their information were described, informed consent was obtained from all of participants

Consent for Publication: Not Applicable

Availability of data and materials: Not applicable.

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Authors' Contributions: SGH developed the original idea, wrote the manuscript, LKH Corresponding author, guidance of doing the research and revised the manuscript. MR, ASHF and ND revised the manuscript.

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Tables

Table 1: Calculating the internal consistency of the instruments using Cronbach's alpha coefficient and calculating the tool stability reliability using ICC

Tool	Cronbach's alpha	ICC
Coping Strategies Questionnaire (CSQ)	0/95	0/95
Child Pain Anxiety Symptoms Scale (CPASS)	0/91	0/92
the Speilberger’s State-Trait Anxiety Inventory (STAI)	0/94	0/93

Table 2: Frequency distribution of demographic variables in children admitted to the surgical wards of Mofid Hospital in Tehran in 2017-2018

variables	N (%) / M (SD)
Child's age	8.58(2.233)
gender	
Girl	59(34.5%)
Boy	112(65.5%)
type of surgery	
Abdominal	91(53.2%)
Genitourinary urine	51(29.8%)
Other surgeries	29(17%)
Experience of pain	
Mild	102(59.7%)
Medium	38(22.2%)
Severe	31(18.1%)
Duration of surgery (minutes)	134.29(68.58)
Mother's age	34.38(6.663)
Father's age	39.63(6.342)
Mother's job	
housewife	137(80.11%)
manual worker	7(4.09%)
Employee	16(9.36%)
Freelance job	11(6.44%)
Father's job	
Unemployed	8(4.67%)
manual worker	54(31.5%)
Employee	26(15.21%)
Freelance job	83(48.54%)
Mother's education	

illiterate	9(5.26%)
High school	55(32.16%)
Diploma	30(17.58%)
Bachelor	77(45%)
Father's education	
illiterate	16(9.35%)
High school	65(38.02%)
Diploma	65(38.02%)
Bachelor	25(14.61%)
Child Pain Anxiety Symptoms Scale	53.66(21.284)
the Speilberger's State-Trait Anxiety Inventory manifest latent	
	47.85(15.11)
	30.15(12.43)
Coping Strategies Questionnaire	
Cognitive	127(14.93)
Behavioral	84.30(18.54)

Table 3: Results of linear regression analysis of postoperative pain with predictive psychological factors

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	F	R2
	B	Std. Error	Beta				
(Constant)	3.489	1.014		3.442	.001		
chid pain anxiety symptoms scale	.009	.002	.311	4.271	.000	18.215	.28
the Speilberger's State-Trait Anxiety Inventory	.040	.009	.311	4.271	.000		
Coping Strategies Questionnaire	-.047	.023	-.147	-2.082	.039		