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Effect of Distraction Technique and Hypnosis in Pain of Bone Marrow Aspiration in Children: a Narrative Review

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Abstract

Background

The present review study provides specific evidence to assess the impact of distraction techniques and hypnosis on the pain of bone marrow aspiration in children.

Materials and Methods

This review study aimed to determine the effects of distraction techniques and hypnosis on the controlling pain of bone marrow aspiration in children. Internal databases (SID, Magiran, IranMedex and Irandoc), and international databases (Google-Scholar, Medline, PubMed, Elsevier, ProQuest, Springer and Web of Science), were searched by using the Mesh key words including "cancer", "bone marrow", "aspiration", "distraction", "hypnosis", "pain", "children" and "pediatric", with no time limit since the foundation of these databases until December 2016.

Results

In overall review of the articles, based on the issues expressed, the effect of most of various distraction interventions and hypnosis on the pain severity of children under the bone marrow aspiration procedure was significant and positive ($P<0.05$). Of course, pain severity variations in all studies, were different.

Conclusion

According to the results of the mentioned studies, we find that in order to reduce the pain of venipuncture in children most effectively, it is better that these techniques be done according to age and the children's mental and physical conditions.

Key Words: Bone marrow aspiration, Distraction, Hypnosis, Pain, Review.

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1- INTRODUCTION

Pain is a subjective experience with cognitive, behavioral, emotional dimensions which is affected by environmental, socio-cultural and evolutionary factors of an individual (1). Due to the great importance of pain, Pain Association of America (PAA), has announced it as the fifth vital sign and also during 2001 to 2010 was called pain control decade (2). The pain resulted from medical procedures is one of the stressful and scary experiences in children (3-5). Despite medical advances in the assessment and management of pain in the past years, according to the studies, most children admitted in hospitals in Finland and Canada, have reported moderate to severe pain levels (6, 7).

Among the common therapeutic procedures, venipuncture has been reported to be one of the largest sources of pain in the children wards (8), that in case of failure to use appropriate strategies to relieve the pain, the risk of adverse physical outcome including impairment of cardio - vascular and immune system (1, 2, 6), psychological "depression" (9), delayed recovery and prolonged hospital stay (10), will increase. Also, pain can disrupt the communication between nurses and children due to stress and anxiety and therefore inhibit treatment procedures and care (2, 11, 12). Therefore, managing the pain resulted from procedures associated with needle therapy is one of the therapeutic priorities (9).

With an emphasis on the adverse effects of pain on the treatment procedures of children, several strategies have been proposed to reduce pain in children, including pharmacological and non-pharmacological therapies (10). Several non-pharmacological interventions for pain control have been discussed in the case studies and its superiority in terms of fewer side effects and costs have been proven compared to pharmacological interventions (11, 13, 14). Among these techniques, distraction due to fewer the cost and side effects and more its accessibility being more attractive to children (15-18). Distraction is one of the pain control techniques applying five senses in order to focus the patient's attention on other stimuli that its result is better control of pain (3, 19).

Some of the various methods of distraction in reducing pain in children include the effect of handheld Video Games (15), distraction with audio-visual systems (watching cartoons) (11), Bubble maker tools and mobile toys (2, 20), listening to music (21), and therapeutic touch (22). The results of Landolt and Meuli study are inconsistent with the above-mentioned studies; in this study, it was stated that distraction technique using playing video games had no effect on the pain reduction of children hospitalized with burns (23).

On the other hand, in another study with title effect of distraction on pain, fear and distress during venous port access and venipuncture in children and adolescent with cancer (19), and effect of distraction technique on pain of children during venipuncture (24), were mentioned that although distraction caused pain reduction, but not significant differences were seen between two groups. Also Danhauer et al. (2010), in a study with aim of evaluation the effect of music on pain and anxiety of patients with leukemia under bone marrow biopsy, was reported that significant differences were not seen in mean level of anxiety and pain between two groups (25).

Hypnosis also is another psychological method that can significantly effects on pain (26). Ranges of pain that can effectively treated by hypnosis are very widespread. As an example today in some treatment centers hypnosis were used to control the labour, pain of patients with

cancer and also multiple sclerosis (MS) (27-29). The present review study is the first research in this field that provides specific evidence to assess the impact of distraction techniques and hypnosis on the pain of bone marrow aspiration in children. It is hoped that the results of this study be helpful in managing pain and stress resulted from painful medical procedures and thereby improve the quality of health care provided to patients in therapeutic environment.

2- MATERIALS AND METHODS

This systematic review study aimed to determine the effects of distraction techniques and hypnosis on the controlling pain of bone marrow aspiration in children.

2-1. Data sources and searches

To do literature review, the components of a systematic review of Population Intervention Comparison Outcome (PICO), was considered as part of the search process (30, 31), and articles were searched and classified accordingly.

Then internal databases "SID, Magiran, IranMedex and Irandoc" and international databases "Google-Scholar, Medline, PubMed, Elsevier, ProQuest, Springer and Web of Science", were searched by using the Mesh key words including "cancer", "bone marrow", "aspiration", "distraction", "hypnosis", "pain", "children" and "pediatric", with no time limit since the foundation of these databases until December 2016.

These keywords were determined by two experts and the search of these terms in databases was conducted by these two researchers. On the other hand, to increase sensitivity and specificity, the search was done using OR and AND operator techniques. Then reviews and re-search of resources and databases, were conducted by one of the researchers to ensure about adequacy searching information and articles.

Moreover, gray literature was entered to study. Presented articles at international and national congresses by searching in Civilica database was examined; also, published theses were searched in the IRANDOC database. Then review articles were investigated based on the criteria of PRISMA checklist 2015. Also all the references of articles were searched.

2-2. Inclusion and exclusion criteria

Inclusion criteria of articles included:

- the study has a Randomized Control Trial (RCT) method;
- the study is published in Persian and English language journals.

Also after reviewing, studies which had conditions such as:

- cases of ambiguity in the expression of methods and results such as the possibility of bias,
- poor quality of paper,
- no available Persian or English full-text were excluded.

A checklist of required information including: name, year and type of study, sample size, age range of participants, type of intervention, method and the results, was designed and used to extract data from articles.

Of the 26 articles found in the investigation of titles, abstracts and full-text articles, after the elimination of duplicates and irrelevant ones, eventually four RCT were entered into the study.

The **Figure.1** shows the stages of selection of the studied articles.

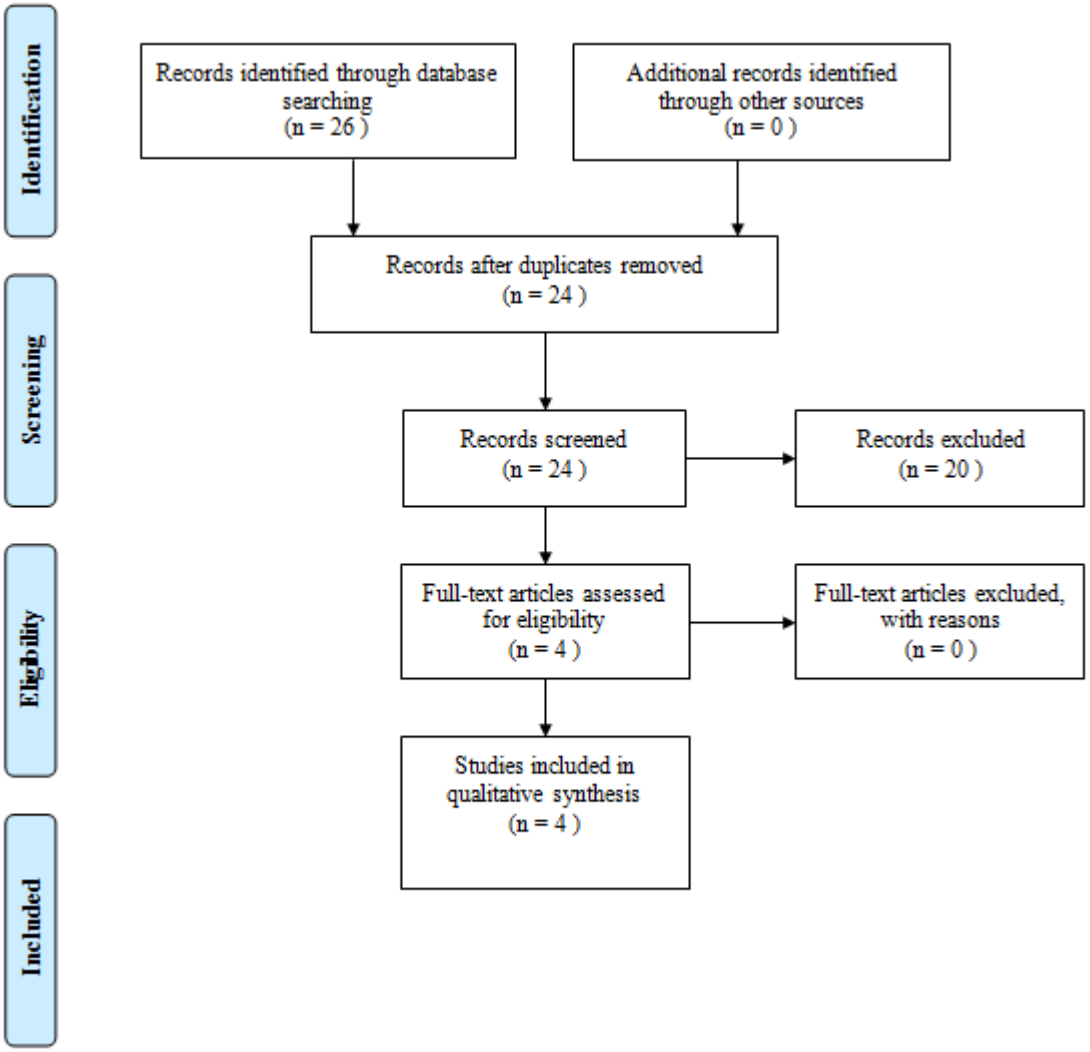

Fig.1: The strategy of selection process

3- RESULTS

This review study was done in Mar 2016. Selected interventional studies with the aim of determine the effect of distraction technique and hypnosis on pain level due to bone marrow aspiration in children up to 2016 were gathered. Age of the most children was between 3 to 18 years old. Also, minimum and maximum sample sizes of gathered articles were 18 and 48 children, respectively. Distraction was performed with Verbal distraction and sensory information, behavioral distraction with hypnosis, training in hypnosis and self-hypnosis and hypnosis through visual imagery in these studies. Pain level was calculated with Observational Scale for Pain and Self-Report Measures of Fear and Pain (visual analog thermometers). In overall review of the articles, based on the issues expressed in **Table.1**, the effect of most of various distraction interventions and hypnosis on the pain severity of children under the bone marrow aspiration procedure was significant and positive. Of course, pain severity variations in all studies were different.

4- DISCUSSION

4-1. Distraction technique and pain relief

Distraction is one of the non-pharmacological techniques of pain management strategies using five senses in

order to focus the patient's attention on other stimuli that its result is better control of pain (3, 19). Based on the mentioned researches, all implemented methods lead to pain relief in children. Generally, results of internal and external studies show that with differences in methods of using distraction technique, still can't say that which method is more effective, but all the methods lead to distraction and contention of senses (32).

Of course, according to available studies and databases, amount of researches about effect of non-pharmacological methods on pain relief of children due to bone marrow aspiration was very limited. Choosing the type of distraction technique is related to age of children. In pediatrics during treatment procedures, using music is effective (33), but in school age children, other method for contention of 5 senses, should be used due to evolution of senses and processing of sensory information that these situations were considered in Smith et al. (1989) study (34).

4-2. Hypnosis and pain relief

Also studies results represented positive and significant effect of hypnosis on pain of bone marrow aspiration in children (35-37). Often times that pain were intensifies, some of the vital signs of body (like blood pressure and pulse rate), were increase, that during hypnosis procedure and taking inception of relaxation these factors returns to the balance status and with companionship of parasympathetic system, pain tolerance will increase (38).

Evidence exists supporting the efficacy of hypnotic analgesia in a variety of experimental and clinical settings including pain associated with medical or surgical procedures (39-41). Gil and colleagues (2000), demonstrated a direct correlation between daily use of pain-coping skills and less major health care contacts (42). Thus, cognitive measures that influence attitudes and improve pain-coping skills appear to have a significant impact on sleep, functional outcomes such as work and school attendance and use of analgesics (43). Since hypnosis is a cognitive-behavioral strategy that has been shown to have a powerful effect on pain management in a number of settings, it is postulated that a program designed to teach and encourage the use of self-hypnosis may positively impact the pain perception, sleep quality, functional outcomes, quality of life, and satisfaction of children undergoing bone marrow aspiration.

4-3. Study Limitations

The searches were conducted only in Persian and English language databases that can be inhibited access to all the studies in this field. Also lake of interventional studies in this field. Therefore, it is suggested that more studies in the future be conducted due to the importance of the issue.

5- CONCLUSIONS

The results of analysis of Persian and English showed that various techniques of distraction and hypnosis can be applied in order to reduce the pain of bone marrow aspiration in children. According to the results of the mentioned studies, we find that in order to reduce the pain of venipuncture in children most effectively, it is better that these techniques be done according to age and the children's mental and physical conditions. So, all distraction methods do not apply to all wards and all patients.

6- CONFLICT OF INTEREST: None.

7- ACKNOWLEDGMENTS

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Table-1: Summary of Data Extracted From the Reviewed Articles

Author (year)	Sample size (n)	Age range	Type of procedure	Distraction intervention	Instrument	Variable	Results	Conclusion
Smith et al. (1989)	n=28; No description of sample of each group	6-18 Years old	Bone marrow aspiration and/ or lumbar puncture.	Verbal distraction and sensory information	Self-report measures of Fear and Pain (visual analog thermometers). Verbal distraction and sensory information	Pain; Fear	Distraction(Repressors): Mean(SD)= 1.45 (.15) Information(Repressors): Mean(SD)= 1.16 (.14) Distraction(Sensitizers): Mean(SD)= 1.39 (.19) Information(Sensitizers): Mean(SD)= 1.53 (.18) Repressor(Coping style): Mean(SD)= 1.31 (.10) Sensitizer(Coping style): Mean(SD)= 1.46 (.13) Distraction(Intervention): Mean(SD)= 1.42 (.12) Information(Intervention): Mean(SD)= 1.34 (.11) Between groups were found on self-reports of fear or anticipated pain: P>0.05 Significant coping style by intervention interaction, p < .05.	Children using the intervention chosen as most "consistent" with their coping style (i.e., Repressors using distraction and sensitizers provided information) actually reported more pain compared to those with an "inconsistent" intervention (i.e., Repressors provided information and Sensitizers using distraction) after controlling for baseline differences.

							Significant intervention main effect, $p < .05$.	
Kuttner et al. (1988)	n=48; No description of sample of each group.	3-10 years	Bone marrow aspiration.	Hypnosis, "imaginative event", behavioral distraction	Procedural Behavior Rating Scale-Revised *(*PBRS-R). Observational scale for pain and anxiety Self-report scale developed and validated for the study.	Pain; Anxiety	In the first intervention session, observational evaluations of distress have shown reductions for the younger group under hypnotic treatment, while the group of older children had reductions in both treatment conditions for pain and anxiety. In the second intervention session, all groups had reductions and control group was seemingly contaminated. The hypnotic method with its internal focus had an everything-or-nothing effect, and distraction has required coping skills to be learned throughout one or more sessions.	The hypnotic method with its internal focus had an all-or-none effect, whereas distraction appeared to require that coping skills be learned over one session or more.
Katz, et al. (1987)	n_t=18; n_c=18	6-8 years	Bone marrow aspiration	Training in hypnosis and self-hypnosis from psychologist.	Self-reported pain Self-reported distress Behavioral measure of distress.	Pain; Distress	Pain (Hypnosis group): Baseline: Median=75.5 Time 1(post treatment): Median=55.0 Time 2 (post treatment): Median=57.0	It appears that hypnosis and play are equally effective in reducing subjective pain and fear to BMAs, while having no significant impact on

							Time 3 (post treatment): Median=60.7 Pain (comparison group): Baseline: Median=23.8 Time 1(post treatment): Median=36.9 Time 2 (post treatment): Median=32.6 Time 3 (post treatment): Median=31.2 Main effect: BMA F = 6.13. df = 3, p < .001	observable behavior, when group data are evaluated as a whole.
Liossi, et al. (1999)	n_t=20; n_c=10	5–15 years	Bone marrow aspiration.	Hypnosis through visual imagery and analgesic suggestion, relaxation.	Self-reported pain Self-reported distress Behavioral measure.	Pain; Distress	Baseline pain (Hypnosis Group): Median=4.0 Baseline pain (Cognitive-Behavioral Group): Median=4.0 Baseline pain (Control Group): Median=4.0 Post-treatment pain (Hypnosis Group): Median=2.0 Post-treatment pain (Cognitive-Behavioral Group): Median=3.0 Post-treatment pain (Control Group): Median=4.0 (Pain: HYPN vs. CTR, p = .0001; CBT vs. CTR, p = .0002; HYPN vs. CBT, p = .2.)	The results confirmed that hypnosis and cognitive-behavioral coping skills can make an important contribution to the management of pediatric oncology BMA-related pain and distress.

Note: n_i= Interventional group; n_c= Control group.