THE EFFECTIVENESS OF KANGAROO MOTHER CARE ON PHYSIOLOGICAL PARAMETERS AMONG THE PRETERM BABIES

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ABSTRACT:

Background: Preterm babies are often subject to many complications in the first few weeks of life due to immature body system. **Objectives:** The purpose of the study is to assess the pre and post test level of physiological parameters among preterm infants and to evaluate the effectiveness of KMC on level of physiological parameters among preterm infants. Moreover to correlate between the physiological parameters among preterm infants after KMC. **Methods:** It was a Quantitative research approach one group pre and post test design conducted among preterm babies in NICU selected by using convenience sampling technique. **Results:** Kangaroo Mother Care is not significantly improves pulse $(F = 6.13, P \leq 0.01)$ and temperature $(F = 7.46, P \leq 0.01)$ of preterm babies. The respiration $(F = 2.90, P > 0.05)$ and oxygen saturation $(F = 1.97, P > 0.05)$ has no significant changes. There is a significant improvement in the weight gain $(F = 5.69, P \leq 0.01)$ of the preterm. The KMC intervention was continued in the preterm babies even after discharge, so can able to see the difference in physiological parameters in preterm's during the follow up care. **Conclusion:** There is a significant difference in the physiological parameters in preterm babies with the KMC intervention. KMC has emerged as a non-conventional low cost method for newborn care that provides warmth, touch, and security to the newborn and is believed to coner significant survival benefit. .KMC is one of the most effective interventions for preventing mortality of LBW infants.

Keywords: Kangaroo Mother Care, Physiological parameter, Preterm babies, Prevalence

INTRODUCTION:

Low birth weight (LBW) infants, born preterm and/or small for gestational age, constitute about 15% of neonates, but account for 70% of all neonatal deaths. Reducing deaths in LBW infants, particularly in low- and middle- income countries (LMICs) in Asia, is therefore key to the achievement of the Sustainable Development Goal target of reducing neonatal mortality to <12/1000 live births in each country by 2030.[1-3]

Approximately 15 million neonates are born worldwide before completing their 37th gestational week. This means that one in every ten neonates is born prematurely. The preterm birth rate in 184 countries varies between 5 and 15%. One million neonates die yearly due to prematurity-related complications (WHO, 2018)[4]. Postpartum complications are more common in preterm deliveries than in term deliveries. The rate of resuscitation in the delivery room is higher in preterm neonates.

Preterm infants are vulnerable to many impediment and complications in the first few weeks of life due to immaturity of the body system. The structural and functional immaturity of neurobehavioral development of the preterm infants results dishevelment of nervous system, physiological function, stress and behaviour. Complications include respiratory problems, hypoglycaemia, sepsis, jaundice, thermoregulation problems, feeding problems, intracranial haemorrhage (ICH), and mortality.[5]

New born care techniques are advancing in day to day life. In spite of that advancement in new born care, a simple, low cost and effective method, i.e, Kangaroo mother care has been evolved in the last few decades. Kangaroo care is a technique of direct skin- to – skin contact between mothers (or fathers) and their premature infants. Kangaroo Mother Care is a powerful and cost effective method, by placing the preterm infants in a perpendicular position between the mother breasts. This is similar to marsupial care- giving, where the premature baby is kept warm in the maternal pouch and close to the breast for unlimited feeding. KMC has emerged as a non-conventional low cost method for newborn care that provides warmth, touch, and security to the newborn and is believed to coner significant survival benefit. .KMC is one of the most effective interventions for preventing mortality of LBW infants.[6] World Health Organization (WHO) [7] guidelines currently recommend initiation of short intermittent Kangaroo Mother Care sessions when the infant's condition begins to stabilize, and continuous Kangaroo Mother Care when fully stable. It has shown to improve the mother's psychological state, strengthen mother and infant bonding and stimulate maternal lactation.[8]

Studies have shown that kangaroo care is effective in regulating the body temperature of the newborn , reduces stress levels (cortisol), regulates heart rate (HR) , the mother's blood pressure, and the infant's respiratory rate (RR)[9] has a positive effect on the infant's oxygen saturation (SpO2) values, and helps to cope better with pain.[10] It has been reported that neonates treated with KMC are calm, cry less, fall asleep faster, and sleep longer than those cared for without Kanagaroo mother care. KMC also contributes positively to breastfeeding.[11] It has also positively increased parental satisfaction and parent-infant attachment.

Optimum levels of vital signs of premature neonates receiving care at the Neonatal Intensive Care Unit (NICU) are essential in terms of health indicators of neonates. Vital signs provide information on the state of infants and give significant information regarding the presentation and planning of care. It has been emphasized that KMC has positive contributions to mothers and neonates. Examination of the literature revealed similar systematic review and meta-analysis studies on KMC.[12]

MATERIALS AND METHODS:

Study design and setting: This is a Quantitative research study undertaken in the NICU at Apollo Women's hospital, Chennai for a period of three month.

Ethical approval: The Institutional Review Board of Apollo Hospitals, Chennai accepted the protocol for this study under reference number AMH-C-S-062/12-22. Permission to conduct the study was obtained in advance from the competent authority of AMH and HOD of our hospital. The study was explained to participants in their native language, and consent was obtained orally and in writing. Confidentiality will be maintained throughout the study

Sample criteria:

The sampling technique used was non probability convenience sampling and the sample size was 30.The inclusion criteria were as follows: A)The Preterm babies with gestational age of 28-37 weeks, B)Preterm babies whose birth weight <2500 grams C)Preterm babies who are hemodynamically stable who are admitted in NICU at Apollo Cradle Hospitals, Chennai. The exclusion criteria is Preterm babies whose mothers are affected with contagious disease and also Mother of preterm infants who are not willing to provide Kangaroo Mother Care.

TOOLS FOR DATA COLLECTION:

The tool consisted of two parts data collection tool and intervention tool. The data collection tool used in this study was structured interview schedule and medical record review for demographic data, WHO guidelines was used to assess the level of physiological parameters of the preterm infants

Section A: Assessment of Demographic Variables.

Section B: Assessment of Physiological parameters based on WHO guidelines.

STATISTICAL ANALYSIS:

Descriptive statistics were used to describe and synthesize data. Frequency, percentage, mean and standard deviation were used under descriptive statistics. Inferential statistics is used derive the association between KMC and physiological variables.

RESULTS:

KMC has emerged as a non-conventional low cost method for newborn care that provides warmth, touch, and security to the newborn and is believed to coner significant survival benefit

Table 1: DEMOGRAPHIC VARIABLES FOR PRETERM BABIES

		Number of babies	%
GESTATIONAL AGE	28-32 weeks	6	20.00%
	33-34 weeks	11	36.67%
	35-37 weeks	13	43.33%
Gender	Male	20	66.67%
	Female	10	33.33%
Birth weight	<1.50 kg	7	23.33%
	1.50-2.00 kg	8	26.67%
	2.01-2.50 kg	7	23.33%
	>2.50 kg	8	26.67%
Weight Of The Preterm Infant In The Day Of Pre-test	<1.50 kg	3	10.00%
	1.50-2.00 kg	13	43.34%
	2.01-2.50 kg	7	23.33%
	>2.50 kg	7	23.33%
Birth order	Elective LSCS	11	36.67%
	Emergency LSCS	13	43.33%
	NVD	6	20.00%
Mode of feeding	DBM	14	46.67%
	EBM,DBM	5	16.66%
	EBM,OGT	11	36.67%
DURATION OF HOSPITAL STAY	< 1 week	17	56.67%
	1-2 weeks	3	10.00%
	3-4 weeks	3	10.00%
	> 4 weeks	7	23.33%

Above table shows the demographic information of preterm babies those who are participated for the following study on "A study to assess the effectiveness of Kangaroo Mother Care on physiological parameters among the preterm babies in a selected hospital".

Table 2: Demographic variables for mothers

		Number of mothers	Column N %
Age Of The Mother	21-25 years	6	20.00%
	26-30 years	18	60.00%
	31-35 years	6	20.00%
Education Level Of The Mother	Schooling	1	3.33%
	UG	21	70.00%
	PG	8	26.67%
Occupation Of The Mother	Home maker	5	16.67%
	House wife	12	40.00%
	Working	13	43.33%
Parity Of The Mother	G1P1	2	6.67%
	G2A1	5	16.67%
	G2P1L1	4	13.33%
	G3A2	1	3.33%
	G3P1A1	3	10.00%
	Primi	15	50.00%
Position Of The Mother During KMC	Sitting	30	100.00%
Communication Of The Mother With Preterm During KMC	Yes	30	100.00%
	No	0	0.00%
Total feeds per day	8	2	6.67%
	10	12	40.00%
	12	16	53.33%
Previous Information About KMC	Yes	15	50.00%
	No	15	50.00%

Above table shows the demographic information of preterm babies mothers those who are participated in this study.

Assessment of Physiological parameters based on WHO guidelines:

Objective 1: To assess the pre and post test level of physiological parameters among preterm infants.

Table 3: Comparison of Day wise mean Temperature score in morning and Evening

	Morning(pre-test)		*Evening(post-test)*		Mean difference	Paired t-test
	Mean	*SD*	*Mean*	*SD*		
DAY1	97.49	1.00	97.42	0.84	-0.07	t=0.39 p=0.69 (NS)
DAY2	97.57	0.87	97.95	0.70	0.38	t=1.85 p=0.07 (S)
DAY3	97.85	0.70	98.05	0.54	0.20	t=1.47 p=0.15 (NS)

Above table shows the Comparison of mean Temperature score in morning and evening. Statistically there is no significant difference. It was confirmed using student paired t-test.

Table 4: Comparison of Day wise mean Pulse score in morning and Evening

	Pre-test		*Post-test-*		Mean difference	Paired t-test
	Mean	*SD*	*Mean*	*SD*		
DAY1	145.00	7.00	145.43	7.12	0.40	t=0.63 p=0.54 (NS)
DAY2	146.83	6.89	148.47	5.93	1.30	t=1.17 p=0.25 (NS)
DAY3	148.73	6.29	149.33	6.33	0.60	t=0.71 p=0.48 (NS)

Above table shows the Comparison of mean Pulse score in morning and evening. Statistically there is no significant difference **.** It was confirmed using student paired t-test.

Table 5: Comparison of Day wise mean Respiration score in morning and Evening

	Morning		*Evening*		Mean difference	Paired t-test
	Mean	*SD*	*Mean*	*SD*		
DAY1	45.33	7.09	46.20	5.24	0.87	t=0.87 p=0.39 (NS)
DAY2	47.40	5.56	47.93	5.86	0.52	t=0.36 p=0.72 (NS)
DAY3	48.07	5.60	48.67	6.53	0.60	t=0.39 p=0.70 (NS)

Above table shows the Comparison of mean Respiration score in morning and evening. Statistically there is no significant difference**.** It was confirmed using student paired t-test.

Table 6: Comparison of Day wise mean Oxygen saturation score in morning and Evening

	Morning		Evening		Mean difference	Paired t-test
	Mean	SD	Mean	SD		
DAY1	97.33	1.45	97.83	1.42	0.50	t=0.87 p=0.39 (NS)
DAY2	97.67	1.52	98.17	1.12	0.50	t=0.36 p=0.72 (NS)
DAY3	98.10	1.47	98.50	1.50	0.40	t=0.39 p=0.70 (NS)

Above table shows the Comparison of mean Oxygen saturation score in morning and evening. Statistically there is no significant difference. It was confirmed using student paired t-test.

Table 7: weight score During DAY1, DAY2 and DAY3

	Day1		Day2		Day3	
	Mean	SD	Mean	SD	Mean	SD
Weight(kg)	2.07	0.40	2.21	0.40	2.27	0.43

Considering Weight score, Day 1 it is 2.07 kg, Day 2 it is 2.21 kg and in day 3 it is 2.27

> Objective 2: To evaluate the effectiveness of KMC on level of physiological parameters among preterm infants.

Table 8: Comparison of Temperature score During DAY1, DAY2 and DAY3

	Day1		Day 2		Day 3		Mean difference	One-way Repeated measures ANOVA F-test
	Mean	SD	Mean	SD	Mean	SD		
Moring	97.49	1.00	97.57	0.87	97.85	0.70	0.36	F=3.71 p=0.05* (S)
Evening	97.42	0.84	97.95	0.70	98.05	0.54	0.63	F=7.46 p=0.01** (S)

Cconsidering morning temperature, Repeated measures F-test analysis shows that, mean overall Temperature score is statistically significant different between DAY1 and DAY3 (F = 3.71, P $\leq$ 0.05).

Considering evening temperature , Repeated measures F-test analysis shows that, mean overall Temperature score is statistically significant different between DAY1 and DAY3 (F = 7.46, P $\leq$ 0.01).

Therefore, we can conclude that a Kangaroo Mother Care nursing interventions improves significantly temperature score of preterm babies.

Table 9: Comparison of Pulse score During DAY1, DAY2 and DAY3

	Day1		Day 2		Day 3		Mean difference	One-way Repeated measures ANOVA F-test
	Mean	SD	Mean	SD	Mean	SD		
Moring	145.00	7.00	146.83	6.89	148.73	6.29	3.73	F=4.70 p=0.01** (NS)
Evening	145.43	7.12	148.47	5.93	149.33	6.33	3.90	F=6.13 p=0.01** (N)

Fig 9 considering morning pulse , Repeated measures F-test analysis shows that, mean overall Pulse score is statistically significant different between DAY1 and DAY3(F = 4.70, P ≤ 0.05).

Considering evening pulse , Repeated measures F-test analysis shows that, mean overall Pulse score is statistically significant different between DAY1 and DAY3 (F = 6.13, P ≤ 0.01).

Therefore, we can conclude that a Kangaroo Mother Care nursing interventions improves significantly pulse score of preterm babies.

Table 10: Comparison of Respiration score During DAY1, DAY2 and DAY3

	Day1		Day2		Day3		Mean difference	One-way Repeated measures ANOVA F-test
	Mean	SD	Mean	SD	Mean	SD		
Moring	45.33	7.09	47.40	5.56	48.07	5.60	2.74	F=2.90 p=0.06 (NS)
Evening	46.20	5.24	47.93	5.86	48.67	6.53	2.47	F=2.46 p=0.10 (NS)

Tab: 10 considering morning Respiration , Repeated measures F-test analysis shows that, mean overall Respiration score is not statistically significant different between DAY1 and DAY3(F = 2.90, P > 0.05).

Considering evening pulse , Repeated measures F-test analysis shows that, mean overall Respiration score is not statistically significant different between DAY1 and DAY3 (F = 2.46, P > 0.05).

Therefore, we can conclude that a Kangaroo Mother Care nursing interventions not improves significantly Respiration score of preterm babies.

Table 11: Comparison of Oxygen saturation score During DAY1, DAY2 and DAY3

	Day1		Day2		Day3		Mean difference	One-way Repeated measures ANOVA F-test
	Mean	SD	Mean	SD	Mean	SD		
Moring	97.33	1.45	97.67	1.52	98.10	1.47	0.77	F=2.38 p=0.10 (NS)
Evening	97.83	1.42	98.17	1.12	98.50	1.50	0.67	F=1.97 p=0.15 (NS)

Tab: 11 considering morning Oxygen saturation , Repeated measures F-test analysis shows that, mean overall Oxygen saturation score is not statistically significant different between DAY1 and DAY3(F = 2.38, P > 0.05).

Considering evening pulse , Repeated measures F-test analysis shows that, mean overall Oxygen saturation score is not statistically significant different between DAY1 and DAY3 (F = 1.97, P > 0.05).

Therefore, we can conclude that a Kangaroo Mother Care nursing interventions not improves significantly Oxygen saturation score of preterm babies.

Table 12: Comparison of weight score During DAY1, DAY2 and DAY3

	Day1		*Day2*		*Day3*		**Mean difference**	**Oneway Repeated measures ANOVA F-test**
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*		
Weight(kg)	2.07	0.40	2.21	0.40	2.27	0.43	0.20	**F=5.69** **p=0.01** (S)

Tab: 12 considering morning Weight, Repeated measures F-test analysis shows that, mean overall Weight score is statistically significant different between DAY1 and DAY3(F = 5.69, P ≤ 0.01).

Therefore, we can conclude that a Kangaroo Mother Care nursing interventions improves significantly Weight score of preterm babies.
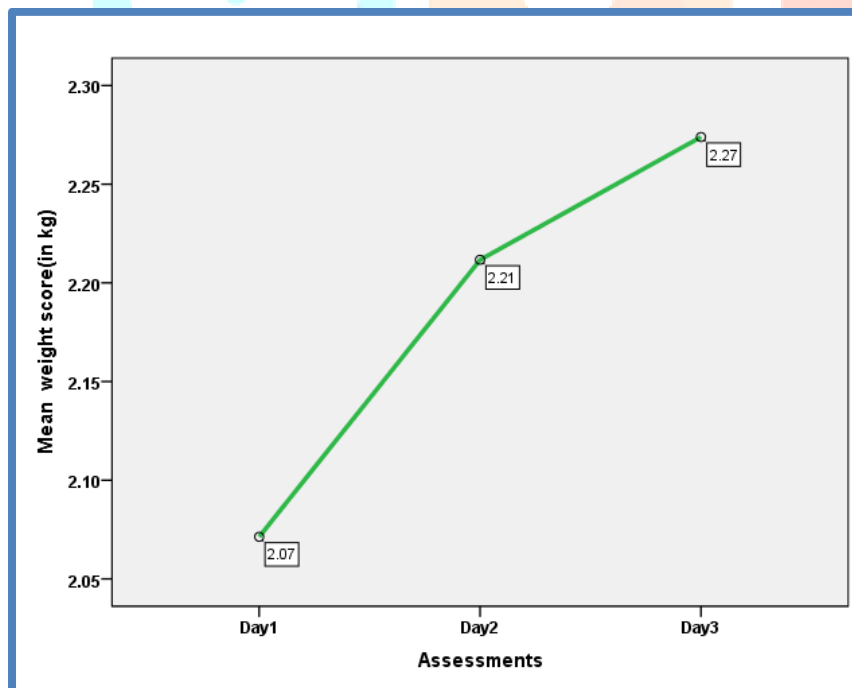

Fig1: Line graph compares the babies Weight score during Day1, Day2 and Day3

Objective 3; To correlate between the physiological parameters among preterm infants after KMC.

Table 13: Correlation between Temperature gain score, pulse gain score, Respiration gain score, oxygen saturation gain score and weight gain score

Correlation between	Mean gain score Mean±SE	Karl Pearson Correlation coefficients	Interpretation
Temperature gain score Vs **pulse gain score**	0.36±0.23 3.30±1.05	r= 0.39 P=0.05*	There is a significant positive fair correlation between Temperature gain score and pulse gain score. It means Temperature gain increases their pulse gain score also increases fairy
Temperature gain score Vs **Respiration gain score**	0.36±0.23 2.73±1.36	r= 0.27 P=0.05*	There is a significant positive fair correlation between Temperature gain score and respiration gain score. It means Temperature gain increases their respiration gain score also increases fairy
Temperature gain score Vs **oxygen saturation gain score**	0.36±0.23 0.77±0.33	r= 0.25 P=0.11	There is not significant positive fair correlation between Temperature gain score and oxygen saturation gain score. It means Temperature gain score increases their oxygen saturation gain score. also increases fairly
Temperature gain score Vs **Weight gain score**	0.36±0.23 0.20±0.08	r= 0.38 P=0.03*	There is a significant positive fair correlation between Temperature gain score and weight gain score. It means Temperature gain score increases their weight score also increases fairly
pulse gain score Vs **Respiration gain score**	3.30±1.05 2.73±1.36	r= 0.21 P=0.26	There is no significant positive poor correlation between pulse gain score and respiration gain score. It means pulse gain score increases their respiration score also increases poorly
pulse gain score Vs **oxygen saturation gain score**	3.30±1.05 0.77±0.33	r= 0.20 P=0.28	There is no significant positive poor correlation between pulse gain score and oxygen saturation gain score. It means pulse gain score increases their oxygen saturation score also increases poorly
pulse gain score Vs **weight gain score**	3.30±1.05 0.20±0.08	r= 0.24 P=0.05*	There is a significant positive fair correlation between pulse gain score and weight gain score. It means pulse gain score increases their weight score also increases moderately

oxygen saturation gain score Vs **Respiration gain score**	0.77±0.33 2.73±1.36	r= 0.13 P=0.46	There is no significant positive poor correlation between oxygen saturation gain score and respiration gain score gain score. It means oxygen saturation gain score increases also respiration gain score also increases.
oxygen saturation gain score Vs **weight gain score**	0.77±0.33 0.20±0.08	r= 0.14 P=0.24	There is no significant positive poor correlation between oxygen saturation gain score and weight gain score. It means oxygen saturation gain increases their weight gain score also increases moderately
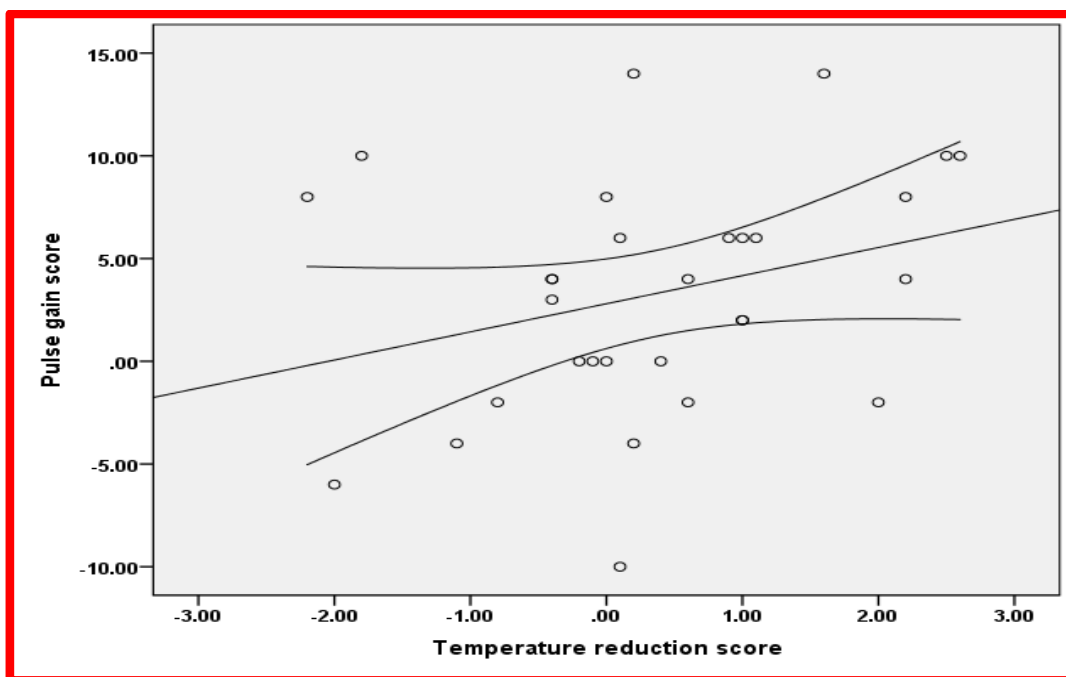
Fig 2: Scatter diagram with regression estimate shows the moderate positive correlation(r=0.39 P≤0.05) coefficient between temperature gain score and pulse gain score.
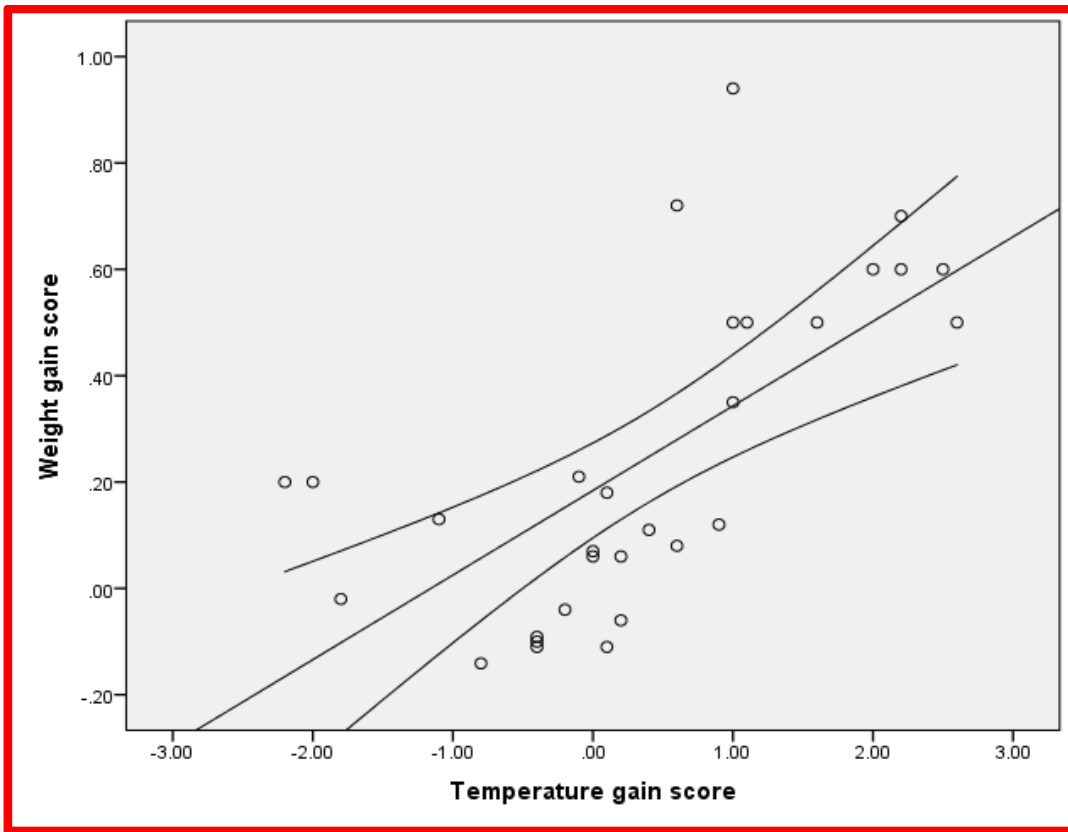
Fig 3: Scatter diagram with regression estimate shows the moderate positive correlation(r=0.45 P≤0.05) coefficient between temperature gain score and weight gain score
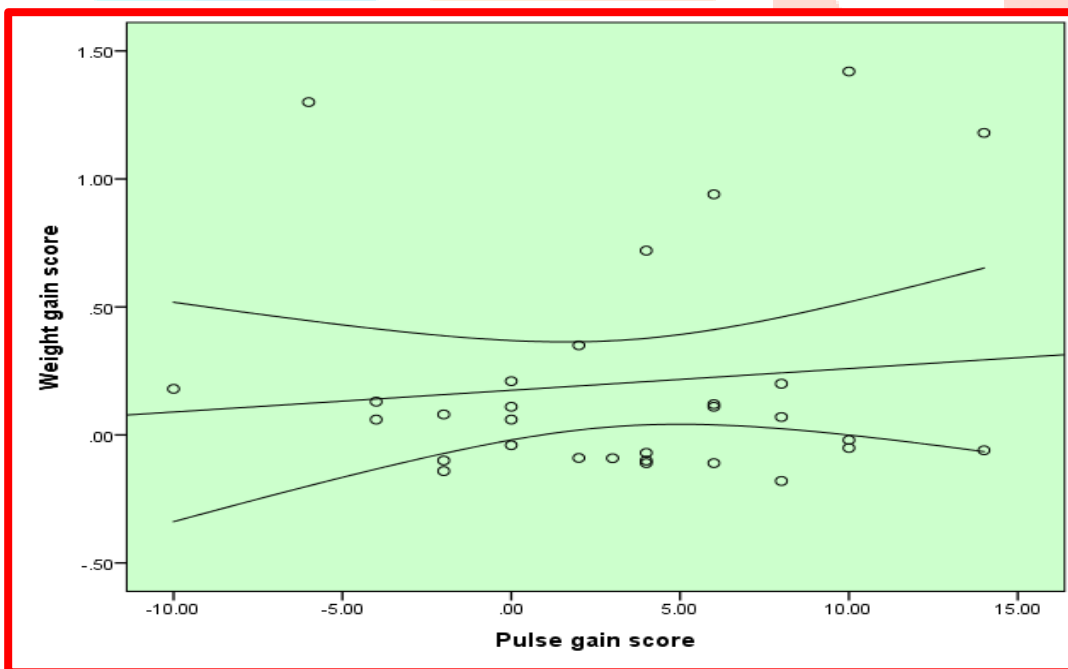

Fig 4: Scatter diagram with regression estimate shows the moderate positive correlation(r=0.21 P≤0.05) coefficient between pulse gain score and weight gain score

CONCLUSION:

The findings proved that the KMC for three consecutive days was effectively improving the physiological parameters among preterm infants. . The health care providers in their practice while caring for the preterm infants in the NICU, postnatal ward and home settings can utilize KMC. Hence, it can be used as a simple, cost effective, motherly based nursing measure for improving the physiological parameters of the preterm infants and it can used as a routine care of preterm infants.

IMPLICATIONS:

The nurse can adopt KMC as a safe, secure and comfortable daily nursing practice for all stable preterm infants as well as term infants at their clinical areas of practice. The nurse educator can incorporate the major study findings in the nursing curriculum at various levels to develop and well equip the staff nurses in the NICU's in order to identify and improve the immaturity levels of preterm infants. The findings of the study can be disseminated to the nurses working in various institutions and student nurses through media and also can train their mothers as a part of preterm care to improving the physiological parameters home settings. The nurse administrator should take initiation in organizing CNE, conferences and workshop on various trends of KMC on level of physiological parameters in order to reduce the complication among preterm infants. The nurse researcher can generalize the study results by replicating the study with larger population.

Author Contributions:

All authors have read and approved this work, and all authors have met the requirements for authorship. Each contributor feels that the document represents honest labour and that the information contained inside has not been previously published.

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