Journal of Medical Research and Health Sciences
Received 20 Sept | Revised 26 oct 2023 | Accepted 20 nov 2023 | Published Online 30 Dec 2023

DOI: https://doi.org/10.52845/JMRHS/2023-6-12-8

JMRHS 6 (12), 2928–2944 (2023)

ISSN (O) 2589-9031 | (P) 2589-9023

Original Article **Open Access Journal**

Comparison of White Noise and Massage Application Methods on the Colicky Infants Aged 0-12-Months*

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Abstract

Objectives: The study was planned to the white noise or massage treatments in reducing colic which determine experimentally that a more effective method.

Methods: The 0-12 months age babies and their families who come to the 500 Evler Health Center in the city of Gaziantep would form the system. The sampling had formed of 90 babies in the 0-12 months age who were colic diagnosed, who were crying daily more than 3 hours, who during routine medical examination had passed the hearing test, who were having no physiological problems. These 90 babies would be separated into three groups by a randomly selecting method. As data collecting means, The Patient Consent Form, The Family Descriptive Information Form, The Baby Descriptive Information Form, The Crying Features Information Form, The Colic Baby Diary Form I/II/III, A CD player, The White Noise CD, The Baby Massage Education CD, Infantile Colic Scale to was used.

Results: While babies of screaming (194.38 hours), crying (252.45 hours), stay awake (828.31 hours) times in the control group and babies of screaming (115.48 hours), crying (226.79 hours), stay awake (759.07 hours) times in the massage group, babies of screaming (65.79 hours), crying (117.17 hours), stay awake (489.00 hours) times in the white noise group were found less than those in other groups ($p<0.01$).

Conclusions: Consequently, it was established that white noise CD affected the babies positively and it was an effective and usable tool for calming down the babies.

Key words: Baby Massage, Infantile Colic, Pediatric Nursing, White Noise.

Background

Infantile Colic was defined for the first time in 1954 by Wessel et al. as the restlessness and crying jags most frequently seen within the first three months following the delivery, which last for

more than three weeks, occur at least three days a week, and exceeds three hours within a day [1]. The incidence of infantile colic varies between 10-30% [2-6].

Although the causes of colic pain cannot be fully explained, the factors such as food allergy or lactose intolerance, hypersensitivity, abnormal peristaltism or extreme gas, tension and stress within the family, bottle nursing or aerophagia during excessive crying, gastroesophageal reflux [2,7,8], low birth weight (lbw) [9,10], and psycho-social problems of the mother [11,12] are thought to cause colic disease [2,7-9,12].

The treatment of colic is gathered under 4 headings as behavioural treatment, dietary treatment, medical treatment and other methods (12). Massage is a method used as the behavioural treatment method. Baby massage was determined to have been effective in reducing colic pain [13]. Çetinkaya (2007), with his study, found that aromatherapy massage was effective in minimizing the symptoms of colic [14].

Another behavioural treatment method started to be used recently so as to reduce the number of crying jags in the babies with colic is the application of 'White Noise'. White Noise consists of intensive and acute noisy sounds between 75-85 decibels (db), having all the frequency ranges within Nature. These sounds were stated to resemble those within a mother's womb and to help babies calm down, as well. It was also observed that babies with colic had calmed down when they were made to listen to sounds of various frequencies nearby, such as the sounds of a hair dryer or a vacuum cleaner [15]. In Balcı's (2006) study, it was found that the white noise CD listened to by babies with colic had positively affected them and even calmed them down [16]. Infantile colic, which is a condition characterized by excessive crying with no known cause within the first five months of the infant's life when pediatric physicians and nurses seek solutions to it together [17], is the case due to which families and baby sitters experience challenging moments [17,18].

In literature reviews, it has been determined that white noise could be a method likely to minimize the symptoms of colic; yet, there are no adequate number of studies conducted on this subject.

This study was conducted to compare the effects of white noise and massage methods on the babies and their families' leading a comfortable life away from stress.

Material and Method

Research Mode

This study was conducted experimentally for the purpose of comparing white noise and massage practices in the babies with colic, who were aged between 0-12 months.

Place and Time of the Research

The study was conducted in Turkey in the City of Gaziantep, on Dec, 01, 2014 - May, 26, 2015 after an Ethics Committee approval was received from Çukurova University, Institute of Health Sciences on Feb, 14, 2014 and a permission from the institution was received on Nov., 12, 2014. The written informed consent forms were received from the families of all the babies incorporated into the scope of the research throughout the research period.

Research Population and Sampling

The study population comprised babies aged 0-12 months and their mothers who had visited 500 Evler Family Health Center. The sampling was selected from among the babies brought to 500 Evler Family Health Center and diagnosed with colic by the family practitioners through the simple random sampling method.

As for the Study Sampling; G*Power [19] program was used for power analysis, and accordingly, the total number of samplings comprised 90 babies aged 0-12 months, who were diagnosed with colic and were brought to 500 Evler Family Health Center with their families. 90 babies were separated into 3 groups through a proportion sampling. In the study in which the error margin of the first kind was taken as 5%, influence quantities mentioned by Cohen were used, and accordingly, the influence quantity was determined to be 0.40 [20], and the power calculated according to these inputs was found as 93%.

The experimental and control groups of this study consisted of the babies aged 0-12, who were diagnosed with colic, who kept on crying for more

than three weeks, three days a week, and for more than three hours a day, who had passed through the hearing test during the routine examination, and who had no physiological problem at all. The first group comprised the control group, whereas the second group comprised the experimental group that was made to listen to the white noise CD, and the third group comprised the experimental group on which massage was performed. The scores of the infantile colic scale performed in these three groups and the periods of crying, outcrying/yelling, staying awake, feeding, and sleeping, which were included in the colic baby diary form, were compared.

Tools and Materials Used in Data Collection

The tools and materials used in data collection are mentioned below.

Family Descriptive Information Form: This is a descriptive form composed of 42 questions including the subjects thought to be possibly linked with colic, such as socio-demographic data, the alcohol consumptions of mother-father, the state of the mother in consuming flatulent foods, and the period of time spent by mother-father together with their baby [1,7,8,14,16,21,22].

Baby Descriptive Information Form: This is a form of 22 questions involving the baby's gender, birth weight and birth week, current weight and current week, feeding method, whether or not it was a planned pregnancy, and which child it is according to the order.

Crying Features Information Form: This, on the other hand, is a form of 17 questions including the crying duration, crying manner and crying quality of the baby on a normal day and during the colic pain as well as the behaviours of the baby while suffering from pain.

Colic Infant Diary Form-I: It is the form within which the families of the control group record the findings as to the baby every 15 minutes, every hour, for 24 hours in total, and for 7 days by following up the behaviours of the baby throughout the day (F: Feeding, C: Crying, S: Sleeping, SA: Staying Awake, O: Outcrying).

Colic Infant Diary Form-II: This is the form which the family records findings in by following up the behaviours of the baby (F: Feeding, S: Sleeping, SA: Staying Awake, O: Outcrying, C: Crying) every 15 minutes, every hour, for 24 hours and for 7 days while the baby is made to listen to the white noise CD during its colic crying (defined as outcrying).

Colic Infant Diary Form-III: This is the form which the family records findings in by following up the behaviours of the baby (F: Feeding, S: Sleeping, SA: Staying Awake, O: Outcrying, C: Crying) every 15 minutes, every hour, for 24 hours and for 7 days while giving a massage to the baby during its colic crying (defined as outcrying).

The behaviours of the baby included in the Colic Baby Diary Form I-II-III (F: Feeding, C: Crying S: Sleeping, SA: Staying Awake, O: Outcrying) as well as the Infantile Colic Scale were taken as the evaluation criteria.

White Noise CD: This was prepared for colic babies by the researcher during the research by using sounds similar to those in the mother's womb like those produced by a hairdryer/blow-dryer or a vacuum cleaner as well as heartbeat sounds. During the research, the white noise CD was played on the CD player, computer or phone owned by the family, and the babies with colic were made to listen to it.

Baby Massage Education CD: The baby massage CD, which contained massage techniques, such as sand-pulling manoeuvre, walking manoeuvre, sun-moon menoeuvre, was organized by the researcher.

Infantile Colic Scale (ICS): This scale was created by Ellett et al. in 2002 [23], and the validity and reliability study on it was also performed in our country by Başbakkal and Çetinkaya in 2006, and the Cronbach's Alpha coefficient examined for the internal consistency was determined to be 0.73.

The Infantile Colic Scale is composed of 19 questions. This scale has 5 sub-groups titled as Cow's Milk Soy Protein Allergy Intolerance, Immature Digestive System, Immature Central Nervous System, Challenging Infant, and Parent-Infant Interaction + Problematic Infant.

The items of the scale were graded through the likert-type of scoring varying from 1 to 6. The grading/rating was performed in the form of 1

(Definitely Do Not Agree) to 6 (Definitely Agree). To allow for a consistency in the interpretation of the scores, the negative questions were reversely encoded. Item 3, which was included in the sub-dimension of Immature Digestive System; Items 7,8,9, which were included in the sub-dimension of Immature Central Nervous System; Items 13,14,15, which were included in the sub-dimension of Challenging Infant; and Item 17 and Item 19, which were included in the sub-dimension of Parent-Infant Interaction + Problematic Infant, were reversely encoded [14,24,25].

Data Collection

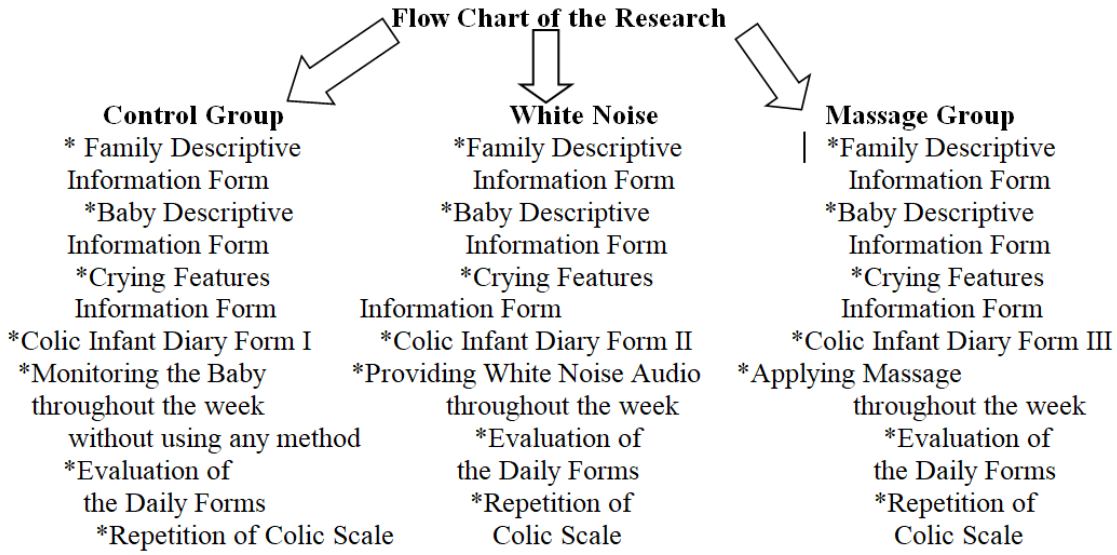
Almost 10 minute-time was spared in order for the Family Interview Form to be filled out. The 'Baby Descriptive Information Form' for the babies that complied with the case selection criteria was filled out in 5 minutes, while the 'Family Descriptive Information Form' and the form regarding the 'Characteristics of the Mother' were filled out in 5 minutes, and the form as to the 'Characteristics of the Father' was filled out in 5 minutes. According to the 'Colic Baby Diary Form' I; the parents recorded the baby's behaviours (F:Feeding, C: Crying, S: Sleeping, SA: Staying Awake, O: Outcrying) within the form by following up the baby every hour at 15-minute-periods, for a total of 24 hours throughout 7 days.

The White Noise CD was, for the first time, allowed by the researcher to be listened on the phone by the colic baby at a higher tone than the crying voice in the way that it would not disturb the baby. The family was taught when and how (when the baby started to cry) the white noise CD would be played for the baby. The family had their baby listen to the CD everyday during its colic crying (defined as outcrying).

Before the massage CD was provided for the family, the family was instructed about the baby massage methods to be applied on the baby by viewing the practices on the phone or on the computer.

The families were allowed to apply massages on their babies everyday during their colic crying episodes by benefiting from the massage CD whenever they wanted. Throughout the 7 days during which the white noise CD was played on for the baby and the massage practice was performed, the researcher kept on being in touch and in co-operation with the involved family, and s/he made an intervention by communicating with the family by phone if required as well as performing consultancy for them.

In the control group, however, baby-monitoring was done without performing any application.



Data Evaluation

In the evaluation of the data; the 'Package for Social Sciences (SPSS)- version 20' program was used. In resolving the data, on the other hand, the descriptive statistics like frequency, arithmetic mean, standard deviation, and percentage were benefited from. Pearson's Chi Square test and Fisher's Exact Test were used for cross-matching. For comparisons, the non-parametric tests called Mann-Whitney U test and Kruskal-Wallis test and the parametric tests called the Independent T- test and Dependent-T test were used; and when the results of Anova analysis of variance proved to be significant, the LSD test was used for the post-hoc analysis.

Although selected in accordance with the case selection criteria of the research, 40 cases were excluded from the evaluation due to the fact that the families did not want to participate, that they did not submit the forms on time, or that they filled out the forms incorrectly, or that they submitted incomplete forms.

Results

The groups in question are homogeneous in terms of of the variables, such as the gender of the baby, birth week, birth weight, current weight, the educational status of the mothers, their employment status, the number of children, family types, their economic status, the employment status of the fathers, and their alcohol use and smoking habits. ($p<0.05$).

All the babies were diagnosed with colic disorder. The involved mothers stated that all of the babies had passed through the hearing test, and that none of them had otitis media or growth retardation.

The ages of the mothers, for all the groups, range between 20 and 42. The mean age of the mothers is 28.83±4.54.

The ages of the mothers who participated in the study as well as their educational status, their working conditions, the number of their children, their family type, their economic status, and the heating ways of the house they resided in did not show a statistically significant difference when compared with the control, massage application and white noise groups. The food consumption characteristics of the mothers (consumption of cow's milk, consumption of flatulent foods, etc.) were not significant according to groups, either. Whether or not mothers-fathers had any colic or allergic problems was insignificant according to the groups. No significant result could be achieved between the mothers' food consumption and the crying periods of the babies, either. The condition of being away from the baby and the duration of being away from the baby along with the condition of spending the gestational period comfortably were not significant according to the groups ($p>0.05$).

Whether or not the mothers had any babysitters for child care was significant according to the groups ($\chi2=7,081$, $p<0.05$). The rate of the mothers in the white noise group who had assistants in child care was higher than that of the other groups [12(40%)].

Smoking near the baby showed a statistically significant difference between the groups. The values of the white noise group as to smoking around their babies proved to be higher [8(26.7%)] (Fisher's Exact, $p<0.01$).

The mean age of the fathers is 32.36±4.67. Most of the fathers have a job, and their educational levels are high, as well. The working conditions/status of the fathers and their alcohol use and smoking habits were insignificant according to the groups. The periods when the fathers were with their babies and the periods when they were away from them were not significant in the groups ($p>0.05$). It was determined that 80% of the fathers in the control group, 63.3% of them in the massage group, and 53.3% of them in the white noise group were not away from their babies except for their work, and that they spent time with their babies for 2-6 hours when they were with them. The ages and educational status of the fathers, however, were found to be significant according to groups ($p<0.01$). The ages of those in the white noise group, whereas the educational levels of those in the control group were higher.

The practices performed by the families so as to calm down their babies are seen in Table 1.

Table 1. Practices performed to calm the baby down*

PRACTICE	Total	
	n: 90	%
Changing Baby Diapers	89	98.9%
Feeding the Baby	86	95.6%
Taking the Baby onto the Lap	86	95.6%
Having the Baby Burp	85	94.4%
Talking to the Baby	84	93.3%
Keeping away from Flatogenic Foods	84	93.3%
Caressing the Baby	80	88.9%
Laying the Baby Down on the Chest	79	87.8%
Giving the Baby a Massage	73	81.1%
Patting	70	77.8%
Having the Baby Listen to Music	62	68.9%
Using Medications	59	65.6%
Providing the Baby with Anise Tea	57	63.3%
Holding the Baby Straight	55	61.1%
Dandling	52	57.8%
**Having the Baby drink Teucrium Polium (Felty Germander)	48	53.3%
Swinging the Baby in Hand with a Blanket	47	52.2%
Putting A Hot Towel on its Belly	47	52.2%
Giving the Baby a Pacifier	46	51.1%
Swaddling the Baby	42	46.7%
Laying the Baby Facedown	41	45.6%
Having The Baby Listen to the Noise of a Hair Dryer and a Washing Machine	34	37.8%
Walking the Baby Around in a Baby Carriage	32	35.6%
Taking the Baby out in a Car	17	18.9%
Leaving the Baby Alone	7	7.8%

*More than one answer were given.

** Teucrium Polium (Felty Germander): An herb specific to Gaziantep region.

53.3% of the mothers who took part in the study stated that they used medication for colic disorder, while 57.8% of them said their anxiety increased during the colic episode, due to which they had to apply to the hospital.

The babies' mean age is 12.71±7.01 weeks.

Table 2. Examining the distribution of the demographic characteristics of babies according to groups

Characteristics	Control		Massage		White Noise	
	n:30	%	n:30	%	n:30	%
Which Child It is (In Order)						
Th First Child	12	40.0%	13	43.3%	11	36.7%
The Second Child	12	40.0%	10	33.3%	7	23.3%
The Third and above	6	20.0%	7	23.3%	12	40.0%
	$\chi 2=3.957$, $p>0.05$					
Birth Week						
Full-term	29	96.7%	29	96.7%	27	90.0%

Premature	1	3.3%	1	3.3%	3	10.0%
	Fisher's Exact, p>0.05					
Age						
4-8 weeks	7	23.3%	14	46.7%	6	20.0%
9-13 weeks	15	50.0%	8	26.7%	7	23.3%
14 weeks and above	8	26.7%	8	26.7%	17	56.7%
	$\chi 2$=12,931, **p<0.05**					
Gender						
Female	19	63.3%	12	40.0%	11	36.7%
Male	11	36.7%	18	60.0%	19	63.3%
	$\chi 2$=5.089, p>0,05					
Birth Weight						
1-2 kilos	0	0.0%	0	0.0%	2	6.7%
2-3 kilos	14	46.7%	10	33.3%	9	30.0%
3-4 kilos	14	46.7%	19	63.3%	19	63.3%
4-5 kilos	2	6.7%	1	3.3%	0	0.0%
	Fisher's Exact, p>0.05					
Current Weight						
3-4 kilos	0	0.0%	2	6.7%	2	6.7%
4-5 kilos	4	13.3%	7	23.3%	6	20.0%
5 kilos and above	26	86.7%	21	70.0%	22	73.3%
	Fisher's Exact, p>0.05					

In Table 2 is the distribution of the demographic characteristics of the babies according to the groups. The current week of the babies was significant according to the groups ($p<0.05$, $\chi 2=12.931$). The babies in the white noise group were heavier than those in the other groups. All the other demographic variables do not show a significant difference according to the groups ($p<0.05$).

No significant difference could be found between the demographic data of the babies and their crying periods according the groups. The crying periods of the babies do not show a significant difference according to the demographic variables of the fathers and their alcohol/cigarette use. No significant result could be found between the dietary (feeding) characteristics of the babies and their crying periods according to the groups ($p>0.05$).

In this study, the crying periods of the babies were compared with the characteristics, such as the ages of mothers and fathers, their educational status, their working conditions, the number of children, family type, economic status, house-heating methods, their use of alcohol and cigarettes, the dietary style of the mother, which child in order the baby is, birth weight, current week, gender, dietary/feeding style, and the use of a pacifier; yet, no significant result could be achieved between these characteristics and the crying period of the babies ($p>0.05$). The crying period of the babies shows some difference only in the 'family type' variable within the control group (Mann-Whitney U testi= 6.0, $p<0.01$). The mean crying period of the babies living within a large family is longer (6.33 hours) in the control group when compared with those living in a nuclear family (4.93 hours).

27(90%) of the mother in the control group, 28(93.3%) of those in the massage application group, and 24(80%) of those in the white noise group stated that their pregnancies had been planned beforehand. 21(70%) of the mothers in the massage application group, 20(66.7%) of those in the control group, and 20(66.7%) of those in the white noise group stated that they had caesarean delivery. Whether or not there had been a planned gestation and the way of delivery (giving birth) were examined according to the groups, which, then, proved to be insignificant ($p>0.05$).

29(96.7%) of the babies in the control group, 29 (96.7%) of those in the massage group, and 86.7% of those in the white noise group were determined to have been provided with colostrum. 26(76.7%) of the mothers in the control group, 21(70%) of those in the massage group, and 21(70%) of those in the white noise group fed their babies with only breast milk.

Table 3. The distribution of the crying jag characteristics and reactions of babies

Crying Jag Characteristics		**n**	**%**
Your Baby's Crying Jags Last All Day Long	Yes	32	35.6
	No	58	64.4
The Onset Time of Crying Jags	In the Morning	20	22.2
	At Noon	4	4.4
	In the Evening	30	33.3
	At Night	36	40.0
The Way Crying Jags Take Place	Suddenly	35	38.9
	Increases gradually	55	61.1
The Baby's Behaviours before Crying Jags	It is fed	1	1.1
	It sleeps	41	45.6
	It plays	14	15.6
	Produces restless sounds	34	37.8
The Manner of Crying during the Attack (Jag) is different from other Cries	Yes	39	43.3
	No	51	56.7
Reactions of the Baby at the time of the Attack (Jag)			
The Baby's face blushes		82	91.1
The Baby Clenches Its hands by Making Fists		75	83.3
Contraction in Its Legs		71	78.9
Contraction in Its Arms		69	76.7
Bouncing/Restless		65	72.2
Tense Stomach		55	61.1
Arc-shaped tense body		55	61.1
Holds Its Breath		17	18.9
Cyanosis on the Lips		10	11.1
Total		90	100

In Table 3 is the distribution of the crying jag features of the babies and their reactions seen.

The results of the analysis of variance (Anova) for the mean value, standard deviation and comparison pertaining to the comparison of the babies' daily mean periods of outcrying, crying, staying awake, sleeping and feeding according to the groups are seen in Table 4. In order to see between what groups the differences proved to be significant in accordance with the obtained results, the post-hoc test was performed. According to the result of the post-hoc test, the white noise group among the other ones proved to be the one that yielded more statistically significant results (The rest of Table 4).

Table 4. Comparison of the daily mean periods of outcrying, crying, staying awake, sleeping and feeding pertaining to babies according to groups

Daily Average	s	Mean	S.D.	F	p

Outcrying Periods	Control	30	194.38	53.08	49.335	0.000**
	Massage	30	115.48	50.95		
	White Noise	30	65.79	47.52		
Crying Periods	Control	30	252.45	71.42	35.556	0.000**
	Massage	30	226.79	66.61		
	White Noise	30	117.17	59.42		
Periods of Staying Awake	Control	30	828.31	129.40	48.493	0.000**
	Massage	30	759.07	155.20		
	White Noise	30	489.00	137.21		
Feeding Periods	Control	30	178.43	34.02	16.130	0.000**
	Massage	30	185.43	38.74		
	White Noise	30	244.60	68.66		
Sleeping Periods	Control	30	559.33	57.37	14.723	0.000**
	Massage	30	609.57	99.27		
	White Noise	30	688.76	113.50		

****p<0.01, *p<0.05**

The Rest of Table 4

Multiple Comparisons-LSD test			Mean Difference (I-J)	P
Outcrying Periods	Control	Massage	78.90*	0.000
		White Noise	128.60*	0.000
	Massage	Control	-78.90*	0.000
		White Noise	49.69*	0.000
	White Noise	Control	-128.60*	0.000
		Massage	-49.69*	0.000
Crying Periods	Control	Massage	25.67	0.136
		White Noise	135.29*	0.000
	Massage	Control	-25.67	0.136
		White Noise	109.62*	0.000
	White Noise	Control	-135.29*	0.000
		Massage	-109.62*	0.000
Periods of Staying Awake	Control	Massage	69.24	0.061
		White Noise	339.31*	0.000
	Massage	Control	-69.24	0.061
		White Noise	270.07*	0.000
	White Noise	Control	-339.31*	0.000
		Massage	-270.07*	0.000
Feeding Periods	Control	Massage	-7.00	0.586
		White Noise	-66.17*	0.000
	Massage	Control	7.0	0.586
		White Noise	-59.17*	0.000
	White Noise	Control	66.17*	0.000
		Massage	59.17*	0.000
Sleeping Periods	Control	Massage	-50.24*	0.040
		White Noise	-129.43*	0.000
	Massage	Control	50.24*	0.040

		White Noise	-79.19*	0.001
	White Noise	Control	129.43*	0.000
		Massage	79.19*	0.001

The daily mean periods of outcrying, crying, staying awake, and sleeping pertaining to the babies in the control group do not show a significant difference according to the educational status of the mothers ($p>0.05$). However, the difference between the daily mean feeding periods of the babies in the control group and the educational status of the mothers proved to be significant ($p<0.05$). As the educational levels of mothers escalate, the feeding periods of babies increase along with it.

The daily mean periods of outcrying, staying awake, sleeping, and feeding pertaining to the babies in the white noise group do not show a significant difference according to the educational status of the mother ($p>0.05$).

Yet, the daily mean crying periods of the babies in the white noise group were significant according to the educational status of the mother ($p<0.05$). The mean crying periods of the babies belonging to the mothers of high-school educational level are much shorter.

In Table 5, the analysis of the comparison of the first and the second measurements of the infant colic scale and its sub-dimensions in the massage application and white noise groups is seen.

Table 5. Examining the comparison of the first and the second measurements of Infant Colic Scale and Its Sub-dimensions in massage application and white noise groups

			s	Mean	S.D.	t	P
Massage	Cow's Milk Soy Protein Allergy Intolerance	First Measurement	30	10.47	2.53	2.795	0.009**
		Second Measurement	30	8.90	2.47		
	Immature Digestive System	First Measurement	30	7.60	2.46	1.571	0.127
		Second Measurement	30	6.93	1.17		
	Immature Central Nervous System	First Measurement	30	29.47	4.64	2.839	0.008**
		Second Measurement	30	25.93	4.70		
	Challenging Baby	First Measurement	30	14.27	5.21	1.884	0.070
		Second Measurement	30	12.37	4.43		
	Parent-Baby Interaction + Problematic Baby	First Measurement	30	11.30	4.87	-0.662	0.513
		Second Measurement	30	11.93	2.77		
	Scale -Total	First Measurement	30	73.10	14.91	2.535	0.017*
		Second Measurement	30	66.07	9.54		
White Noise	Cow's Milk Soy Protein Allergy Intolerance	First Measurement	30	9.80	2.95	4.334	0.000**
		Second	30	7.30	3.05		

		Measurement					
	Immature Digestive System	First Measurement	30	7.20	2.86	1.066	0.295
		Second Measurement	30	6.57	1.63		
	Immature Central Nervous System	First Measurement	30	30.27	6.20	4.097	0.000**
		Second Measurement	30	24.53	5.29		
	Challenging Baby	First Measurement	30	15.97	5.05	2.131	0.042*
		Second Measurement	30	13.57	4.07		
	Parent-Baby Interaction + Problematic Baby	First Measurement	30	13.77	5.10	2.659	0.013*
		Second Measurement	30	10.80	3.98		
	Scale -Total	First Measurement	30	77.00	14.37	4.018	0.000**
		Second Measurement	30	62.77	10.78		

**p<0.01 , *p<0.05

Discussion

All the babies were diagnosed with colic disorder, and all of them passed through the hearing test; yet, none of them were found to have had any otitis media or growth retardation. In order to understand whether or not the baby's crying episode is caused by colic, it is necessary to rule out the disorders like otitis media that causes the baby to cry for nights. In this study, as seen in the babies, no such problem could be observed. It is important for babies to pass the hearing test so as to be able to make them listen to the white noise CD. Growth retardation may develop due to different ailments in babies; for instance, the baby may have some gastro-intestinal problems, and it may be being fed insufficiently, thus, the crying episode may be due to hunger; therefore, in order to clarify such a situation, determining this information is of importance for the study.

The mean age of the mothers is 28.83±4.54. According to the data of TPHR (Turkish Population and Health Researches) (Turkish:TNSA), it is known that the fertility age in our country ranges between the age groups of 25-29 [26]. The fertility ages of the mothers are accordant with the TPHR data, which reflect on the population of Turkey in general.

It was determined that 80% of the fathers in the control group, 63.3% of them in the massage group, and 53.3% of them in the white noise group were not away from their babies except for their work, and that they spent time with their babies for 2-6 hours when they were with them. Today, since mothers also go to work, the relationship between the babies and their fathers who play a more active role in baby care is highly significant [27,28]. Also in this study, the fact that fathers are interested in taking care of their babies is an important finding in terms of family-baby health in our country.

Methods, such as changing the baby diapers (98.9%), feeding the baby (95.6%), taking the baby onto the lap (95.6%), having it burp (94.4%), talking to it (93.3%), staying away from flatogenic foods (93.3%), caressing the baby (88.9%), laying it on the chest (87.%), giving it a massage (81.1%), patting (77.8%), having the baby listen to music (68.9%), and using medications (65.6%), are being applied (Table 1). In the study conducted by Karaca Çiftçi and Arıkan (2007), it was found that mothers, in order

to calm down their babies, had taken them into their lap (87.9%), used the massage method (80.9%), laid their babies facedown (79.4%), applied to a hospital (50.%), kept their babies in a quiet and dark room (48.2%), had them drink sugar liquor (44.7%), warmed them up (41.1%), had them drink herbal tea (33.3%), and had them listen to music (27.7%), in addition to which it was also found that all the mothers had tried any other behavioural treatment, whereas more than half of them had used medical treatment as well as natural methods [3]. In the study conducted by Uğurlu et al. (2014), it was determined that the most common form of pain found in children was the stomach ache by 77.4%, in the face of which families preferred to apply the massage performed on the stomach at most (77.6%) [29]. Çetinkaya and Başbakkal (2012), on the other hand, determined that the aromatherapy massage they had applied with lavender oil on babies had alleviated the symptoms of colic as well as the stress experienced by families [14,30]. Huhtala et al. (2000), in his study, ascertained that swinging babies in a cradle with a vibratör had been effective in minimizing the symptoms of colic [31].

In this study, it was determined that mothers had provided their babies with anise tea 59 (63.3%) as well as 'Teucrium Polium (Felty Germander)' 50 (53.3%) so as to alleviate the symptoms of colic. Anise (aniseed/anasone) is a sedative and anti-depressant herb [32]. There are few numbers of studies with control that suggest herbal teas are effective in the treatment of colic. Fennel, licorice root, chamomile are the most-commonly used herbs in the treatment of colic. In a placebo-controlled practice performed along with the mixture of melissa (lemon balm), fennel and chamomile, babies crying periods had shortened after a week, and no side-affect was seen in them, either [33]. However, there are some risks in using herbal teas for therapeutic purposes; there may be serious and even lethal side-effects due to the toxic substances contained in them and also due to the fact that their dosages and contents are not standardized, and they ruin the normal diet/nutrition, as well [2]. For example, as the result of having sage tea oil (salvia officinalis) prepared in a herbalist's store in order to eliminate the abdominal distension, gas and crying crises in the baby and then wrongly applying high doses of sage oil orally instead of applying it on the skin led to a convulsion in the child [34]. Separately, there are also some publications suggesting that fennel has a mutagenic effect in bacteria and in mice [8,10]. The results obtained from the study in accordance with this information also indicate that several practices can be performed to alleviate the symptoms of colic; yet, determining which one of them is effective and harmless is of great importance. Within this context, pediatric nurses have quite a significant place in determining such practices by keeping in contact with children and their families as well as fulfilling their tasks like informing parents about such issues.

In this study, the crying periods of the babies were compared with the characteristics, such as the ages of mother and father, their educational status, their employment status, the number of children, family type, economic status, house-heating methods, uses of alcohol and cigarettes, mothers' dietary style, which child in order the baby is, birth weight, current week, gender, feeding style, and the use of a pacifier; yet, no significant results could be achieved ($p>0.05$). Only in the control group were the daily mean crying periods of the babies living in a large family proved to be higher (6.33 hours) than those of the others. In the conducted studies, it is thought that the factors, such as the mother's age, the socio-economic level of the family [35], the birth weight of the baby [36], the use of alcohol and cigarettes [37,38], anxiety in the family and the environmental factors [1,27,39], the baby's feeding style [40], cow's milk allergy, and the mother's consumption of flatulent foods [7,41], could be indirectly effective in the occurrence of colic disorder. However, the exact cause of infancy colic is unknown, and there are a number of theories for explaining its cause [1,4,14,42-45]. In the study conducted by Karabel et al. (2010), exposure to colic was seen not to have led to any change in the incidence of colic [4], whereas in another study, it was determined that there was no relationship between maternal attachment and colic [46]. Yet, in another study, it was ascertained that there was no association between the birth week and gender and colic [43]. Although the information in the literature also suggest that the exact cause of colic

cannot be identified, these results in question are considered to contribute to the literature anyway.

The mean age of the babies is 12.71±7.01 weeks. The mean current week pertaining to the babies on whom white noise therapy was applied by Balcı (2006) was found as 44.38±2.67 [16]. The mean age of the babies on whom aromatherapy was applied by Çetinkaya (2007) was found as 27.70±7.96 [14]. However, also in many other studies, colic was determined to have been seen frequently, like between 0-4 months, and our study we have conducted also shows accordance with the information provided in the literature in this respect [1,14,16,47].

When we take a look at how babies are fed, it is seen that most of them are fed on breast milk, while there are few that are fed with baby food, and there is no baby fed on cow's milk. In the study conducted by Ahancihan et al. (2014), it was determined that cow's milk protein allergy was effective in the occurrence of colic in babies [48]. Even though there may be publications in which baby colic is seen more frequently in the babies fed on breast milk than those fed with formula [35,43], no consensus as to this matter has been reached, yet [2].

It is reported in the study that mothers state the fact that their babies' faces blush during the crying episodes [82(91.1%)], that their babies clench their hands in fists [75(83.3%)], that they contract their legs [71(78.9%)], and that their bellies take the form of a tense arc [55(61.1%)] (Table 3). Babies with colic cry with their bellies as tense as an arc, their hands in the form of fists, their legs contracted, their faces blushed, their lips turning blue, and with their legs pulled towards their belly [7,16,49-51]. The study is accordant with the information in the literature.

In the study, it is reported that the crying episodes of babies occur mostly at night [36(40%)], and that they take place by gradually increasing at evening hours [30(33.3%)] (Table 3). Also in the information found in the literature, the crying episodes are reported to be generally observed in the afternoon or at evening hours [2,52]. In this respect, the study shows compliance with the literature.

In the study, the babies' daily mean periods of crying, outcrying, staying awake, sleeping, and feeding show a statistically significant difference according to the groups ($p<0.01$). The babies in the white noise group outcry, cry, stay awake less and are fed and sleep more than those in the massage and control groups (Table 4). In a study conducted on babies with colic, it was found that white noise had reduced their outcrying, crying and stay- awake durations while increasing their feeding and sleeping durations [16]. In another study, white noise was determined to have been effective on pain, as well [53,54].

In the colic scale, significant declines were seen in the white noise and massage groups. In the massage group, the sub-dimensions of Cow's Milk Soy Protein Allergy Intolerance ($p<0.01$) and Immature Central Nervous System ($p<0.01$) and the total scores of the scale decreased on a significant level ($p<0.05$) (Table 5). With their study,

Çetinkaya and Başbakkal (2012) found that aromatherapy massage had alleviated the crying periods of the babies with colic and that it could be used as an effective method in that respect [14,30]. In another study, the massage applied with fennel seed oil on the belly was also found to be more effective than placebo in alleviating colic [55].

It was observed in the white noise group that the sub-dimensions pertaining to Cow's Milk Soy Protein Allergy Intolerance ($p<0.01$), Immature Central Nervous System ($p<0.01$), Challenging Infant ($p<0.05$), Parent-Infant Interaction + Problematic Infant ($p<0.05$) as well as the total scores of the scale proved to have decreased to a significant degree ($p<0.05$). Accordingly; more decline was seen in the white noise group (Table 5). McRury and Zolotor (2010), in their study, applied the baby care program in which behavioural treatments such as swaddling, swinging, white noise CD, and pacifiers were practised on the babies in the experimental group; whereas they applied the ordinary newborn care on the babies in the control group, as the result of which they failed to achieve any significant result when they compared the crying and sleeping periods of the babies in these two groups [56]. However, Spencer et al. (1990), in their study,

found that white noise had increased the sleeping periods [57]. Balcı (2006), in another study he conducted, found out that white noise had reduced the crying periods of the babies with colic while increasing their sleeping and feeding periods [16]. Muenssinger et al. (2013), in their study on fetuses, determined that the babies in mothers' wombs had reacted to the stimulator of white noise at most [58]. This study, in compliance with the literature, also suggests that white noise is the method to be used in alleviating the symptoms of colic.

Infantile colic, which is commonly seen in babies, affect family-infant relationship in a negative way, and this relationship is harmed due to this situation. Therefore, it is important to eliminate and alleviate the symptoms.

The approaches of nurses towards the babies with infantile colic must be family-centered, the family should be supported to be able to cope with the stress experienced, methods to boost self-confidence should be tried, and the treatment methods to reduce the period and to alleviate the severity of colic must also be taught [14,42]. Besides, the family should be informed about the necessity of providing the baby with fewer stimulators in the behavioural treatment [43].

Conclusion

In line with the results of the research, the Infant Colic Scale, which is determined to be a valid and reliable assessment tool in identifying colic, can be advised to be used by the health personnel working with babies in the field of Pediatrics. By teaching families how to use the colic scale, they can be allowed to observe the colic condition in their babies. It is recommended that the health personnel working with babies have knowledge of colic-causing factors, the symptoms of colic and the elimination of the symptoms.

As the result of the study, it was determined that there was more decline in the colic symptoms of the babies with colic that were made to listen to white noise when compared with the group to which baby massage was applied. The findings suggest that the white noise practised on the babies with colic has been effective in eliminating the symptoms of colic.

By taking into consideration the effect of white noise on colic, it can be advised that the families in whose babies colic has been detected be provided with education and training on white noise as well as presenting such practices in in-service trainings inside the units in the field of Pediatrics where babies are involved and also during the baby follow-ups performed by the nurses and midwives working in the primary care health services. The white noise CD used in the research can be recommended to be used by nurses and midwives in training the families of the babies with colic disorder.

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How to Cite: Celik, M. Y., & Çetinkaya, Şenay .(2023). Compar?son of Wh?te No?se and Massage Appl?cat?on Methods on the Col?cky Infants Aged 0-12-Months*. *Jour Med Resh and Health Sci*, *6*(12),2928–2944. https://doi.org /10.5284 5/JMRHS/2023-6-12-8