ORIGINAL ARTICLE

Effect of Swaddle and Conventional Tub Bath on Physiological and Comfort Response in Premature Newborns at a Government Hospital in West Java, Indonesia

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ABSTRACT

Introduction: Daily bathing for premature newborns is a standard activity that frequently triggers stress. Low temperature might influence physiological activity and comfort reactions which can traumatize premature newborns. The research aims to determine the distinctions in the impact of the swaddle and conventional tub bath on physiological and behavioural responses in preterm newborns. **Methods:** It utilized a quasi-experimental pre-post testdesign with a consecutive sampling strategy in 2 groups. The number of samples in this study was 36 respondents. Vital signs and Premature Infant Pain Profile (PIPP) were estimated by standard estimation, the crying term was estimated in seconds. Statistical tests used paired t, Wilcoxon, independent t, and Mann Whitney. **Results:**The studydemonstrated that the swaddle bath has a significant effect on body temperature level at post-bath 1 and 15 minutes and respiratory rate at post-bath 30 minutes with a p-value <0.05. Conventional tub bath had a major effect on the body temperature level, respiratory rate, and oxygen saturation at post-bath 1 minute; heart rate at post-bath 30 minutes with p-value <0.05. There was a significant contrast in oxygen saturation, PIPP, and crying duration at post-bath 1 minute; crying term during a bath in both intervention groups with p-value <0.05. **Conclusion:** There were no critical distinctions in physiological reactions among both intervention groups, however, swaddle bath was more effective to limit issues on comfort reactions in preterm newborns. The study recommended further exploration to reduce anxiety in preterm newborns. It is suggested further research to analyze stress levels in preterm newborns.

Keywords: Bathing, Behavioral Responses, Physiological Responses, Preterm Newborns

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INTRODUCTION

Providing high-quality care to newborns during the neonatal period is very crucial. Proper care during the initial 28 days of life of a child could forestall the worldwide number of neonatal deaths which is assessed to be around 40% (1), and the primary driver of infant deaths of around 35% are preterm newborns with complications (2). After birth the child faces innumerabledifficulties which are new to the newborn with immature organs, as the child is being presented to a different climate from the mother's womb (3-6). Excruciating technique, rest aggravations, detachment from mother, noisy and very bright light are related to elevating stress on preterm newborns (7). Repetitive stress on premature newborns can cause long term consequences in the brain development (8, 9).

The daily bath is an everyday activity that regularly traumatizesthe preterm newborn and it is very unpleasant for the premature newborns. This can cause some physiological reactions, for example, hypothermia, hypoxia, dyspnea, cyanosis, desaturated, and tachycardia (9-13); behavioural (comfort) distress, for example, crying, eyes open, yawning, tongue augmentation, pain and stress level (11-15).Despitethe drawbacksof post bathing, it gives huge benefits, for example, cleansing and protectingthe external layer of the body, protection from diseases, removing undesirable substance, making one feel strong, healthy, and full of energy with overall circulation of blood in the skin, mitigates pain, and providing comfort and well-being (4, 12, 16, 17).Nursing care of premature

newborns has not utilized pain reduction technique or atraumatic care approach in bathing procedures (5, 18). Based on field observation and interviews among pediatric nurses, the majority of the caregivers encountered premature newbornsexpressing intense discomfort during bath intervention. Itcries from the starting point even to the furthest limit of the intervention, and few newborns become hypothermic. Observation from the various hospital has shown thatthe sponge bath technique is the most widely recognized bathing strategy in numerous hospitals asit is easier to handle in their bustling timetables and traditional tub bathing was given before the newborns get discharged from the hospital. There is a lack of persuasive evidence regarding the effect of swaddle and conventional tub bath on physiological and comfort responses among preterm newborns. The swaddle bath wasgiven to premature newborns while swaddling with a delicate blanket before immersing them into a warm tub in a flexed and midline position. Meanwhile, in conventional tub bath,the clothes of the premature newborn is removed before immersing into the warm tub. The research purpose was to compare the effect of the swaddle and conventional tub bath on physiological and comfort responses in premature newborns in enhancing neurodevelopment with consideration of utilizing the atraumatic care approach.

MATERIALS AND METHODS

The research method utilized was a quasi-experimentalpre-post test in 2 groups, the sampling technique was consecutive sampling with 36 respondents (with 18 respondents in each group). This study was conducted between June - December 2019 in the perinatology unit ata government hospital in West Java, Indonesia. Inclusion criteria in this study were newborn child with gestational age of 30 - 37 weeks; body weight >1,500 grams; body temperature 36°C - 37.5°C; heart rate (100 – 180 x/minute); respiratory rate (30 - 60 x/minute); oxygen saturation (88 - 99%); stable general condition; attended by parents or guardians; received normal procedure (bathing, feeding, orogastric tube, and so forth); had been given milk feeding 1 hour before bathing, the room temperature was 24°C - 26°C; temperature of the water in the tub was 37.7°C - 38.3°C; and spotlight were accessible during the intervention. Exclusion criteria were premature newborns with neurological problems, congenital defects, received sedatives, received analgesics, received muscle relaxation drugs that could affect pain and stress, and parents or guardians of premature newborns who were unwilling to participate in this study.

Observation sheet was maintained for recording demographic data, vital signs, oxygen saturation, and crying duration. Vital signs, oxygen saturation, and crying duration before and after bathing intervention was measured using an infrared thermometer, pulse oximeter, stethoscope. A smartphone was used to videotape the crying duration. Premature Infant Pain Profile (PIPP) was used to evaluate premature newborns' pain (5, 19, 20).

The ethical clearance was conducted after obtaining research approval and permission from Sekolah Tinggi Kesehatan (STIKes) Jenderal Achmad Yani Cimahi and the number was 02/KEPK/VI/2019.

The research plan was communicated to the participant unit and simulating it to the perinatology unit staff. The informed consent was taken from the parents or guardians after an explanation of the study. Respondent of premature newborns in the conventional tub bath group was given followingstandard operational methods as main intervention utilized in the perinatology unit. While respondent of preterm newborns in the swaddle bath group was given the last intervention which was adopted and adjusted from various literature (10, 11, 21, 22). The Newborns' temperature was measured at pretest and posttest after 1, 15, and 30 minutes. Each respondent was bathed for 4 - 8 minutes. The interventions were carried out directly by the researcher. Data analysis was done by univariate and bivariate analysis. To detect the effect of the swaddle and conventional tub bath on physiological and comfort responses parametric test was done by paired t-test and non-parametric test was done utilizing Wilcoxon test. To distinguish the information of the two interventions using the parametric test with the unpaired t-test and the non-parametric test with the Mann Whitney test was done. The degree of significance of p-value <0.05, implies it is significant.

RESULTS

Table I showed that the swaddle bath was related to the gestational age(least were 33 weeks, most extreme were 37 weeks, and mean were 35.67 weeks); postnatal age in hours (minimum were 6, maximum were 129, and mean were 25.56). While conventional tub bath had a gestational age in weeks (minimum were 33, maximum were 37, and mean were 35.83); postnatal age in hours (least were 10, maximum were 144, and mean were 47.83).

Table II showed thedescriptive outcomes on physiologic responses among preterm newborns.In group A swaddle bath had a pretest median body temperature of 36.7°C; the lowest mean value was at 1-minute post-bath at 36.43°C; and mean at 15 and 30 minutes post-bath and reached to normal value(36.57°C and 36.6°C). Mean pretest heart rate and respiratory rates were 120.17 and 47.56 x/minutes and both reduced within normal level at post-bath after 1-minute and eventually temperature reduced to normal threshold after 30 minutes. While mean pretest oxygen saturation was 95.28%, it went down a little bit 1-minute post-bath with mean 94.67% and picked up the highest reading at a normal level with

Table I: Demographic Respondents Data of Numerical and Categorical in Group A (Swaddle Bath, n = 18) and Group B (Conventional Tub Bath, n = 18)

Characteristics	Group A (Swaddle Bath) n = 18				Group B (Conventional Tub Bath) n = 18				
	Min.	**Max.**	**Mean (SD)**	**n (%)***	**Min.**	**Max.**	**Mean (SD)**	**n (%)**	**Total n (%)****
Gestational Age (Week)	33	37	35.67 (1.609)		33	37	35.83 (1.200)		
Postnatal Age (Hour)	6	129	25.56 (30.174)		10	144	47.83 42.987)		
Birth Weight (Gram)	1714	4034	2472.22 (516.356)		1714	3400	2432.22 (392.879)		
Weight at Bathed (Gram)	1708	3738	2403.67 (479.360)		1590	3400	2343.78 (403.978)		
Type of Delivery 1: Spontaneous				9 (50)				4 (22.2)	13 (36.10)
2: Sectio Caesarean				9 (50)				14 (77.8)	23 (63.90)
Gender 1: Male				9 (50)				7 (38.9)	16 (44.45)
2: Female				9 (50)				11 (61.1)	20 (55.55)

*n = Respondent numbers and % (frequency), **Total n & frequencies

Table II: Description of Physiologic Responses in Premature Newborns Before and After Swaddle and Conventional Tub Bath

Variables	**Group A (Swaddle Bath) n = 18**					**Group B (Conventional Tub Bath) n = 18**				
	Min.	**Max.**	**Mean**	**Median**	**S.D**	**Min.**	**Max.**	**Mean**	**Median**	**S.D**
Temperature (°C) Pretest	36.4	36.9	36.68	**36.70***	0.1353	36.2	37.2	36.70	36.70	0.2249
Postbath 1 Minute	36.2	36.6	36.43	36.40	0.1138	36.1	36.8	36.34	36.30	0.2064
Postbath 15 Minutes	36.4	36.8	36.57	36.60	0.1320	36.3	36.9	36.60	36.60	0.1534
Postbath 30 Minutes	36.5	36.9	36.64	**36.60***	0.1092	36.4	36.9	36.65	36.65	0.1383
Heart Rate (x/minute) Pretest	105	140	120.17	118.50	10.118	103	140	120.94	118.50	10.957
Postbath 1 Minute	100	135	117.94	118.00	8.815	100	146	122.17	122.00	14.821
Postbath 15 Minutes	102	136	114.78	111.50	9.137	103	142	117.50	117.00	11.174
Postbath 30 Minutes	103	141	115.33	114.50	9.822	105	136	114.28	111.00	**8.050***
Respiratory Rate (x/minute) Pretest	38	55	47.56	**50.00**	4.706	36	55	46.39	47.50	5.479
Postbath 1 Minute	40	55	48.33	**50.00**	4.550	45	56	50.28	50.00	3.862
Postbath 15 Minutes	38	55	45.28	**45.00**	4.376	35	55	47.17	48.00	5.523
Postbath 30 Minutes	38	52	44.94	**45.00**	4.094	37	55	46.06	46.00	4.929
Oxygen Saturation (x/minute) Pretest	92	99	95.28	**95.00**	2.347	88	99	93.83	94.00	2.975
Postbath 1 Minute	89	99	94.67	**94.50**	2.828	86	96	90.83	91.00	2.975
Postbath 15 Minutes	90	99	95.06	**95.00**	2.999	85	99	92.89	93.50	3.909
Postbath 30 Minutes	92	99	96.11	**96.00**	2.026	90	99	95.00	96.00	2.828

*= Abnormal Data Distribution

a mean of 96.11% after 30 minutes.

Table II also showed descriptive results of physiologic responses among preterm newborns in group B with conventional tub bath. This group had a mean pretest body temperature of 36.7°C, and the most reduced mean body temperature in group B conventional tub bath was 36.34°Cat post-bath 1-minute, but it was picking up to the normal limit at 15 and 30 minutes post-bath (36.6°C and 36.65°C). Mean pretest heart rate and respiratory rates were 120.94 and 46.39 x/minutes and both increased within normal value at 1-minute post-bath and happily reachedto normal threshold after 30 minutes post-bath. While mean pretest oxygen saturation was 93.83%, it declined at post-bath 1-minute with mean value of 90.83% and unexpectedly picked up the highest reading at a normal level with a mean of 95% at 30 minutes postbath.

Table III showed a description of comfort responses among preterm newborns which included crying duration and PIPP during and after bath. Group A swaddle bath showed that the highest mean value of crying and PIPP were at 1-minute post-bath with 45.56 seconds and 4.61 (moderate), but the crying duration and PIPP at post-bath after 15 and 30 minutes were 0.01 seconds and 3 (mild). Group B conventional tub bath interpreted the highestmean value of crying during bath and PIPP at post-bath after 1-minute with 132.94 seconds and 8(severe). Meanwhile, the median crying duration at postbath 1 minute was 76 seconds, at post-bath 15 and 30 minutes were 0.01 seconds. Furthermore, the median value of PIPP at post-bath after 15 and 30 minutes were 3.5 and 3 respectively.

Table IV showed the effect of swaddle bath on physiologic responses among premature newborns considering the variable of body temperature at 1 and 15 minutes post-bath using Wilcoxon statistical test withp-value <0.05, and there was an effect of the swaddle bath on the respondent's body temperature at post-bath after 1 and 15 minutes. Promisingly, the body temperature after swaddle bath started picking up to the normal value at post-bath 30 minutes with the p-value >0.05, and there was no effect of swaddle bath on body temperature after 30 minutes at post-bath. Heart rate, respiratory rate, and oxygen saturation among preterm newborns at postbath 1, 15, and 30 minutes had no indicative effect with the p-value >0.05; except the variable of the respiratory rate at post-bath after 30 minutes using paired-samples t-test obtained p-value<0.05, it meant that there is an effect of swaddle bath at post-bath 30 minutes among preterm newborns.

Table IV also showed the effect of conventional tub baths on physiologic responses among premature newborns on the variable of body temperature after 1-minute post-bath using paired-samples t-test withp-value <0.05 and it meant that there was a meaningful effect of conventional tub bath on the respondent's body temperature at post-bath 1-minute. Heart rate at post-bath after 1 and 15 minutes had no valuable influence after the intervention, but heart rate at post-bath after 30 minutes experienced a decrease using Wilcoxon statistical test with ap-value <0.05, it means that there was a notable effect on heart rate after conventional tub bath at post-bath 30 minutes because respondents slept well. Sadly, the respiratory rate and oxygen saturation of preterm newborns at post-bath after 1-minute using paired-samples t-test obtained p-value, <0.05 and it was seen that there was an important effect of conventional tub bath on the respondent's respiratory rate and oxygen saturation at 1-minute post-bath.

Table V explained the difference in mean physiologic and comfort responses (during and after bathing) among premature newborns with the swaddle and conventional tub bath which implied that the oxygen saturation at1-minute post-bath with a mean group A swaddle bath were 94.67% which were higher than the mean Group B conventional tub bath value of 90.8%, the results of independent samples t-test gave p-value of <0.05, and there was a significant difference in oxygen saturation at post-bath 1-minute in the two intervention groups. Next, the duration of crying duration among preterm newborns during bathing, with a mean group A swaddle bath was 35.56 seconds and it was lower than the mean group B conventional tub bath which was 132.94 seconds. The results of independent samples t-test showed a p-value <0.05, and there was a notable difference on the crying duration in both the intervention groups. The duration of crying at 1-minute post-bath, with the mean rank of group A, swaddle bath was 13.97 seconds and it was lower than the mean ranks of group B conventional tub bath which was 23.03 seconds, the results of Mann Whitney test at post-bath 1-minute gave ap-value <0.05, and there was a denotative difference on the crying duration at post-bath 1-minute in the two intervention groups. Meanwhile, the PIPP result using independent samples t-test with p-value <0.05, and there was a significant difference at PIPP's post-bath 1-minute inboth the groups (with mean group A swaddle bath 4.61 as

Table III: Description of Comfort Responses in Premature Newborns During and After Swaddle and Conventional Tub Bath

Variables	Group A(Swaddle Bath) n = 18					Group B (Conventional Tub Bath) n = 18				
	Min.	Max.	Mean	Median	S.D	Min.	Max.	Mean	Median	S.D
Crying Duration (Second) During Bath	0	112	35.56	35.00	32.176	40	250	132.94	117.50	67.677
Post bath 1 Minute	0	110	45.56	47.50	32.504	35	300	105.39	76.00	**74.087***
Post bath 15 Minutes	0	18	1.56	0.01	**5.731***	0	15	3.89	0.01	**6.077***
Post bath 30 Minutes	0	16	2.28	0.01	**5.356***	0	10	0.56	0.01	**2.357***
PIPP Postbath 1 Minute	1	10	4.61	4.00	2.227	3	12	8.00	8.00	2.301
Postbath 15 Minutes	1	5	3.28	3.00	**1.127***	2	8	4.06	3.50	**1.514***
Postbath 30 Minutes	3	5	3.56	3.00	**0.705***	1	5	3.44	3.00	**0.922***

PIPP= Premature Infant Pain Profile,*= Abnormal Data Distribution.

Table IV: Effect of Swaddle and Conventional Tub Bath On Physiologic Responses among Premature Newborns

Variables	Grup A (Swaddle Bath) n = 18					Grup B (Conventional Tub Bath) n = 18				
	Mean (S.D)	**Ranks**	**Mean Ranks**	**n**	**P Value**	**Mean (S.D)**	**Ranks**	**Mean Ranks**	**n**	**P Value**
Temperature (°C) Pretest	36.68 (0.1353)					36.70 (0.2249)				
Postbath 1 Minutes	36.43 (0.1138)	Negative	9.00	17	p=0.001[b], ***	36.34 (0.2064)				p=0.001[a], ***
		Positive	0.01	0						
		Ties		1						
Postbath 15 Minutes	36.57 (0.1320)	Negative	9.45	11	p=0.011[b], ***	36,60 (0.1534)				p=0.055[a], *
		Positive	4.00	4						
		Ties		3						
Postbath 30 Minutes	36.64 (0.1092)	Negative	7.00	8	p=0.169[b], *	36,65 (0.1383)				p=0.425[a], *
		Positive	5.50	4						
		Ties		6						
Heart Rate (x/minute) Pretest	120.17 (10.118)					120.94 (10.957)				
Postbath 1 Minute	117.94 (8.815)				p=0.199[a], *	122.17 (14.821)				p=0.728[a], *
Postbath 15 Minutes	114.78 (9.137)				p=0.092[a], *	117.50 (11.174)				p=0.277[a], *
Postbath 30 MInutes	115.33 (9.822)				p=0.052[a], *	114.28 (8.050)	Negative	9.88	13	p=0.014[b], ***
							Positive	6.12	4	
							Ties		1	
Respiratory Rate (x/ minute) Pretest	47.56 (4.706)					46.39 (5.479)				
Post Bath 1 Menit	48.33 (4.550)				p=0.529[a], *	50.28 (3.862)				p=0.002[a], ***
Postbath 15 Minutes	45.28 (4.376)				p=0.088[a], *	47.17 (5.523)				p=0.512[a], *
Postbath 30 Minutes	44.94 (4.094)				p=0.017[a], ***	46.06 (4.929)				p=0.824[a], *
Oxygen Saturation (%) Pretest	95.28 (2.347)					93.83 (2.975)				
Postbath 1 Minute	94.67 (2.828)				p=0.427[a], *	90.83 (2.975)				p=0.004[a], ***
Postbath 15 Minutes	95.06 (2.999)				p=0.786[a], *	92.89 (3.909)				p=0.335[a], *
Postbath 30 Minutes	96.11 (2.026)				p=0.195[a], *	95.00 (2.828)				p=0.099[a], *

[a] Paired Samples T-Test, [b] Wilcoxon Test, ***Significant, *Not Significant

moderate, which was lower than group B conventional tub bath with a value 8 as severe).

DISCUSSION

Demographic Data as Vulnerable Populations

Premature newborns experience an earlier life transition from the intrauterine to the extrauterine environment to adapt and sustain life (3, 23). Age is one of the variables that influence body temperature in newborns, particularly premature newborns. Premature newborns have a temperature component intolerance so that there can be radical changes in body temperature according to the climate (23, 24). More studies aboutpremature newborn is needed to increase the knowledge of nurses so that they can provide professional and quality nursing care.

The mean gestational age of premature newborns in group A swaddle bath was 35.67 weeks while group B conventional tub bath was 35.83 weeks. Coherently, the previous study explored that the gestational age was 33 – 37 weeks(12, 13, 15, 25);the mean score wasaround 31.6weeks (11); 34 – 35 (14). Postnatal age on group A swaddle bath was 25.56 hourswith a minimum was 6 hours and group B conventional tub bath was 47.83 hours with a minimum s 10 hours. Antecedent reports investigated that postnatal age was 4.44 days with a minimum postnatal age of 10.34 days (15); more than a day (25); 7 – 30days (12); 19 – 20days (11); 15 – 21 days (13).

Effect of Swaddle Bath and Conventional Tub Bath on Physiological Responses among Premature Newborns

Any kind of bath should not be given before 24 hours after

Table V: The difference in Mean Physiologic and Comfort Responses (During and After Bathing) among Premature Newborns with Swaddle and Conventional Tub Bath

Variables	Grup A (Swaddle Bath) n = 18		Grup B (Conventional Tub Bath) n = 18		P-Value
	Mean (S.D)	**Mean Ranks**	**Mean (S.D)**	**Mean Ranks**	
Temperature (°C) Postbath 1 Minute	36.43 (0.1138)		36.34 (0.2064)		p=0.121[a], *
Postbath 15 Minutes	36.57 (0.1320)		36.61 (0.1534)		p=0.564[a], *
Postbath 30 Minutes		17.97		19.03	p=0.756[b],*
Heart Rate (x/minute) Postbath 1 Minute	117.94 (8.815)		122.17 (14.821)		p=0.308[a], *
Postbath 15 Minutes	114.78 (9.137)		117.50 (11.174)		p=0.429[a], *
Postbath 30 Minutes		18.89		18.11	p=0.823[b], *
Respiratory Rate (x/minute) Postbath 1 Minute	48.33 (4.550)		50.28 (3.862)		p=0.176[a], *
Postbath 15 Minutes	45.28 (4.376)		47.17 (5.523)		p=0.263[a], *
Postbath 30 Minutes	44.94 (4.094)		46.06 (4.929)		p=0.467[a], *
Oxygen Saturation (%) Postbath 1 Minute	94.67 (2.828)		90.83 (2.975)		p=0.001[a], ***
Postbath 15 Minutes	95.06 (2.999)		92.89 (3.909)		p=0.071[a], *
Postbath 30 Minutes	96.11 (2.026)		95.00 (2.828)		p=0.184[a], *
Crying Duration (Second) During Bath	35.56 (32.176)		132.94 (67.677)		p=0.001[a], ***
Postbath 1 Minute		13.97		23.03	p=0.010[b], ***
Postbath 15 Minutes		16.61		20.39	p=0.139[b], *
Postbath 30 Minutes		19.56		17.44	p=0.271[b], *
PIPP Postbath 1 Minute	4.61 (2.227)		8.00 (2.301)		p=0.001[a], ***
Postbath 15 Minutes		16.47		20.53	p=0.226[b], *
Postbath 30 Minutes		18.78		18.22	p=0.861[b], *

[a] Independent Samples T-Test, [b] Mann Whitney Test, ***Significant, *Not Significant

birth but according to cultural elements the newborn is given a bath, after 6 hours of birthfor cleaning the dirt on the body utilizing baby oil to forestall the occurrence of hypothermia, because of the act of bathing causes heat loss by evaporation and radiation (3, 4, 26). Hypothermia after bathing might be a threat to breathing and expanded oxygen utilization, and the primary bath in an infant ought not to be offered until the vital signs have stabilized (18, 26). Clinical professionals suggest maintaining the shortest bathing duration of5 minutes to prevent cold stress (27).

This study indicated that the effect of swaddle bath on physiologic responses among premature newborns considering the variable of body temperature was in the cold stress stage at post-bath 1-minute. Previous research explored similarly with p-value <0.05 at post-bath 10 minutes and high statistical significance at postbath 30 minutes with p-value <0.001 (13); there was no important influence at post-bath 10 and 20 minutes (25); no meaningful effect at post-bath 10 minutes (11), no significant effect at post-bath 1, 5, 15 and 30 minutes (15). Nevertheless, the body temperature after the swaddle bath in this study started picking up to the normal value at post-bath 30 minutes with the p-value > 0.05.

This study explored the effect of swaddle baths on the respiratory rate at post-bath 30 minutes among preterm newborns, but respondents were in good sleep. However, the figure remains within normal limits. A former study indicated that there was a significant effect at heart rate post-bath 10 minutes with p-value <0.05 (25); a meaningful effect at post-bath 1 minute on heart rate, respiratory rate, and oxygen saturation (15); a highly denotative effecton heart rate and respiratory rate at post-bath 10 and 30 minutes was noticed, and oxygen saturation at post-bath 10 minutes had a meaningful effect (13).

Effect of conventional tub bath on physiologic responses among premature newborns in this study was in the cold stress stage at postbath 1-minute. Previous study inspected similarly with p-value <0.05 at post-bath 10 minutes and highly statistical significance at post-bath 30 minutes with p-value <0.001 (14, 28, 29); there was a significant effect at post-bath 10 minutes with p-value <0.001 (12); no indicatory influence at post-bath 10 and 20 minutes (25). There was an effect on heart rate at post-bath 30 minutes, and respiratory rate and oxygen saturation at post-bath 1-minute, but the figure stays within normal limits. Former study showed that were a significant effect on heart rate post-bath 10 minutes

with a p-value <0.05 (25); a highly significant impact on heart rate and respiratory rate at postbath 10 and 30 minutes, and oxygen saturation at post-bath 10 minutes were a meaningful effect (13).

The difference in Mean Value of Physiological and Comfort Responses (During and After Bathing) with Swaddle Bath and Conventional Tub Bath among Preterm Infants

The findings of this study revealed the distinguishing physiologic responses especially inferred the oxygen saturation at postbath 1-minute among premature newborns was critical, which showed mean group A swaddle bath was higher than group B conventional tub bath. The discoveries (13) conducted a true experimental comparative research design using a simple random technique and separated 60 preterm newborns into two groups. The oxygen saturation at post-bath 10 minutes investigated on group A was 91.33% which was higher than group B were 90.5% with a p-value <0.05, and there was a denotative difference discovered in both groups.

Mean crying duration during bath among preterm newborns for group A swaddle bath was lower than group B conventional tub bath. A similar finding on crying time was supported by another study (11) using a single-blind randomized clinical trial with block randomization for 50 premature newborns into two groups, and the result illustrated that crying time was significantly less in the experimental group than in the control group (30, 31). Other studies (32) utilizing a randomized controlled experimental trial among 80 full-term infants revealed that crying duration was less significant on experimental/swaddle bath group (mean were 17.58 seconds) than in the control/traditional tub bath group (mean were 99.23 seconds). An additional study (12) regarding crying while bathing intercession indicated that were fundamentally lower in the trial group than those in the control group.

Meanwhile, the outcomes of PIPP of the current study at post-bath 1-minute among preterm newborns for group A swaddle bath were lower than group B conventional tub bath. There is a lack of study in assessing pain scale during swaddle bath and conventional tub bath intervention. The previous study (15) using a randomized crossover design for 35 premature newborns (divided into swaddle and sponge bath groups); illustrated that the pain level of premature newborns during and after sponge bath intervention was higher than swaddling bath intervention.

The finding in this study indicated that there was no significant effect on body temperature, heart rate, and respiratory rate among preterm newborns in both intervention groups. The outcome of another study said that the preterm newborns' body temperature declined similarly during bathing whether the infant was on a swaddle bath or not (25). While the previous study indicated a less significant influence on body temperature among premature newborns in the experimental group than the control group (11). Another study in full-term infants showed that body temperature decreased notably less in the swaddle bath group compared to the traditional tub bath group (32). The additional finding indicated that there was a highly significant difference in thermal stability indicated by less heat loss on the swaddle bath group than the conventional tub bath group (13, 33). The result of this study might be disrupted due to the limitations of the study.

The limitation also include the presence of undesirable environmental stimuli that impediment this investigation. The ecological boosts can impact the newborn's behaviour, an endeavour was made during the study to give a bath in a quiet and stress-free environment. Nevertheless, it was unrealistic to completely control all the environmental stimuli in the perinatology unit environment. Every newborn is remarkable and social reactions brought about by stress vary among. Thereafter, this can practically affect the consequences of the study and further research is recommended to analyze stress levels in preterm newborns.

Based on the results of this study and previous studies supporting these elements it is shown that physiological impact and comfort responses is crucial while giving baths to premature newborns in the gestational age, postnatal age, and the bathing strategy must be determined. At that point, it is most likely to be reasonable that the swaddle bath strategy is a sort of bathing that is more secure and more steady in estimating physiologic and comfort responses of preterm newborns because it is stress-free. Swaddle bath is a stress-free, protected, and comfortable bathing technique that recreates a notable uterine climate. Swaddle bath gives comfort during bath and a wonderful bathing experience for premature newborns (12, 17, 21).

CONCLUSION

The finding proved that swaddle baths were significantly useful, safe, protected, and stress-free in physiological and comfort responses among preterm newborns which can preserve oxygen saturation stability, cause less crying time during and after a bath, and lower pain level. However, swaddle baths can be included as components of developmental care in enhancing the atraumatic care approach as a routine bathing method in the perinatology unit.

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