

Hypnosis in children undergoing painful medical procedures

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Abstract:

Hypnosis in children undergoing painful medical procedures

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Non-pharmacological pain relief for children is a special challenge for health care providers in managing children's pain. Hypnosis/imagery is one technique reported to help children relieve pain from painful medical procedures. This paper critically reviews hypnosis/imagery intervention studies that have examined approaches to relieving pain in children undergoing painful medical procedures. It also offers suggestions to guide future research. It is concluded that hypnosis is still an enigma and challenge within medical science. However, there is evidence that using hypnosis is useful in reducing children's pain, behavioral distress and anxiety undergoing painful medical procedures.

Key words: hypnosis/imagery, non-pharmacological technique, children, painful medical procedure

บทคัดย่อ:

การบรรเทาความปวดโดยการไม่ใช้ยานั้นยังคงเป็นสิ่งที่ท้าทายอย่างมากสำหรับเจ้าหน้าที่ทางการแพทย์ในการจัดการเพื่อช่วยบรรเทาความปวดในเด็ก มีรายงานพบว่าการสะกดจิต/การสร้างจินตภาพเป็นกลวิธีหนึ่งที่สามารถช่วยบรรเทาความปวดในเด็กที่ได้รับหัตถการ

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ทางการแพทย์ได้ รายงานฉบับนี้มีวัตถุประสงค์เพื่อทบทวนงานที่ทดลองให้การสะกดจิต/การสร้างจินตภาพเพื่อช่วยบรรเทาความปวดในเด็กที่ได้รับหัตถการทางการแพทย์ และได้เสนอแนะแนวทางของการวิจัยในเรื่องต่อไป จากรายงานสรุปได้ว่า การสะกดจิต/การสร้างจินตภาพ ยังเป็นสิ่งที่เป็นปริศนาและท้าทายในวงการแพทย์ อย่างไรก็ตามมีหลักฐานที่แสดงว่าวิธีการการสะกดจิต/การสร้างจินตภาพมีประโยชน์ในการลดความปวด ความทุกข์ทรมาน ความวิตกกังวลในเด็กที่ได้รับความปวดจากการทำหัตถการทางการแพทย์

คำสำคัญ: การสะกดจิต/การสร้างจินตภาพ, วิธีการบรรเทาปวดโดยไม่ใช้ยา, เด็ก, การทำหัตถการทางการแพทย์ที่มีความปวด

Introduction

Children's pain, anxiety and distress can result from painful medical procedures such as lumbar punctures (LPs), bone marrow aspiration (BMAs) or cardiac catheterization.¹⁻² Pharmacological management of cancer pain appears to be relatively ineffective.³ Thus, unrelieved pain may contribute to complications of illness, delay recovery, and alter responses to future pain. Alternative approaches to pain relief are an important area for research. Nurses attend to children before, during, and after medical procedures and are responsible for helping children cope with their pain and anxiety. Hypnosis is one non-pharmacological technique that has received some support in the literature as a means to help control pain in children undergoing medical procedures. However, few hypnosis intervention studies have been done with children undergoing medical procedures. Furthermore, some hypnotic interventions have included social support, some have included parents as active participants and some combine hypnosis with other non-pharmacological techniques. Because of the variety of hypnosis-inducing methodologies used in previous studies, it is difficult to determine the true relationship between hypnosis and pain control. Investigations of hypnosis intervention for relief of pain in children need to be critically reviewed in order to provide data on which to base future research.

The purpose of this paper is to review the state of the science of hypnosis/imagery as a non-pharmacological intervention for managing children's pain. Therefore, anecdotal and case study evidence was excluded. The search in this study covered the Medline and CINAHL database, using key words including hypnosis/imagery, non-pharmacological technique, children and painful medical procedure. The search results

indicated that prior to 1982 no systematic research has been completed within the focus of this study. Since this time 10 papers have been published. However, 7 papers could be access from internet and library in Thailand. Therefore, the 7 papers were reviewed in this study. Strengths and limitations of current intervention studies will be discussed and directions for future research are highlighted.

Review of current research

The terms imagery and hypnosis are sometimes used interchangeably because clinical hypnosis involves inductive relaxation and imagery to produce an imaginative state. Hypnosis is defined as a combination of deep relaxation and a shift in cognitive ability to focus on something else.⁴ Imagery is defined as a cognitive ability to focus on images formed in the mind.⁵ Both techniques involve cognitive ability to focus on a thought or image and make it difficult to attend to painful stimuli, thus altering or suppressing painful sensations.⁶ Typically, hypnotic induction includes relaxation techniques such as breathing exercises, distraction, imagery, suggestion and therapist support for entering hypnosis. Thus, it is difficult to compare hypnosis interventions across studies because there are no standardized hypnosis procedures that define a situation as hypnosis (Table 1). The term hypnosis will be used in this paper to include both techniques.

Selection of a particular hypnotic technique must be based on the child's level of development. Children must be able to understand instruction, use symbolic thought, and communicate verbally. They also must cooperate and focus their attention to shift to an altered state of consciousness.⁷

Table 1 Hypnosis/imagery intervention studies

Researchers	Subjects and Procedures	Study design and description	Dependent variable and Instruments	Results
Zeltzer and LeBaron ⁸	N=33 6-17 years Oncology patients during BMA and LP	Random assignment into Intervention group: imagination stories, deep breathing and practice session. Non-hypnosis group: combine deep breathing, distraction, and practice sessions to control fear.	Pain Self-Report Anxiety Self-Report	During BMA, pain was significantly reduced to a large degree by hypnosis and to a smaller but significant extent by non-hypnosis. Anxiety was significantly reduced by hypnosis, but not significantly by non-hypnosis. During LP, only hypnosis significantly reduced pain. Anxiety was reduced significantly in both groups.
Hilgard and LeBaron ⁹	N=24 6-19 years Oncology patients during BMA	Baseline-post-intervention into Intervention group: imagination stories	Pain Self-Report Anxiety Self-Report The Stanford Hypnotic Scale Anxiety Observational Rating Scale	Pain and anxiety were significantly reduced. Subjects who gained higher hypnotizability scores achieved significantly greater reductions in pain and anxiety than those who gained low hypnotizability scores.
Katz, Kellerman Ellenberg ¹⁰	N=36 6-12 years Oncology patients undergoing BMAs.	Random assignment into Intervention group: eye fixation with or without eye closure, imagery, deep muscle relaxation and specific suggestion. Control group: non-directed play sessions (non-medical play and non-medical interaction).	Procedural Behavioral Rating Scale-Revised (PBRS-R) Nurse Rating of Anxiety Fear Self-Report (Fear-SR) Pain Self-Report (Pain-SR)	Children in both hypnosis and comparison groups showed significant decreases in self-report of fear and pain from baseline to postintervention BMAs, with no significant difference between groups. On the observation distress measures, however, both groups showed a rise in distress scores over the postintervention.
Kuttner, Bowman and Teasdale ¹¹	N=48 3-10 years Oncology patients undergoing BMA	Random assignment into Intervention group: distraction(toys, puppets, pop-up books, or bubbles to distract pain), breathing exercise Intervention group: imagery (imaginative stories or time distraction). Control group: routine manner (provide information about treatment)	Procedural Behavioral Rating Scale-Revised (PBRS-R) Anxiety Rating Scale Pain Observational Rating Scale Pain Self-Report Scale Anxiety Self-Report Scale	At first intervention: no significant change in pain self-report across groups. Hypnosis significantly reduced distress in young children when using observational rating scale, whereas the older group achieved significant reductions by both distraction and imagery for observer-rated pain and anxiety. At second intervention: all groups showed reductions in distress, pain and anxiety with no significant difference among groups. However, the control group was contaminated.

Table 1 (Continuous)

Researchers	Subjects and Procedures	Study design and description	Dependent variable and Instruments	Results
Broome et al. ¹²	N=14 3-15 years Oncology patients undergoing LMs	Baseline-posttest into Intervention group: children and parents were asked to practice imagery, relaxation techniques and breathing exercise for comforting during procedure.	The Child Medical Fear Scale (CMFS). The Observation of Behavioral Distress Scale (OBDS) The Baker-Wong FACES Scale The Spielberger State/Trait Anxiety Scale (STAI). Parent Behavioral Distress Scale.	Children's medical fear scores did not change significantly over time. However, children's pain report decreased significantly over time. Children's behavioral response to procedure varied considerably. Parent anxiety state was low and stable over time.
Pederson ¹³	N=24 9-17 years Cardio patients undergoing cardiac catheterization	Random assignment into Intervention group: imagery and relaxation technique. Presence group: the intervener provided presence by sitting near the child's head using eye contact, conversing with the child intermittently in a quiet tone of voice and using touch to build rapport and communicate empathy. Control group: routine manner.	The State-Trait Anxiety Inventory for Children (STAIC). The Observational Scale of Behavioral Distress. (OSBD) The Visual Analogue Scale (VAS) Salivary Control Radioimmunoassay (Cortisol)	Children's self-reports of pain were not reduced in hypnosis and control groups. However, children in the presence group reported the lowest level of pain, with no significant difference from baseline. Children's behavioral distress scores were different among groups, but not significantly different. However, the hypnosis group had the lowest distress behaviors. Children's cortisol level was significantly different between the groups, however the control group has the least physiological responses to pain during the procedure.
Foertsch, O'Hara and Stoddard ¹⁴	N=23 3-12 years Burn patients undergoing burn-dressing changes.	Random assignment into Intervention group: familiar imaginative story. Control group: the experimenter was present and casually chatted with the child, offering words of encouragement during painful moments and friendly listening when the child spoke.	The Observational Scale of Behavioral Distress (OSBD) The FACES Scale for children 3-9 years and a visual analogue thermometer" for children 9-12 years.	No difference in pain or behavioral distress between groups during burn-dressing changes.

Zeltzer and LeBaron studied the effects of hypnosis and non-hypnosis on 33 children with leukemia aged 6 to 17 years.⁸ Children undergoing bone marrow aspiration and lumbar puncture were randomly assigned to hypnosis or non-hypnosis treatment groups. In the hypnosis group, children were provided imaginative stories, deep breathing exercises and then practice to control fear. Non-hypnosis treatment consisted of a combination of deep breathing, distraction, and then practice to control fear. Subjects were asked to self-report pain and anxiety at baseline and then post-intervention. During bone marrow aspiration, pain was significantly reduced to a large degree by hypnosis and to a smaller but significant extent by non-hypnosis. Anxiety was significantly reduced by hypnosis, but not as significantly as by the non-hypnosis treatment. During lumbar puncture, only hypnosis significantly reduced pain. Anxiety was significantly reduced in both groups. A strength of this study is that subjects were matched for age and disease category across groups. One limitation of this study was the variability of the hypnosis intervention. Some children in the hypnosis group did not require assistance with their imagination because they were able to create images and cope well on their own. Other children required assistance to stimulate their imagination because they were not able to create images independently. In addition, this study did not standardize the amount of intervention time, and included a wide variability in children's age, which may have affected the interpretation of pain reduction and distress.

Hilgard and LeBaron studied the efficacy of hypnosis in reducing bone marrow aspiration related pain and anxiety on 24 children and adolescents with cancer aged 6-19 years.⁹ Subjects were observed and asked to report pain and anxiety at baseline and then post-intervention. Hypnotizability was also measured using the Stanford Hypnotic Scale for Children. In the hypnosis procedure, children were provided imaginative stories. Overall, results indicated that hypnosis significantly reduced pain ($p < .001$) and anxiety ($p < .01$). In addition, the authors concluded that subjects who gained higher hypnotizability scores achieved significantly greater reductions in pain ($p < .05$) and anxiety ($p < .01$) than those who gained low hypnotizability scores. One strength of this study was that

baseline measurement of pain and anxiety were measured before participating in the intervention. Furthermore, hypnotizability scores was also measured. One limitation was that this study did not standardize the amount of intervention time each child received, and included a wide variability in children's age which may have affected the interpretation of reduction of pain and anxiety.

Katz, Kellerman and Ellenberg studied 36 children with leukemia, aged 6 to 12 years, undergoing bone marrow aspiration.¹⁰ Subjects were randomly assigned to hypnotic intervention and control groups. The hypnosis intervention included induction of eye fixation with or without eye closure, imagery, deep muscle relaxation, and specific suggestion related to pain reduction. The comparison group had non-directed play sessions such as non-medical play or non-medical verbal interaction. Subjects were asked to self-report fear and pain at baseline and then post-intervention. Children in both hypnosis and comparison groups showed significant decreases in self-report of fear and pain from baseline to post-intervention after bone marrow aspiration, with no significant difference between groups. On the observational distress measures, however, both groups showed a rise in post-intervention distress scores. One strength of this study is the effort to match the intervention and control groups for sex and age. In addition, baseline measurement of pain, fear and anxiety strengthened the sophistication of the analyses. One limitation of the study and a potentially confounding factor is the presence of the parents in the treatment room in 85% of cases during the intervention which could have also influenced children's pain distress.

Kuttner, Bowman and Teasdale studied the effect of hypnosis on pain in 48 children with leukemia undergoing bone marrow aspiration.¹¹ Children were divided into appropriate age groups (3 to 6 and 7 to 10 years) and were then randomly assigned to the hypnosis, distraction or control group. During the aspiration procedure, the intervener provided imaginative stories to the hypnosis group. In the distraction group, the intervener engaged the child by using toys, puppets, pop-up books, or bubbles to minimize anticipatory anxiety. The control group was given routine care. Pain and behavioral distress

were measured at baseline, after the first intervention and after the second intervention. At first intervention, hypnosis significantly reduced distress in the younger children as measured by the observational rating scale, whereas the older children had significant reductions in both the hypnosis and distraction groups. However, there was no significant change in self-reported pain across groups. At second intervention, all groups showed reductions in distress, pain and anxiety, with no significant difference among groups. Strengths included matching to gender and age and baseline testing before receiving intervention. One limitation of this study is that the control group was contaminated by staff using distraction techniques, in essence, turning the control group into a second distraction group rather than a true control group.

Broome, Lillis, McGahee, et al. studied the effect of distraction and imagery on pain in children with leukemia during lumbar puncture.¹² Fourteen children, aged 3 to 15 years, were chosen to participate in the intervention group, and no control group was utilized. Children and parents were asked to learn imagery and relaxation techniques including breathing exercises. Parents were actively involved in coaching their children. Behavioral distress and pain scores were obtained at baseline and posttest. The study findings indicate that while children's self-reported pain decreased significantly over time, fear scores did not change significantly over time. Children's behavioral response to the procedure varied considerably. A limitation of this study is that the ability of the child and parent to use the techniques and the frequency that the child and parents utilized the practices during the procedure was not assessed. Variations in the integrity and strength of the intervention may have affected the interpretation of reduction of pain and distress. Other limitations included the small number and wide age range of subjects. It was unclear how the investigators addressed the issue that young children communicate less verbally than older children. In addition, without a control group, it is difficult to attribute the change unequivocally to the treatment.

Pederson compared the effectiveness of hypnosis, "presence" and a standard practice with 24 children ages 9 to 17 undergoing cardiac catheterization.¹³ Participants were randomly assigned to one of these three groups. In the hypnosis

intervention group, the intervener combined imagery and relaxation techniques such as breathing, blowing out tension, and muscle relaxation. In the "presence" group, the intervener provided "presence" by sitting near the child's head, using eye contact, conversing with the child intermittently in a quiet tone of voice, and using touch in ways that established rapport and communicated empathy. The control group was provided with routine care. Child self-report, as well as physiologic measures of pain, anxiety and distress were used. Children's self-reported pain was not reduced in hypnosis and control groups. However, children in the "presence" group reported the lowest level of pain, with no significant difference from baseline. Children's behavioral distress scores varied among groups, but were not significantly different, however, the hypnosis group had the lowest level of distress behaviors. Children's cortisol levels was significantly different between the groups, however the control group had the least physiological responses to pain during the procedure. The strength of this study is that groups were equivalent in age, sex, pain experience during prior cardiac catheterization, precatheterization cortisol, staff nurses, and sedative and analgesic medication given. In addition, self-reported pain and distress were measured based on baseline before participating in the intervention. One limitation was that salivary samples were not obtained from three subjects, thus influencing interpretation of physiological measurement of pain and anxiety.

Foertsch, O'Hara and Stoddard compared hypnosis and social support techniques in children undergoing burn-dressing change.¹⁴ Twenty-three children, aged 3 to 13 years, were assigned to either intervention or control groups. The intervention group received a familiar imaginative story. In the control group, the experimenter was present and casually chatted with the child, offering words of encouragement during painful moments and friendly listening when the child spoke. Pain self-report and behavior distress were measured at baseline and post-intervention. The study reported no difference in pain or behavioral distress between hypnosis and social support groups during burn-dressing changes.

The strength of this study is that groups were equivalent in age, sex, burn size and medication given. One limitation is the considerable variability in age, ranging from 3 to

12 years, which affected interpretation of outcome measures. Because most of the three year-olds and some four-year olds would have been unable to comprehend a self-report scale, behavioral distress observation measures were used instead of self-report scales. Comparing behavioral distress scores may lead to an overestimation of response to the intervention because young children tend to exhibit more distress behaviors than older counterparts. In addition, because burn-dressing patients were hospitalized, the stress and change associated with the hospital environment may have affected the behavioral distress of the children.

Syntheses critique of studies and directions for future research

Most hypnosis interventions in these studies^{8, 10, 12-13} combined various relaxation techniques. The results evaluated both pain and behavioral distress as outcomes. A strength of these studies^{11, 13} is the random assignment of subjects to hypnosis, non-hypnosis and control groups so that the effectiveness of the intervention could be more carefully analyzed. Another strength is that in five studies groups were matched for sex, age, disease categories and analgesic given. Statistical comparison of subject characteristics showed no significant differences between control and intervention groups. Further, for all instruments used in these studies, reliability and validity were reported. Overall, these studies provide some preliminary evidence that hypnosis may control children's pain, behavioral distress and anxiety during distressful medical procedures. Furthermore, a variety of non-hypnosis interventions such as distraction techniques (toys, puppets, pop-up books or bubbles to minimize anticipatory anxiety),¹¹ deep breathing,^{8, 12} or social support (parents or clinicians)^{12, 14} were also reported to help children cope with pain and anxiety.

Because hypnosis interventions are combined with a variety of relaxation techniques, questions remain about which aspects of intervention are most useful. Future research needs to investigate which individual or combination of elements are the most effective for reducing pain or behavioral distress.

Furthermore, the criteria for judging the degree or level of children's attained hypnotic state needs to be clearly expli-

cated. It could be useful to create and test standard criteria for judging the level of hypnosis and the amount of experience a child has in self-hypnosis before assigning subjects to a hypnosis intervention.

Interestingly, some children require parents or interveners to assist them in engaging their imagination during painful procedures. The presence of parents or interveners may help children to support their fantasies. Involving the parents or interveners during medical procedures may not only support the children, but also help to distract them from painful procedures. The relationship between the parents' or interveners' presence and the children's response to hypnosis induction requires more examination. Future studies could investigate the effect of parent and non-parent as the intervener in success of hypnosis induction.

The wide range of children's ages in these studies (3 to 17 years) raises questions about the need for a more homogeneous sample. It is clear that children's cognitive stage and ability to engage in hypnosis/imagery varies at different stages of development and from one child to another.¹⁰ Future research should examine the relationship between children's cognitive stage and success in inducing hypnosis, the effectiveness of hypnosis in each age group, and which aspects of hypnosis induction are the most effective for children in each age group.

Even though all instruments used in these studies reported the reliability and validity for use in children, questions remain about the extent to which younger children are able to self-report their pain. One study suggested that young children tend to respond to pain and express distress behavior more severely than older children.¹⁰ Comparing observational scores between young children and older children may underestimate or overestimate pain. The observational, self-reported pain, and distress behavior scales require investigation into their reliability and validity in each age group.

Comparisons across the reviewed studies suggest that responses differed across painful medical procedures. One study found hypnosis was efficacious during bone marrow aspiration,¹⁰ while another noted no effect during burn-dressing changes.¹³ Clearly, hypnosis is not applicable to all painful

medical procedures, but situations in which it would be most useful need to be further specified. Future research could examine the usefulness of hypnosis intervention in alleviating distress with a wide variety of medical procedures such as lung tapping and abdominal tapping, and address variables such as the severity of medical procedures and the amount of time under hypnosis.

Conclusions

Although, the use of hypnosis has been investigated and reported in children undergoing painful medical procedures, little is known about its action and effectiveness. While this intervention holds great promise, further research is needed to determine the effectiveness of hypnosis in children undergoing painful medical procedures. Although pharmacological treatment does not appear to reduce pain effectively, non-hypnosis has also been reported to reduce children's pain, behavioral distress and anxiety. Therefore, it could be instructive to combine hypnosis and/or non-hypnosis with pharmacological treatment in further testing of approaches to reduce behavioral distress in children.

References

1. MaGrath PJ, Hsu E, Cappelli M, Luke B, Goodman JT, Dunn-Geier J. Pain from pediatric cancer: a survey of an outpatient oncology clinic. *J Psychosoc Oncol* 1990; 8: 109-24.
2. Jay SM, Ozolins M, Elliot CH, Caldwell S. Assessment of children's distress during painful medical procedures. *Health Psychol* 1983;2:133-47.
3. Zeltzer LK, Altman A, Cohen D, LeBaron S, Munksela EL, Schechter NL. Report of the subcommittee on the management of pain associated with procedures in children with cancer. *Pediatrics* 1990;86: 826-31.
4. Patterson KL, Ware LL. Coping skills for children undergoing painful medical procedures. *Issues Compr Pediatr Nurs* 1988;11: 113-43.
5. Hockenberry M, Bologna-Vaughan S. Preparation for intrusive procedures using noninvasive techniques in children with cancer: state of the art vs. new trend. *Cancer Nurs* 1985; 8: 97-102.
6. MaGrath PJ, Beyer J, Cleeland C, Eland J, McGrath PA, Portenoy R. Report of the subcommittee on assessment and methodologic issues in the management of pain in childhood cancer. *Pediatrics* 1990;85: 814-7.
7. Valente SM. Using hypnosis with children for pain management. *Oncol Nurs Forum* 1991;18: 699-704.
8. Zeltzer L, LeBaron S. Hypnosis and techniques for reduction of pain and anxiety during painful procedures in children and adolescents with cancer. *J Pediatr* 1982; 101: 1032-35.
9. Hilgard JR, LeBaron S. Relief of anxiety and pain in children and adolescents with cancer: quantitative measures and clinical observations. *Int J Clin Exp Hypn* 1982;XXX:416-41.
10. Katz ER, Kellerman J, Ellenberg L. Hypnosis in the reduction of acute pain and distress in children with cancer. *J Pediatr Psychol* 1987;12:379-94.
11. Kuttner L, Bowman M, Teasdale M. Psychological treatment of distress, pain, and anxiety for young children with cancer. *J Dev Behav Pediatr* 1988;9:374-81.
12. Broome ME, Lillis PP, McGahee TW, Bates T. The use of distraction and imagery with children during painful procedures. *Oncol Nurs Forum* 1992;19:499-502.
13. Pederson C. Effect of imagery on children's pain and anxiety during cardiac catheterization. *J Pediatr Nurs* 1995;10: 365-74.
14. Foertsch CE, O'Hara MW, Stoddard FJ. Treatment-resistant pain and distress during pediatric burn-dressing changes. *J Burn Care Rehabil* 1998;19:219-24.