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Research Article

Effectiveness of Nesting and Swaddling Technique on Bio-physiological Parameters, Neuro-behavioral Activity, and Sucking Response among Sick Neonates of Selected Pediatrics Units of Navi Mumbai

Deepa Ganesh Reddy[1], Smriti G. Solomon[2]

[1]Department of Nursing, Malwanchal University, Indore, Madhya Pradesh, India, [2]Department of Nursing, Index College of Nursing, Indore, Madhya Pradesh, India

Abstract

Aim: This study examined the effects of Nesting and Swaddling on bio-physiological parameters, neuro-behavioural activity, and sucking reflex in ill neonates.

Method: The researcher used a quantitative and quasi-experimental approach in this investigation. The study included sick Neonates in pediatric unit of selected hospitals Navi Mumbai. Sample size for the study is 200.

Result: The experimental normal delivery group reported 56% temperatures over 99.3F. The experimental cesarean group had 54% temperatures over 99.3 F. Sick neonates have mean neuro-behavioral activity of 1.88 with SD 0.89 in the experimental normal delivery group and 1.84 with SD 0.86 in the experimental caesarean group. Sucking response of sick neonates shows 44% of experimental normal delivery group has poor feed. About 54% of experimental cesarean patients were inadequately fed. About 70% of experimental normal delivery group had 97.5–99.3 F. After Nesting and Swaddling, 60% of experimental caesarean delivery patients had 97.5–99.3 F. After nesting and swaddling, sick babies' neuro-behavioural activity is 2.96 with SD 1.45 in the experimental normal birth group and 3.5 with SD 1.16 in the experimental cesarean group. After nesting and swaddling, 68% of experimental normal birth group sick babies had reasonably effective feed by post-test sucking. At least 50% of experimental cesarean birth patients had effective feed.

Conclusion: This study shows that nesting and swaddling sick neonates improves biophysiological measures, neuro-behavioural activity, and sucking reflex. Sick newborns' biophysiological measurements, neuro-behavioural activity, and sucking response score improve.

Keywords: Bio-physiological parameters, nesting technique, neuro-behavioral activity, sick neonates, sucking response, swaddling technique

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Introduction

Human birth is the most spectacular, transformational, and mystifying event in history, making newborns the most vulnerable when adjusting. Low birth weight (LBW) babies need help breathing, avoiding infection, staying warm, and eating after delivery. LBW babies are particularly sensitive because their body surface area to weight ratio exposes more skin to the environment.[1]

Address for Correspondence:
Deepa Ganesh Reddy, Research Scholar, Department of Nursing, Malwanchal University, Indore, Madhya Pradesh, India. E-mail: deeparmn24@gmail.com

Preterm birth, which refers to all neonates born before 259 days or 37 weeks, is thought to cause 24% of newborn deaths. Despite 5–7% of live births in some industrialized countries, undeveloped countries have substantially higher preterm birth rates. One in ten US newborns was premature. The number of preterm births dropped between 2007 and 2014. More recent data shows a small increase in the national preterm birth rate from 2014 to 2015. African American mothers had 13% preterm births in 2015, approximately 50% more than white women (9%).[2]

Preterm infants are vulnerable and require skilled nursing care to survive and develop. Their early birth prevents the development of their lungs, brain, gut, and immune systems and disrupts airway control and breathing. Lack of development affects digestion, intellectual capacity, and immunological function. Their lack of self-control, inability to move purposefully, and communication issues make them susceptible.[3,4]

Premature babies often develop using nesting, a breastfeeding method. A nest of rolled-up sheets provides physiological, behavioral, and postural stability for premature babies. However, nesting requires putting hands near to positioning devices bring the face and feet together to create a warm, safe, and useful nest for premature babies. Nesting abilities keep premature babies comfortable, monitor vital signs, and provide impulsive movement for proper skeletal joint and neuromuscular function.[5]

It will be hard for your newborn to leave the womb. After growing up in a warm, cosy environment, babies find a bright, cold world. Swaddling mimics the safe and comforting womb, helping babies become toddlers.

Swaddling an infant can help maintain a healthy body temperature, but choose a breathable, high-quality swaddle like the Tulo Baby Summer blanket to minimize overheating. Avoid "double swaddling" or blanketing the baby. Too many clothes and bundling might cause the baby to overheat, increasing SIDS risk. A breathable material like the tulo baby sleeping pod, made of 100% cotton hosiery, will keep your baby warm without overheating.[6]

This study evaluated the effects of the nesting and swaddling techniques on biophysiological measures, neurobehavioral activity, and the sucking reflex in unwell newborns from a subset of Navi Mumbai's pediatric wards.

Materials and Methods

Research approach

In this study, the researcher utilized a quantitative research approach.

Research design

For this study, a quasi-experimental design was adopted.

Setting of study

The setting for the present study is the selected paediatric units of Navi-Mumbai.

Population of study

In this study, the population consisted of sick neonates of pediatric units of Navi Mumbai.

Sample technique

In this study, purposive sampling technique was used.

Sample size

The sample size for the study is 200 samples.

Statistics

Descriptive

Frequency and percentage used for the demographic data, categorization of the bio-physical parameters, neuro-behavioral activity, and sucking response.

Inferential

- Use of a t-test to find out the difference between the pre- and post-test scores
- Use of Chi-square tests to find out the association of sucking response with their selected demographic variables.

Results

Section I: Assessment of respondents according to the demographic variables of child

Table 1 shows that in experimental normal birth, 40% of responders are 5–6 days old 34% of experimental caesarean birth patients were 5–6 days old. In the regular birth group, 30% were 7–8 days old. In the control caesarean delivery group, 32% were 7–8 days old. In the experimental normal delivery group, 64% were women. In the experimental cesarean delivery group, 54% were men. In the control normal delivery group, 62% were women and the control cesarean delivery group had 54% women. In the experimental normal delivery group, 42% had 2500–2999 g. In the experimental cesarean delivery group, 42% had birth weights over 3000 g. The control normal delivery group had 40% 2500–2999 g of birth weight. In the control cesarean delivery group, 42% had 2500–2999 g. In the experimental normal delivery group, 56% had 37 weeks. 62% of experimental cesarean delivery patients were 37 weeks pregnant. In the control normal birth group, 62% had 37 weeks. In the control cesarean delivery group, 56% had 37 weeks. About 42% of experimental normal delivery group have second birth order. About 50% of experimental cesarean delivery patients had second birth order. The control normal delivery group has 54% of first births. About 54% of control caesarean delivery patients have a second birth order. In the experimental normal delivery group, 56% had 8–10 Apgar scores. In the experimental cesarean delivery group, 62% had 8–10 Apgar scores. In the control normal birth group, 62% had 8–10 Apgar scores and in the control cesarean delivery group, 56% had 8–10 Apgar scores.

Table 1: Distribution of respondents according to the demographic variables of child. *n*=200 (100+100)

Demographic variables child	Experimental group (*n*=100)				Control group (*n*=100)			
	Normal delivery		Caesarean delivery		Normal delivery		Caesarean delivery	
	n=50	%	*n*=50	%	*n*=50	%	*n*=50	%
1. Age of the baby in days								
a) 1–2 days	07	14	10	20	11	22	13	26
b) 3–4 days	11	22	09	18	11	22	06	12
c) 5–6 days	20	40	17	34	13	26	15	30
d) 7–8 days	12	24	14	28	15	30	16	32
2. Gender								
a) Male	18	36	27	54	19	38	23	46
b) Female	32	64	23	46	31	62	27	54
3. Birth weight								
a) 1500–1999 g	03	6	00	00	01	2	04	8
b) 2000–2499 g	07	14	11	22	12	24	09	18
c) 2500–2999 g	21	42	18	36	20	40	21	42
d) 3000 g and more	19	38	21	42	17	34	16	32
4. Gestational age at birth								
a) 37 weeks	28	56	31	62	31	62	28	56
b) 36 weeks	17	34	12	24	16	32	18	36
c) 35 weeks	04	8	03	6	03	6	04	8
d) 34 weeks	01	2	04	8	00	00	00	00
5. Birth order of the child								
a) First	18	36	23	46	27	54	17	34
b) Second	21	42	25	50	23	46	27	54
c) Third and more	11	22	02	4	00	00	06	12
6. Apgar score at birth								
a) <3	05	10	07	14	03	6	04	8
b) 4–7	17	34	12	24	16	32	18	36
c) 8–10	28	56	31	62	31	62	28	56

Table 2: Distribution of respondents according to the demographic variables of mother *n*=200 (100+100)

Demographic variables mother	Experimental group (*n*=100)				Control group (*n*=100)			
	Normal delivery		Caesarean delivery		Normal delivery		Caesarean delivery	
	n=50	%	*n*=50	%	*n*=50	%	*n*=50	%
1. Age of the mother in years								
a) <20	00	00	02	4	01	2	00	00
b) 21–30	29	58	33	66	38	76	28	56
c) 31–40	21	42	15	30	11	22	21	42
d) >40	00	00	00	00	00	00	01	2
2. Ordinal position of the child birth								
a) One	18	36	23	46	27	54	17	34
b) Two	21	42	25	50	23	46	27	54
c) Three	11	22	02	4	00	00	04	8
d) Four	00	00	00	00	00	00	02	4
3. Type of conception.								
a) Normal	45	90	41	82	50	100	43	86
b) Treatment	05	10	09	18	00	00	7	14
4. Mode of delivery								
a) Normal	43	86	00	00	41	82	00	00
b) Instrumental	07	14	00	00	09	18	00	00
c) Cesarean	00	00	50	100	00	00	50	100
5. Any risk during pregnancy								
a) No complications	18	36	23	46	20	40	16	32
b) Gestational DM	10	20	11	22	09	18	25	50
c) Pregnancy induce Hypertension	11	22	02	4	10	20	04	8
d) Anemia	11	22	14	28	11	22	02	4
e) Other complications	00	00	00	00	00	00	03	6
6. Birth spacing between the child								
a) <2 years	21	42	25	50	23	46	27	54
b) >2 years	11	22	02	4	00	00	06	12
c) Not applicable	18	36	23	46	27	54	17	34

DM: Diabetes mellitus

Section II: Assessment of respondents according to the demographic variables of mothers

In Table 2, 58% of experimental normal delivery group members are 21–30 years old. In the experimental cesarean delivery group, 66% are aged 21–30. In the control normal delivery group, 76% are aged 21–30. 56% of control cesarean birth patients are 21–30 years old. In the experimental normal delivery group, 42% had two children. In the experimental caesarean group, 50% had two children. The control normal birth group had 54% of one child. In the control cesarean delivery group, 54% had two children. The experimental normal delivery group had 90% normal conception. The experimental cesarean group had 82% of normal conception. Control normal delivery 100% of responders had normal conception. In the control caesarean group, 86% had normal conception. The experimental normal delivery group had 86% normal delivery. The experimental caesarean group had 100% cesarean deliveries. The control group had 82% normal delivery. Almost all cesarean deliveries are controlled. About 36% of experimental normal delivery patients had no problems, 22% had pregnancy-induced hypertension and anemia. In experimental cesarean group, 46% had no problem. In the normal delivery group, 40% had no problems. In the control caesarean group, 50% had gestational Diabetes mellitus. In the experimental normal delivery group, 42% had spacing <2 years. The experimental caesarean group had a 50% spacing of <2 years. In normal delivery, 54% of the cohort had their first child and 46%. About 54% have <2 years spacing.

Section III-A: Assessment of respondents according to the existing bio-physiological parameters among the sick neonates

Table 3 demonstrates that 56% of experimental normal delivery group had temperatures above 99.3F. In the experimental cesarean group, 54% had temperatures above 99.3 F. Over 50% of control normal delivery group had temperatures below 97.5 F. About 46% of control cesarean patients had temperatures below 97.5 F. About 38% of experimental normal delivery patients had 100–190 BPM. Most experimental cesarean delivery patients (44%) had 100–190 BPM. The control normal delivery group had 80% 100–190 BPM. About 75% of control caesareans were 100–190 BPM. About 40% of the experimental normal delivery group had <30 breaths/min. 44% of experimental caesarean patients breathed 30–60 times. In the control normal delivery group, 38% breathed 30–60 times/min. About 40% of control cesarean patients breathe 30–60 times/min. About 84% of experimental normal delivery group had 91–100% saturation. About 82% of experimental cesareans had 91–100% saturation. Most control normal delivery groups have 91–100% saturation (88%). In the control caesarean group, 80% had 91–100% saturation.

Section III-B: Assessment of respondents according to the neuro-behavioral activity among the sick neonates

Table 4 shows that the mean score for respondent neuro-behavioral activity in sick neonates is 1.88 with SD 0.89 in experimental normal delivery, 1.84 with SD 0.86 in experimental caesarean, and 2.02 with SD 0.82 and 0.84 in control normal delivery and cesarean groups, respectively.

Section III-C: Assessment of respondents according to the existing sucking response among sick neonates

In Table 5, 44% of ill neonates in the experimental normal delivery group have inadequate feed after sucking. About 54% of experimental caesarean delivery patients had poor feed. The control regular delivery group had 48% inadequate feed. Control cesarean delivery had 58% poor feed.

Section IV-A: Assessment of respondents according to the bio-physiological parameters among the sick neonates after nesting and swaddling technique

Table 6 deals with post-test bio-physiological characteristics that indicate, 70% of experimental normal delivery group

Table 3: Distribution of respondents according to the existing Bio-physiological parameters among the sick neonates. *n*=200 (100+100)

Existing bio-physiological parameters	Experimental group (*n*=100)				Control group (*n*=100)			
	Normal delivery		Caesarean delivery		Normal delivery		Caesarean delivery	
	n=50	%	*n*=50	%	*n*=50	%	*n*=50	%
1. Temperature (F)								
a) More than 99.3 F	28	56	27	54	20	40	20	40
b) 97.5 F–99.3 F	12	24	09	18	05	10	07	14
c) <97.5 F	10	20	14	28	25	50	23	46
2. Heart rate (per minute)								
a) <100 BPM	13	26	16	32	09	18	15	30
b) 100–190 BPM	29	38	22	44	40	80	25	75
c) >190 BPM	08	16	12	24	01	2	10	20
3. Respiratory rate (per min)								
a) <30 breaths/min	20	40	18	36	18	36	15	30
b) 30–60 breaths/min	19	38	22	44	19	38	20	40
c) >60 breaths/min	11	22	10	20	13	26	15	30
4. Oxygen saturation (%)								
a) <91%	08	16	09	18	06	12	10	20
b) 91–100%	42	84	41	82	44	88	40	80

had 97.5 F–99.3 F temperature. Over 60% of experimental cesarean delivery patients had 97.5 F–99.3 F. In the control normal delivery group, 40% had temperatures over 99.3 F and below 97.5 F. 44% of control cesarean delivery patients had temperatures below 97.5 F. About 38% of experimental normal delivery group had 100–190 BPM heart rate. Most experimental cesarean delivery patients (44%) had 100–190 BPM. Most control normal delivery respondents (80%) had 100–190 BPM. Over 50% of control cesarean birth patients had 100–190 BPM. Approximately 40% of the experimental normal group had <30 breaths/min. About 44% of experimental caesarean patients breathed 30–60 times/min. About 38% of control normals breathe 30–60 times/min. 40% of control caesarean patients breathe 30–60 times/min. Most experimental normals (96%) have 91–100% saturation. About 90% of experimental cesareans had 91–100% saturation. Most control normals (92%) have 91–100% saturation. About 86% of control cesareans had 91–100% saturation.

Table 7 depicts that after nesting and swaddling, sick neonates' neuro-behavioral activity was assessed. The experimental normal delivery group had a mean score of 2.96 with SD 1.45, the experimental cesarean group 3.5 with SD 1.16, the control

Table 4: Assessment of respondents according to the neuro-behavioral activity among the sick neonates. *n*=200 (100+100)

Neuro-behavioral activity	Experimental group		Control group	
	Normal delivery	Caesarean group	Normal delivery	Caesarean group
Mean	1.88	1.84	2.02	2.02
SD	0.89	0.86	0.82	0.84

Table 5: Distribution of respondents according to the existing sucking response among sick neonates. *n*=200 (100+100)

Existing sucking response	Experimental group (*n*=100)				Control group (*n*=100)			
	Normal delivery		Cesarean delivery		Normal delivery		Cesarean delivery	
	n=50	%	*n*=50	%	*n*=50	%	*n*=50	%
Poor feed	22	44	27	54	24	48	29	58
Moderately effective feed	19	38	20	40	20	40	20	40
Successful feed	09	18	03	6	06	12	01	2

Table 6: Distribution of respondents according to the Post-test Bio-physiological parameters among the sick neonates. *n*=200 (100+100)

Post-test Bio-physiological parameters	Experimental group (*n*=100)				Control group (*n*=100)			
	Normal delivery		Caesarean delivery		Normal delivery		Caesarean delivery	
	n=50	%	*n*=50	%	*n*=50	%	*n*=50	%
1. Temperature (F)								
a) More than 99.3 F	12	24	12	24	20	40	19	38
b) 97.5 F–99.3 F	35	70	30	60	10	20	09	18
c) <97.5 F	03	6	08	16	20	40	22	44
2. Heart rate (per minute)								
a) <100 BPM	13	26	16	32	09	18	15	30
b) 100–190 BPM	29	38	22	44	40	80	25	50
c) >190 BPM	08	16	12	24	01	2	10	20
2. Respiratory rate (per min)								
a) <30 breaths/min	20	40	18	36	18	36	15	30
b) 30–60 breaths/min	19	38	22	44	19	38	20	40
c) >60 breaths/min	11	22	10	20	13	26	15	30
3. Oxygen saturation (%)								
a) <91%	02	4	05	10	04	8	07	14
b) 91–100%	48	96	45	90	46	92	43	86

Table 7: Assessment of Respondents according to the Neuro-behavioral activity among the sick neonates after nesting and swaddling technique. *n*=200 (100+100)

Post-test Neuro-behavioral activity	Experimental group		Control group	
	Normal delivery	Cesarean group	Normal delivery	Cesarean group
Mean	2.96	3.5	1.94	2.06
SD	1.45	1.16	0.86	0.73

Table 8: Distribution of respondents according to the post-test sucking response among sick neonates. *n*=200 (100+100)

Post-test sucking response	Experimental group (*n*=100)				Control group (*n*=100)			
	Normal delivery		Cesarean delivery		Normal delivery		Cesarean delivery	
	n=50	%	*n*=50	%	*n*=50	%	*n*=50	%
Poor feed	03	06	10	20	20	40	28	56
Moderately effective feed	34	68	25	50	22	44	20	40
Successful feed	13	26	15	30	08	16	02	4

normal delivery group 1.94 with SD 0.82, and the control cesarean group 2.06 with SD 0.73.

Section IV-C: Assessment of respondents according to the sucking response among sick neonates after nesting and swaddling technique

Table 8 demonstrates that the post-test sucking response of unwell newborns after nesting and swaddling shows that 68% of experimental normal delivery group had moderately effective feed, 26% achieved feed, and 6% poor feed. The experimental cesarean birth group had 50% moderately effective feed, 30% successful feed, and 20% unsatisfactory feed. In the control normal delivery group, 44% had somewhat effective feed, 40% inadequate feed, and 16% successful feed. In control caesarean delivery, most of 56% having poor feed followed by 40% having moderately effective feed and 4% having successful feed.

Section V: Determine the impact of nesting technique on sucking response among sick neonates

Table 9 indicates the effects of nesting and swaddling on sucking response. Pre-test mean 5.53 and SD 3.59; post-test mean 8.3 and SD 3.33. The "t" test value was 5.64, df = 99, and $P < 0.00001$. The study found considerable efficacy ($P < 0.05$).

Table 10 indicates the effects of nesting and swaddling on sucking response: Pre-test mean 5.1 and SD 3.35, post-test mean 5.58 and SD 3.56. The "t" test was 0.981, df = 99, and $P = 0.163854$. Results indicate non-significant efficacy ($P < 0.05$).

Section VI: Association of pre-test level of sucking response with selected demographic variables

In Table 11, sucking response is associated with selected demographic characteristics in experimental group. The Chi-square value of demographic variables such as age of baby in days, gender, birth weight, and birth order showed a significant association with pre-test sucking response at 0.05. The null hypothesis was rejected and the alternative hypothesis was accepted.

Table 12 shows that chosen demographic characteristics in experimental group affect sucking response. The Chi-square value of demographic variables such as mother's age in years, child's ordinal position, type of conception, mode of delivery, pregnancy risk, and birth spacing did not show a significant association with pre-test sucking response at 0.05. Hence, null hypothesis is accepted and alternative hypothesis is rejected.

Table 13 shows that chosen demographic characteristics in control group affect sucking response. At 0.05 level of

Table 9: Impact of nesting technique on sucking response among sick neonates in experimental group. *n*=100

Test	Mean	SD	T test	DF	*P*-value	Result
Pre-test	5.53	3.59	5.64	99	<0.00001	S
Post-test	8.3	3.33				Significant

Table 10: Impact of nesting technique on sucking response among sick neonates in control group. *n*=100

Test	Mean	SD	T test	DF	*P*-value	Result
Pre-test	5.1	3.35	0.9817	99	0.1638	NS
Post-test	5.58	3.56			*P*<0.05	Non-Significant

significance, the Chi-square value of demographic variables such as age of baby in days, gender, birth weight, gestational age at birth, birth order, and Apgar score at birth did not show a significant association with pre-test sucking response. Hence, null hypothesis is accepted and alternative hypothesis is rejected.

Table 14 shows that chosen demographic characteristics in control group affect sucking response. The Chi-square value of demographic variables such mother's age in years, child birth ordinal position, and conception type any pregnancy risk was associated with pre-test sucking reaction at 0.05 significance. Demographic characteristics were also associated with sucking response. The null hypothesis was rejected and the alternative hypothesis accepted.

Discussion

Similar study conducted by Thakur S. *et al*. (2022), conducted on a study investigated the impact of nesting on preterm newborns' physiological characteristics and posture in a New Delhi hospital. The computed "*t*" values for heart rate were 2.261 in post-test 3 and significant at $P \leq 0.05$. The post-test "*t*" value for respiratory rate was 2, 2.079, and significant at $P \leq 0.05$. A significant "*t*" value of 2.28 in post-test for oxygen saturation was reported at $P \leq 0.05$. Post-test 1 posture "*t*" values were 3.644, post-test 2 9.917, and post-test 3 13.467. All post-tests showed significant results at $P \leq 0.05$. The study found that nesting stabilizes physiological markers (heart rate, respiratory rate, and oxygen saturation) and improves preterm babies' posture, making it a valuable measure.[7]

Patel *et a*l. (2021), The research comparing nesting on specific physiological parameters against typical care in preterm infants in the neonatal critical care unit revealed that, Traditionally,

Table 11: Association of pre-test level of sucking response with selected demographic variables of child in experimental group. *n*=100

Sociodemographic variables of child	Total no of samples	Sucking response			Df	*P*-value	Chi-square-value	Result
		Poor feed	Moderately effective feed	Successful feed				
1. Age of the baby in days					6	0.055	12.32	S
a) 1–2 days	17	06	08	03				
b) 3–4 days	20	05	11	04				
c) 5–6 days	37	22	10	05				
d) 7–8 days	26	16	10	00				
2. Gender					2	0.01	7.82	S
a) Male	45	26	18	01				
b) Female	55	23	21	11				
3. Birth weight					6	0.013	16.12	S
a) 1500–1999 g	03	01	01	01				
b) 2000–2499 g	18	05	07	06				
c) 2500–2999 g	39	17	19	03				
d) 3000 g and more	40	26	12	02				
4. Gestational age at birth					6	0.3115	7.10	NS
a) 37 weeks	59	32	24	03				
b) 36 weeks	29	12	11	06				
c) 35 weeks	07	03	02	02				
d) 34 weeks	05	02	02	01				
5. Birth order of the child					4	0.00006	24.54	S
a) First	41	32	06	03				
b) Second	46	12	27	07				
c) Third and more	13	05	06	02				
6. Apgar score at birth					4	0.9161	0.9578	NS
a) <3	12	06	04	02				
b) 4–7	29	15	10	04				
c) 8–10	59	28	25	06				

Table 12: Association of pre-test level of sucking response with selected demographic variables of mother in experimental group. *n*=100

Sociodemographic variables of mother	Total no of samples	Sucking response			Df	*P*-value	Chi-square-value	Result
		Poor feed	Moderately effective feed	Successful feed				
1. Age of the mother in years					4	0.821	1.52	NS
a) <20	02	01	01	00				
b) 21–30	62	33	22	07				
c) 31–40	36	15	16	05				
d) >40	00	00	00	00				
2. Ordinal position of the child birth					4	0.7384	1.9856	NS
a) One	41	23	13	05				
b) Two	46	20	21	05				
c) Three	13	06	05	02				
d) Four	00	00	00	00				
3. Type of conception					2	0.4353	1.6632	NS
a) Normal	86	42	35	09				
b) Treatment	14	07	04	03				
4. Mode of delivery					4	0.129	7.1253	NS
a) Normal	43	21	17	05				
b) Instrumental	07	02	02	03				
c) Cesarean	50	26	20	04				
5. Any risk during pregnancy					6	0.4516	5.75	NS
a) No complications	41	19	16	06				
b) Gestational DM	21	11	07	03				
c) Pregnancy induce Hypertension	13	06	04	03				
d) Anemia	25	13	12	00				
e) Other complications	00	00	00	00				
6. Birth spacing between the child					4	0.586	2.833	NS
a) <2 years	46	19	20	07				
b) >2 years	13	07	04	02				
c) Not applicable	41	23	15	03				

Table 13: Association of pre-test level of sucking response with selected demographic variables of child in control group. *n*=100

Sociodemographic variables of child	Total no of samples	Sucking response			Df	*P*-value	χ^2 value	Result
		Poor feed	Moderately effective feed	Successful feed				
1. Age of the baby in days					6	0.9031	2.17	NS
a) 1–2 days	24	11	10	03				
b) 3–4 days	17	09	07	01				
c) 5–6 days	28	15	12	01				
d) 7–8 days	31	18	11	02				
2. Gender					2	0.67	0.785	NS
a) Male	42	21	17	04				
b) Female	58	32	23	03				
3. Birth weight					6	0.4355	5.89	NS
a) 1500–1999 g	05	03	01	01				
b) 2000–2499 g	21	12	06	03				
c) 2500–2999 g	41	22	18	01				
d) 3000 g and more	33	16	15	02				
4. Gestational age at birth					4	0.605	2.72	NS
a) 37 weeks	59	34	22	03				
b) 36 weeks	34	17	14	03				
c) 35 weeks	07	02	04	01				
d) 34 weeks	00	00	00	00				
5. Birth order of the child					4	0.0655	8.8285	NS
a) First	44	22	18	04				
b) Second	50	29	20	01				
c) Third and more	06	02	02	02				
6. Apgar score at birth					4	0.886	1.15	NS
a) <3	07	03	03	01				
b) 4–7	34	17	15	02				
c) 8–10	59	33	22	04				

Table 14: Association of pre-test level of sucking response with selected demographic variables of mother in control group. *n*=100

Socio-demographic variables of mother	Total no of samples	Sucking response			Df	*P*-value	χ^2 value	Result
		Poor feed	Moderately effective feed	Successful feed				
1. Age of the mother in years					6	0.006	17.71	S
a) <20	01	01	00	00				
b) 21–30	66	44	18	04				
c) 31–40	32	08	21	03				
d) >40	01	00	01	00				
2. Ordinal position of the child birth					6	0.030	13.95	S
a) One	44	22	18	04				
b) Two	50	29	20	01				
c) Three	04	01	01	02				
d) Four	02	01	01	00				
3. Type of conception					2	0.0005	14.91	S
a) Normal	93	51	38	04				
b) Treatment	07	02	02	03				
4. Mode of delivery					4	0.3091	4.79	NS
a) Normal	41	22	18	01				
b) Instrumental	09	04	03	02				
c) Cesarean	50	27	19	04				
5. Any risk during pregnancy					8	0.043	15.90	S
a) No complications	36	15	18	03				
b) Gestational DM	34	21	12	01				
c) Pregnancy induce Hypertension	14	12	01	01				
d) Anemia	13	04	08	01				
e) Other complications	03	01	01	01				
6. Birth spacing between the child					4	0.087	8.115	NS
a) <2 years	50	27	19	04				
b) >2 years	06	02	02	02				
c) Not applicable	44	24	19	01				

Lower F values are seen in well-cared-for preterm newborns for skin temperature (1.695), heart rate (2.155), respiratory rate (1.000), and oxygen saturation (0.753). On nesting, preterm infants have lower F values for respiratory rate (1.303), heart rate (1.307), skin temperature (26.278), and oxygen saturation (17.078) than the table value. Significant differences in skin temperature and oxygen saturation are observed ($P < 0.05$).[8]

Similar study conducted by the Reyhani T *et al*. (2016). The study on the effects of nesting as a developmental care on premature infants' physiological functioning and neuro-behavioral organizsation found high statistical significance in premature infants' physiological, behavioral, and neurological outcomes in temperature, oxygen saturation (SaO_2), crying, sleeping, motor activity, and primitive reflexes. Nesting improved premature infants' physiological and neurobehavioral development.[9]

Abirami and Selvi (2017) examined the effects of nested versus swaddled placement on chosen behavior in Salem hospitals' very LBW newborns. As shown, Swaddling versus nesting Swaddle placement was effective on extremely LBW neonates with $P = 0.001$ and association detected in research groups I and II for weight and gestational weeks, but not in control group. The study found that swaddling very LBW infants improved their behavior. The investigator thought nested versus swaddle configuration would help very LBW newborns learn.[10]

Similar study conducted by Kayalvizhi *et al*. (2022). The study on nesting's effects on preterm babies' posture, movement, and physiological indicators in Cuddalore hospital found that Student independent "*t*" test values for posture ($t = 16.312$), movements ($t = 20.137$), temperature ($t = 8.956$), respiratory rate ($t = 2.835$), heart rate (9.774), and SPO_2 ($t = 8.585$) on the 7th day between experimental and control groups showed that nesting maintained normal posture, healthy movement, and stable physiological parameters in the experimental group. Significant associations were found between mothers' posture, area of residence, family history of preterm labor, and movements in the experimental group ($\chi^2 = 4.751$, $P = 0.029$, $\chi^2 = 4.337$, $P = 0.037$). There was a significant correlation between physiological measures and baby demographics, such as breastfeeding practies ($\chi^2 = 16.966$, $P = 0.009$) in the experimental group. The study found that nesting improves preterm newborns' posture, movements, and physiological characteristics.[11]

Conclusion

This study shows that nesting and swaddling sick neonates improves biophysiological measures, neuro-behavioural activity, and sucking reflex. Sick newborns' biophysiological measurements, neuro-behavioural activity, and sucking response score improve.

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