Stories to Take the Edge Off Pain During Immunization for Preschoolers: A Randomized Controlled Trial

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Importance: Fear and distress during immunization may lead to long-term preprocedural anxiety and nonadherence to immunization schedules. Pictorial stories provide a way of educating the parent and child about the procedure.

Objective: To determine the efficacy of pictorial stories in reducing pain perception among children and anxiety among mothers during immunization.

Design: Three-arm randomized controlled trial

Setting: Immunization clinic of a tertiary care hospital in South India.

Participants: Fifty children ages 5 to 6 yr, who reported to the hospital for measles, mumps, and rubella and typhoid conjugate virus vaccines. Inclusion criteria were that the child was accompanied by the mother and maternal knowledge of either Tamil or English. Exclusion criteria were child hospitalization in the past year or neonatal intensive care unit admission in the neonatal period.

Intervention: Pictorial story regarding immunization before the procedure that contained information related to immunization, coping strategies, and distraction techniques.

Outcomes and Measures: Pain perception was evaluated using the Sound, Eye, Motor Scale; the Observation Scale of Behavioral Distress; and the Wong-Baker FACES Pain Rating Scale (FACES). Maternal anxiety was measured using the General Anxiety–Visual Analog Scale.

Results: Of 50 children recruited, 17 were in the control group, 15 were in the placebo group, and 18 were in the intervention group. Children in the intervention group reported lower pain scores on the FACES ($p = .04$) compared with the placebo and control groups.

Conclusions and Relevance: A pictorial story is a simple and cost-effective intervention to reduce pain perception among children.

What This Article Adds: Pictorial stories may be a feasible, simple, and cost-effective intervention to reduce pain perception during immunization.

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Pain is considered to be an iatrogenic harm of immunization. Procedure-related pain is associated with negative emotional outcomes such as anxiety, fear, and distress among children and their families, with procedures involving needles being the most feared (Uman et al., 2008). Maternal psychological symptoms and behaviors with even a subtle display of anxiety may intensify the child's pain and interfere with the procedure (Evans et al., 2016). If not addressed, fear of procedures may lead to long-term consequences, such as health care avoidance and nonadherence to immunization schedules, contributing to outbreaks of vaccine-preventable diseases (O'Doherty et al., 2017).

Several nonpharmacological interventions have been found to be effective in decreasing needle-related pain. Children positioned sitting upright rather than lying supine reported lower levels of fear (Taddio, Shah, et al., 2015). Other interventions include providing tactile stimulation by rubbing or stroking the skin over the injection site (Taddio et al., 2010), external application of a vibrating device coupled with cold (Taddio, Shah, et al., 2015), and clinicians' competency in administering immunizations (Pillai Riddell et al., 2015). Distraction techniques were used as a pain prevention strategy during immunization nearly half of the time (Schurman et al., 2017). Distraction techniques can be passive, such as watching videos and listening to music or a story, or active, such as singing songs, using relaxation breathing, and playing with squeeze balls or electronic devices (Abdelmoniem & Mahmoud, 2016). Educating parents on the effects of pain and its management before and on the day of immunization helps them get involved in pain-reducing interventions during the procedure (Pillai Riddell et al., 2015). Educating children ages 3 yr and older on the day of immunization by providing information about what will happen (procedural information), how it will feel (sensory information), and how to cope (strategies to mitigate pain and fear) has been recommended (Taddio, McMurtry, et al., 2015).

Pictorial stories have been found to be effective in decreasing anxiety and associated behavioral expressions in children undergoing dental procedures (Aminabadi et al., 2011). Preparatory storytelling is easily implemented and applicable to a variety of behaviors (Aminabadi et al., 2011). No studies have looked at the effectiveness of pictorial stories on immunization pain or maternal anxiety.

The objective of this study was to determine the effectiveness of a tailored pictorial story before the immunization procedure on pain perception of children ages 5 to 6 yr and maternal anxiety. We hypothesized that children who received preparatory information before immunization would have reduced pain perception and mothers would have lower anxiety levels.

Method

Research Design

The study was a three-arm single-blinded randomized controlled trial conducted in the immunization clinic of a tertiary care hospital in South India.

Participants

Parents of children ages 5 to 6 yr who reported to the hospital between December 2019 and March 2020 for the measles, mumps, and rubella (MMR) and typhoid conjugate virus (TCV) vaccines (chosen for uniformity) were approached for consent to participate in the study. Inclusion criteria were the child being accompanied by the mother during immunization and maternal knowledge of either Tamil or English language. Children were excluded from the study if (1) they had a hospitalization in the past year or (2) they had an admission to the neonatal intensive care unit during their neonatal period. These infants were excluded because studies of former premature infants who required intensive care have shown behavioral differences related to early pain experiences (Grunau et al., 2001).

Instruments

Pain perception in the child was assessed using three scales.

Sound, Eye, Motor Scale

The Sound, Eye, Motor (SEM) Scale measures changes in the eyes, sound, or movement of the patient. Responses were graded on a scale ranging from 0 (*comfort*) to 3 (*painful*) and classified into four levels: comfort, mild discomfort, moderately painful, and painful (Wright et al., 1991). Lower scores represent a less physical reaction to the injection stimulus than do higher scores, which indicate more pain (Kreider et al., 2001). The SEM Scale has been reported to correspond favorably with the Frankl Behavior Rating Scale (Wright et al., 1991).

Observation Scale of Behavioral Distress

The Observation Scale of Behavioral Distress (OSBD) measures children's behavioral responses to painful medical procedures, with higher scores indicating greater anxiety. It evaluates eight behaviors: information seeking, cry, scream, restraint, verbal resistance, requests emotional support, verbal pain, and flail. It has good interobserver reliability ($r = .98$) and correlates well with nurse ratings of pain, children's self-report ratings of pain and anxiety, and physiological measures before and after procedures (Elliott et al., 1987).

Wong-Baker FACES Pain Rating Scale

The Wong-Baker FACES Pain Rating Scale (FACES) is a self-reported pain intensity rating tool used for children ages 3 yr and older. It consists of six faces showing facial expressions of no pain to the worst pain. It has a good concurrent validity ($r = .63$–$.94$), reliability ($r = .791$), and preference, $\chi^2(5) = 135.81$ (Keck et al., 1996).

Maternal anxiety was assessed using the General Anxiety–Visual Analog Scale (GA–VAS). Mothers graded the level of anxiety on a 100-mm scale that ranged from *not at all anxious* to *extremely anxious*. The GA–VAS correlates well with other anxiety measures, such as the Hamilton Rating Scale for anxiety ($r = .60$, $p < .0001$) and the Hospital Anxiety and Depression Scale–Anxiety subscale ($r = .74$, $p < .0001$). It is an effective tool for capturing quick reductions in anxiety (Williams et al., 2010).

The family's socioeconomic status (SES) was classified using the Modified Kuppuswamy Scale (Wani, 2019) in

urban and rural areas. This scale classifies the population into five SESs, namely, upper, upper middle, lower middle, upper lower, and lower. It consists of a composite score that includes the education and occupation of the head of the family, along with the family's monthly income, and yields a score of 3 to 29, where a higher score implies higher SES (Wani, 2019).

The Seguin Form Board Test uses form boards to evaluate eye–hand coordination, shape concept, visual perception, and cognitive ability through nonverbal means (Koshy et al., 2017). It can be used with children as young as age 3 yr (Venkatesan, 2014) and consists of 10 differently shaped wooden blocks. Participants are required to fit the shaped blocks into their respective slots on the form board (Koshy et al., 2017). This is a culture-fair test, used for preliminary assessment of mental age in a typically developing population, and administration takes 10 min (Koshy et al., 2017). Studies providing preparatory information should consider a child's comprehension—a function of IQ—as one of its factors (Aminabadi et al., 2011; Cho, 2010).

Intervention

A pictorial story was narrated before the immunization procedure. The story contained information about anxiety related to immunization, coping strategies, and distraction techniques. The story was in a book format, with pictures and text depicting a child's visit to the immunization clinic step by step and ending with the child going home happy. The story was developed in a culturally appropriate format and translated into the local language.

Procedure

For uniformity of vaccines, children receiving the MMR, a subcutaneous vaccine, and the TCV, an intramuscular vaccine generally given around age 5 yr, were selected for inclusion.

Once written informed consent was obtained, the participants were taken to a separate room for the intervention by the secondary investigator (SI; Hima B. John). Demographic information was collected. Additional factors obtained via interview were whether (1) the child received prior information about immunization on the same or previous day; (2) verbal threats were used, such as saying the child would receive injections for bad behavior (a common practice in the community); (3) the child had experienced painful procedures in the hospital in the past 6 mo that included immunizations but not hospitalization; and (4) distraction techniques had been used.

All children who were recruited performed the Seguin Form Board Test to screen for intelligence. If their scores were average or above, they were randomly allocated by block randomization into one of three groups—control, placebo, and intervention—using serially numbered opaque envelopes given to them by the SI. In the control group, no intervention was provided. In the placebo group, the child was narrated a story related to a visit to a grocery store. A placebo group was used to rule out the effect of the story in providing a distraction before immunization. In the intervention group, a pictorial story regarding immunization was narrated. The characters—a mother, a son, and a daughter—were the same in both the placebo and the intervention groups.

The primary investigator (PI; Addlin Sarah) administered all the outcome measures. Maternal anxiety was assessed before the immunization procedure using GA–VAS. The FACES was administered to the children as a subjective measure of anticipated pain before and after the procedure. The PI followed a uniform procedure when administering the SEM Scale and OSBD during the immunization. The injection was administered by either of two senior nurses. Distraction techniques used by the mother were recorded.

Randomization, Allocation, and Blinding

Children were randomly allocated into three groups using the block randomization technique with blocks of 3, 6, and 9. Allocation was concealed by using opaque sealed envelopes. The randomization schedule was generated using SAS software (Version 9.4) by the biostatistician. The PI enrolled the participants and the SI assigned participants to the intervention. This study was single blinded; the PI was blind to group allocation.

Sample Size Calculation

The sample size was calculated on the basis of the results of the study by Aminabadi et al. (2011), which assessed the impact of a pictorial story in reducing pain perception, situational anxiety, and behavior in children undergoing dental procedures. The mean SEM scores for the children's pain behavior were 3.58 and 6.03 in the intervention and control groups, respectively. To detect a difference of 2 points between the study groups with a standard deviation of 1.5, power of 90%, and 5% α error, the sample size was calculated as 12 for each group. We aimed to recruit 15 participants in each arm, considering a dropout rate of 25% and following an allocation ratio of 1:1:1.

Data Analysis

Data were analyzed using SPSS Statistics (Version 21). Descriptive statistics for continuous variables were expressed as means and standard deviations. All categorical variables were represented as *n*s and percentages. Differences in pain perception and maternal anxiety between the groups (control, placebo, and intervention) were analyzed using one-way analysis of variance. Associations between categorical demographic variables between the groups (control, placebo, and intervention) were analyzed using the χ^2 test. A $p < .05$ was considered statistically significant.

Results

The flow of participants through the study is shown in Figure 1. Of 73 children assessed for eligibility, 54 parents consented to participation and were randomly allocated into the three groups. One child from the control group and 1 child from the intervention group were excluded from analysis. The final sample included 50 participants, 17 in the control group, 15 in the placebo group, and 18 in the intervention group. There were no significant differences in demographic characteristics of the children and mothers among the three groups (Table 1).

The intervention group had significantly lower scores on the FACES, indicating less postvaccination pain expression, when compared with control and placebo groups ($p = .04$; Table 2). No significant differences between the groups were found for SEM scale, OSBD, and the prevaccination FACES. The intervention group had lower maternal anxiety scores when compared with placebo and control groups; however, the differences was insignificant ($p = .15$).

No significant differences in pain perception and maternal anxiety were found on the basis of demographic characteristics and additional factors (Table 3). The timing of prior information given by the parents was either the previous day night (70%) or the same day before leaving home for immunization (30%). Parents either explained the benefit of good health (88%) or bribed the child for good behavior (12%). Approximately 5 mothers (10%) used injection as a threat. Only 12 parents (22%) used distraction techniques during the procedure—of these, 6 parents (50%) used verbal techniques (talking soothingly, diverting attention), 5 parents (42%) used visual distractions (pointing to cartoons/objects in the room), and 1 parent (8%) used bribing (promising eatables).

Discussion

This is, to our knowledge, the first study to assess the effectiveness of pictorial stories in reducing pain perception among children and maternal anxiety during immunization. The findings of this study have implications for occupational therapy practitioners' role in the management of pain because they can specifically address physical, cognitive, and sensory–perceptual aspects of a child's pain.

Figure 1. Flow of participants through the study.

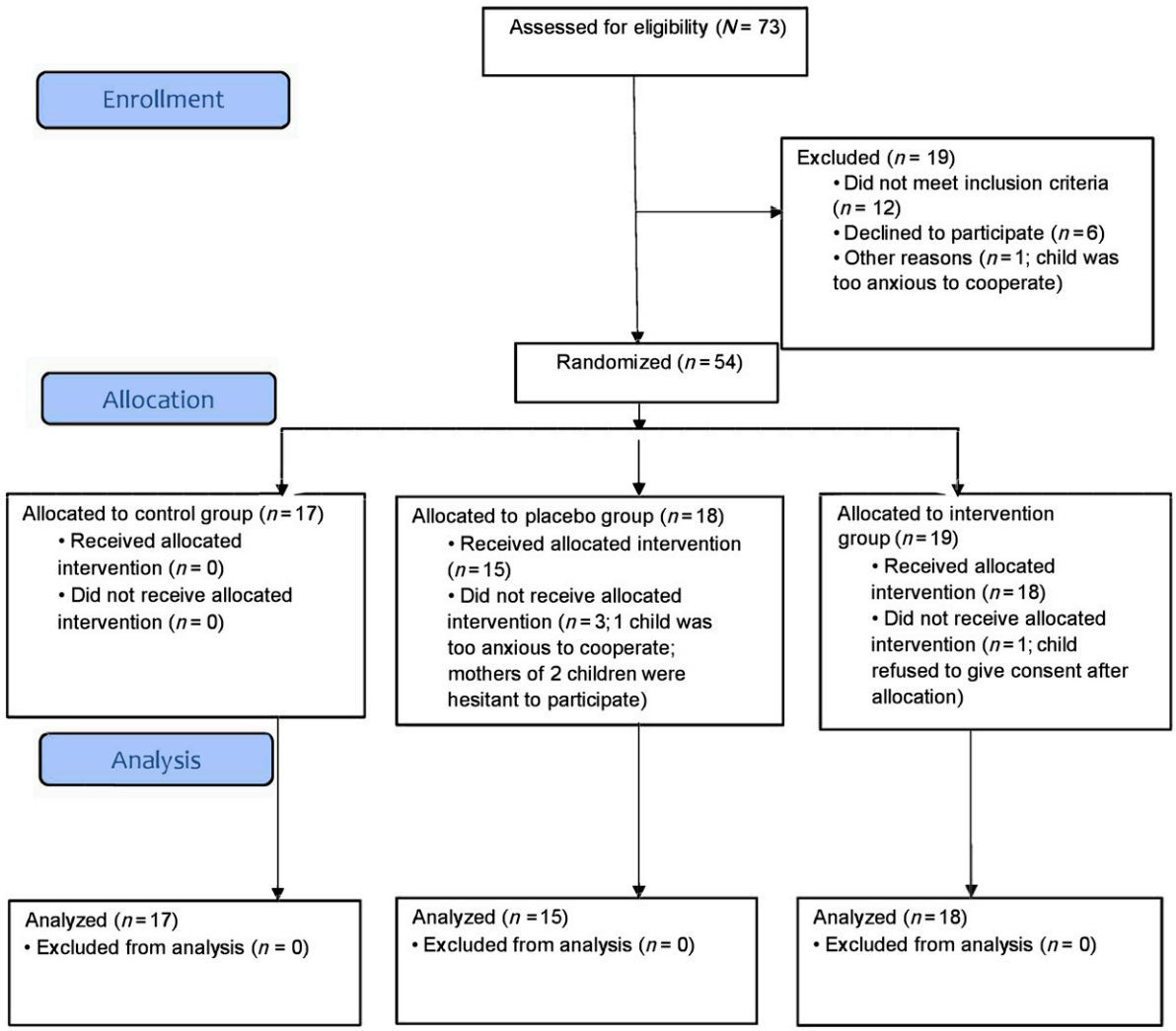

Table 1. Demographic Characteristics of the Study Population

Demographic Characteristics	*n* (%)		
	Control Group (*n* = 17)	Placebo Group (*n* = 15)	Intervention Group (*n* = 18)
Gender			
Male	9 (52.94)	8 (53.33)	8 (44.44)
Female	8 (47.06)	7 (46.67)	10 (55.56)
Birth weight, g, *M* (*SD*)	2,941.33 (462)	2,903.89 (531)	2,908.40 (429)
Length, cm, *M* (*SD*) (*n* = 43)	48.23 (2.09)	48.87 (2.62)	48.28 (3.92)
Head circumference, cm, *M* (*SD*) (*n* = 20)	34.30 (1.07)	33.24 (0.84)	33.37 (1.65)
Gestational age at birth, wk, *M* (*SD*)	38.34 (1.20)	38.12 (1.44)	38.48 (1.33)
Age at vaccination, mo, *M* (*SD*)	64.41 (4.51)	63.80 (3.60)	64.17 (3.55)
Birth order			
Firstborn	11 (64)	10 (66)	9 (50)
Later born	6 (35)	5 (33)	9 (50)
Age, yr, *M* (*SD*)	30.41 (4.74)	32.80 (4.95)	32.33 (4.23)
Mother's literacy			
Nongraduate	5 (29)	4 (26)	8 (44)
Graduate and above	12 (70)	11 (73)	10 (55)
Occupation			
Homemaker	16 (94)	13 (86)	14 (77)
Employed	1 (5)	2 (13)	4 (22)
SES classification			
Upper	5 (29)	2 (13)	3 (16)
Upper middle	6 (35)	8 (53)	8 (44)
Lower middle–upper lower	6 (35)	4 (26)	7 (38)

Note. Because of missing data for the placebo group in the SES classification, *n* = 14. SES = socioeconomic status.

In this study, children in the intervention group had significantly lower pain perception postvaccination than the placebo and control groups. Even small benefits in mitigating pain can be considered clinically beneficial (Taddio et al., 2010). According to Janis's (1958) theory of psychological preparation, provision of information regarding procedures initially results in greater fear, prompting internal rehearsal of the potentially threatening situation. This "work of worrying" ultimately helps children regulate their expectation of the procedure, which may be worse than the reality, resulting in decreased anxiety after the procedure (Janis, 1958). Effective behavioral interventions to reduce anxiety and pain are recommended to be interactive and to include content regarding the procedure as well as an explanation of sensations (Cohen, 2008). Parents also benefit from preparation, specifically training on how to coach their children on coping behaviors (Cohen, 2008). Reduced distress before and during venipuncture was observed when parents read the child a simple story about the procedure and the sensations the child was likely to experience (Kolk et al., 2000). Children ages 6 to 7 yr who were told a pictorial story before undergoing a dental procedure reported significantly decreased pain perception compared with a placebo group (Aminabadi et al., 2011). The timing of when the information is provided plays an important role. It has been recommended that immunization information be given on the same day. During the procedure, neutral information and coping strategies should be provided, because threatening information just before the procedure can increase fear (Taddio, McMurtry, et al., 2015).

Self-reported pain measures continue to be a gold standard for children, with studies showing poor correlation of objective assessments with children's pain scores by health care professionals, who often underestimate pain (Khin Hla et al., 2014). Our study found no differences between the groups on the SEM Scale and the OSBD, as evaluated by the PI. Other studies have reported similar findings (Khin Hla et al., 2014; Rajasagaram et al., 2009; Schneider & LoBiondo-Wood, 1992; Maciocia et al., 2003). Furthermore, providing procedural information alone had only a limited positive effect on fearful individuals and may be more effective when coupled with the other techniques (McMurtry et al., 2016). Procedural information combined with coping instructions in the form of either

Table 2. Comparison of Outcomes Measures in Control, Placebo, and Intervention Groups

Outcome Measure	*M* (*SD*)			*p*	*F*(1, 49)	95% Confidence Interval
	Control Group (*n* = 17)	Placebo Group (*n* = 15)	Intervention Group (*n* = 18)			
Seguin Form Board: shortest trial, s	25.24 (4.9)	26.47 (10.4)	26.17 (6.3)	.88	0.12	[23.8, 28.02]
SEM	5.59 (3.0)	4.07 (3.0)	4.83 (2.4)	.33	1.13	[4.04, 5.67]
OSBD	15.47 (7.1)	12.53 (6.0)	14.50 (6.4)	.44	0.81	[12.37, 16.10]
Prevaccination GA–VAS	26.65 (26.2)	19.47 (22.0)	12.50 (13.1)	.15	1.97	[13.3, 25.49]
FACES						
Prevaccination	3.88 (2.1)	3.00 (1.8)	2.67 (1.9)	.19	1.68	[2.27, 4.98]
Postvaccination	4.35 (1.7)	4.13 (1.9)	2.83 (1.7)	.03*	3.58	[3.46, 5.24]

Note. FACES = Wong-Baker FACES Pain Rating Scale; GA–VAS = General Anxiety–Visual Analog Scale; OSBD = Observation Scale of Behavioral Distress; SEM = Sound, Eye, Motor Scale.
*Denotes significance at $p < .05$.

relaxation and physical exercises or cognitive techniques has shown far more positive effects in mitigating patient distress and reducing stress (Tak & van Bon, 2006). It has also been recommended that efforts focus on preventing a fear of needles from developing (McMurtry et al., 2016). The intervention used follows the principle of Social Stories, which provide preprocedural information using a pictorial representation.

This study found lower maternal anxiety scores in the intervention group when compared with placebo and control groups; however, the difference was insignificant. Several studies have shown that parental anxiety influences the child's anxiety and pain across a range of medical and nonmedical events (Bearden et al., 2012). High maternal anxiety levels were associated with more negative and uncooperative behaviors in children undergoing dental treatment compared with mothers with low anxiety levels (Johnson & Baldwin, 1968). Parental anxiety levels were significantly associated with children's anxiety before surgery and during bone marrow transplantation (Getahun et al., 2020; Kleiber & Harper, 1999). Similarly, parents' anxiety before immunization was shown to affect preschoolers' procedural anxiety, which in turn affected procedural pain (Bearden et al., 2012). Specific to the routine immunization procedure, a combination of parent and staff in-session behaviors, along with prior medical experience, accounts for approximately 40% of the variance in children's coping and 60% of the variance in children's distress (Frank et al., 1995).

This study did not find a difference between the groups in mothers' use of distraction techniques to reduce the child's pain perception. Distraction behaviors by adults have been associated with children's coping behaviors. However, the value of distraction to reduce a child's distress shows only a modest positive effect (Kleiber & Harper, 1999).

Statistical differences in pain perception and maternal anxiety were not found on the basis of demographic characteristics such as gender, SES, or birth order. Studies on gender differences in pain perception in children show that at approximately age 8 yr girls reported higher levels of unpleasantness in response to needle pain; before age 8 yr, there is no evidence of gender difference (Goodenough et al., 1999).

This study found significant associations between mother's higher literacy and increased pain perception in the child (see Table 3). The majority of studies found no such association between maternal socioeconomic or education level and a child's preprocedural anxiety (Cagiran et al., 2014; Getahun et al., 2020). The reason for this finding in the current study is unclear. We hypothesize that children of educated mothers may have been sensitized to the immunization procedure to a greater extent, which may have reflected adversely on their perception of pain.

Using injection as a verbal threat to discourage bad behavior is commonly seen in the South Indian community. This study showed no association between this practice on the child's pain perception even though 5 mothers (10%) in our study used it as a threat. However, another study found information containing verbal threats to have fear-enhancing effects on children (Muris & Field, 2010).

Limitations

Even though our sample of 50 children was adequately powered to achieve significance, a larger sample may have provided more conclusive results. This was a single-center study, which limits generalizability to other groups. Because the intervention could not be masked, children may have responded in a manner that was expected of them.

Future Research

A qualitative study design may have helped in better understanding the cognitive and perceptual processes underlying children's and parents' responses and should be explored. Further studies are needed to

Table 3. Differences of the Child and Mother Characteristics With Outcome Measures

	SEM		OSBD		FACES				GA–VAS	
					Prevaccination		Postvaccination			
Demographic Characteristics	***M* (*SD*)**	***p***	***M* (*SD*)**	***p***	***M* (*SD*)**	***p***	***M* (*SD*)**	***p***	***M* (*SD*)**	***p***
Gender		.73		.60		.73		.82		.66
Male	5.0 (2.5)		14.7 (6.5)		3.2 (2.0)		3.6 (1.8)		18.0 (20.7)	
Female	4.7 (3.2)		13.7 (6.6)		3.0 (2.0)		3.8 (2.0)		20.7 (22.4)	
Mother's literacy		.02*		.002*		.65		.59		.83
Graduate and above	6.1 (2.6)		18.0 (6.5)		3.0 (2.1)		3.9 (2.1)		20.2 (23.9)	
Nongraduate	4.2 (2.7)		12.2 (5.7)		3.27 (2.0)		3.6 (1.8)		18.9 (20.4)	
SES		.79		.37		.43		.41		.77
Upper	4.8 (3.1)		15.4 (8.2)		3.9 (1.7)		4.2 (1.6)		14.7 (15.7)	
Upper middle	4.8 (2.7)		12.8 (4.6)		2.9 (2.0)		3.8 (1.9)		19.1 (20.1)	
Lower middle and upper lower	5.0 (3.0)		15.7 (7.5)		3.2 (2.1)		3.5 (1.9)		23.0 (26.5)	
Birth order		.15		.26		.35		.05		.46
Firstborn	5.3 (2.7)		15.1 (6.6)		3.4 (2.1)		4.1 (1.8)		21.2 (24.2)	
Later born	4.1 (2.9)		12.9 (6.4)		2.8 (1.9)		3.1 (1.8)		16.6 (16.5)	
Prior information given		.26		.03*		.27		.29		.82
Yes	5.6 (2.8)		17.6 (7.7)		3.7 (1.8)		4.2 (1.9)		20.5 (24.6)	
No	4.6 (2.8)		13.1 (5.8)		3.0 (2.0)		3.5 (1.9)		19.0 (20.6)	
Recent painful procedure		.22		.10		.39		.22		.50
Yes	4.0 (2.5)		11.8 (3.8)		2.7 (1.9)		3.2 (1.7)		16.0 (17.1)	
No	5.1 (2.9)		15.1 (7.1)		3.3 (2.0)		3.9 (1.9)		20.6 (23.0)	
Distraction techniques		.97		.48		.32		.98		.72
Yes	4.8 (2.6)		13.0 (7.0)		2.6 (1.9)		3.7 (1.9)		17.5 (21.6)	
No	4.8 (2.9)		14.6 (6.4)		3.3 (2.0)		3.7 (1.9)		20.0 (21.6)	
Injection used as a threat		.86		.97		.51		.74		.19
Yes (n = 6)	4.6 (4.0)		14.3 (8.6)		2.6 (1.7)		3.5 (1.5)		30.1 (17.5)	
No (n = 44)	4.8 (2.7)		14.2 (6.3)		3.2 (2.0)		3.7 (1.9)		17.9 (21.6)	

(*Continued*)

Table 3. Differences of the Child and Mother Characteristics With Outcome Measures (*Cont.*)

Demographic Characteristics	SEM		OSBD		FACES				GA–VAS	
					Prevaccination		Postvaccination			
	M (*SD*)	*p*	*M* (*SD*)	*p*	*M* (*SD*)	*p*	*M* (*SD*)	*p*	*M* (*SD*)	*p*
Injection		.91		.68		.10		.22		.72
One at a time ($n = 14$)	4.9 (2.9)		14.8 (6.7)		2.4 (2.0)		3.2 (2.0)		21.1 (27.1)	
Given together ($n = 36$)	4.8 (2.8)		14.0 (6.5)		3.4 (1.1)		3.9 (1.8)		18.7 (19.2)	

Note. FACES = Wong-Baker FACES Pain Rating Scale; GA–VAS = General Anxiety–Visual Analog Scale; OSBD = Observation Scale of Behavioral Distress; SEM = Sound, Eye, Motor Scale; SES = socioeconomic status.
* Denotes significance at $p < .05$.

explore the potential application of pictorial stories in different age groups of children; in special needs populations of children, who are most vulnerable to pain; and for other painful medical procedures in the South Indian population.

Implications for Occupational Therapy Practice

This study has the following implications for occupational therapy practice:

- The use of pictorial stories can improve the quality of painful experiences for children and their mothers and provides a guideline for parents to communicate with their children during subsequent immunization visits.
- This cost-effective and easily implemented intervention may improve vaccine adherence, reducing vaccine-preventable disease outbreaks that might lead to disability, and it supports the role of occupational therapists in health promotion and well-being.
- This intervention widens the scope of occupational therapists' work in pain management with typically developing children as well as with those with special needs in different age groups.

Conclusion

This study is to our knowledge the first to assess the effectiveness of pictorial stories in reducing pain perception in a population of typically developing preschoolers during routine immunization. The results of the study support the use of pictorial stories as an effective intervention to reduce pain perception among children, thus improving the quality of the painful experience.

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