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Original Articles

Effects of Parent's Presence on Pain Tolerance in Children during Venipuncture: A Randomised Controlled Trial

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Abstract ***Introduction:*** The aim of this study is to determine whether presence of parents can change tolerance of pain and distress in children. ***Materials and Methods:*** A hundred thirty five children (62 girls, and 73 boys) between 3-6 years who were admitted to the paediatric outpatient clinic were included in the study. The cases were randomised into two groups: those who were accompanied by a parent (group 1), and those who were accompanied by a hospital staff member (group 2). We used the Wong-Baker FACES Pain Rating Scale to evaluate pain. Analyses were performed using commercially software (PASW ver. 18, ID:33478001 SPSS inc. Chicago, IL). A p-value <0.05 was considered as statistically significant. ***Results:*** The mean age of the cases with their parents was 4.19±1.23 years. The mean age of cases with hospital personnel was 4.36±1.41 years. During the procedure, mean respiratory rates were 32.09±9.09/min and 38.60±8.70/min in groups 1 and group 2, respectively (p<0.05). The mean heart rates of group 1 were 123.24±16.08/min, and the mean heart rates of group 2 were 131.82±16.96/min; this difference was statistically significant (p<0.05). During the procedure 53 (77.9%) members of group 1 and 58 (86%) members of group 2 obtained Wong-Baker scores higher than 3, but this difference was not statistically significant (p>0.05). ***Conclusion:*** As a result, our study showed that parental presence had a minimal positive effect on pain tolerance, additional randomised and controlled studies with larger groups are required before a conclusion about the issue can be reached.

Key words Children; Pain; Parental presence; Venipuncture

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Introduction

Pain has been defined as an unpleasant sensory or emotional experience associated with actual or potential tissue damage.[1] Although the perception of pain is affected by cognitive, emotional, and social factors, it has been reported that the emotional component is more important in children.[2] A child who experiences pain in an unsecure environment (i.e., away from his or her family) can suffer from a lack of confidence and stress that is comparable to the pain associated with the wound itself. If the child has experienced a prior painful event, exposure to a similar situation can lead to severe anxiety that even renders the application of topical analgesics ineffective in preventing fear of the pain.[3] Thus, inadequate relief of pain and distress during painful childhood medical procedures may have long-term negative effects on future pain tolerance and pain responses.[4]

Pain assessment can be used to indicate the need for

intervention as well as the effectiveness of treatments designed to reduce pain.[5] A common method for measuring personal pain is the Wong-Baker FACES Pain Rating Scale,[6] which uses drawings of different facial expressions to help children express the level of pain they are experiencing.[2] Facial expressions have been accepted as a reliable and objective index in this regard. Alterations in cardiovascular (heart rate, blood pressure), endocrine (levels of stress hormones such as plasma cortisol and catecholamines), and respiratory parameters have been used to study the biological substrate of pain.

Efforts to control and treat pain in children have been hindered by lack of knowledge and education regarding pain in children. Physicians and nurses dealing with the health of children are responsible for the alleviation of their pain. Children have different needs for the alleviation of pain during different phases of their development. It is proposed that school children (including those attending preschool) also require their parents' support in situations involving pain. However, no consensus about whether the presence of parents helps to reduce the pain associated with medical procedures has been reached.[7,8]

This study investigated the effect of the support of parents during venous puncture on young patients' experiences of pain.

Material and Methods

A total of 429 children between 3 and 6 years of age were admitted to our clinic between June 2010 and August 2010; 135 children were included in the study. Approval by the hospital ethics committee and written consent from all participants were also obtained. The inclusion criterion was admitted children between the ages of 3 and 6 years with one parent in attendance. All children received a physical examination, and a detailed medical history was obtained with respect to each exclusion criterion. Exclusion criteria included a history of venipuncture within the last year; concurrent analgesic treatment during the project; a psychomotor disorder; a chronic disease such as familial Mediterranean fever, asthma, or cancer; an extreme pain reaction (if the child was consoled for more than 5 minutes, demonstrated agitated movements, or developed muscular rigidity); or if more than one venipuncture had been attempted. The exclusion criteria for parents included a psychiatric diagnosis within the past 5 years. As a result, 54 children were excluded from the study due to a pervious history of venipuncture, parental mental disorders, chronic disease, or analgesic use, yielding a final sample of 135 children. In this prospective study, the cases were randomised into two groups to compare whether the presence of a parent during venipuncture affected pain tolerance. Children who were undergoing venipuncture were randomly assigned (1:1) using computer-generated random positive integers to one of two groups: (a) those who were accompanied by a parent (group 1), and (b) those who were accompanied by a hospital staff member (group 2). We used the Wong-Baker FACES Pain Rating Scale to evaluate pain.

Drawings of facial expressions are a popular approach to the measurement of the severity of pain in paediatric populations.[9] Scales used to rate facial expressions are known to correlate with other self-report indices[10] and with ratings by parents and nurses.[11] A number of face-based rating scales are available.[11] Although some debate about the optimum design of facial expressions exists, facial-expression scales are the preferred method for eliciting reports of pain from children.[12] An advantage associated with use of drawings is the ease with which they can be inexpensively reproduced. Additionally, the drawings lack any specific ethnic or sex-related features.[13] The disadvantage of the face scales is that children may not choose the right face.[14,15] The Wong-Baker scale measures the pain experienced during medical procedures by presenting patients aged 3-18 years with different facial expressions[11,15] that are scored from "no hurt" (0) to "hurt worst".[5] A score of ≥3 has been accepted as representing severe distress.

Heart and respiratory rates were recorded before and after the procedure, which was divided into three sections. The preprocedural period was defined as the time from obtaining consent to just before the tourniquet was placed on the child's arm. The procedural period was the time from tourniquet placement to placement of the tape on the IV site. The postprocedural period was the 5 minutes following the procedure. An experienced nurse took the samples from the left antecubital veins with a 21-gauge syringe after application of alcohol swabs. All venipuncture procedures were performed by the same nurse. The number of attempts to take blood samples was recorded. The facial expressions of the child were recorded before, during, and after the procedure using the Wong-Baker scale (Figure 1); these responses were then evaluated by an experienced anaesthetist. After the venous puncture, heart and respiratory rates were recorded for 2 minutes, and the examiner made note of children who cried before and during the procedure.

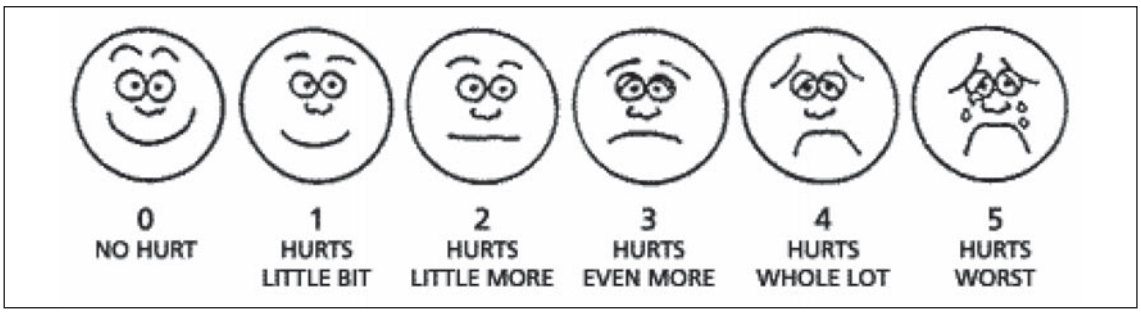

Figure 1 Wong-Baker faces pain rating scale.

Statistical Measurements: The sample used for calculations consisted of 128 children (34 per treatment group); a two-tailed test and a type-I error rate (*alpha*) of 0.05, a power (1-*beta*) of 0.80, and an effect size of 0.05 were used. We increased the sample size to 135 to compensate for dropouts and deviations in protocol. *Chi*-square tests were used to compare the categorical variables, which are presented as numbers and percentages. Respiratory and heart rates had normal distributions, whereas the Wong-Baker scores for the two groups did not according to a one-sample Kolmogorov-Smirnov normality test performed separately for the two groups. Therefore, two independent-sample *t*-tests were used to compare the respiratory and heart rates between those accompanied by a parent and those accompanied by a staff member. The Mann-Whitney U test was used to compare the Wong-Baker scores of the two groups. A one-way repeated ANOVA was used to compare the respiratory and heart rates before, during, and after the venipuncture procedure. A two-way repeated ANOVA was used to compare the changes in respiratory and heart rates experienced by members of the two groups during the procedure. The Wilcoxon rank-sum test was used to separately compare the Wong-Baker scores obtained by the parent-accompanied and the staff-accompanied groups during and after venipuncture. Two independent-sample *t*-tests were used to compare the differences in these scores between the two groups. The continuous variables are presented as means and standard deviations. A *p*-value <0.05 was considered statistically significant. Analyses were performed using commercially available software (PASW ver.18, ID:33478001 SPSS Inc. Chicago, IL).

Results

We studied 135 children: 62 girls and 73 boys. Group 1 included 31 girls (45.6%) and 37 boys (54.4%), and the mean age of this group was 4.19±1.23 years. Group 2 contained 31 girls (46.3%) and 36 boys (53.7%), and the mean age of this group was 4.36±1.41 years. Respiratory and heart rates before the procedure were 23.47±5.33/min and 100.2±14.95/min, respectively, in the girls and boys in group 1. Respiratory and heart rates before the procedure were 26.75±6.56/min and 105.09±11.63/min, respectively for girls and boys in group 2. During the procedure, mean respiratory rates were 32.09±9.09/min and 38.60±8.70/min in groups 1 and group 2, respectively ($p<0.05$, Table 1, Figure 2). The mean heart rates of group 1 were 123.24± 16.08/min, and the mean heart rates of group 2 were 131.82±16.96/min; this difference was statistically significant ($p<0.05$, Table 1, Figure 3).

During the procedure 53 (77.9 %) members of group 1 and 58 (86%) members of group 2 obtained Wong-Baker scores higher than 3, but this difference was not statistically significant ($p>0.05$). After the procedure, 30 (44.1%) members of group 1 and 40 (59.7%) members of group 2 obtained Wong-Baker scores higher than 3 (Table 2, Figure 4); this difference also did not reach statistical significance.

The personnel who performed the venous puncture rated the ease of each procedure. The mean score in the parent-accompanied group was 2.72±1.16, whereas that in the staff-accompanied group was 2.24±1.09; this difference was not statistically significant ($p>0.05$, Table 1).

Discussion

Although pain can have a negative impact on children's lives, the needs of children during and especially after painful procedures are usually ignored.[7] If the child is not sufficiently informed about the procedure or is not near to a trusted individual or family member, his or her reaction can be greatly exaggerated.[16] Studies have shown that

Table 1 Heart rates, respiratory rates and the score given by the observer during the procedure

	Venipuncture	Parents presence(n=68)	Personnel presence(n=67)	[1]p
Wong-Baker pain	During	3.47±1.38	3.88±1.16	0.089
face rating scale	After	2.25±1.43	2.69±1.29	0.071
	[2]p	<0.001	<0.001	
	[3]p	0.955		
Respiratory rate (mean / min)	Before	23.47±5.33	26.75±6.56	0.002
	During	32.09±9.09	38.60±8.70	<0.001
	After	26.40±7.43	30.72±7.63	0.001
	[2]p	0.001*	0.001*	
	[3]p	0.004		
Heart rate (mean / min)	Before	102.38±14.95	105.09±116.30	0.316
	During	123.24±16.08	131.82±16.96	0.003
	After	111.03±13.82	117.67±16.14	0.011
	[2]p	0.001*	0.001*	
	[3]p	0.035		
Personnel score	During	2.72±1.16	2.24±1.09	0.015

[1]: Results of comparisons between parent and personnel presence groups separately for procedure periods

[2]: Results of comparisons among before, during and after procedure separately for groups

[3]: Results of comparisons the alterations of procedures between parent and personnel presence groups

*: There was statistically significant differences between before and other measures according to pairwise comparison test.

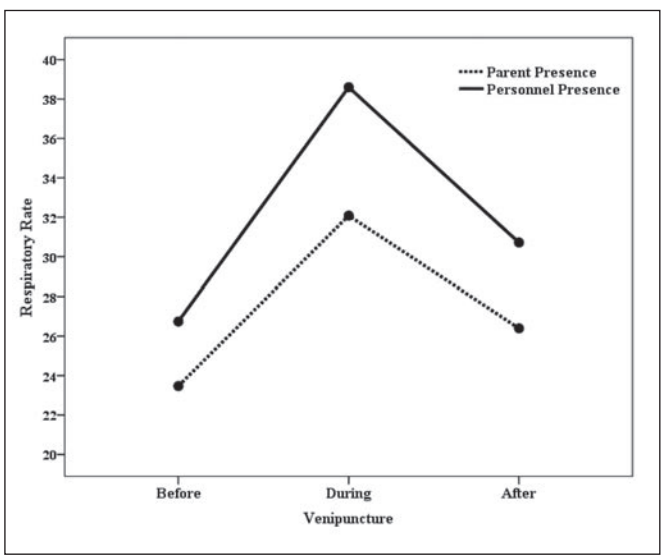

Figure 2 Alterations of respiratory rates during the procedure.

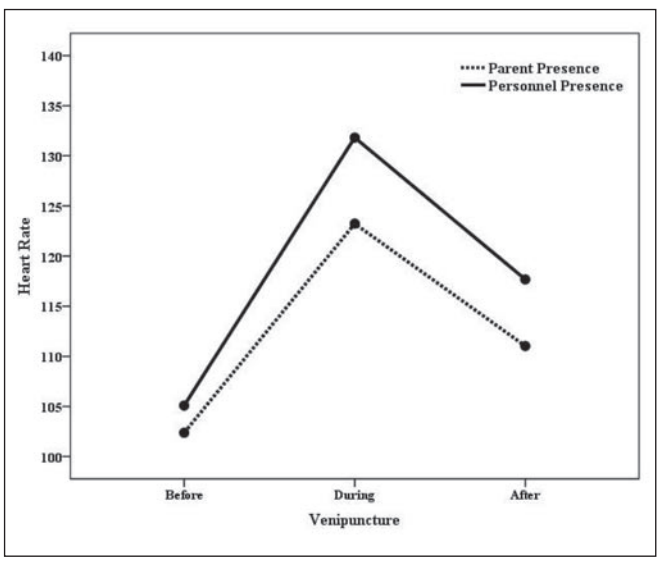

Figure 3 Alterations of heart rates during the procedure.

Table 2 Levels of distress according to Wong-Baker pain faces rating scale

Participant with	Venipuncture	 0 NO HURT	1 HURTS LITTLE BIT	2 HURTS LITTLE MORE	3 HURTS EVEN MORE	4 HURTS WHOLE LOT	5 HURTS WORST
Parents (n=68)	During	1 (1.5%)	7 (10.3%)	7 (10.3%)	18 (26.5%)	14 (20.6%)	21 (30.9%)
	After	10 (14.7%)	11 (16.2%)	17 (25.0%)	15 (22.1%)	12 (17.6%)	3 (4.4%)
Personnel (n=67)	During	1 (1.5%)	1 (1.5%)	7 (10.4%)	12 (17.9%)	21 (31.3%)	25 (37.3%)
	After	4 (6.0%)	9 (13.4%)	14 (20.9%)	21 (31.3%)	15 (22.4%)	4 (6.0%)

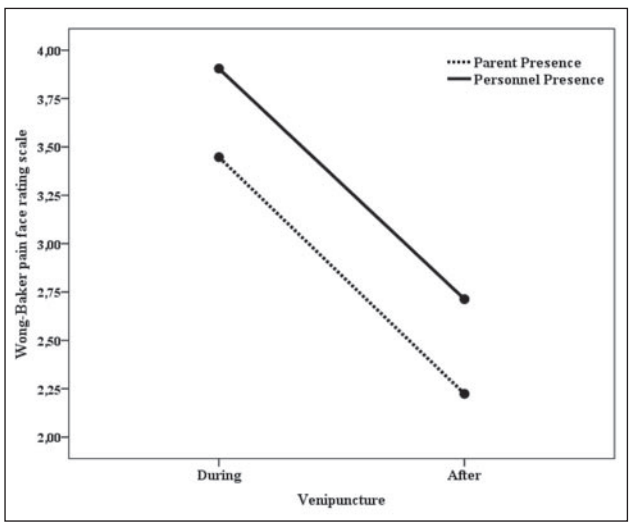

Figure 4 Alterations of Wong Baker pain faces rating scale during the procedure.

effective distraction techniques during venipuncture may help to alleviate stress.[17-19] Several studies have shown sex differences in pain perception such that females feel more pain than males during certain procedures.[20] In contrast, we found no sex differences in pain perception.[21]

One of the main difficulties in studying pain perception involves obstacles to the evaluation of distress in children. Methods commonly used include self-reports and behavioural assessments.[22] Such methods should take into consideration the developmental stage of the child and whether the child can discriminate between different levels of distress.[15] Information on the localisation, intensity, and characteristics of pain can be expressed in developmentally appropriate terms by children older 3 years of age, but those younger than this age and those with intellectual disabilities cannot appropriately express their distress. Many methods based on behavioural and physiological parameters can be used to measure perceptions of short and high-intensity painful stimuli, such as needles, in children younger than 3. Such parameters include facial appearance, body position, tearfulness, sleep disturbances, and skin discolorations. These signs can indicate whether the child is in distress.[7]

In this study, the face-rating scale was used to determine the level of distress. The expressions of pain during venipuncture performed with or without the presence of a parent did not differ significantly. The respiratory and heart rates of children without a parent were significantly increased compared with those of children with a parent. However, parental presence can also have a negative effect on the perception of pain if a parent shows a fearful facial expression while reassuring his or her child, who then may have a higher level of fear.[23] Additionally, some children have noted[24] that the presence of parents had little effect on pain tolerance during painful procedures. In contrast with these studies, Wolfram et al found that the presence of parents resulted in less distress in 130 children during venipuncture.[22] Emergency procedures are usually stressful for both children and parents, and an increasing trend toward parents staying with their children during invasive procedures has been reported.[25] According to a survey conducted by Waseem et al, 91% of physicians approved of the presence of parents during venipuncture.[26] Clinicians have been more likely to support the presence of parents

during less invasive, non-life-treating procedures.[26,27] Although parental presence during complex invasive procedures has been shown to offer several benefits to the child and the parents, few hospitals have policies that permit parents to remain at the bedside during invasive procedures.[25]

In conclusion, pain is a complex phenomenon in children, and the alleviation of pain in this population does not depend on a single factor. Many studies have shown that parental presence increases the pain tolerance of children; however, some studies have disagreed with this observation, yielding no general consensus on the effect of parental presence on pain tolerance. Although our study showed that parental presence had a minimal positive effect on pain tolerance, additional randomised and controlled studies with larger groups are required before a conclusion about the issue can be reached. However, our study also has some limitations. Because the children studied were aged between 3 and 6 years, an ideal level of cooperation could not be achieved, and participants were not able to accurately express their pain levels in a spontaneous way. The only statistically significant results involved the Wong-Baker scores, and we did not use other methods, such as a visual analogue scale. Although we excluded children with histories of venipuncture within the last year, it is also possible that experiences with venipuncture that occurred more than 1 year previously also affected the pain perceptions of children. Additionally, sociocultural influences may have directly influenced responses to painful events, further confounding the results of our study.

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