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"Effect of polyethylene cover on selected physiological parameters among neonates in tertiary care centers of Sangli- Miraj city." Mrs. Suman M. Pawar¹, Nilima R. Bhore²

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Abstract: Objectives: 1. To assess the temperature, heart rate, respiration rate and oxygen saturation before application of polyethylene cover among neonates in experimental and control group. 2. To assess the temperature, heart rate, respiration rate and oxygen saturation after application of polyethylene cover among neonates in experimental and control group. 3. To compare the pretest and posttest scores within experimental and control group. 4. To compare the pretest and posttest scores between experimental and control group. Methods: Research Approach was Quantitative Experimental study. Design :Experimental -pre and post control group design. Samples were selected by Systematic Randomization Sampling Technique. Research tool-Part I- Demographic profile. Part II- Observational record of temperature, heart rate, respiratory rate and oxygen saturation. Results: The post-test mean temperature level 37.24 with SD of ± 0.25 was higher than the pre-test mean temperature level 36.86 with SD of \pm 0.29. The paired t test analysis indicates (t- 4.43; p= 0.0001) i.e., the difference of pre-test and post-test mean temperature level is found less than 0.05 level. The post-test mean oxygen saturation level 98.25 with SD of \pm 0.85 was higher than the pre-test mean oxygen saturation level 97.7 with SD of \pm 0.80.The paired t test analysis indicates (t- 2.10; p=0.04) i.e., the difference of pre-test and post-test mean oxygen saturation level is found less than 0.05 level. **Conclusion:** Through the results of the study, we could conclude- among the selected physiological parameters, temperature and oxygen saturation among neonates shows significant effect in the experimental group, hence researcher can interpret that there is effect of polyethylene cover on temperature and oxygen saturation among neonates.

Introduction:

Background of the Study:

In the delivery room, wrapping a low-birth-weight neonate in a polyethylene bag reduces the risk of hypothermia. However, extended use of the bag might conceivably increase the risk of thermal stress and thus body overheating. Segments. To assess the temperature, heart rate and oxygen saturation before application of polyethylene cover among neonates in experimental and control group. To assess the temperature, heart rate and oxygen saturation after application of polyethylene cover among neonates in experimental and control group. To compare the selected physiological parameters between control and experimental group among neonates.¹

Approximately 3 million neonates die annually in one month of life worldwide. Compared with the developed world, neonatal mortality in the developing world is 6 times higher. Hypothermia is associated with increased neonatal mortality. Each 10C decrease in axillary temperature is associated with 75 % increase in neonatal mortality. Hypothermia in newborns is the highest within first minutes to hours after birth as the newborns adjusts to the extrauterine environment. Neonates are vulnerable to heat loss due to large surface area to weight ratio, immature thermoregulatory mechanisms – lack of vasomotor control. Standard thermoregulation World Health Organization guidelines recommend comprehensive measures to prevent hypothermia, including warm delivery rooms, immediate drying, skin to skin contact, early breastfeeding, postponed bathing and weighing, appropriate clothing and bedding, and warm transportation and resuscitation. In spite of these standard thermoregulation techniques, a large study in rural India reported 43% of hypothermia in normal birth weight infants.²

Hypothermic neonates have a higher risk of developing hypothermia, respiratory distress syndrome, jaundice and metabolic acidosis. Reducing the prevalence of neonatal hypothermia has a significant contribution to reducing the global burden of neonatal deaths. Polyethylene bag or wraps aid in thermal regulation by protecting infants from radiant, evaporative, and convective heat loss. Use of polyethylene cover during the first hour after birth shows decrease rate of hypothermia.³

I. Research Problem Statement

A study to assess the effect of polyethylene cover on selected physiological parameters among neonates in tertiary care centres of Sangli- Miraj city.

II. Research Objectives

- 1. To assess the temperature, heart rate, respiration rate and oxygen saturation before application of polyethylene cover among neonates in experimental and control group.
- 2. To assess the temperature, heart rate, respiration rate and oxygen saturation after application of polyethylene cover among neonates in experimental and control group.
- 3. To compare the pretest and posttest scores within experimental and control group.
- 4. To compare the pretest and posttest scores between experimental and control group.

III. Hypothesis

H1- There will be significant difference in the temperature, heart rate, respiratory rate and oxygen saturation before and after application of polyethylene cover among neonates in experimental and control group.

IV. Research Methodology

- 1. Research Approach- Quantitative Experimental study.
- 2. Research Design- Experimental -Pre and post control group design.
- 3. Variables under study:
- a. Independent variables- Application of polyethylene cover.
- b. Dependent variable Axillary Temperature, Heart rate, Respiratory rate and Oxygen saturation.
- 4. Research setting- Labour room and Post natal ward.
- 5. Population Target population Term neonates born in the labour room and post natal wards.
- Sample Full Term neonates born above 37 weeks of gestation Accessible population- Term neonates born in labour rooms and post natal wards of tertiary care centres in Sangli – Miraj city.
- 7. Sample Selection criteria
- Inclusive criteria-
- ✓ Term neonates with 2500g and above, also 37weeks and above.
- \checkmark Born vaginally or by cesarean section in hospital setting.
- Exclusive criteria-
- ✓ Apgar score below 8.
- ✓ If neonates have an abdominal wall defect, myelomeningocele, major congenital disorder, blistering skin disorder.
- 8. Sample Size- 276 samples(138 in experimental group and 138 in control group)
- 9. 95% confidence level, 80% power and 10% expected effect size.
- 10. Sampling method Systematic Randomization Sampling Technique.
- 11. Research tool-

a. Part I- Demographic profile

Neonatal factors (sex of neonate, birth weight in grams, Apgar score at 1 minute) Obstetric factor of mother (parity, mode of delivery, Hb level)

- b. Part II- Observational record of temperature, heart rate, respiratory rate and oxygen saturation.
- V. Plan for data collection and brief about intervention
 - 1. Obtain permission from concerned authorities of the organization
 - 2. Take approval from institutional ethical committee.
 - 3. Prepare tool for data collection.

- 4. Get content validity of the tool done from concerned experts.
- 5. Reliability for the tool
- 6. Plan for data collection.
- 7. Conduct Pilot study
- 8. Obtain parental consent from mothers of potentially eligible infants within 10 minutes after delivery or before delivery.
- 9. Select samples according to inclusion criteria using systematic randomization technique and divide them in experimental and control group.
- 10. Pretest will be conducted by checking the physiological parameters at 10 minutes after birth in experimental and control group
- 11. Control group will receive hospital routine care protocols.
- 12. Experimental group will receive care as per protocols for applying polyethylene cover.

Protocols for applying polyethylene cover :-

- a) Neonates randomized to the experimental group will receive same care as control except they will be placed inside a polyethylene cover after brief drying of head and body on the mother's abdomen while the cord is been cut no later than 10 minutes after birth.
- b) Then the neonate's trunk and lower extremities will be placed in clear polyethylene cover [non medical low cost (3cent/bag) linear low density polyethylene cover measuring 10 *8*24inch and 1.2-mil thousandth of an inch) thick] within 10 minutes after birth.
- c) The polyethylene cover will be secured under the neonate's arms and around the chest covering the trunk and lower extremities.
- d) Around the cover the neonate will be tightly swaddled with a cloth or towel provided by the infant's mother. Care will be taken to prevent the bag from covering the mouth or nose.
- e) The polyethylene cover will be changed when soiled.
- f) Breastfeeding by mother will be provided to the neonate while remaining in the cover.
- g) Assist the mother in the care of neonate and provide safety of the neonate.
- h) The neonates will remain in the polyethylene cover foe one hour after birth.
- i) The bag will be removed at one hour after birth.
- 13. Post test will be conducted by checking the physiological parameters at one hour after birth in experimental and control group.
- 14. <u>Steps to be taken If in case any allergy occur to the neonate towards polyethylene cover</u> :
 - a) Immediately remove the neonate from the polyethylene cover.
 - b) Assess for the site of allergy, record the vital signs and reaction.
 - c) Inform to the concerned doctor/authority/ staff and parents about the allergy occurring due to polyethylene cover.
 - d) Consult doctor for further treatment for allergy.
 - e) Administer medications for allergy as per doctor's orders.

f) Observe the neonate for any further allergic reactions.

g) Monitor the neonate till discharge.

- 15. Plan for data Analysis
 - ✓ Descriptive (frequency distribution and percentage)
 - ✓ Inferential statistics (unpaired t test.)

VI. Results:

The analysis of pilot study is presented under the following headings:

- Part A-I: Distribution of Frequency and Percentage of Demographic profile of Neonatal information.
- Part A-II: Distribution of Frequency and Percentage of Demographic profile of obstetric information of mother.
- Part B: Distribution of Frequency and Percentage of temperature, heart rate, oxygen saturation and respiratory rate before application of polyethylene cover in control and experimental group among neonates.

Variables	Group	Control	group	Experime	ental group.
v al lables	Group	Frequency	Percentage (%)	Frequency	Percentage (%)
Gender of	Male	8	40	9	45
Neonate Female	Female	12	60	11	55
Birth weight in	2500-3000	13	65	14	70
grams	3001-3500	05	25	03	15
	More than 3501 grams	02	10	03	15
Apgar score	8	11	55	09	45
	9	07	35	10	50
	10	02	10	01	5

• Part C: Distribution of Frequency and Percentage of temperature, heart rate, oxygen saturation and respiratory rate after application of polyethylene cover in control and experimental group among neonates.

• Part D: Evaluation of effectiveness of polyethylene cover on selected physiological parameters in the experimental group.

• Part E: Comparison of posttest scores of selected physiological parameters among control group and experimental group.

Part A-I: Distribution Demographic profile of Neonatal factors

Table no.1: Frequency and percentage distribution of gender ,birth weight and Apgar score.

n=40 (20+20)

Table no 1 shows that in control group majority of 12(60%) neonates were female whereas in experimental group majority of 11(55%) were female.

In control group majority of 13(65%) neonates having birth weight between 2500-3000grams whereas in experimental group majority of 14(70%) neonates having birth weight between 2500 to 3000grams.

In control group majority of 11(55%) respondents having Apgar score 8. In experimental group majority of 10(50%) having Apgar score 9.

Part A-II: Distribution of Demographic profile of obstetric factor of mother

		Control group		Experimental	group.
Variables	Groups	Frequency	Percentage (%)	Frequency	Percentage (%)
Gravida	Primigravida	9	45	12	60
	Multigravida	11	55	8	40
Mode of Delivery	Vaginal delivery	15	75	17	85
	Cesarean Section	05	25	03	15
Hb level of mother (g/dl)	Less than 10 g/dl	2	10	3	15
	10.1-11 g/dl	5	25	7	35
	11.1-13 g/dl	10	50	8	40
	More than 13.1 g/dl	3	15	2	10

Table no.2: Frequency and percentage distribution of Gravida, Mode of Delivery and Hb level of mother.

n=40 (20+20)

Table no 2 depicts that in control group majority of 11(55%) were multigravida. In experimental group majority of 12(60%) were primigravida. In control group majority of 15(75%) had delivered vaginally whereas, in experimental group 17(85%) of respondents delivered vaginally.

In control group majority of 10 (50%) of mothers have Hb level between 11.1-13 g/dl. In experimental group 8(40)% have Hb level between 11.1-13 g/dl

Part B: Distribution of Frequency and Percentage of temperature, heart rate ,oxygen saturation and respiration rate before intervention .(routine care and application of polyethylene cover.)

Table no.3: Pre-test assessment of temperature, heart rate ,oxygen saturation and respiration rate in control group.

Physiological Parameters	Category	Frequency	Percentage (%)	Mean	SD
Temperature	36.5°C- 37.0°C	14	70	36.905	0.28
	37.1°C- 37.5°C	06	30		
Heart Rate	90-120BPM	-	-	145.9	10.33
	121-150BPM	14	70		
	151-180BPM	06	30		
	181-210BPM	-	-]	
Oxygen Saturation	93-96%	13	65	96.85	1.42
	97-100%	07	35		

Respiratory	30-40 BPM	07	35	44.5	7.48
Rate					
	41-50 BPM	11	55		
	51-60 BPM	02	10		

Table no. 3 :

In control group, the pre-test scores of physiological parameters in show that majority of neonates 14(70%) had temperature between $36.5^{\circ}C^{-}37.0^{\circ}C$ further, majority 14(70%) had heart rate between 121-150BPM, majority of 13(65%) had oxygen saturation between 93-96% and majority 11(55%) had respiratory rate between 41-50 BPM.

The mean and SD of temperature, heart rate, oxygen saturation, respiration rate were M=36.90 (SD \pm 0.28), M=145.9 (SD \pm 10.33), M=96.85 (SD \pm 1.42) and M= 44.5(SD \pm 7.48) respectively among neonates in control group

Table no 4: Pre-test assessment of	f temperature,	heart rate,	oxygen	saturation	and
respiration rate in experimental grou	up.				

Physiological	Category	Frequency	Percentage	Mean	SD		
Parameters			(%)				
Temperature	36.5°C-37.0°C	15	75	36.86	0.29		
	37.1°C-37.5°C	05	25	-			
Heart Rate	90-120BPM	-	-	141.3	7.43		
	121-150BPM	16	80				
	151-180BPM	04	20				
	181-210BPM	-	-				
Oxygen Saturation	93-96%	06	30	97.7	0.80		
Saturation	97-100%	14	70				
Respiratory Rate	30-40 BPM	07	35	44.8	6.87		
mutt	41-50 BPM	10	50				
	51-60 BPM	03	15				

Table no 4,

In experimental group, the pre-test physiological parameters show that majority of neonates 15(75%) had temperature between $36.5^{\circ}C^{-}37.0^{\circ}C$ whereas majority of neonates 16 (80%) had heart rate between 121-150BPM, majority of neonates 14 (70%) had oxygen saturation between 97-100 % and , majority of neonates 10(50%) had respiration rate between 41-50 BPM.

The pretest mean and SD of temperature, heart rate, oxygen saturation, respiration rate were M=36.86 (SD \pm 0.29), M=141.3(SD \pm 7.43), M=97.7(SD \pm 0.80) and M=44.8(SD \pm 6.87) respectively among neonates in experimental group.02

Part C: Distribution of Frequency and Percentage of temperature, heart rate ,oxygen saturation and respiration rate after intervention. (routine care and application of polyethylene cover.)

Table no 5: Post-test assessment of temperature, heart rate, oxygen saturation and respiration rate in control group.

Physiological Parameters	Category	Frequency	Percentage (%)	Mean	SD
Temperature	36.5°C- 37.0°C	10	50	37.05	0.30
	37.1°C- 37.5°C	10	50	_	
Heart Rate	90-120BPM	-	-	141.5	5.94
	121- 150BPM	17	85		
	151- 180BPM	03	15		
	181- 210BPM	-	-		
Oxygen Saturation	93-96%	11	55	97.6	0.99
Saturation	97-100%	09	45		
Respiratory Rate	30-40 BPM	07	35	44.6	8.26

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41-50 BPM	08	40	
51-60 BPM	05	25	

Table no 5,

In control group, the post-test physiological parameters show that majority of neonates 10(50%) had temperature between $36.5^{\circ}C^{-}37.0^{\circ}C$ further majority of neonates 17(85%) had heart rate between 121-150BPM, majority of neonates 11(55%) had oxygen saturation between 93-96% and majority of neonates 8(40%) had respiratory rate between 41-50 BPM followed. The posttest mean and SD of temperature, heart rate, oxygen saturation, respiration rate were M=37.05 (SD ± 0.30), M=141.5(SD ± 5.94), M=97.6(SD ± 0.99) and M= 44.6(SD± 8.26) respectively among neonates in control group.

Table no 6: Post-test assessment of temperature, heart rate and oxygen saturation in experimental group

Physiological Parameters	Category	Frequency	Percentage (%)	Mean	SD
Temperature	36.5°C- 37.0°C	03	15	37.24	0.25
	37.1°C- 37.5°C	17	85		
Heart Rate	90-120BPM	-	-	142.4	5.45
	121-150BPM	17	85	1	
	151-180BPM	03	15	1	
	181-210BPM	-	-	1	
Oxygen Saturation	93-96%	05	25	98.25	0.85
Saturation	97-100%	15	75		
Respiratory	30-40 BPM	04	20	45.4	5.47
Rate	41-50 BPM	13	65	1	
	51-60 BPM	03	15		

Table no 6:

The post-test physiological parameters of experimental group show that 17(85%) had temperature between $36.5^{\circ}C^{-}37.0^{\circ}C$ further in majority of 17(85%) had between heart rate 121-150BPM, majority of 15(75\%) had oxygen saturation between 93-96 % and majority of 13(65%) had respiratory rate between 41-50 BPM followed.

The posttest mean and SD of temperature, heart rate, oxygen saturation, respiration rate were M=37.24 (SD \pm 0.25), M=142.4(SD \pm 5.45), M=98.25(SD \pm 0.85) and

Sr.no	Physiological Parameters	Experi	mental	group		Result	Result			
		Pretest	ţ	Posttes	Posttest		ʻp' value	df	result	
		Mean	SD	Mean	SD					
1	Temperature	36.86	0.29	37.24	0.25	4.43	0.0001	38	P<0.05	
2	Heart Rate	141.3	7.43	142.3	5.45	0.53	0.59	38	P>0.05	
3	Oxygen Saturation	97.7	0.80	98.25	0.85	2.10	0.04	38	P<0.05	
4	Respiratory Rate	44.8	6.87	45.4	5.47	0.3056	0.76	38	P>0.05	

 $M = 45.4(SD \pm 5.47)$ respectively among neonates in experimental group.

Part D: Evaluation of effectiveness of polyethylene cover on physiological parameter in experimental groups.

Table no 7. Determining the effectiveness of Polyethylene cover on temperature in experimental group.

n=20

Table no 7 shows that,

1. The post-test mean temperature level 37.24 with SD of ± 0.25 was higher than the pre-test mean temperature level 36.86 with SD of ± 0.29 . The paired t test analysis indicates (t- 4.43;

p=0.0001) i.e., the difference of pre-test and post-test mean temperature level is found less than 0.05 level. Hence null hypothesis is rejected and alternative hypothesis is accepted. This signifies that administration of Polyethylene cover had significant effect on the temperature of neonates.

2. The post-test mean heart rate level 142.3 with SD of \pm 5.45 was higher than the pre-test mean heart rate level 141.3 with SD of \pm 7.43. The paired t test analysis indicates (t- 0.53; p= 0.59) i.e., the difference of pre-test and post-test mean heart rate level is found more than 0.05 level. Hence null hypothesis is accepted and alternative hypothesis is rejected. This signifies that administration of Polyethylene cover had no significant effect on the heart rate of neonates.

3. The post-test mean oxygen saturation level 98.25 with SD of ± 0.85 was higher than the pretest mean oxygen saturation level 97.7 with SD of ± 0.80 . The paired t test analysis indicates (t-2.10; p= 0.04) i.e., the difference of pre-test and post-test mean oxygen saturation level is found less than 0.05 level. Hence null hypothesis is rejected and alternative hypothesis is accepted. This signifies that administration of Polyethylene cover had significant effect on the oxygen saturation of neonates.

4. The post-test mean respiration rate level 45.4 with SD of \pm 5.47 was higher than the pre-test mean respiration rate level 44.8 with SD of \pm 6.87. The paired t test analysis indicates (t-0.3056; p=0.76) i.e., the difference of pre-test and post-test mean respiration rate level is found more than 0.05 level. Hence null hypothesis is accepted and alternative hypothesis is rejected. This signifies that administration of Polyethylene cover had no significant effect on the respiration rate of neonates.

Part E: Comparison of posttest scores of selected physiological parameters among control group and experimental group among neonates.

 Table no. 8 Comparison of posttest scores of selected physiological parameters between control and experimental groups.

n=40 (20+20)

Physiological Parameters	Control group		Experime group	ental	Result				
	Mean	SD	Mean	SD	't'-test	df	ʻp' value	result	
Temperature	37.5	0.30	37.24	0.25	2.978	38	0.4341	P>0.05	

Heart Rate	141.5	5.940	142.3	5.450	0.4993	38	0.711	P>0.05
Oxygen Saturation	97.6	0.99	98.2	0.85	2.056	38	0.512	P>0.05
Respiratory Rate	44.6	8.26	45.4	5.47	0.3611	38	0.08	P>0.05

Table no 8 shows that,

- 1. The post-test mean temperature level in control group is 37.5 with SD of ± 0.30 whereas the post-test mean temperature level in experimental group is 37.24 with SD of ± 0.25 . The unpaired t test analysis shows (t= 2.978; p= 0.4341). Thus, the result is not significant at 0.05 level of significance.
- 2. The post-test mean heart rate in control group is 141.5 with SD of \pm 5.940 whereas the post-test mean heart rate in experimental group is 142.3 with SD of \pm 5.450. The unpaired t test analysis shows (t= 0.4993; p= 0.71). Thus, the result is not significant at 0.05 level of significance.
- 3. The post-test mean oxygen saturation in control group is 97.6 with SD of \pm 0.99 whereas the post-test mean oxygen saturation in experimental group 98.2 with SD of \pm 0.85. The unpaired t test analysis shows (t= 2.056; p= 0.512). Thus, the result is not significant at 0.05 level of significance.
- 4. The post-test mean respiration rate in control group is 44.6 with SD of \pm 8.26 whereas the post-test mean respiration rate in experimental group is 45.4 with SD of \pm 5.47. The unpaired t test analysis shows (t= 0.3611; p= 0.08). Thus, the result is not significant at 0.05 level of significance.

Discussion:

The study is discussed under the following headings:

1. Discussion on the demographic variables.

2. Discussion on the effect of polyethylene cover on selected physiological parameters among neonates.

Discussion on the demographic variables:

In the present study, term male and female infants were selected. Birth weight was between 2500-3500 gms and above.

In the similar study, premature male and female infants were selected. Birth weight below 900gms and above were selected.⁴

Discussion on the effect of polyethylene cover on selected physiological parameters among neonates:

In the present study, temperature and oxygen saturation were found to be improved after application of Polyethylene cover.

In the similar study, only hypothermia was prevented by using Polyethylene cover.⁴

Conclusion

- Through the results of the study, we could conclude- Among the selected physiological parameters, temperature and oxygen saturation among neonates shows significant effect in the experimental group, hence researcher can interpret that there is effect of polyethylene cover on temperature and oxygen saturation among neonates.
- By comparing the interventional results in control and experimental groups, there was no significant difference on the selected physiological parameters.

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Conflict of interest: No Conflicts of interest aroused during the study.

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