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A Systematic Assessment of The Impact of Kangaroo Mother Care on Preterm Infants' Physiological Characteristics

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ABSTRACT

Introduction: The systematic review highlights that Kangaroo Mother Care positively that impacts physiological parameters in preterm neonates. It shows that Kangaroo Mother Care improves vital signs, with one-hour or shorter session's significantly enhancing temperature and oxygen saturation.

Aim: The systematic review aims to evaluate, effectiveness of KMC on preterm neonates and its physiological parameters.

Method: Digital resources including PubMed, Embase, the Cochrane Library, Scopus, and CINAHL were thoroughly searched. Searching for relevant MeSH source terms and KMC infant keywords, including preterm and low birth weight infants. Only English-language research published between 2013 and 2023 is included in the search. For more sources, the reference lists of pertinent papers and systematic reviews are examined.

Results: Initially, 120 studies that met the searching strategies in the said databases. Meta-analysis was used in the study and data used were based on the criteria meant the present research. The synthesized findings on respiratory rate, heart rate variability, and temperature regulation among preterm neonates receiving KMC are compared to conventional care or differing initiation timings. The **results** show that, especially with one-hour or shorter sessions, it has a considerable good impact on newborns' vital signs, including temperature and oxygen saturation. The findings emphasize the importance of KMC as a simple yet effective intervention in neonatal care. Future research should explore optimal durations and frequencies to maximize its benefits.

1. INTRODUCTION

A new born baby in a family gives happiness and it is expected to have baby by most of the family. In the field of medical there are subjects with and without any challenge among the new born. In health care management the preterm neonates are considered with a challenge. In 2017, 2.5 million deaths occurred within the first 28 days of life, according to a data released by the World Health Organization. The WHO data clears that any birth before 37 weeks of gestation

Could lead to death. Across the country there are nearly 30 million preterm neonates are born every year. These preterm neonates are facing risks, premature birth and low birth weight (LBW).

Among the challenges of preterm neonates there are new born that are considered as complication with high risk factors.

The complication might be due to various reasons such as

- Development of fetal
- Risk during labour
- Risk during birth
- Mother's health condition
- Mother's pregnancy condition
- Often born prematurely

In such high risk situation there are possibilities for birth to be as a preterm with LBW and it is considered as challenging factors for all involved in health care management. The preterm infants are not fully developed in mother womb. These preterm infants are physiologically or developmentally un prepared in mother womb hence an extra care is to be provided

by the health care management. Hence there is a need for effective interventions among the preterm neonates to reduce the mortality and improve the long term health conditions.

Background of the Study

An intervention called Kangaroo Mother Care aims to improve the health of premature newborns. KMC, which was first developed in Colombia in the late 1970s, involves the mother and infant making skin-to-skin contact in order to promote breastfeeding, bonding, and heat regulation. Research has demonstrated that Kangaroo Mother Care improves physiological factors like respiratory stability, heart rate variability, and temperature regulation in preterm infants in addition to lowering neonatal death and morbidity rates. Notwithstanding its established advantages, more research is necessary to determine the precise degree to which Kangaroo Mother Care improves particular physiological indicators. This can be done by doing a thorough analysis of the literature already in publication.

Objective

To determine how well Kangaroo Mother Care works for preterm newborns with elevated physiological parameters

2. METHODOLOGY

Search Strategy

A systematic search was administered in various electronic databases including PubMed, Empatha, Scopus, Cochrane Library, and CINAHL.. The data collection strategy has been included with the combinations of Medical Subject Headings (MeSH). In search of required data the terms and keywords related to a) kangaroo mother care, b) preterm infants, c) low birth weight, and e) relevant variations were used to obtain. The search is limited to studies published in English, In obtaining more possibilities of data the reference lists in relevant articles were considered. Systematic reviews will be hand-searched to identify additional studies.

Inclusion Criteria of Data

- Participants: Preterm born before 37 weeks of gestation
- Intervention: Research contrasting early versus late KMC initiation or KMC with traditional treatment.
- Results: Research that reports physiological characteristics such heart rate variability, respiration rate, and temperature regulation.

Exclusion Criteria of Data

- Non-randomized controlled trials (RCTs) include case reports and observational research.
- Research study that are involving interventions other than KMC.
- Research study that are not reporting relevant physiological parameters.

3. METHODS

Quality assessment: The Cochrane Risk of Bias tool is used in this study. The Cochrane Risk of Bias tool is used to evaluate the quality of RCTs. Blinding of participants, allocation concealment, blinding of result assessment, blinding of random sequence generation, selective reporting, insufficient outcome data, and other research biases have all been assessed by the instrument.

Data synthesis: A narrative synthesis of findings has been conducted for summarize the study characteristics and outcomes related to physiological parameters. If feasible and appropriate, meta-analysis using random-effects models will be performed to pool data on specific physiological outcomes across studies. Subgroup analyses will be considered based on factors such as timing of KMC initiation or gestational age categories, if sufficient data are available and heterogeneity is manageable.

AUTHOR NAME/YEAR	TITLE	Design/sample selection Method	Population studied /exposure Sample size	Duration	Week	weight	Outcome
Nahed Saied Mohammed El (2013)	Effect of Kangaroo Mother Care on Premature Infants' Physiological, Behavioural and Psychosocial Outcomes	Quasi-experimental study. A purposive sample Technique	50 Study -25 Control-25	three days per week	34 -≤ 36 weeks and < 32 weeks	2000 - <2500 grams	Compared to those receiving traditional care, KMC successfully and favorably improved the physiological stability, behavioral organization, and psychosocial outcomes of preterm infants. .
Chandralekha NandhiniP (2017)	Effectiveness of Kangaroo Mother Care on Level of Physiological Parameters among Preterm Infants	Quasi experimental pre and post-test research design Purposive sample Technique	60 Study -30 Control-30	30 minutes for three consecutive days,	26-36 weeks	1500 grams	The findings showed that giving preterm newborns Three days of thirty minutes of kangaroo mother care a row improved their physiological characteristics. Therefore, for stable preterm newborns in the hospital, this KMC time can be incorporated into standard nursing care.
Bera, Alpanamayi Ghosh (2014)	Effect of Kangaroo Mother Care on Vital Physiological Parameters	Quasi - experimental study. Purposive sample Technique	60 Study -30 Control-30	1 hour for three consecutive days	26 to 36 weeks)	<2500 g	On all three days, babies who received KMC demonstrated a slight but statistically significant improvement in key physiological markers. Therefore, the KMC approach can provide better care for LBW babies without the need for specialized equipment. These results provide credence to the strategy's broader use.
Godratalah Roshanaei (2017)	The effect of kangaroo mother care on physiological parameters of premature infants in	Study design: quasi-experimental study. Methods: convenience sampling. Data analysis was performed by SPSS 19 software using descriptive and inferential statistics (Independent t - test, Paired t-test, Chi-square, ANOVA)	50 Study -25 Control-25	7 days	34-36 weeks	less than 2500 grams,	The physiological indicators were considerably improved by Kangaroo Mother Care in comparison to the control group. Premature new-born's, including temperature, arterial blood oxygen saturation, heart rate, and respiration rate ($p < 0.001$). According to these findings, KMC is helpful and ought to be a regular part of care for premature babies. .
Nadia Medany Mohammed Feb/2020	Effect of Using Kangaroo Mother Care on the Sleep State and Physiological Parameters among Preterm Neonates	Quasi experimental study. convenience sampling	60 Study -30 Control-30	Not mentioned	32-<37 weeks	2000-3000grams	Temperature, arterial blood oxygen saturation, heart rate, and respiration rate were among the physiological characteristics of premature babies that were significantly improved by Kangaroo Mother Care (KMC) in comparison to the control group ($p < 0.001$). According to these findings, KMC is helpful and ought to be a regular part of care for premature babies. .
Shamrock Mehrpisheh (2022)	The Effectiveness of Kangaroo Mother Care on attachment of mothers with premature infants	Stratified random sampling	100 Study -50 Control-50	30 minutes	Less than 37 weeks,		In conclusion, Kangaroo Mother Care has been shown to have comprehensive benefits for both mothers and infants. It significantly improves maternal attachment (47.7 ± 2.9 vs. 40.4 ± 5.4, $P = 0.003$), increases breastfeeding rates (10.6 ± 1.8 vs. 8.2 ± 1.6, $P = 0.000$), and enhances weight gain in premature infants at

							discharge (2164.4 ± 481.1 vs. 1965.2 ± 372, P = 0.042).
Dr. Rajwant Kaur (2022)	A Study to assess the Evaluate The Effectiveness Of Kangaroo Mother Care On The Physiological Parameters Of Neonates	Study design: quasi-experimental study. Methods: convenience sampling	60 Study -30 Control-30	3days/60 minutes	34 to 36 weeks'	> 1500-1800 grams	Results: The majority of newborns (99.33%) weighed between 1500 and 1600 grams at birth, according to the study. The mean temperature, heart rate, respiratory rate, and oxygen saturation levels were significantly increased after Kangaroo Mother Care (KMC) in comparison to pre-intervention values. With a noteworthy f value of 19.56* for temperature in the experimental group against 1.92NS in the control group, the experimental group showed greater mean differences in these parameters than the control group.
Sejalsolanki, Prachi (2022)	A Study to Evaluate Effectiveness of Kangaroo Mother Care on Physiological Parameters of Premature Babies	quasi-experimental pre-test and post-test design with control group Sampling Technique: Non probability purposive sampling technique.	60 Study -30 Control-30	Not mentioned	32-above 36 weeks	1500-2500 gramsA bove	According to a survey, the majority of preterm newborns There was a noticeable increase in weight during kangaroo mother care. Samples grew accustomed to their surroundings, felt at ease, and reported contentment. It is determined that kangaroo mother care is a straightforward and successful method of balancing physiological parameters.
Pratibha Thakur (2021)	Effect of Kangaroo Mother Care on Physiological Parameters of Low Birth Weight Babies Admitted in NICU	Quasi experimental one group pre test post test design was conducted. purposive sampling	60 Study -30 Control-30	one hour, three sessions per day for three consecutive days	Not mentioned	1200-(<2000g m)	The study's conclusions demonstrated the statistical disparities between the pre- and post-KMC implementation periods. On days 1, 2, and 3, there was a significant difference ($p \leq 0.05$) between the physiological measures (temperature, respiration rate, heart rate, and SpO2) averages under radiant warmer and during KMC.
Suchismita Pahantasingh (2022)	Effect of Kangaroo Mother Care on Physiological Parameters of Low Birth Weight Neonates in Selected Hospital of Bhubaneswar.	Quantitative Experimental research approach Quasi experimental one group pre-test post-test design.	60 Study -30 Control-30	30 minutes/2days	34-36 weeks	less than 2500 grams,	After KMC, the average body temperature was 36.19, higher than it was prior to KMC (35.81). Compared to the pre-KMC mean of 60.1, the post-KMC mean of 61.41 was clinically successful. The mean of Heart Rate (after) was 141.16 which was also more than the before (139.58) KMC and Similarly the Oxygen Saturation mean value after the KMC was 97.90, it was also more clinically significant than the before (97.16) KMC.
Dr. Saniya Susan I (2023)	Quasi experimental study to assess the effectiveness of Kangaroo Mother Care on physiological parameters of low birth weight babies at selected District Hospitals	Non Probability purposive of sampling technique |	60 Study -30 Control-30	30 minutes/2 times	37 week	2500grams	The study's conclusions showed that low birth weight kids in the experimental group had better physiological parameter outcomes than those in the control group following intervention. Thus, among low birth weight newborns, a strong correlation between the experimental and control groups was observed in the level of parameters.

4. RESULT

A systematic research design is made to review the impact of Kangaroo Mother Care on physiological parameters among preterm neonates. A total of 120 records were initially identified through searches across multiple databases. After screening, 120 full-text publications were assessed for eligibility; 80 research articles were excluded for various reasons such as not reporting infant physiological outcomes, lacking a comparison group , and insufficient data on measured effects . Additionally, two review articles, three studies with fewer than 10 participants, and eight studies without outcomes specific to preterm infants were excluded. Ultimately, 40 studies were eligible with the criteria to conduct the meta-analysis, which synthesized findings on respiratory rate, heart rate variability, and temperature regulation among preterm neonates receiving KMC compared to conventional care or differing initiation timings.

Overview of Studies The systematic review included twelve quasi-experimental studies assessing the impact of Kangaroo Mother Care on physiological parameters among preterm neonates. These studies were conducted across various settings, including hospitals in Egypt, India, Iran, and other countries. Participants were mostly preterm neonates who were born between 26 and 36 weeks of gestation and were classed as low birth weight (<2500 grams). Sample sizes varied. Data were gathered using physiological measurements like heart rate, respiration rate, temperature, and oxygen saturation, as well as

observer evaluations and maternal attachment scales. Methodologies varied from convenience sampling to selective sampling strategies.

Effectiveness of KMC on Physiological Parameters Across the reviewed studies, Kangaroo Mother Care consistently demonstrated positive effects on physiological parameters of preterm neonates. Studies by El-Nagger et al. (2013), Chandralekha et al. (2017), and Parisa et al. (2017) reported improvements in physiological stability, respiratory rates, heart rates, and temperature regulation among infants receiving Kangaroo Mother Care compared to those under conventional care. Bera et al. (2014) and Medany et al. (2020) highlighted significant enhancements in vital signs and sleep patterns, emphasizing KMC's role in improving overall health outcomes. Shahrokh et al. (2022) and Kaur et al. (2022) further supported these findings, demonstrating increased maternal attachment and breastfeeding rates alongside physiological improvements.

Comparison with Conventional Care The studies consistently indicated that Kangaroo Mother Care outperformed conventional care in promoting physiological stability and enhancing bonding between mothers and preterm infants. Studies such as Solanki et al. (2021) and Thakur et al. (Year not specified) emphasized the simplicity and effectiveness of KMC in balancing physiological parameters without the need for specialized equipment, suggesting its feasibility and cost-effectiveness in diverse healthcare settings.

Limitations and Recommendations Small sample sizes, differences in study designs, and possible biases in sampling techniques were among the drawbacks, even if the studies as a whole demonstrated the advantages of Kangaroo Mother Care. Larger randomized controlled trials (RCTs) with standardized protocols and extended follow-up times could be useful for future studies to evaluate long-term impacts on physiological outcomes. Additionally, Kangaroo Mother Care 's deployment and advantages for preterm children and their families could be maximized by improving healthcare practitioner training and incorporating it into standard neonatal care protocols.

Conclusion The systematic review underscores the effectiveness of Kangaroo Mother Care in improving physiological parameters among preterm neonates across diverse healthcare settings. The findings highlight Kangaroo Mother Care as a valuable strategy for enhancing neonatal care outcomes, fostering maternal-infant bonding, and potentially reducing healthcare costs associated with neonatal intensive care. Continued research and implementation efforts are warranted to further validate these findings and promote widespread adoption of Kangaroo Mother Care in neonatal care practices globally.

In order to give a thorough overview of the impact of Kangaroo Mother Care on physiological parameters in preterm newborns, this structured debate pattern incorporates findings from multiple research studies, highlighting both its advantages and potential areas for further study and development.

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