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The impact of cognitive interventions in reducing intensity of pain and distress, and improving quality of life of children with cancer

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ABSTRACT

Background: The present study aimed to assess the efficacy of use of combined cognitive interventions to prepare the child and parent, and distraction of child's attention on reported intensity of pain, distress caused by lumbar puncture, and situation-related quality of life of children with cancer.

Methods: This was a clinical trial using pretest-posttest method and a control group. Study population consisted of all children with cancer, attending Mahak and Mofid hospitals in Tehran. Forty-one child-parent pairs were selected and randomly divided into case and control groups. Children were visited twice. In the first visit, both groups received normal care. In the second, case group received cognitive interventions, and control group received normal care. Data were collected through demographic details questionnaire, Oucher, CHEOPS, and PedsQLTM VAS.

Results: Study results showed that cognitive interventions to prepare the child and parent, and distraction of child's attention were able to reduce intensity of pain and distress level, and improve child's situation-related quality of life. There was a positive and significant correlation between reported intensity of pain and distress level, a negative and significant correlation between situation-related quality of life and intensity of pain, and a negative and significant correlation between situation-related quality of life and distress.

Conclusion: Cognitive interventions were found to be effective in reducing reported intensity of pain and distress, and improving situation-related quality of life in children with cancer, undergoing lumbar puncture. Cognitive interventions are recommended in this painful procedure, for management of child's pain and distress.

Keywords: ***Distress, pain, cancer, situation-related quality of life, cognitive interventions.***

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Introduction

Research shows that in pediatric oncology, pain is a sign that scares children most of all.[1] Many painful procedures are carried out on children with cancer.[2, 3] One of the diagnostic and therapy procedures in pediatric oncology is lumbar puncture (LP), which is used for both diagnostic and treatment purposes through intrathecal (IT) administration of medication.[4] It has been reported that such procedures create high levels of pain, fear, anxiety, and emotional distress in children.[5] Pain is harmful for children.[6] Pain that does not abate has negative physical and psychological consequences. Inadequate reduction of pain hinders satisfactory quality of life.[7] Non-pharmacological strategies are widely used in pain management and coping with emotional distress.[8] Diverting attention has a well proven efficacy as a cognitive coping strategy in management of pain and distress in children.[9] Diverting attention strategy is associated with lower levels of pain.[10] Results of a meta-analysis by Uman et al.[11] showed that cognitive-behavioral interventions can be effective in reducing acute needle pain, and especially in behavioral distress caused by bone marrow sampling. Research in this field has shown that distraction of attention can alter experience of mental pain and psychological distress. Distraction has been successful in reducing distress in small children during lumbar puncture and bone marrow samplings.[12] Alavi and Zargham[13] investigated the effect of bubble blowing (distracting attention technique) on intensity of pain caused by venipuncture in children with thalassemia and found bubble blowing helps reduce pain caused by venipuncture, and since it is more economical, use of distracting attention technique by nurses during venipuncture sampling enhances quality of life of children with thalassemia. Results of a study by Tavasoli H [14] comparing the effects of familiarizing game and distraction on intensity of pain and anxiety of needle-related procedures in children with thalassemia showed that mean levels of pain and anxiety and behavioral signs of pain significantly reduced in both familiarizing game group and distraction group. Preparation of the child and his family is another vital aspect of pain and anxiety reduction in needle-related procedures,[15] and the role of child preparation is emphasized in various studies.[16] Bryer et al.[17] investigated the role of child preparation in reducing anxiety of surgery, and found changes in anxiety scores was significantly better in the intervention group than in the control. Kolk et al.[18] used preparation technique in management of distress caused by venipuncture sampling, and results showed that prepared children compared to unprepared children, irrespective of gender, race, history of injection, and parental stress, exhibited significantly less distress before and during the procedure. Because of the harmful effect of pain on children, the present study intends to investigate the efficacy of combined cognitive interventions, including preparation of child and parent (information booklet for parent and painting short story pictures about lumber puncture sampling for the child) and distraction of child's attention (presenting cartoons during procedure, and maze before procedure) on reported intensity of pain, distress caused by IT/LP, and situation-related quality of life of children with cancer. Another objective was to investigate relationships between reported intensity of pain and level of distress, reported intensity of pain and situation-related quality of life, level of distress and situation-related quality of life, relationship between situation-related quality of life reported by child and parent.

Method and Methods

Design: The present study is a clinical trial with pretest-posttest design and a control group. After obtaining necessary permissions from Shahid Beheshti University of Medical Sciences and hospital authorities, study was conducted in Mofid Children Hospital and Mahak Hospital and Welfare Center.

Study subjects: In this study, statistical population included all children with a variety of cancers (including: AML, ALL, lymphoma, central nervous system tumors, and musculoskeletal tumor) that had attended Mahak Hospital and Welfare Complex (charitable organization for support of children with cancer) and Mofid Children Hospital in Tehran for performing LP/IT procedures. Children were randomly divided in terms of type of cancer and frequency of LP sampling into study groups. In the present study, purposive convenient sampling was used, and given study limitations, sample size was determined 41 persons. Children with their parents were randomly placed in one of the two case and control groups. Of the

41 participants, 21 (51.2%) were girls and 20 (48.8%) were boys. Twenty-one child-parent pairs were randomly placed in the trial group and 20 pairs in the control. Mean age of children was 78.2± 15.884 months (equivalent to 6.5 years). Study inclusion criteria were 5-8 years age range, diagnosis of cancer, attending hospitals to perform LP/IT, no previous psychological interventions for pain management, no other underlying chronic diseases, use of topical anesthetic cream before procedure, and no use of systemic analgesics. Study exclusion criteria were presence of parents during LP/IT, receiving midazolam (not included in hospital's standard care), having congenital diseases such as heart failure, asthma, and diabetes (with potential effect on physiological measurements).

Tools: Data collection tools included a researcher-made form containing demographic details (age, gender, diagnosis …), and inclusion criteria, Oucher pain intensity scale, CHEOP scale, and PedsQLTM VAS.

1. Oucher scale: This is a poster comprising two scales: a numerical scale of 0-10 or 0-100 for older children, and a pictorial scale with 6 pictures on the right hand side and numbers 0-10 on the left of pictures for younger children. In numerical scale 0-10, the number called out by the child is indicative of his pain score. When pictorial scale is used, picture chosen by the child should be converted into even numbers from 0 to 10; lower picture=0, 2nd picture=2, 3rd=4, 4th=6, 5th=8, and 6th=10. Currently, there are 5 versions of Oucher scale available. The validity of the Asian version was not known, and the pictures of children looked like Iranian children in the Spanish version, and also its validity was known, thus the Spanish version was used in this study. Content validity of this version was found 0.65 through Kendall concordance coefficient ($P<0.001$). Beyer et al. [19] found pictorial scale validity 0.912, and numerical scale validity 0.984 for this scale ($P<0.001$).

2. Children's Hospital of Eastern Ontario Pain Scale (CHEOPS): This scale includes items of crying, facial expression, verbal, muscular tension, and touching and position of the leg, with scores ranging from 4 to 13. Since its differential validity has not been fully proven, CHEOPS should only be considered a measure of behavioral distress during painful medical procedures, rather than a direct measure of subjective pain. [20]

3. PedsQLTM VAS: This scale evaluates child's self-assessment and parental report of anxiety, despair, anger, fatigue, and pain using 6 visual analogue scales compatible with developing age. [21] Validity and reliability of this tool has been reported favorable.[21] To use the tool in this study, its linguistic validity was determined by the designing organization in Iran during the study, and permission to use the tool in Iran was obtained. Prior to commencement of study, content validity of the scale in Iran was evaluated by 11 experts (faculty members of School of Psychology and Educational Sciences of Shahid Beheshti University) who considered the scale appropriate for evaluation of children's situation-related quality of life.

To obtain data, the researcher attended the hospitals every day for 5 months, from Feb to July 2009. After identifying eligible people in terms of age, and introductions, the researcher talked with parent of every child and explained the research project and its aims. Eventually cooperation of parent for participation in the study was secured, and written consent was obtained for participation of parent and child in the study. Parent was requested to enquire child's view on taking part, and verbal consent of the child was also obtained. After explanations about study objectives and obtaining parents' and child's consents, first demographic details and related data to inclusion criteria were collected. There were two meetings with children (individually); in the first meeting, both groups received routine care (topical cream before, and reward after procedure). By the end of the first meeting, an information booklet containing management of pain in children, and a relevant story to the procedure was given to parent to read between two meetings, and also read the story to the child, and the child was to paint the pictures. In the second meeting, children in the trial group were presented with a maze (in the waiting room) and cartoon (during painful procedure), and the control group received the routine care. In each meeting, he intensity of pain (3-5 minutes after procedure), observed level of distress (during procedure), and situation-related quality of life (child-parent form) were measured. Data obtained from score differences between trial and control groups' pretest and posttest were analyzed using independent t-test and covariance analysis, and Pearson's correlation was used to assess relationships between variables.

Results

Results of inferential analysis of data are presented in **tables 1, 2, 3, and 4**.

Distribution of posttest mean and standard deviation of variables (**table 1**) and covariance analysis results (**table 2**) showed that cognitive interventions (including parent information booklet, and child's distraction through cartoons during IT/LP, maze and painting short story pictures about lumber puncture sampling) had a significant effect on the trial group at P<0.001, and that cognitive interventions had been effective in reducing reported intensity of pain and level of distress, and improving quality of life of children with cancer.

Pearson's correlation results showed (P<0.001) a positive significant correlation between reported intensity of pain and level of distress, a negative significant correlation between reported situation-related quality of life by child and reported intensity of pain, a negative significant correlation between significant correlation between reported situation-related quality of life by child and level of distress, and insignificant correlation between reported situation-related quality of life by child and reported situation-related quality of life by parent.

Table 4 shows an insignificant difference between girls and boys in variables: intensity of pain, distress level, and situation-related quality of life in pretest (degree of freedom=39, two-tailed test).

Table 1: Distribution of mean and standard deviation of variables: pain intensity, distress, and situation-related quality of life

Indicator / variable	Trial group	Control group
	Mean (standard deviation)	Mean (standard deviation)
Intensity of pain	2.00(2.449)	4.40(2.393)
Distress level	7.71(2.05)	9.70(2.179)
Situation-related quality of life	2.7611(1.85075)	4.0533(2.28109)

Table 2: Covariance analysis results of variables: pain intensity, distress, and situation-related quality of life

Indicator/ effect of group on variable	Sum of squares	Degree of freedom	Mean squares	F	Significant level
Intensity of pain	89.179	1	89.179	30.412	0.0001
Distress level	65.996	1	65.996	28.571	0.0001
Situation-related quality of life	30.942	1	30.942	18.794	0.0001

Table 3: Summary of posttest correlation coefficient between variables

Reported intensity of pain and distress level	Correlation coefficient	Significant level
Reported intensity of pain and distress level	0.722	0.0001
Situation-related quality of life and intensity of pain reported by child	-0.582	0.0001
Distress level and situation-related quality of life reported by child	-0.365	0.019
Situation-related quality of life reported by child and situation-related quality of life reported by parent	0.229	0.149

Table 4: T-test results of comparison of differences in mean scores of intensity of pain, distress, and situation-related quality of life based on pretest scores

Indicator/variable	Mean (standard deviation)		Mean difference	t	Significant level
	Girl	Boy			
Reported intensity of pain	3.81(2.089)	4.60(3.440)	0.790	0.894	0.377
Distress level	9.43(2.063)	9.80(2.419)	0.371	0.530	0.599
Situation-related quality of life	3.8627(2.23499)	4.3133(2.10397)	0.45063	0.664	0.511

Discussion

This study aimed to investigate the efficacy of cognitive interventions of child's distraction, and preparation of child and parent, on reported intensity of pain, distress caused by IT/LP, and situation-related quality of life of children with cancer, and also to investigate relationships between variables of reported intensity of pain and distress, intensity of reported pain and situation-related quality of life, distress level and situation-related quality of life, and relationship between situation-related quality of life reported by child and by parent. Concurrent use of pharmacological and non-pharmacological strategies (preparation, self-control, distraction, massage, hypnosis, and analgesics) is among general principles of management of pain in children. [22] Among non-pharmacological strategies of management of acute pain in children, cognitive-behavioral interventions meet criteria of interventions with empirical support in management of acute pain of medical procedures in pediatric medicine.[23] There are many strong studies that support the effectiveness of cognitive interventions (especially distracting technique) in reducing pain caused by needle-related procedures. The present study results in relation to reduction of pain and distress, and improvement of quality of life are in line with other studies.[11, 12, 13, 14, 18, 24, 25, 26, and 27] Cognitive interventions of preparation and distraction were able to reduce pain and distress of the child at the time of injection and improve child's quality of life. According to the cognitive theory of limited attention span, attention capacity is limited. If a task draws all the attention of a person, aversive and pathological stimuli will not be perceived. Cognitive theory of limited attention span, in relation to distraction of attention as a management of pain technique predicts that stimuli that engage more of the attention span, allocate less attention resources to have the chance to experience pain.[27] This means that cognitive interventions prevent perception of painful stimuli by engaging attention resources and attention capacity of the person. Consequently, cognitive interventions can reduce pain. On the other hand, attention is a primary mechanism through which painful stimulus reaches awareness level.[10] It seems cognitive strategies that divert attention from pathological and threatening situations can prevent painful stimulus reaching awareness level and incidence of threatening thoughts that cause distress by distracting attention toward neutral or pleasant stimulus.[28] Manne et al.[29] used bubble blower to distract attention, and their results showed that this technique, as other interventions such as involving parents, positive strengthening (cartoon character labels) and preparation therapist, significantly reduced physical containment. But the child did not report a significant reduction in pain. They justified it as that bubble blower might not be as effective as other distracters in other studies (for example, watching cartoon or a film). In using cartoon as a distracting technique, child's attention is diverted from painful stimulus through two audio and visual channels. Hence, cartoon can effectively reduce pain caused by painful procedure. It is widely believed that pain deeply affects quality of life of a person.[30] Most studies have shown an inverse relationship between pain and quality of life, so that increasing one reduces the other. It has been found that pain reducing treatments improve quality of life through pain reduction.[31] The present study results are in line with these research findings, and quality of life improved by reduction in pain. There is an extensive research material on the role of anxiety in increasing pain.[1, 22] In non-aversive pain and emotional distress, common psychological-biological systems operate.[32] Generally the more children are emotionally distressed and helpless, the more their pain intensifies and the more unpleasant it will be.[33] In studies on adults, women have reported more recurring and intense pain to stimuli than men. This finding is less applicable to children.[34] A secondary finding in the present study confirms these results, and among male and female children, no difference was found in reported intensity of pain due to painful procedures. Another finding was that the relationship between reported quality of life by parent and child was insignificant. In a series of studies, differences in parent's report against child's report, in child's performance, among children and adolescents with cancer have been recorded.[35] Parents' reports are based on observation and conversation with children, and children's report may be based on inner mental experiences that cannot be expected to be accessible by parent. These different perceptions are not strange, and reports by parents and children can be considered information source with different, but mutual values.[36] The present study results supported efficacy of

cognitive interventions in reducing reported intensity of pain, distress level, and improving quality of life of children with cancer undergoing painful procedures of LP/IT sampling. Hence, given the results of the present and other studies in this area, cognitive interventions can be used to reduce pain and distress and improve quality of life of children with cancer in painful procedures like lumbar puncture sampling. Given the effectiveness of interventions provided to reduce pain, through adjustments and modifications, strategies used in this study can also be used in other acute or chronic medical or dental diseases with painful diagnostic and treatment procedures to reduce pain and distress in children. Given that prevention is better than treatment; pediatric psychological and psychiatric centers in hospitals can help children in painful medical procedures by providing simple and inexpensive interventions, and have a more active presence in such situations, and thus prevent harmful effects of pain and distress caused by painful procedures on children.

A study limitation involved the presence of confounding factors such as dimensions of injection room, number of people in the room, and the way personnel treated children in these two hospitals. Controlling these factors was beyond the scope of researcher's responsibility. Given the effectiveness of distraction technique, and that in some hospitals, LP sampling room, or any other injection room are unsuitable for children in terms of dimensions, colors, and decorations, and may cause fears in children. Better and prettier rooms should be used to distract child's attention, and help reduce pain and distress in children by use of posters, childish pictures, hanging toys, and more specifically, playing music and cartoons.

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