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RESEARCH ARTICLE

"EFFECT OF CLING WRAP ON BODY TEMPERATURE AND WEIGHT AMONG LOW BIRTH WEIGHT NEONATES ADMITTED IN SICK NEWBORN CARE UNIT OF SELECTED MEDICAL COLLEGES OF WEST BENGAL"

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Abstract

Background: Low birth weight (LBW) is a major challenging public health problem in developing countries. LBW neonates are more susceptible to evaporative heat loss and develop hypothermia immediately after birth that may lead to morbidity and mortality. An experimental study was undertaken among low birth weight neonates in selected medical colleges of West Bengal, with the objectives of effect of cling wrap on body weight and temperature among LBW neonates. **Methods:** 60 (E =30 & C= 30) subjects were recruited by simple random sampling technique (along with neonatal characteristics). Data were collected through record analysis proforma, digital baby weighing scale and digital thermometer. All tools were tested for validity and reliability and instruments were calibrated before data collection. Permission obtained from Ethics committee before data collection. **Results:** The findings revealed that most of the subjects (76.67%) had hypothermia in pretest and majority of the subjects (60%) had hypothermia in posttest in control group and most of the subjects (83.33%) had hypothermia before use of cling wrap whereas no one had hypothermia after the use of cling wrap in experimental group. There was significant difference in body temperature between control and experimental group for all five days in post-test at 0.05 level of significance. There was no significant difference in body weight between the control and experimental group of neonates but weight loss is less in experimental group than control group which is not statistically significant for all five days in posttest. The results also showed the significant association between post-test level of thermoregulation and weight at birth in control group of neonates.
Conclusion: Therefore, use of cling wrap might be a simple innovative intervention for maintaining body temperature and preventing weight loss to some extent among LBW neonates.

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Introduction:-

Low Birth Weight (LBW) is one of the major challenging public health problems because it is a leading cause of neonatal mortality. The magnitude of LBW varies in different countries. More than 20 million infants are born with

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LBW globally and about 95% of LBW infants are born in developing countries[1]. The magnitude of LBW in developing countries (16.5%) is double than that of developed countries (7.0%). About 30-35% babies are born LBW in India, however, more than half are full term babies. In West Bengal prevalence of LBW is 21.49%[1].

According to WHO[2], India is top listed in 10 nations contributing 60% of the preterm deliveries globally. In India, 3.5 million babies are born prematurely in every year.[2] All low birth weight neonates are at greater risk. It is, therefore, necessary to pay more attention to their weight and maintenance of body temperature as they are more prone to develop hypothermia.

According to WHO[2], hypothermia is one of the "top killers" during the neonatal period. Many interventions can be adopted to prevent hypothermia at birth such as plastic wrap, plastic bag and skin to skin contact etc. Studies showed that using a plastic wrap made of polyethylene (cling wrap) in neonate immediately before or after drying can further minimize evaporative and convective heat losses. Prevention and management of hypothermia in settings not having good resource must focus on simple and effective interventions.[2]

Kaushal M, Agarwal R, Singal A et al[3] reported that Cling wrap as an innovative intervention for temperature maintenance and reduction of insensible water loss in very low-birth weight babies nursed under radiant warmers. Use of Cling Wrap might be a simple method of maintaining temperature in very low-birth weight babies in developing countries.

Shaojun L, Pengfei G, Zou Q et al[4] reported that Plastic wrap can be considered as an effective method to prevent hypothermia in preterm infants. However, its cost-effectiveness and long-term effect on mortality needs to be ascertained by conducting more well-designed studies.

Thermal care practices have very much importance in neonatal care. Concept of thermoregulation for newborn has evolved over the years from the use of incubators in the 1800s to various combinations of technologies including radiant warmers, heated mattresses and family-led practices such as delayed bathing, wrapping the neonate, hats and skin-to-skin care, kangaroo mother care etc.

There are very limited number of studies conducted on effect of cling wrap on body weight and temperature among LBW neonates. During our experiences we have seen the use of cling wrap in a few SNCU. So investigators felt need to conduct a study on this area.

Objectives of the study:-

1. To assess the body temperature of LBW neonates in cling wrap and non-cling wrap group.
2. To determine the effectiveness of cling wrap in terms of body temperature before and after the use of cling wrap in control and experimental group of LBW neonates.
3. To assess the weight of LBW neonates in cling wrap and non-cling wrap group.
4. To determine the effectiveness of cling wrap in terms of body weight before and after the use of cling wrap in control and experimental group of LBW neonates.
5. To find out the association between the level of thermoregulation and selected neonatal characteristics before and after the use of cling wrap in control and experimental group of LBW neonates.

Hypotheses

1. H_1-There is a significant difference in mean score of body temperature between experimental and control group after the application of cling wrap at 0.05 level of significance.
2. H_2- There is a significant difference in mean score of body weight between experimental and control group after the application of cling wrap at 0.05 level of significance.

Methods & Materials:-

Research design

Group	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6
Experimental	O_1	T	O_2	T	O_3	T	O_4	T	O_5	T	O_6
Control	O_1	--	O_2		O_3		O_4		O_5		O_6

Quantitative Experimental Research Approach" was selected. True experimental pre-test-post-test research design was used. A simple random sampling technique through lottery method was used to select the subjects. Record analysis performa, baby weighing scale & digital thermometer was used to collect data. Neonatal variables like gender, gestational age, birth weight, mode of delivery, APGAR score at 10 minutes and types of feeding were collected. Reliability of the record analysis performa was established by interrater reliability by two observers simultaneously. The value of r was 1, calibrated weighing machine and calibrated digital thermometer was used. Inclusion criteria were low birth weight babies who were hemodynamically stable, nursed under radiant warmer and whose parents are willing to give their consent for participation in this study. Exclusion criteria were low birth weight babies who were with congenital malformation, critically ill, under phototherapy, undergone surgery and having infection. In the present study low birth weight babies refers to those babies who was having birth weight less than2500 grams irrespective of gestational age and normothermia was 36.5-37.5ºc and hypothermia is below 36.5ºc. Pilot study was done before conducting final study. Final data collected from 60subjects (E=30 & C =30) from a SNCU of selected medical college of West Bengal during 01.01.2021 to 31.01.2021. Informed consent was taken from parents and institutional Ethics committee permission taken.

Intervention protocol:

Data related to neonatal variables were collected from babies' bed head ticket and case record sheet. The study carried out for six consecutive days for each neonate. On first day of observation body weight and axillaries temperature were measured for all neonates in both experimental and control group. After that cling wrap was applied to the bassinet of radiant warmer for neonates of experimental group and daily body weight was measured by digital baby weighing scale once in the morning and axillary temperature was measured by digital thermometer every 2 hourly from 8 am to 6 pm for all neonates in both experimental and control group for five consecutive days. Same weighing scale and same digital thermometer was used, same brand and material of cling wrap was applied to all babies in experimental group. Control group received only routine care in SNCU as per hospital protocol. Cling wrap was changed every morning and when it was torn.

Plan for data analysis:

Data related to neonatal variables are represented by frequency and percentage distribution table and data related to body temperature and body weight are represented through bar diagram, t test, line diagram. Chi square and Modified Fisher's exact test (Freeman-Halton extension)[5] for those 2*3 contingency tables where more than 20% cells have expected frequency less than 5 because categories also cannot be merged to determine the association between level of thermoregulation and selected neonatal characteristics.

Results:-

Table 1:- Frequency and percentage distribution of neonatal characteristics. n=60(n_c+n_e=30+30).

Variables	Control group (n_c=30)		Experimental group(n_e=30)	
	Frequency	Percentage	Frequency	Percentage
Gender				
Boy	15	50	14	46.67
Girl	15	50	16	53.33
Gestational age				
29-32 weeks	4	13.33	9	30
33-36weeks	21	70	13	43.33
≥37 weeks	5	16.67	8	26.67
Weight at birth				
1000-1499 grams	10	33.33	14	46.67
1500-2499 grams	20	66.67	16	53.33
Mode of delivery				
Normal vaginal delivery	22	73.33	18	60
Caesarean section	8	26.67	12	40
APGAR score at 10 minute				
4-6	15	50	19	63.33
7-10	15	50	11	36.67
Type of feeding				

Oro-gastric feeding	5	16.66	2	6.67
Katori-spoon feeding	14	46.67	19	63.33
Exclusive breast feeding	11	36.67	9	30

Table 2:- Comparison of mean and SD of body temperature and weight in control group and experimental group n=60 (n_c+n_e=30+30)

Parameters	Groups	Mean	SD	't' value	df	p value
Body temperature	Control	35.71	0.95	1.19	58	0.239
	Experimental	35.39	1.14			
Body weight	Control	1557.83	202.95	1.39	58	0.085
	Experimental	1479.83	236.59			

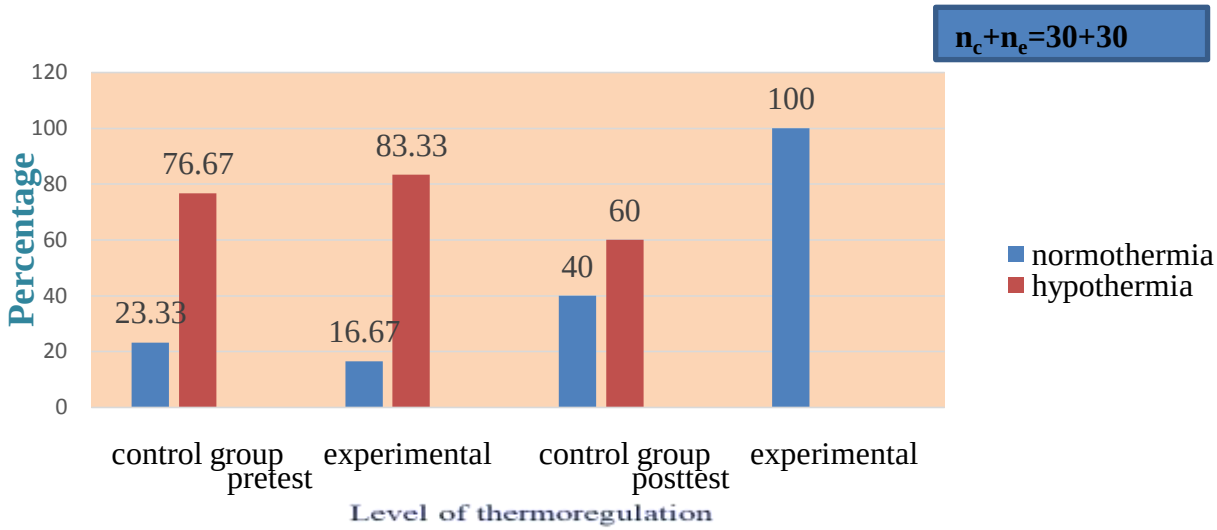

Figure-1:- Bar diagram showing the percentage distribution of pretest and posttest level of thermoregulation in control and experimental group of neonates.

Table 3:- Day wise comparison of Mean, SD, SE and t value of changes in body temperature (^{0}c) in control group and experimental group. n=60 (n_c+n_e=30+30).

Day	Group	Mean	SD	Mean Difference	SE	df	t value	p value
Day 1	Control group	36.37	0.46	0.36	0.09	58	**3.95***	**≤ 0.000**
	Experimental group	36.73	0.18					
Day 2	Control group	36.29	0.56	0.52	0.11	58	**4.75***	**≤ 0.000**
	Experimental group	36.8	0.19					
Day 3	Control group	36.29	0.49	0.58	0.10	58	**5.82***	**≤ 0.000**
	Experimental group	36.88	0.25					
Day 4	Control group	36.26	0.53	0.52	0.10	58	**5.10***	**≤0.000**

	Experimental group	36.79	0.19					
Day 5	Control group	36.25	0.46					
				0.53	0.09	58	**5.74***	**≤ 0.000**
	Experimental group	36.78	0.20					

* Significant at 0.05 level of significance

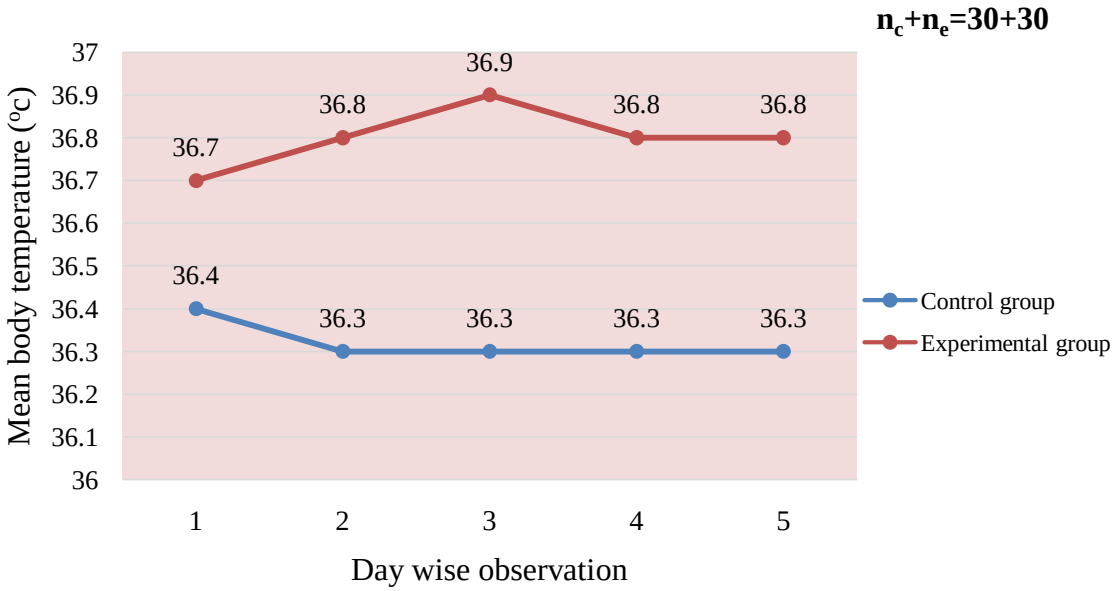

Figure 2:- Line diagram showing distribution of mean score of body temperature in control and experimental group from 1st day to 5th day.

Table 4:- Comparison of mean and SD of pre-test and post-test score of body temperature (^{0}c) between control group and experimental group n=60 ($n_c+n_e=30+30$).

Parameter	**Control group $n_c=30$ Mean ± SD**	**Experimental group $n_e=30$**	**t value**	**df**	**p value**
Body temperature Pre-test	35.71±0.95	35.39±1.14	1.19	58	0.239
Post-test	36.21± 0.43	36.79±0.16	**6.95***		**≤0.000**

* Significant at 0.05 level of significance

From table-4 we can say that null hypothesis is rejected and research hypothesis is accepted. It indicates that application of cling wrap is effective in maintenance of body temperature among LBW neonates.

Table 5:- Day wise comparison of Mean, SD and t value of body weight (grams) in control group and experimental group. n=60 ($n_c+n_e=30+30$).

Day	**Group**	**Mean± SD**	**df**	**t value**	**p value**
Day 1	Control group	1515.67±200.44	58	1.04	0.302
	Experimental group	1456.5±237.71			
Day 2	Control group	1488.17± 198.39	58	0.86	0.393
	Experimental group	1440.0±232.28			
Day3	Control group	1461.67±196.32	58	0.59	0.559
	Experimental group	1429.17±230.75			
Day 4	Control group	1444.0±198.25	58	0.48	0.633

	Experimental group	1417.17±232.84			
Day5	Controlgroup	1430.17±197.72	58	0.31	0.761
	Experimental group	1413.17±231.19			

Table 6:- Comparison of mean and SD of pre-test and post-test score of body weight (grams) between control group and experimental group. n=60 (n_c+n_e=30+30).

Parameter		Control group n_c=30 Mean ± SD	Experimental group n_e=30	t value	df	p value
Body weight	Pre-test	1557.83±202.95	1479.83± 236.59	1.39	58	0.085
	Post-test	1483.90± 199.61	1431.20±233.45	0.94		0.351

From table-6 we can say that null hypothesis is accepted and research hypothesis is rejected. It indicates that application of cling wrap is not effective in maintenance of body weight among LBW neonates.

Table 7:- Association between the pre-test level of thermoregulation and selected neonatal characteristics in control group of neonates. n_c=30.

Neonatal Characteristics	Normothermia	Hypothermia	Chi square value	df	p value
Gender					
Boy	5	10	1.677	1	0.195
Girl	2	13	0.745		0.388(With Yates correction)
Gestational Age (weeks)					
29-32	1	3	0.007	1	0.933
33- ≥37	6	20	0.303		0.582(With Yates correction)
Birth weight (grams)					
1000-1499	2	8	0.093	1	0.760
1500-2499	5	15	0.023		0.879
Mode of delivery					
Normal Vaginal Delivery	4	18	1.224	1	0.269
Caesarean Section	3	5	0.382		0.536(With Yates correction)
APGAR score at 10 min					
4-6	5	10	1.677	1	0.195
7-10	2	13	0.745		0.388(With Yates correction)
Type of feeding					
Exclusive breastfeeding	1	4	0.065		
Katori-Spoon feeding	1	13	(Modified Fisher's exact p value)		
Oro-gastric feeding	5	6			

Table 8:- Association between the post-test level of thermoregulation and selected neonatal characteristics in control group of neonates n_c=30.

Neonatal Characteristics	Normothermia	Hypothermia	chi square value	df	p value
Gender					
Boy	7	8	0.14	1	0.708
Girl	5	10			
Gestational Age (weeks)					
29-32	1	3	0.433	1	0.511
33≥37	11	15	0.012		0.913 (With Yates correction)
Birth weight (grams)					
1000-1499	1	9	5.625	1	**0.018***

1500-2499	11	9	3.906		**0.048*** (With Yates correction)
Mode of delivery					
Normal Vaginal Delivery	8	14	0.455	1	0.500
Caesarean Section	4	4	0.064		0.800(With Yates correction)
APGAR score at 10 min					
4-6	8	7	2.222	1	0.136
7-10	4	11	1		0.264(With Yates correction)
Type of feeding					
Exclusive breastfeeding	4	1			0.146
Katori-Spoon feeding	4	10			(Modified Fisher's exact p value)
Oro-gastric feeding	4	7			

* significant at 0.05 level of significance

Table 9:- Association between the pre-test level of thermoregulation and selected neonatal characteristics in experimental group of neonates n_e=30.

Neonatal Characteristics	**Normothermia**	**Hypothermia**	**Chi square value**	**df**	**p value**
Gender					
Boy	2	12	0.107	1	0.743
Girl	3	13	0.027		0.869(With Yates correction)
Gestational Age (weeks)					
29-32	1	8	0.286	1	0.593
33≥37	4	17	0.286		0.593(With Yates correction)
Birth weight (grams)					
1000-1499	2	12	0.107	1	0.743
1500-2499	3	13	0.027		0.869(With Yates correction)
Mode of delivery					
Normal Vaginal Delivery	2	16	1	1	0.317
Caesarean Section	3	9	0.25		0.617(With Yates correction)
APGAR score at 10 min					
4-6	3	16	0.029	1	0.865
7-10	2	9	0.115		0.735 With Yates correction)
Type of feeding					
Exclusive breastfeeding	1	1			0.510
Katori-Spoon feeding	3	16	(Modified Fisher's exact p value)		
Oro-gastric feeding	1	8			

Table 10:- Day wise comparison of Mean, SD and t value (related to weight loss in grams) in control group and experimental group. n=60 (n_c+n_e=30+30).

Day ⇓	**Group** ⇓	**Mean**	**SD**	**df**	**t value**	**p value**

Day 1	Control group	32.5	24.38	58	**2.12***	**0.039**
	Experimental group	19.67	22.55			
Day 2	Control group	23.33	16.37	58	1.82	0.074
	Experimental group	15.83	15.53			
Day 3	Control group	21.17	16.64	58	1.63	0.108
	Experimental group	14.33	15.79			
Day 4	Control group	17.67	9.89	58	1.29	0.202
	Experimental group	13.17	16.32			
Day 5	Control group	15.0	11.89	58	**2.29***	**0.025**
	Experimental group	7.83	11.01			

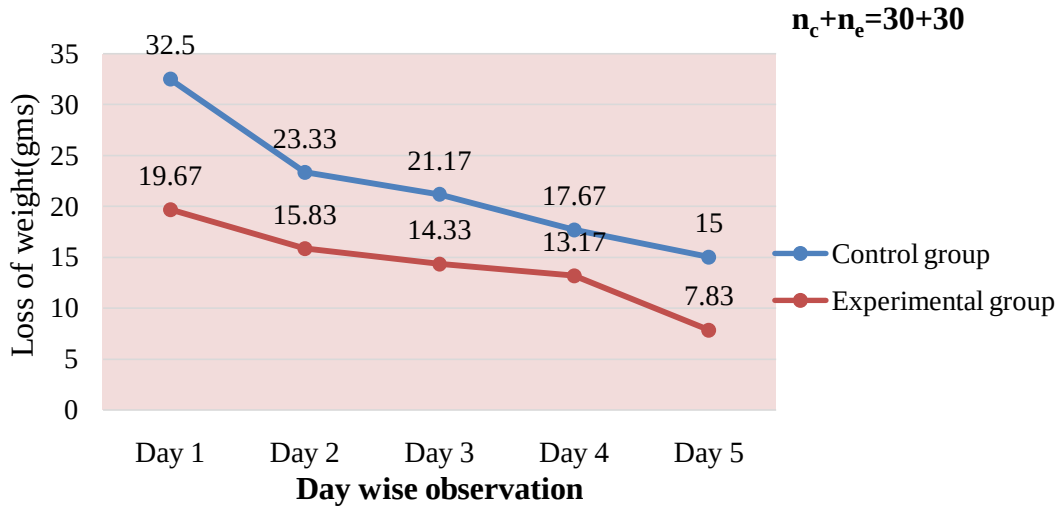

Figure 3:- Line diagram showing distribution of mean score of weight loss in control and experimental group from 1st day to 5th day.

Discussion:-

The results of the present study reflected that most of the subjects (83.33%) had hypothermia before use of cling wrap whereas 100% subjects are normothermic after application of cling wrap in experimental group. The findings of the present study are congruent with the findings of some studies[6,7] in which they reported that no subjects had hypothermia in cling wrap group. In addition, Oatley H K,Blencowe H, and Lawn J E[8] concluded that plastic wraps were associated with reduction in hypothermia.

On the other hand, the study conducted byMcCall E M,Alderdice F, Halliday H L et al[9] and Reilly M C, Rac VE, Zayack D et al[10] in which they concluded that fewer neonates in wrap group had hypothermia and this inconsistency may be due to differences in settings (temperature control) or neonatal characteristics.

The results of present study reveal that there is statistically significant difference present in body temperature between control and experimental group in day1,2,3,4 and5 at 0.05 level of significance which is evident from 't' value. The findings of the present study are consistent with the findings of the study conducted by Thakur S, Kumar Y, Chand S et al[11] which revealed that t value of axillary temperature of neonates were statistically significant at 0.05 level of significance for all five days.

This present study also exhibits that the difference in the mean score of body temperature between the control and experimental groups is statistically significant in post-test (t=6.95, p<0.000). This is supported by the study conducted by Thakur S, Kumar Y, Chand S et al[11 in] which they revealed the significant difference between the axillary temperature of non- cling wrap group and cling wrap group at 0.05 level of significance.

The findings of the present study also show that there is no significant difference in pre-test and post-test score of body weight in control group and experimental group. This is supported by the study conducted by Thakur S, Kumar Y, Chand S et al[11] which revealed that no significant difference was found in non- cling wrap group and cling wrap group at 0.05 level of significance.

The findings of present study reflect that there is no significant association between pre-test level of thermoregulation and selected neonatal characteristics in control and experimental group of neonates. The findings are consistent with the study conducted by Thakur S, Kumar Y, Chand S et al[11] which revealed that the computed chi square value was found to be non-significant. On the other hands, Amirtha J[12]reported that there is significant association between gestational age and APGAR score in pre-test level of thermoregulation. This inconsistency might be due to differences in neonatal characteristics.

In this study there is significant association between post-test level of thermoregulation and weight at birth in control group of neonates. The findings are not supported by other studies may be due to some differences in neonatal characteristics.

In addition, the present study also reveals that there is significant difference in weight loss between experimental group and control group. The findings are supported by the study conducted by Deorari A K, Kaushal M, Singal Aet al[3] where they found significant difference in cumulative weight loss between the Cling Wrap group and the Non Cling Wrap group. On the other hand, the study also found that weight loss in different days were less in experimental group than control group but it is not statistically significant. These findings are congruent with the other study conducted by Thakur S, Kumar Y, Chand S et al[11] which revealed that decrease in weight was less in cling wrap group as compared to non-cling wrap group.

This study has limitation too. Firstly, the study was limited to assessment of body temperature and weight only and other physiological parameters were not assessed. Secondly, axillary temperature was measured from 8 am to 6pm, not measured at night. Thirdly, subjects in both control and experimental group did not receive kangaroo mother care due to restriction of mother in COVID19 pandemic. So comparison could not be attempted to see whether cling wrap is more effective than kangaroo mother care or not. Fourthly, cling wrap might have effect on body weight if subjects were observed for extended period of time.

Conclusion:-

The study concluded that cling wrap is effective in reducing hypothermia and maintenance of body temperature whereas not effective in maintenance of body weight but it prevents weight loss to some extent among LBW neonates. Use of cling wrap might be an innovative intervention and a simple method for maintaining body temperature and preventing weight loss to some extent among LBW neonates and it requires minimal efforts for application.

Conflict of Interest:
None.

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