



ORIGINAL ARTICLE

The effect of colored masks used in pediatric emergency clinics on children's pain perception: Randomized controlled study

Çocuk acil servislerinde kullanılan renkli maskelerin çocukların ağrı algısına etkisi: Randomize kontrollü çalışma

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Summary

Objectives: This study was conducted in a randomized controlled manner to examine the effect of colored surgical masks used by nurses in pediatric emergency clinics on children's pain perception.

Methods: The study included 81 children aged 1–3 years who applied to the pediatric emergency clinic of a State Hospital located in a province in eastern Turkey. Data were collected using the "Personal Information Form" and the "Facial Expression, Leg Movement, Activity, Cry, Consolability (FLACC) Pain Assessment Tool" to measure the level of pain perception. During the vascular access procedure, colored surgical masks were used in the experimental group, while white surgical masks were used in the control group. Children's pain was assessed based on nurse observations. Independent samples t-test and ANOVA were employed to assess the data. The results were evaluated with a 95% confidence interval and a significance level of $p < 0.05$.

Results: It was observed that in the white mask group, 35% of the children were 1 year old and 35% were 3 years old. In the colored mask group, 46.3% of the children were 2 years old. Furthermore, 52.5% of the children in the white mask group and 31.7% in the colored mask group were girls. The total mean score of the "FLACC" scale was 8.92 ± 1.526 in the white mask group and 4.73 ± 2.721 in the colored mask group.

Conclusion: The use of colored surgical masks by nurses during vascular access in children aged 1–3 years was found to be effective in reducing children's pain perception.

Keywords: Child; mask; nursing care; pain.

Özet

Amaç: Bu çalışma, çocuk acil servislerinde hemşirelerin kullandığı renkli cerrahi maskelerin çocukların ağrı algısı üzerindeki etkisini incelemek amacıyla randomize kontrollü olarak yapılmıştır.

Gereç ve Yöntem: Araştırma, Türkiye'nin doğusundaki bir ilde bulunan bir Devlet Hastanesinin çocuk acil polikliniğine başvuran 1–3 yaş arası 81 çocuk ile gerçekleştirilmiştir. Veriler, ağrı algı düzeyini ölçmek amacıyla "Kişisel Bilgi Formu" ve "Yüz İfadesi, Bacak Hareketi, Aktivite, Ağlama, Teselli Edilebilirlik (FLACC) Ağrı Değerlendirme Aracı" kullanılarak toplanmıştır. Damar yolu işlemi yapılırken, deney grubunda renkli cerrahi maske, kontrol grubunda ise beyaz cerrahi maske kullanılmıştır. Çocukların ağrısı, hemşire gözlemlerine dayanarak değerlendirilmiştir. Verilerin değerlendirilmesinde bağımsız örneklem t-testi ve ANOVA testi kullanılmıştır. Sonuçlar %95 güven aralığında ve $p < 0.05$ anlamlılık düzeyinde değerlendirilmiştir.

Bulgular: Beyaz maske grubundaki çocukların %35'inin 1 yaşında, %35'inin ise 3 yaşında olduğu görülmüştür. Renkli maske grubundaki çocukların %46.3'ü 2 yaşındadır. Beyaz maske grubundaki çocukların %52.5'i, renkli maske grubundaki çocukların ise %31.7'si kızdır. "FLACC" ölçeğinin toplam puanı beyaz maske grubunda 8.92 ± 1.526 , renkli maske grubunda ise 4.73 ± 2.721 olmuştur.

Sonuç: 1–3 yaş arası çocuklarda damar yolu işlemi sırasında hemşireler tarafından renkli cerrahi maske kullanımının çocukların ağrı algısını azaltmada etkili olduğu belirlenmiştir.

Anahtar sözcükler: Ağrı; çocuk; hemşirelik bakımı; maske.

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Introduction

Hospitals are places that parents frequently resort to for routine follow-ups of their children from the moment of their birth or when they become ill.^[1] Invasive procedures and being in the hospital are painful and frightening experiences for children and their families.^[2] Venipuncture, vascular access, injection, and vaccination are common painful invasive procedures applied to children.^[1,3]

The main goals of nursing care include defining, assessing, and relieving pain in children and enhancing their quality of life. The American Society for Pain Management Nursing (ASPMN) states that nurses are responsible for managing children's pain by using pharmacological and non-pharmacological methods.^[4] The use of non-pharmacological methods has increased in recent years, as their use on their own and in combination with pharmacological methods provides a pain-relieving effect.^[5] Studies have revealed that non-pharmacological methods can be effective alone in the management of pain resulting from invasive procedures, and their combination with pharmacological methods increases the benefits of drugs.^[6,7] In recent years, parents and healthcare professionals have employed this method in different ways to relieve the pain of children during painful procedures like invasive interventions, and this method has been found to be effective.^[8,9] This is because these techniques can help children cope with painful situations by focusing their attention on other stimuli.^[8]

In the light of this information, the present study was designed to determine the effect of colored masks used in pediatric emergency clinics on the pain perception of children aged 1–3 years during medical procedures.

Material and Methods

Design and Settings

This randomized controlled study was conducted with children aged 1–3 years who applied to the pediatric emergency clinic of a State Hospital located in a province in eastern Türkiye between December 2021 and February 2022.

Ethical Considerations

Ethical Standards of Research Ethics Committee approval numbered E-24630 were obtained from Ağrı

University Non-Interventional Clinical Research Ethics Committee on 25.11.2021. Written informed consent was obtained from the mothers who volunteered to participate in the study after explanations about the purpose and method of the study. All study procedures were conducted under the ethical standards of the national research committee and the Declaration of Helsinki (World Medical Association, 2013).

Sample

The population of the study consisted of children aged 1–3 years who applied to the pediatric emergency department and underwent intravenous access as a part of medical treatment at the doctor's request. The sample size was calculated using the GPower computer program. In the calculation made through the power analysis with an effect size at the level of $\alpha=0.05$, in independent samples t-test ($d=0.8$)^[10] and with the study power of 95%, a total of 70 children, covering 35 in each of the control and experimental groups, should be included in the study. The inclusion criteria for the children were determined as follows: being in the age group of 1–3 years, having no history of analgesic, sedative, or narcotic substance use within 24 hours before the application, suffering from a febrile illness at the time of application, and undergoing the procedure only once. The inclusion criteria for the parents of the children were determined as follows: being voluntary and agreeing to participate in the study.

Eighty-one children (colored mask group=41; white mask group=40) in the sample were randomly assigned to the colored mask group and the white mask group. The assignment of children to the colored mask and white mask groups was carried out according to the order of their arrival in the pediatric emergency clinic. Children who did not meet the inclusion criteria were excluded from the study. During data collection and data analysis, the nurse and the researcher were blinded.

Measures

1. Personal Information Form: It was prepared by the researchers and included questions about the descriptive characteristics of the participants and their information about the disease and hospitalization.



Figure 1. Used colored and white surgical mask.

2. Facial Expression, Leg Movement, Activity, Cry, Consolability (FLACC) Pain Assessment Tool: This scale was developed by Merkel et al.^[11] in 1997. It is an observational behavioral scale used to evaluate procedural and postoperative pain in children aged 2 months to 7 years. It was translated into Turkish by Şenaylı et al.^[12] in 2006 as the FLACC (Facial Expression, Leg Movement, Activity, Cry, Consolability) pain scale. Şenaylı et al.^[12] conducted the Turkish validity and reliability study of the scale in children aged 1 month to 9 years. In the present study, the Cronbach’s Alpha reliability coefficient of the “Pain Assessment” tool was found to be 0.902.

Data Collection

In order to obtain the data from the children in the colored mask group (Fig. 1), the children’s parents were asked to answer the questions about the descriptive characteristics of the children in the personal information form before the procedure, and the nurse who established vascular access during the procedure was asked to wear a colored mask. Five minutes before the intervention and after the procedure was completed, the child’s body temperature, respiration and pulse rate, and O₂ saturation were measured by the clinical nurse. The child’s reactions to procedural pain were rated using the “FLACC Pain Assessment Tool.”

In order to obtain the data from the children in the white mask group (Fig. 1), the children’s parents were also asked to answer the questions about the descriptive characteristics of the children in the personal information form before the procedure, and the same nurse, who wore a white mask instead of a colored mask, applied the procedures to the children in this group. The child’s reactions to procedural pain were rated using the “FLACC Pain Assessment Tool.”

Analysis

This section presents the results of the statistical analysis of the data using the SPSS v.23 program.

Table 1. Normality test results of the pain assessment tool (FLACC)

	Number of items	Skewness	Kurtosis
Pain assessment tool	5	-0.786	-0.297

FLACC: Facial expression, leg movement, activity, cry, consolability.

Table 1 shows the skewness and kurtosis values of the “FLACC Tool.” Kolmogorov-Smirnov analysis results were first examined to determine whether or not the data were normally distributed, and as a result of the analysis, it was observed that the data were not normally distributed (p<0.05). However, it is stated that if the sample size is greater than fifty and the skewness and kurtosis values range between -1.5 and +1.5, the data are accepted to be normally distributed (Tabachnick & Fidell, 2013).

Results

Table 2 shows the demographic information of the participants. When the table was examined, it was observed that 35% of the children in the white mask group were 1 year old, 52.5% of the children in the white mask group and 31.7% of the children in the colored mask group were girls. Additionally, 82.5% of the children in the white mask group and 78% of the children in the colored mask group had come to the pediatric emergency clinic before.

Table 3 shows the FLACC minimum, maximum, mean scores, and standard deviation values of the children participating in the study.

It was observed that the FLACC total mean score was 8.92±1.526 in the white mask group and 4.73±2.721 in the colored mask group.

Table 4 shows the results of the one-way analysis of variance (ANOVA) for the differentiation of the FLACC mean score according to the age variable. According to the results of the one-way analysis of variance (ANOVA), there was a significant difference in the FLACC mean score according to the age of the children in the white mask group (F(2.37)=3.799; p<0.05). According to the test results, a significant difference was obtained between 2-year-old children and 3-year-old children. Two-year-old children felt more pain than 3-year-old children (F(2.38)=0.635; p>0.05).

Table 2. Frequency and percentage distribution of demographic characteristics of the participants

Variables	White mask group		Colored mask group	
	f	%	f	%
Age				
1	14	35.0	10	24.4
2	12	30.0	19	46.3
3	14	35.0	12	29.3
Gender				
Girls	21	52.5	13	31.7
Boys	19	47.5	28	68.3
The child's previous visit to the emergency clinic				
Yes	33	82.5	32	78.0
No	7	17.5	9	22.0
Previous intervention in the emergency clinic				
Yes	26	78.8	27	84.4
No	7	21.2	5	15.6
The child's chronic illness				
Yes	4	10.0	4	9.8
No	36	90.0	37	90.2
Prior hospitalization status				
Yes	15	37.5	14	34.1
No	25	62.5	27	65.9
Before the intervention (Mean±SD)				
Body temperature	36.85±0.279		36.49±0.385	
Respiratory rate	23.50±1.109		24.34±4.186	
Pulse rate	117.05±18.092		103.29±13.849	
O ₂ saturation	93.57±2.540		92.60±3.727	
After the intervention (Mean±SD)				
Body temperature	36.72±0.140		36.67±0.132	
Respiratory rate	25.65±0.699		24.90±1.985	
Pulse rate	101.32±5.230		102.87±14.012	
O ₂ saturation	97.00±1.037		93.95±3.208	

SD: Standard deviation.

Table 4 also shows the results of the independent samples t-test for the differentiation of the FLACC mean score according to the gender variable. According to the independent samples t-test results, a significant difference was found in the FLACC mean score according to the gender of the children in the white mask group ($t[40]=-3.183$; $p<0.05$). The significant difference was observed in favor of girls. A significant difference was also found in the FLACC mean score according to the gender of the children in the colored mask group ($t[41]=-2.125$; $p<0.05$). The significant difference was observed in favor of girls. In other words, girls felt less pain than boys.

Table 3. Minimum, maximum, mean and standard deviation values obtained from FLACC

	Min.	Max.	Mean	SD
White mask	5.00	10.00	8.92	1.526
Colored mask	0.00	9.00	4.73	2.721

FLACC: Facial expression, leg movement, activity, cry, consolability; Min: Minimum; Max: Maximum; SD: Standard deviation.

The results of the independent samples t-test for the differentiation of the FLACC mean score according to the variable of whether the children had un-

Table 4. Comparison of the FLACC mean scores of the children according to their descriptive characteristics

Variables	White mask Mean±SD	Colored mask Mean±SD
Age		
(1) 1	9.07±1.817	4.60±3.306
(2) 2	9.66±0.651	5.21±2.347
(3) 3	8.14±1.460	4.08±2.843
Test	F=3.799 p<0.5 2>3	F=0.635 p>0.5
Gender		
Girl	8.28±1.764	3.46±3.098
Boy	9.63±0.760	5.32±2.357
Test	t=-3.183 p<0.5	t=-2.125 p<0.5
The status of coming to the pediatric emergency clinic before		
Yes	9.00±1.639	4.46±2.828
No	8.57±0.786	5.66±2.179
Test	t=0.670 p>0.05	t=-1.172 p>0.5
Previous intervention in the emergency clinic		
Yes	8.801±0.766	3.92±2.947
No	9.14±0.949	6.28±1.204
Test	t=-0.658 p>0.5	t=-2.860 p<0.05
The presence of chronic diseases		
Yes	10.00±0.000	4.00±2.708
No	8.80±1.564	4.81±2.747
Test	t=1.510 p>0.05	t=-0.561 p>0.05
The status of being hospitalized		
Yes	9.00±1.511	3.92±3.269
No	8.88±1.563	5.14±2.348
Test	t=0.238 p>0.05	t=-1.376 p>0.05

FLACC: Facial expression, leg movement, activity, cry, consolability; SD: Standard deviation.

dergone any intervention in the emergency room before are seen in Table 4. A significant difference was determined in the FLACC mean score according to whether or not the children in the colored mask group had undergone any intervention in the pediatric emergency clinic before ($t[41]=-2.860$; $p<0.05$). The significant difference was determined in favor of the children who had undergone an intervention before.

Table 5 shows the results of the analysis regarding the correlation between the pre- and post-intervention body temperature, respiratory rate, pulse rate, and oxygen saturation values of the children in the white mask group and the FLACC mean score.

Table 6 shows the result of the independent samples t-test for the differentiation status of the FLACC mean score according to the variable of the study groups.

Table 5. Results of Pearson’s Correlation Test for the correlation between pre-intervention and post-intervention body temperature, respiratory rate, pulse rate, and O₂ saturation and FLACC tool

	Pre-intervention				Post-intervention			
	Body temperature	Respiratory rate	Pulse rate	O ₂ saturation	Body temperature	Respiratory rate	Pulse rate	O ₂ saturation
White mask	-0.045	-0.598*	-0.339*	-0.008	-0.064	-0.337*	-0.273	0.389*
Colored mask	0.218	-0.198	-0.428*	-0.168	0.299	-0.172	-0.026	-0.099

FLACC: Facial expression, leg movement, activity, cry, consolability; *: P<0.05.

Table 6. Differentiation of the FLACC mean scores of the groups

Group	N	Mean	SD	t	p
FLACC tool					
White	40	8.92	1.525	8.583	0.000*
Colored	41	4.73	2.720		

FLACC: Facial expression, leg movement, activity, cry, consolability; SD: Standard deviation; *: P<0.05.

Discussion

Distraction is a common method used for relieving pain.^[13–17]

There was a significant difference between 2-year-old children and 3-year-old children in the white mask group. Two-year-old children felt more pain than 3-year-old children. In the study conducted by Semerci in 2017 on distraction in children, it was determined that as the age of children increased, the pain they felt was less.^[18] Similarly, in the study conducted by Tüfekci and Erci in 2007, it was revealed that the pain tolerance of children increased with increasing age.^[19] Another study on distraction with cold application concluded that the pain felt by children was less with increasing age.^[20] The results of a study conducted to evaluate the effect of the presence of a clown on the pain perception of children during the vascular access procedure indicated that their pain perception decreased with increasing age.^[21] Contrary to these studies, a study examining the effect of the Buzzy device on pain while establishing vascular access in children reported that age had no effect on pain perception.^[22] The developmental process of children needs to be taken into account during distraction.^[23,24] Toddlers aged 1–3 years are curious, active, and animistic. They think that everything they see in the

hospital is alive, and they suffer from rather intense fears.^[25] It can be thought that using colorful and fun materials to distract children during this period will help them feel less pain.

The significant difference according to the gender variable was observed in favor of the girls in the white mask group. Contrary to the present study, numerous studies have reported that gender had no effect on pain.^[26–29] In addition, in their study, Tüfekci and Erci determined that the pain mean score of girls was higher.^[19] It can be thought that the resulting difference was caused by the sample difference.

When examining the variable of undergoing any intervention in the pediatric emergency clinic before, it was found that there was no significant difference in the white mask group in terms of this variable. On the other hand, a significant difference was found in the FLACC mean score of the children in the colored mask group according to this variable. The significant difference was observed in favor of the children who had undergone an intervention. Contrary to the present study, there are study results in the literature stating that the pain threshold of children who had previous intervention experience was adversely affected.^[19–29,30–32] In the study by Inal, it was observed that being exposed to a painful intervention before did not affect the child’s perception of pain.^[33] It can be asserted that the reason for the different results is the difference in samples.

When the pre-intervention and post-intervention body temperature, respiratory rate, pulse rate, and oxygen saturation values of the children in the white mask group were examined in the study, a negative moderate significant correlation was found between the pre-intervention respiratory rate and the pain level. In a study conducted by Kaplan on vascular

access in children, it was observed that saturation and body temperature did not change, but pulse rate changed.^[34] Similarly, in Göksu's study, it was determined that the pulse rate of children changed during the procedure.^[35] Other studies revealed that pulse rate and body temperature did not change.^[36–38] When the literature is examined, it has been stated that physiological changes return to normal rapidly, and their adaptation is quick in short-term procedures such as vascular access, injection, and venipuncture.^[23,39,40] It is plausible to assert that this situation is the reason for the lack of significant changes.

When the pain perceptions of the participants were examined according to the variable of the study groups, a significant difference was observed in favor of the children in the colored mask group. The use of colorful and illustrated materials in preschool children during the application helps to distract them and minimizes their perception of pain.^[9] In the study by Semerci, it was determined that the use of distraction cards in children while taking venous blood samples reduced their pain perception.^[18] Different studies have revealed that watching videos that attract children's attention, such as cartoons, also reduces their pain perception.^[41–45] It can be thought that the colored and illustrated surgical masks used by the nurses in the study also drew the attention of the children to the mask and minimized their pain perception.

Conclusion

In a study conducted to evaluate the effect of nurses' use of colored and illustrated masks on pain perception during the vascular access procedure in children aged 1–3 years, it was determined that the perception of pain was lower. In our research, we identified that the utilization of colorful masks effectively diminishes the perception of pain in children by diverting their attention. Furthermore, our findings indicate that children experience a diminished level of discomfort during medical procedures they find distressing. Minimizing pain is one of the important nursing interventions, and pediatric nurses play a crucial role in this regard. Therefore, nurses' knowledge about how to manage children's pain is vital. It may be recommended to conduct further studies on colored and illustrated masks and to increase their use in pediatrics and pediatric emergency clinics.

Ethics Committee Approval: The Ağrı University Non-Interventional Clinical Research Ethics Committee granted approval for this study (date: 25.11.2021, number: E-24630).

Authorship Contributions: Concept – EG; Design – EG, FGC, SK; Supervision – EG; Resource – EG, SK; Materials – EG, FGC; Data collection and/or processing – EG, SK; Analysis and/or interpretation – EG, FGC; Literature review – EG, FGC; Writing – EG, FGC; Critical review – EG.

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