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The Impact of kangaroo Mother Care on the Newborn Health Outcome of a Preterm infant at Al-Zahraa Teaching Hospital in Al-Najaf AL-Ashraf City 2024.

A thesis

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بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

﴿اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ * خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ * اقْرَأْ وَرَبُّكَ الْأَكْرَمُ * الَّذِي عَلَّمَ بِالْقَلَمِ * عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ﴾

صدقَ الله العلي العظيمِ

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Dedication

To my family... my husband

My mother, whose prayer was essential to my success

To my supervisors for their guidance, encouragement, help and support

I made this project

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Lists of Abbreviations

KMC	Kangaroo mother care
BW	Birth Weight
GA	Gestational Age
CFR	Case Fatality Rate
KCP	Kangaroo Care Provider
KF	Kangaroo Foundation
KP	Kangaroo Position
LBW	low birth weight
M	Mean
MDG	Millennium development goal
NCUs	Newborn Care Units
PT	Preterm
SD	Standard Deviation
SDG	Sustainable development goal
SHCLBNB-KM	Standards for Humanized Care Low Birth Newborns - Kangaroo Method
S-SC	Skin-to-skin contact
UNICEF	United Nations International Children's Emergency Fund
VP	Very preterm
WHO	World health organizations

Abstract

Background

Preterm neonates are the most critical cause of death in infants, especially in developing countries. Kangaroo Mother Care (KMC) is an important early distinctive care with the least expensive equipment to permit the health and well-being of infants born, by holding neonates on the mother's naked chest with skin-skin contact and exclusive breastfeeding involved with early home discharge. WHO recommended KMC for all neonates, especially preterm.

Objective: study aimed to assess the effect of the Kangaroo Mother Care approach on preterm health survival at Al-Zahraa Teaching Hospital in Al-Najaf City/Iraq.

Methods

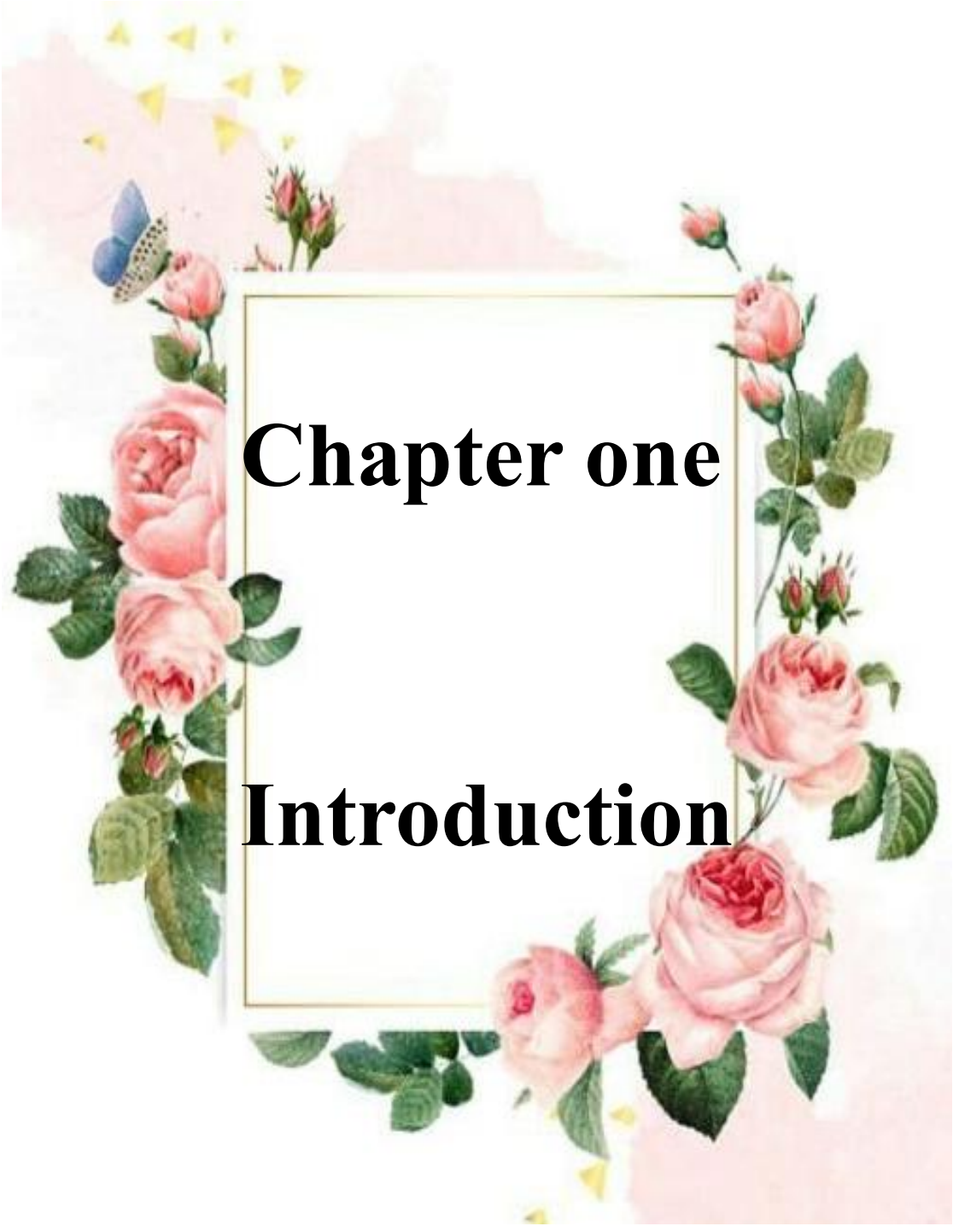
A prospective cohort, observational study design of preterm infants, the study included a sample of 100 neonates (50 of them subjected to kangaroo groups, the remaining 50 were control group) delivered in AL-Zahraa teaching hospital with birth weight of less than 2000gm and gestational age of 28–35 weeks of both group, Consecutive sample was used on preterm infants to collect the data, all mothers of preterm babies were involved and interviewed with a predesigned questionnaire to take information about her and the neonates, then data collected, after discharge home each preterm neonates were followed-up for six months age, comparison have been occurred between preterm admitted to kangaroo mother care unit and preterm neonates who didn’t admit.

Result

A total contributor numbers consist of 100 neonates of preterm delivery, with no significant differences in sociodemographic characteristics of mothers, mode of delivery, birth weight within 980- 1700 (gm) but no significant differences of P-value. (90%) of KMC infants demonstrated Weight gain compared to (58%) of control group RR 1.55(95%CI 1.2-1.99), and (90%) length increment RR 2.50(95%CI 1.7-3.5), (100%) exclusively breast fed, infant's developmental activities revealed (100%) RR 2.77(95%CI 1.9-4.0), the mean duration of hospital admission of Kangaroo group was (7.47±1.05) while, the Control group (11.28±5.05), a P-value of all these follow up variations are statistically significant (<0.001).

Conclusion

Results yield that KMC is one of the essential, inexpensive methods; it has the potential effects that significantly improve the newborns' physiological outcomes, sufficient nutrition to ensure weight gain by exclusive lactation, increase neonatal survival, improve maternal-infant attachment, and encourage early hospital discharge.



Chapter one

Introduction

Introduction

Kangaroo mother care which resembles a kangaroo's pocket, is an intersession of keeping a child with early skin-to-skin contact throughout the first 24 hours of life and spend a portion of their day(at least one hour) in an upright posture with the swaddled infant on the mother's naked chest with exclusive breastfeeding whenever possible, adapted to local specific conditions is internally expressed to Kangaroo care (KC)(Campbell-Yeo *et al.*, 2015)This is better described as a loving body hug or a womb-like environment.

1.1 History

In the early 1970s, researchers in the USA investigated the effect of "Extra contact" between mother and their infants, which means skin-skin contact. The medical use of this natural phenomenon of holding a newborn was first presented in 1978 by Rey and Martinez in Colombia and conducted at the Maternal and Child Institute of Bogota-Colombia (Kostandy and Ludington-Hoe, 2019).

It was named Kangaroo mother Care for its similarity to marsupial care, care methods, and attachment, facilitates better infant adaptation in early postnatal environments, and gives a special bond between parents and their preterm infant(Group, 2021). This reciprocal parent-infant relationship is facilitated by Kangaroo Mother Care (KMC). The KMC involves skin-to-skin contact (irrespective of the delivery type) between the mother and her neonate; such emotional contact begins during pregnancy when the fetus grows in the uterus and goes on to the postnatal period; accordingly, KMC emerged in other countries as an alternative to stimulate preterm infants in countries without dependable or easily accessible incubators(Abbasi-Shavazi *et al.*, 2019), in 2000 it was launched by the Ministry of Health as Standards for Humanized Care Low birth newborns - Kangaroo Method

(SHCLBNB-KM). in 2007, Mashhad University of Medical Science held the first KMC workshop which advised doctors, nurses, and midwives to promote this technique's widespread use in the nation's hospitals. Since 2007, skin-to-skin care has been used for preterm infants in the St. Olav's University Hospital delivery room. Various studies examined different facets of KMC in Iran(Mohammadi *et al.*, 2024), which later became the preferred technique in several Neonatal Infant Care Units and recommended as national health policy to encourage the bond between parents and their newborns.(Sarparast *et al.*, 2015)

Recently, WHO guideline development procedures published in 2000 maternal sessions provided during pregnancy, labor, and throughout newborn periods to improve preterm outcomes (WHO Recommendations on Interventions to Improve Preterm Birth Outcomes2015 page5Accessed April 12, 2020)

1.2 Newborn Care:

WHO advocated a strategic approach to enhance newborns' health through many levels of care; the guidelines have been published, (Stark *et al.*, 2023), which are:

I. Essential newborn Care: demanded for around 85% of all neonates, involves proper breathing, warmth, close contact (zero separation), sticky skin attachment between each mother and her newborn, exclusive breastfeeding advancement, illness avoidance measures, and early risk assessment.

II. Intermediary Care or special care: wanted for around 10 to 12% of newborn. refer to medications, oxygen therapy, phototherapy, intravenous fluids gavage feeding, etc. mostly given in special newborn care unit (NCU)

III. Tertiary Care or intensive care: Obligatory for about 5% of newborns. Only specialized doctors and nurses in advanced care units with advanced technology and top-notch leadership are qualified to provide it.

IV. Specialized care for the newborns: like Surgical Care

Thus, kangaroo mother care is considered an early, essential primary response with the least expensive piece of equipment—for all preterm babies soon after birth in the labor room (skin-to-skin contact for a few minutes are unattainable with Kangaroo mother Care), skin-to-skin contact is advised independent of sex, birth weight, except those who necessitate immediate resuscitation.

1.3 Burden of preterm infants:

Any birth that befalls before 37 completed weeks of gestation is called premature; there are numerous reasons for preterm delivery, either spontaneous or medical causes, that demand early termination of pregnancy. Annually, around 14.8 million preterm infants are born (10.6% of all births), and more than 90% of preterm are concentrated in low- and middle-income countries, mostly in South Asia 48% and sub-Saharan Africa 24%,(Organization, WHO 2023).

Importantly, birth outcomes related to prematurity greatly raise the burden of disease as they have a significant impact on impairment later in life, including Infections and other acute morbidities, noncommunicable diseases, with long-term physical, neurodevelopmental, retinopathy, growth failure (stunting, wasting) and other socioeconomic effects have all become more common in premature babies, (Walani, 2020).

Newborn babies born preterm have markedly higher risks of adverse outcomes compared with babies born at term. Neonates born very preterm have higher risk of morbidity and mortality based on degree of prematurity ,

with babies born extremely preterm (<28 weeks of gestation) at the highest risk, afterwards babies born very preterm (28 weeks to <32 weeks), then babies born moderate to late preterm (32 weeks to <37 weeks, (Ohuma *et al.*, 2023).

Addressing the global burden of preterm birth is necessary to lower preterm-related neonatal and child mortality and achieving the Sustainable Development Goal target 3·2 (committing to reduce neonatal mortality to 12 or fewer neonatal deaths per 1000 livebirths in every country)

1.4 Neonatal Mortality:

Globally, each year, 30 million babies are born in risky birth circumstances. Such conditions include premature babies, at risk of becoming ill, death, or having learning, visual, or hearing problems and disability, (chisel, J. et al. 2022).

Preterm born is the leading cause of death in infants worldwide (Lawn *et al.*, 2010), In 2020 an approximated 13.4 million preterm were delivered, leading to increased risk of complication and death (WHO,KMC2023), and an estimated 2.3 million deaths occurred in 2022(WHO2024 newborn mortality2024). Of them, two-thirds were premature babies happen within the first week of life, that`s concerning of the greatest delicately periods in the life and deserves higher quality newborn and intrapartum medical attention. The newborn stage (first 28 days of life) is still the most infant deaths happen, especially in developing countries where 12% of infant deaths are preterm and 60% of these deaths occur in Africa and South Asian countries (Ghazi *et al.*, 2021) definitely during the outbreak of the war in these countries made the existing methods to prevent infant deaths in conventional neonatal care are expensive, require qualified human resources, and ongoing logistical support. Millennium Development Goal NO.4 (lower child mortality), the mortality rate of children under five has significantly

decreased globally, from an estimated 90 deaths per 1000 live births in 1990 to 46/1000 in 2013, (World Health Organization, 2018) (Organization, 2018).

The UN Inter-agency Group for Child Mortality Estimation (IGME, 2023) reports that the neonatal mortality rate in Iraq dropped from 66/1000 in 1975 to 22/1000 live births in 2020, providing kangaroo mother care (KMC) to at least 75% of eligible infants and this care lowering neonatal mortality to 12 or less per 1,000 live births are two of the goals of Every Newborn Action Plan, which was introduced by the United Nations International Children's Emergency Fund (UNICEF).

In 2022, the WHO released revised modest solutions for the survival of preterm infant interventions, such as early breastfeeding initiation and kangaroo mother care after delivery, improving maternal nutritional status, offering adequate maternal care, and perinatal healthcare, which can considerably reduce the mortality rate of preterm infants. (Health, WHO KMC practical guidline 2003).

1.5 Kangaroo Mother Care and Traditional Care:

An incubator is a transparent, box-shaped structure offered in the neonatal unit to Preterm infants (incubator) in which oxygen, humidity, and temperature can all be adjusted. Also utilized for promoting external thermoregulation of premature infants because they can't regulate their internal temperature. The incubator is frequently closed to preserve the warm environment inside. Babies, while they are in the incubator compared to KMC, have little contact with the outside world; the newborn is additionally kept separated from the mother, which makes it difficult for the woman to care for her child; the mother is occasionally allowed to see, touch, and fed the child thus showed increase maternal stress anxiety and depression during

child hospitalizations in these units this symptom of stress may persist after discharge (Kraft *et al.*, 2021).

It is thought that holding infants in incubators would harm their developing bodies and protect their immune systems. Also, when a baby is too young or delicate to handle for an extended period or is exposed to external infectious agents or stimulation, an incubator is used to keep them (Hartz, Bradshaw and Brandon, 2015). Preterm babies in NICU are exposed to a variety of stressors, such as intense lighting, loud medical equipment noises, and invasive hospital procedures so that incubators may cause behavioral and physiological reactions in preterm babies.

Lately, Research findings suggest the significant benefits of not establishing newborns in incubators but instead holding them on their mothers' skin as early as possible; the theory of KMC was developed to avoid prolonged separation between mother and child throughout the postpartum phase, which could contribute for the insufficient production of milk, low affective bond, and increase of morbidities (Smola and Lawson, 2019)

KMC's goal is to empower the mother and her family by progressively giving them the capacity and duty to care for their infant's physical and emotional requirements. Also offers safe, natural cos, effective, and feasible interventions for saving and caring for clinically stable infants; it's ideal for individuals of every socioeconomic class. Based on skin-to-skin contact(S-SC) between the newborn and mother, KMC is a systematic and protocolized care approach suitable for both developed and developing nations, with an emphasis on low birth weight (LBW) babies (<2500g) and premature babies (<37 weeks) (Charpak and Montealegre-Pomar, 2023)

1.6 Medical uses

Originally, stable preterm newborns who were born with a weight of ≤2500 gm, a mean gestational age of 29.6 wks. whose cardiovascular and respiratory functions didn't require continuous support or monitoring were qualified for kangaroo care. Cardiopulmonary monitoring, oximetry, additional oxygen, or nasal masks do not prohibit Kangaroo care. Babies who require intubation in the delivery room, life-threatening medical conditions in the last 24 hours, severe congenital malformations, breathing difficulties (continuous positive airway pressure), intravenous infusions, or monitor leads are not allowed. Infants under the care of kangaroos have stabilized oxygen requirements, thermal, and feeding function, are less likely to experience bradycardia and apnea, and haven't danger signs like central or peripheral cyanosis or fever. Stabilization of vital functions (independent of gestational age and weight) has been considered crucial for the success of this intervention, (Hassan, Z.A., Al-Haris. &Nasrawi, A.J.M., 2024)

Also, it should be noted that not every mother is a good candidate for kangaroo mother care as long as their mothers serve as both their primary source of nourishment and stimulation and as "incubators" to regulate their body temperature National Association of Neonatal Nurses guidelines provide practical advice for evaluating parental readiness. Among some of the maternal considerations is the presence of depression, non-control mental illness, drug dependence, smoking, contagious infections, skin rash or lesion, and disinterest in holding the baby; another person or relative may be allowed to provide help instead of the mother, (Clinical practice Guideline Kangaroo Mother Care)

1.7 Component

Kangaroo Mother Care components include:

- Skin-to-skin contact (kangaroo position) between the mother and the child, which can occur sooner in the neonatal period and provides appropriate thermal regulation, among other benefits;
- Exclusive breastfeeding (kangaroo nutrition) whenever probable or expressing breastmilk if the mother is not attained;
- Early discharge, beginning in the Hospital and continuing at home, and then follow-up if possible, (Charpak *et al.*, 2005).

1.7.1Position

The distinctive aspect of Kangaroo Mother Care is the skin-to-skin contact (S-SC). An infant is wrapped between mothers' breasts (as they instinctively hold their infants to their chest). Where the baby's abdomen and chest adhere to the mother's bare chest under her clothes. The infant's head is placed almost sideways to keep the airway free, and his extremities are flexed; this position has been described as "frog-like" (Campbell-Yeo *et al.*, 2015).

A physician must decide on Kangaroo positions and organize them with a trained nurse. The child is maintained in the position by the mother's arms and the tension of her clothes. A cloth support or girdle (cotton or elastic material) is used to allow the baby to relax or even sleep while the baby is kept in a kangaroo position. It is especially crucial because preterm babies

typically have hypotonic conditions if this support is not provided, obstructive positional apneas might develop (Charpak and Montealegre-Pomar, 2023); it became evident that it was critical to point out two key aspects of kangaroo position: the timing of KMC beginning and the total time spent in skin-to-skin contact each day, In the studies under review, KMC was started early range from a few hours to several days after birth. Or "late initiation" indicates that the preterm/LBW babies have already passed the point at which their health was at risk.

Duration of KMC: KMC enhances the survival of LBW and preterm babies and should ideally be administered for a minimum of 20 hours per day.

Kangaroo duration either:(Cristóbal Cañadas *et al.*, 2022)

- Continuous: for 24 hours a day, this mode implementation avoids separating the child from his mother; the kangaroo baby should always be kept in a kangaroo position, as long as it suits her, only for obligatory breaks to continue supplying KMC are taken by mother for personal needs and the baby when changing a diaper, feeding, etc. The infant can then be turned over to an alternate Kangaroo Care Provider (AKP) if one is available to remain KMC through the 24 hours; the whole hours of KMC are calculated by count the overall number of hours given by the mother and the AKP in different sessions.

- Intermittent: skin-to-skin contact lasting less than 20 hrs. (Cutland *et al.*, 2017). Breaks last for short periods (at least one hour), then resume once or several times a day with long breaks. This could be more frequently when kangaroo position is performed; it's merely utilized as a first step in a gradual adaptation process of continuous kangaroo position and used ongoing based on the child's status.

1.7.2 Exclusive Breastfeeding

Breast milk is the ideal decision for all infants. It is essential nourishment for all newborn children as it is composed of Fat, proteins, water, carbohydrates, minerals, antibodies, and other vitamins required for health and survival. Also, breastfeeding activates multisensory receptors in the skin and the Auditory-Visual sense of the newborn.(Rodovanski, Réus and Dos Santos, 2023).

Global health organizations, such as WHO and UNICEF, advise that all infants be breastfed exclusively. This is called exclusive when a child is fed with breast milk only. Because preterm infants are more likely to experience infections and chronic medical conditions, as well as because the benefits of breast milk are more pronounced in these babies, this recommendation also applies to them (Hall *et al.*, 2024). Managing these preterm babies is clinically more challenging and has many difficulties as their suckling behavior is not fully mature; they have sluggish guts and an inability to coordinate sucking, swallowing, and breathing. These require neonatal care for a sustainable period (Li *et al.*, 2024). Breastfeeding promotes skin-to-skin, eye contact, and the mother-baby emotional bonds. The Oro sensory qualities of the breastmilk make the baby feel safer and calmer (Nurbayanti, 2021).

Stable babies: (Who must have a vigorous cry shortly next birth and clearly didn`t have additional health issues or deformity like cleft lip or palate, which could influence direct lactating) Preferably neonate should be place to mother's bare breast and start feeding between 30-60 minutes after delivery, and allows for colostrum taking without need for pre-lacteal meals. Further newborns with late cries, difficulty breathing, or other issues may need to be fed after their heart rate and respiration have stabilized; for very young neonates, the first feeding should occur no later than one hours

following delivery to guarantee colostrum nutrition. (Rasoul, H.N., Farman, H.A. and Raheem, S.S., 2024)

1.7.3 Early Discharge and Follow up

KMC follow-up, established by Dr. Rey-Sanabria, was associated with an early discharge from the kangaroo position; meanwhile, infants met proper discharge criteria with a brief, empirical, regular follow-up required for neuro-motor, neuro-behavior, and sensory development for all babies.

Further instructions that involve early homebased discharge as soon as possible after neonate was stabilized, and have been implemented by the Kangaroo Foundation (KF) in Colombia (Charpak and Montealegre-Pomar, 2023). Infants get discharged home after they undergo careful daily monitoring until they regain their birth weight and gain at least 15g/kg/day and successfully adjusting to the kangaroo situation and nutrition. Then home visits following that are planned until full term, which is 40 weeks of conception age, (Charpak *et al.*, 2005).

The mother receives training in KMC and sends home with the neonates in Kangaroo Position; danger signs should be learned to the family:

Apnea- Breathing stops for more than 20 seconds. Trouble breathing, either slowly or extremely quickly, irregular rate and rhythm.

Hyperthermia (Fever).

Peripheral cyanosis.

Chest indrawing.

Feeding cessation or reduced or vomits.

Weakness, lethargic or reduced activity.

Diarrhea/loose feces.

Seizure/unusual actions or behavior.

Abdominal distension/ fullness.

Kangaroo baby follow-up is an effective method to evaluate KMC performance of clinical outcomes until 6 months to ensure survival quality. Ensure the mother fully understands every step of the instructions for providing additional micronutrients, such as vitamins, calcium, phosphorus, iron, and calcium. Indeed, since KF's initial randomized control trial (RCT) in 1994, this ongoing observation has made it possible to examine both the short- and long-term benefits of initial identification and treatment of any prematurity or low birth weight related difficulties happen in the first year, (Charpak and Montealegre-Pomar, 2023).

The Kangaroo Position reduces the length of infant hospitalization and prepares the parents for discharge and caring for their infant at home. During the discharge process, address and important data will be documented, and an appointment for follow-up will be given to all infants at the same Hospital.

The discharge criteria: (Government of Maharashtra, UNICEF, KMC Foundation of India, 2021)

- Once preterm can be feed orally, either by direct or expressed breast milk.
- Confirmation weight advance for three consecutive days.
- Able to hold on body temperature without external sources of additional heating.
- No other significant health issues.
- The mother is liable for staying to care for the infant at home, consistent with hospital recommendations.
- Family members are trained to help the mother at home alongside KMC.

- Evaluation of a milestone, oxygen dependency, neurodevelopmental assessment.
- In rare special conditions of excessive cries and wriggling, the baby pulls her/his limbs out and fusses whenever the mother attempts put in skin-to-skin contact.

1.8 Benefits of Kangaroo Mother Care.

Include:

1.8.1 Benefits to the Infant: High potential for reduced mortality (40% of all newborn death possible to eliminate) (Campbell-Yeo *et al.*, 2015). the kangaroo position can reduce hypothermia by warming up the newborns who already have thermal stress by developing thermal synchrony (mother perceives a little increase in body temperature as the infant`s temperature decrease, and vice versa)(Wahyuningrum *et al.*, 2023).

It also stabilizes vital signs (heartbeat, oxygen saturation, and respiratory rate) (Durmaz, Sezici and Akkaya, 2023), enduring in physiological levels and upsurges the duration of exclusive milk feeding, resulting in well weight gain and growth. Lowers the risk of septicemia, a serious infection affecting several organs, and hospital-acquired (nosocomial) infections in neonates. Condenses the necessity for oxygen and occurrence of apneic attacks, which frequently occur in very preterm babies (Ghazi *et al.*, 2021), and improves the mother-child relationship, affecting the mother's psychological state. As a result, better cognitive outcomes (Cristóbal Cañadas *et al.*, 2022) and a feeling of security by enhancement of hearing, touch, taste, vision and smell, which are fulfilled very early, corresponding to boost behavior, neurodevelopment and encourage restful sleep, (Uchitel *et al.*, 2022).

1.8.2 Benefits of KMC to Mother:

A deeper bond connection existed between the infant and the mother, which feels competent and empowered to care her neonate in the hospital, also augments infant-mother links, interaction, that`s essential for social and emotional attachment (Cho *et al.*, 2016) and continues the same care at home after discharge Fewer chances of postpartum (After delivery) depression and psychosis in mother, beside vaginal bleeding rapidly stops after delivery and earlier involution of the uterus so stopping of postpartum bleeding, hasty shrinking of uterus, decreased engorgement of the breast and swelling, yield better milk stream from the breast caused by hormonal effect. Enhanced family support and engagement in the infant's Care, Early return home.(Cristóbal Cañadas *et al.*, 2022).

1.8.3 Benefits of KMC to the Hospital:

Reduces the cost of medical care for a small, ill newborn in addition to the postnatal period. Improved utilization of infrastructure and labor. Decreased need for formulas, oxygen, antibiotics, and other drugs. Reduced risk of hospital-acquired infections, that has been more challenging to treat the mother's increased involvement in her child's care reduced the workload for the nursing staff.

1.9 Justification

The positive effects of Kangaroo mother care in NICUs are well documented but, to a lesser extent, explored after years of researches. Yet in spite of these recommendations and a lack of unfair research results, adopting KC as an accepted new clinical method, with less expensive equipment, this review summarizes current knowledge about the advantages of KMC for infants born preterm, prominence the variations and similarities across nations with low and high resource. In addition, implementation, considerations and unanswered enquiries for future research are addressed.

1.10 Objectives:

1. To evaluate health consequences, growth, activity improvement, and feeding methods in premature infants supported by Kangaroo Mother Care at birth, at discharge throughout six months according to timetable.
2. To inspect the effect of the kangaroo mother care technique on the mortality rate compare the results to those of matched neonates appointed home without receiving KMC training at Al-Zahraa Teaching Hospital in AL-Najaf City.
3. To determine the fate of preterm infants in the study's group, whether improved health or deteriorated. By quantifying various kinds of well-being parameters.

Chapter Two

❖Methods❖

2. Subjects and Method

2.1. Study Design, Setting and Time:

The present study used a prospective cohort, observational design study of preterm infants performed on preterm infants at AL-Zahraa Teaching Hospital with a gestational age of 28–35 weeks in Al Najaf Al Ashraf City between October 2023 and July 2024.

2.2. Study Population:

The study included a sample of 100 neonates delivered in AL-Zahraa teaching hospital with a birth weight of less than 2000gm together with their mothers, who gave their written consent and agreed to participate in this study, the case group contained stable preterm neonates who admitted to Kangaroo unit, and the control group contained preterm neonate with hemodynamic instability who received conventional care and discharged home from neonatal intensive care unit (NICU) after treatment for various reasons and gained complete clinical stabilization without KMC training.

2.3 Inclusion Criteria:

Infants assigned to the cases group were stable preterm infants (after complete plan management) who were admitted to the KMC unit and were eligible to get involved in this research project, the control group have the same as case gestational age, birth weight, but not received Kangaroo care.

2.4 Exclusion Criteria:

1. infants were in an unstable condition, dependent on oxygen or fluids,
2. severe jaundice, or seizure.
3. had visible malformations, Significant congenital disabilities not compatible with life, hydrocephalus, encephalopathy, chromosomal disorders, genetic abnormalities, neonatal asphyxia, and infants who have received corticosteroid therapy,
4. if the mother was unwilling to participate or was ill or disabled and unable to attend the nursery, she was excluded from the study.

2.5. Pilot Study:

A pilot study was carried out before starting the collection of data for one week, and it was performed in the kangaroo mother care ward of Al-Najaf City; we interviewed 10 mothers of preterm infants in October 2023 to determine the reliability of the questionnaire and resolve any difficult issues that arise during the data collection process. This pretest indicates that any proposed changes to the questionnaire were considered accordingly. It usually takes 10 minutes to interview each Participant. Responses obtained in the pilot study were not included in the final analysis.

2.6 Data collection Tools

To collect the data, a consecutive sample was used on preterm infants from the kangaroo mother care ward. All mothers of preterm babies in the KMC participated, and after getting verbal consent from them, each mother was asked to answer the questions in a predesigned questionnaire. Then, the data from face-to-face interviews were recorded in the descriptive characteristic questionnaire, prepared in English, and translated into Arabic.

It consists of three parts, as follows:

Part one includes ten questions about the mother's demographic information (age, residence, educational status, economic status, number of births, disease during a previous pregnancy, and Hospital or home delivery?).

Part two includes eleven questions about Neonatal information (gestational age, birth weight, gender, feeding methods, age and weight of initiation KMC, frequency and daily duration of skin-skin contact, past medical history, and mean duration of KMC)

Part three includes eleven questions about the follow-up questionnaire: (does the infant condition change after kangaroo unit admission, weekly weight gain, monthly length increment, overall improved activity and movement, feeding methods, readmission to the Hospital, the episode of illness, does the position of S-SC restricts your activity, whether S-SC enhanced bonding between you and your infant, your opinion about KMC unit admission).

2.7 Sampling Technique

Eligible mothers with their infants received instructions to enroll in the Kangaroo mother care program at AL-Zahraa Teaching Hospital. An infant was included if they survived the neonatal phase and fulfilled the KMC requirements mentioned in the admission criteria; primarily, the mothers were counseled on the advantages of KMC, and formal written informed consent of willing mothers for inclusion in the study was obtained.

Kangaroo Mother Care intercession consisted of keeping the infant in the kangaroo position. Firstly, mothers were instructed to sleep in a semi-sitting position to keep the infant upright to place the neonate in a strictly upright position (skin-to-skin contact) between the mother's bare breasts and under her front–opening clothes. The newborn head was turned to one side, thus keeping the airway patent; the hips were kept flexed and

abducted in a frog position; the arms were flexed. The mothers thus acted as human "incubators" or "loving body hugs." The mother feels authorized and competent to take attention of her small infants, which is the main source of stimulation and continuous contact, which increases touch and love bonding between them.

Other caregivers(grandmother) could share the mother's role as a kangaroo position provider. The baby was allowed to suck on the breast as often as it wanted, so all infants should receive exclusive breastfeeding whenever possible.

All Preterm neonates eligible for KMC have a gestational age of 28-35 (wks.) with birth weight of less than 2000gm, we included both siblings of a twin pregnancies pair in the study (9 twins of case and 4 of control group) even if only one weighed under 2,000 g. only one infant of control group actually weighted 2,000 g was at inclusion.

The certified classification of both gestational age and birth weight was utilized: gestational age:<28 weeks extremely pre-term, 28to less than 32 weeks very preterm, 32 to less than 37 moderate to late preterm (Quinn *et al.*, 2016) Newborn birth weight/gram:<1500 extremely low birth weight, 1500 to less than 2000 very low birth weight, 2000 to less than 2500 low birth weight (Cutland *et al.*, 2017)

All participating infants were evaluated at birth (from recorded data), and at the time of eligibility for admission until they achieved at least 10-15 g per day weight increment for at least three consecutive days and weekly until they reached term (Organization, 2022) weight measure by naked infant placed on the measuring device if the infant did not thrive or appeared tired while sucking the caloric density of the milk was increased by feeding infants primarily hind milk, the mother expresses. Stores milk before each meal; the meal starts by direct sucking off the mother's breast;

for all infants with inadequate weight gain, a systematic workout was performed to identify secondary causes (e.g., hypothermia, anemia, infection).

Regarding the daily duration of skin-skin contact, our study revealed that most mothers do KMC intermittently, not continuously, for 24hrs; mothers do skin contact for at least four hrs. continuously and then stop for a few hours before resuming, repeat the S-SC for another 4hrs. Consequently, the total duration of daily contact should be at least eight hours.(Ledinger, Nußbaumer-Streit &Gartlehner, 2024)

Discharge was performed once the baby was stable and once the mother had received instruction on how to continue KMC at home; usually, follow-up visits were planned for mothers in both groups. The first follow-up visit is simultaneous with the retinopathy screening unit at AL-Zahraa Teaching Hospital (all mothers gave an appointment for a retinopathy visit four weeks from birth date). At that appointment, an interview with the mothers of newborn pairs was done, and she asked about any difficulties with feeding and insisted on breast milk exclusively and continuous KMC S-SC at home. Measure the weight by putting naked infant on the measuring device and length by tape measure and overall activity, behavior, developmental progress well-being by asking about language (2 months: nega, 4 months: Haha, 6months: Babble), Gross Motors (2 months: Raised head, 4months: Rolled over, 6months: Sits up with support) and Social (2months: smiles, 4months: Focus on sound, 6months: Stranger anxiety).

Some appointments need to be completed on time. Indeed, other families need to pay more attention to returning to scheduled checks, dropping out of follow-up Care, or coming less regularly; a phone call will be made to remind the family about the visit date and insist on a descriptive date.

Other follow-up visits consecutively coincide with primary health center visits for receiving vaccines. According to Iraqi vaccinations are scheduled every two months, and follow-continues to be monitored until six months of age. Discussions with mothers revealed that most of them were able to do S-SC as much as they had done in the Hospital; they explained that they did KMC consistently at night rather than during the day time. Meanwhile, one mother, unfortunately, said she stopped practicing KMC as soon as she left the Hospital because deteriorated infant health conditions ended in death.

Control group

Regarding the control groups(n=50), neonates managed with standard care of an incubator or under the radiant heater, naked except for wearing a diaper and any covering for the head and legs to avoid hypothermia, because of many medical conditions like cardiopulmonary monitoring, breathing difficulties (continuous positive airway pressure), intravenous infusions, or monitor leads preterm neonates of this group don't admitted to the KMC unit, and don't involve in S-SC. because of the prolonged separation from their moms while in the Hospital and subsequently discharged home; most of conventional care group get used to bottle or mixed feeding. Similar inclusion and exclusion criteria and evaluation, monitoring, follow-up period during the six-month were used for the case groups, the control groups were also used, according to the follow-up field-tested descriptive questionnaire.

2.8 Definition of Variables

High income (above one million Iraqi dinars) per month. Middle income (between four hundred thousand and one million Iraqi dinars) per month. Low income (below four hundred thousand Iraqi dinars) per month, (Average salary in Iraq 2024).

2.9 Statistical analysis

Statistical analysis of this study was carried out using the Statistical Package for Social Sciences (SPSS) version 22.00 and Microsoft Excel 16 to compute descriptive statistics. Mean ±standard deviation (St. D). was the interpretation used for continuous variables, and frequencies and percentages were used to represent categorical data. The means of the two groups were compared using an independent samples t-test . The chi-square test and fisher exact test were used to associate between categorical variables. A p-value equal to or less than 0.05 was considered statistically significant.

2.10 Ethical considerations:

1. The Council of the College of Medicine accepted the protocol of the study, 2024, which was also approved by the ethical committee of the College of Medicine/Kerbala University.
2. A written agreement was obtained from AL-Zahra Teaching Hospital.
3. Verbal consent was obtained from mothers before the interview and after the aims of this study were explained.

Chapter Three

❖Results❖

Results

The total number of participants in the study consisted of 103 neonates at AL-Zahraa Teaching Hospital; 51 of them were subjected to kangaroo mother care, and the remaining 52 were considered the control groups. Unfortunately, one of the total kangaroo groups died after 2 weeks of discharge (birth weght:760 gm), while two of the control groups died during follow-up because of recurrent illness and low birth weight among KMC-initiated babies.

Infant Mortality Rate =total number of infant deaths in a given place within a specific year/total number of live births happening in that place in the year.

The mortality rate was 2% for kangaroo infants and 4% for the control group. So, the net number of infants was 100.

The mothers joining in this study had the age range of 16-37 years with a mean and standard deviation of years (27.6±5.5).

Most mothers participating in the study were from urban residences, completed secondary education, and had an intermediate income 76%, 82% of case and control groups Sequentially.

Chapter Three: Results:

There is no discernible difference in employment status, greatest of the mothers were housewife, the P-value was no significant difference. All sociodemographic characteristics of mothers with premature infants are shown in Table 1; no significant difference was observed between KMC groups and non KMC-intended groups ($P > 0.05$).

Table 1: Sociodemographic characteristics of the mothers (N=100)

Maternal characteristics	Variables	Group		Total	P value
		Case (n=50) No. (%)	Controls(n=50) No. (%)		
Residence	Urban	28(56%)	33(66%)	61(61%)	0.305
	Rural	22(44%)	17(34%)	39(39%)	
Educational status	Primary	16(32%)	20(40%)	36(36%)	0.706
	Secondary	25(50%)	22(44%)	47 (47%)	
	College	9(18%)	8(16%)	17(17%)	
Economic status	Poor	2(4%)	1(2%)	3(3%)	0.716
	Intermediate	38(76%)	41(82%)	79(79%)	
	Good	10(20%)	8(16%)	18(18%)	
Work status	Housewife	30(60%)	33(66%)	63(63%)	0.820
	Governmental employee	15(30%)	13(26%)	28(28%)	
	Private work	5(10%)	4(8%)	9(9%)	

Table 2 reflects that a more than half of both the case and control mother groups had birth via cesarean section (54%), (52%) subsequently, whereas (46), (48%) of both mother groups gave birth vaginally,

Majority of both groups were multigravida (54%, 66%)

Of the two groups, Anemia, among the other illnesses, had the greatest complications during the last pregnancy; the control mothers had the more gestational complications by 66%

A P-value statistically significant of 0.001

Table 2: Distribution of Mothers' Obstetric Information According to Study Groups(N=100)

Maternal characteristics	Variables	Group		Total	P value
		Cases (n=50) No. (%)	Controls(n=50) No. (%)		
Mode of delivery	NVD	23(46%)	24(48%)	47(47%)	0.549
	CS	27(54%)	26(52%)	53(53%)	
Gravida	Primigravida	23(46%)	17(34%)	40(40%)	0.307
	Multi	27(54%)	33(66%)	60(60%)	
Diseases during last pregnancy	Gestational DM	6(12%)	4(8%)	10(10%	0.001
	Hypertension	9(18%)	10(20%)	19(19%)	
	Anemia	20(40%)	33(66%)	53(53%)	
	Premature delivery	0(0%)	3(6%)	3(3%)	
	Others	1(2%)	0(0%)	1(1%)	
	None	14(28%)	0(0%)	14(14%)	

Chapter Three: Results:

Enrolled newborn infants of kangaroo and control groups in Table3 demonstrated baseline characteristics, including sex, birth weight, and gestational age. In both groups, male made up the majority of the gender.

Kangaroo preterm neonates have a birth weight within 980-1700 (gm) Mean±SD (1180.6±334.9) and gestational age of 28-35 (wks.) Mean±SD (32.1±2.4), The control group's Mean±SD for birth weight and gestational age was almost similar to that of the case group.

No significant differences in sex, birth weight, gestational age, or P-value with no significant differences (0.224, 0.261 , 0.161) systematically.

Table3: Neonate Characteristics n=50

Neonate Demographic Characteristics	**Subgroups**	**Groups**		**Total**	**P value**
		Cases (n=50) No. (%)	Controls (n=50) No. (%)		
Sex	**Female**	24(48%)	18(36%)	42(42%)	0.224
	male	26(52%)	32(64%)	58(58%)	
Birth weight (gm)		1180.6±334.9	1123.2±130.2		0.261
Gestational age (wks.) Mean ±SD		32.1±2.4	32.7±1.8		0.161

Following up with both groups' newborns over precisely six months revealed various effects of KMC on different neonatal factors such

as feeding methods, weight gain, length increment, and activity improvement in Table 4.

All kangaroo preterm were exclusively breastfed, in contrast to control groups, most infants in this group were given a mixed feeding (breast +formula feeding) consisted of 80%, P-value statistically significant (<0.001)

Ninety percent of kangaroo infants had significant increase their weight while the control groups don't have, P-values of weight gain are statistically significant (<0.001). Risk ratio (1.5) that mean infant in KMC group demonstrated weight gain 1.5 times than control group with 95% CI (1.2-1.99)

A further significant increment in the length of case infants by 90% (45), even though. Even though only 64% of control groups don't have increment P-value of length increment are statistically significant (<0.001). risk ratio (2.509) 95% CI(1.7-3.5)

Another notable improvement in kangaroo infant's activity levels revealed 100% merely just 64% of control groups have a P-value statistically significant (<0.001) risk ratio of (2.77) 95%CI(1.9-4.0)

Case groups only complained of jaundice in 42% compared to 78% of control groups. P-value statistically significant (<0.001)

Table 4: Follow up Results for Six Months.

Neonatal Demographic Characteristics	Subgroups	Group		Total	P value	RR (95%CI)
		Cases (n=50) No. (%)	Controls (n=50) No. (%)			
Feeding method	Exclusive breastfeeding	50(100%)	10(20%)	50(50%)	<0.001	
	Mixed	0(0%)	40(80%)	50(50%)		
Weight gain	Yes	45(90%)	29(58%)	74(74%)	<0.001	1.55(1.2-1.9)
	No	5(10%)	21(42%)	26(26%)		
Length increment	Yes	45(90%)	18(36%)	63(63%)	<0.001	2.50(1.7-3.5)
	No	5(10%)	32(64%)	37(37%)		
Activity improvement	Yes	50(100%)	18(36%)	68(68%)	<0.001	2.77(1.9-4.0)
	No	0(0%)	32(64%)	32(32%)		
Present illness	None	29(58%)	0(0%)	29(29%)	<0.001	
	Jaundice	21(42%)	39(78%)	60(6%)		
	Seizure	0(0%)	1(2%)	1(1%)		
	Others*	0(0%)	10(20%)	10(10%)		

A comparison between the study groups revealed weight gain during the time of follow-up (at one, two, four, and six months). The result showed in Table 5 and Figure5 the mean weight gain was highly significant in KMC infants, especially after two months (1720±369.78) till six months follow-up, compared to the control group P-value (<0.001).

Table5: Comparison of Weight Gain (gm) According to the Time of Follow-up between Study Groups

Weight (gm)	Cases Mean SD	Controls Mean SD	P
At birth	1357±1263.25	1123.2±130.22	0.196
At 1 month	1321.6±345.56	1197.4±144.47	0.021
At 2 months	1720±369.78	1455±315.62	<0.001
At 4 months	2184.6±529.17	1921.2±323.25	0.003
At 6 months	4102±1171.64	3234±1107.714	<0.001

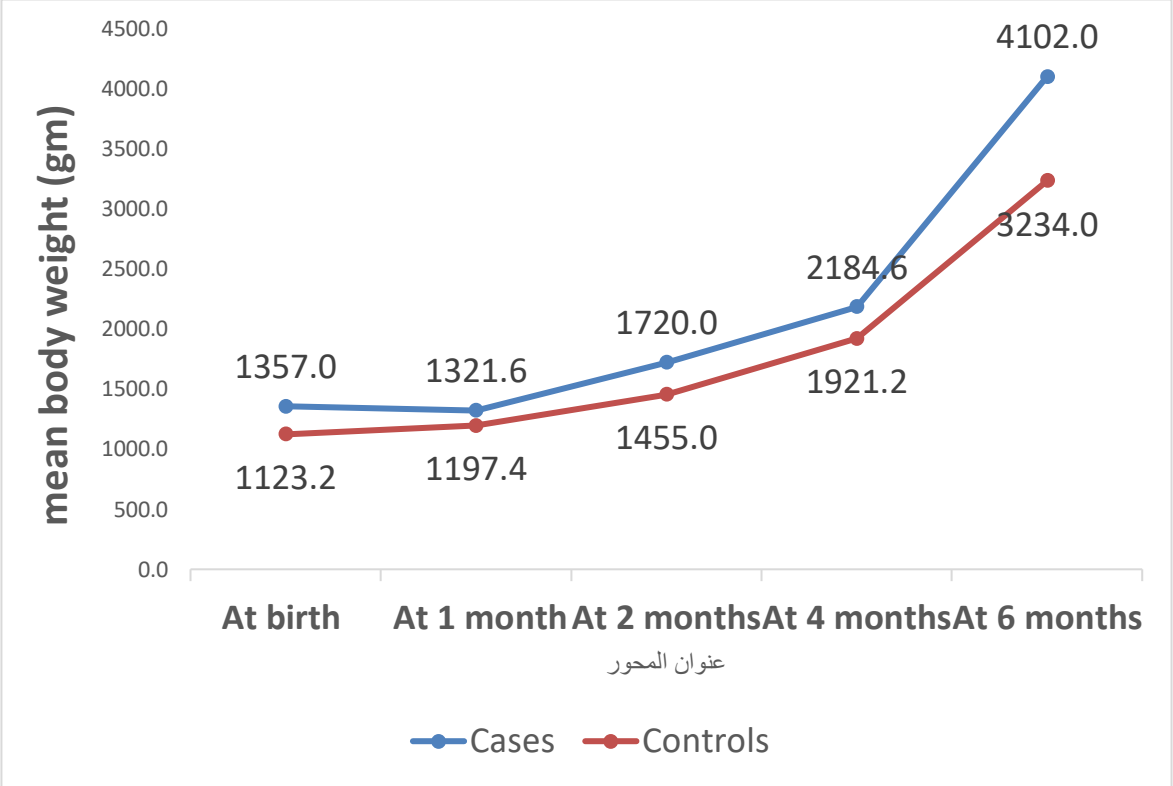


Figure 1: Weight Gain during Six Months Follow-up.

In addition to earlier findings, readmission to the Hospital as showed in Table 6 that (66%) of control infants had readmitted. In contrast, only 24% of kangaroo infants were readmitted, P-value statistically significant (<0.001). RR 0.36(0.23-0.64), many episodes of illness to both study group arranged in Table 6 demonstrates that 64% of kangaroo infants never had an episode of illness, but 56% of control groups developed a fever, 24% jaundice, and 14% gastroenteritis, P-value statistically significant differences (<0.001), many causes of kangaroo group readmission to hospital are shown in Figure2 arranged by the highest percentage, Fever was the most common cause of readmission

Table 6: Follow up Episode of illness, Readmission to Hospital

Neonate characteristics	Subgroups	Group		Total	P value	RR (95%CI)
		Cases (n=50) No. (%)	Controls (n=50) No. (%)			
Readmission to Hospital	Yes	12(24%)	33(66%)	45(45%)	<0.001	0.39 (0.23-0.64)
	No	38(76%)	17(34%)	55(55%)		
Episode of illness	Fever	8(16%)	28(56%)	56(56%)	<0.001	0.26 (0.14-0.48)
	None	32(64%)	5(10%)	37(37%)		Ref.
	Jaundice	10(20%)	12 (24%)	22(22%)		0.52 (0.32-0.84)
	Others	0(0%)	5(14%)	5(5%)		0.09 (0.007-1.38)

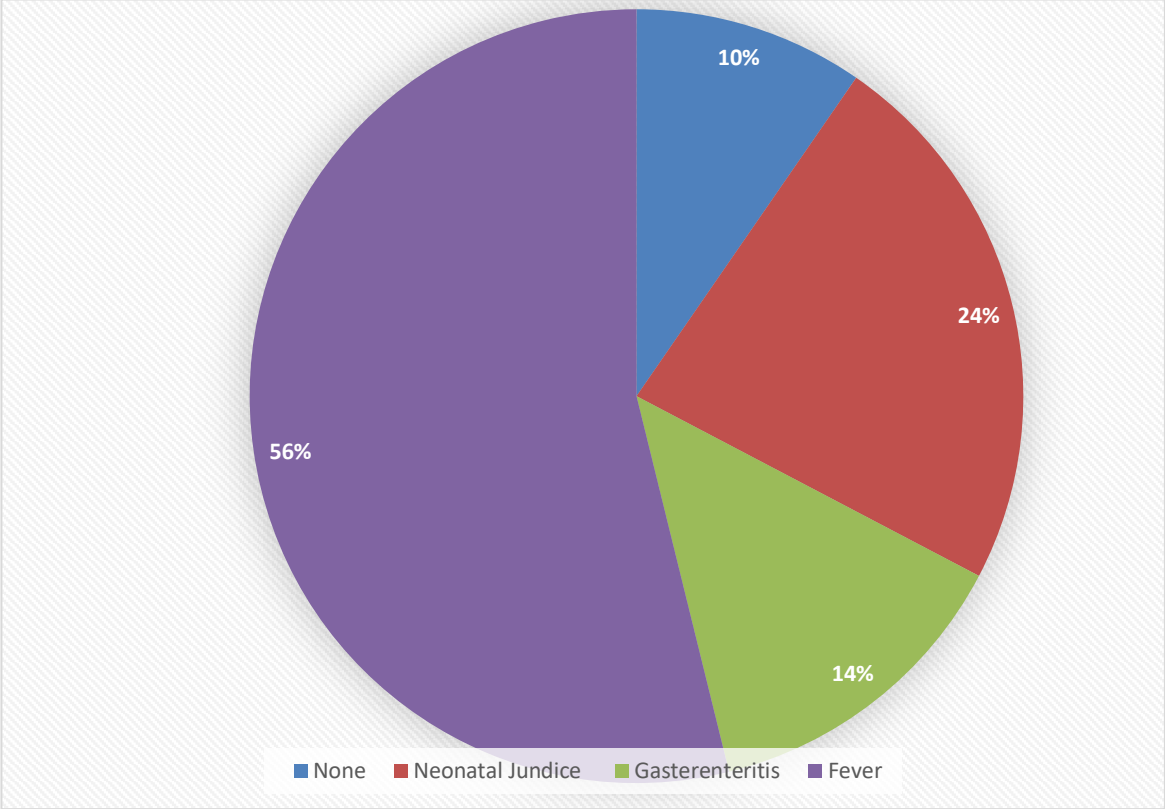


Figure 2: Causes of Readmission of the Control Group Neonates (n=50)

Maximum age at initiation KMC (after neonate stabilization) was one month (9.04±6.8).

Meanwhile, neonate weight ranges from 950_2000 gm at the initiation of KMC with a mean (1227.4±296.24)

The Mean daily duration of skin-to-skin contact in hours was (7.47±1.05) with maximum 9 hrs.

Intermittent skin-skin contact is purely utilized by the mothers to hold infants for a maximum of hrs. with a mean of 7.47±1.05 (11.28±5.05) as the mean duration of hospital admission, the case groups spent less time in the kangaroo unit, which refers to early discharge, reduce financial equipment and Hospital-acquired infection. Table:7.

Table 7: age, weight, and daily duration of skin-to-skin contact in KMC (n=50)

	Minimum	Maximum	Mean	SD
Age(days)at initiation KMC	1	30	9.04	6.8
Weight (gm)at initiation of KMC	800	2000	1223.20	305.78
Daily duration skin-skin contact(hrs.)	6	9	7.47	1.05
the mean duration of KMC (days)	3	23	11.28	5.05

In Figure3 showed 60% of kangaroo mothers carried their preterm neonate twice a day, with each S-SC lasting almost four hours each day, whereas 36% of mothers used the kangaroo position for triples, which lasted almost three hours each day, only 4% of moms utilized the quadruple position every day, with each hold of S-SC lasting two hours

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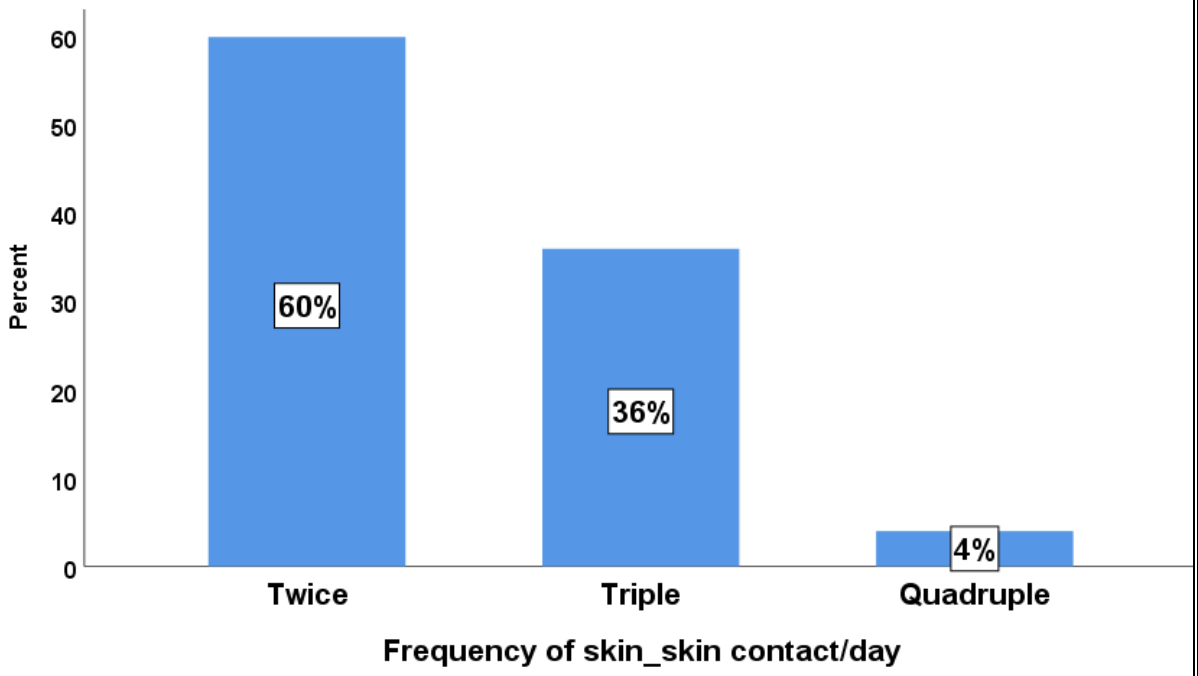

Figure 3: Frequency of S-SC.

As an open-ended question on mothers` opinion of KMC was given at the end of the questionnaire, Figure 4 results showed that 92% of women believed KMC was beneficial. No discomfort was reported by mothers who held the infants while in the kangaroo position.

The questionnaire and conversations with the parents revealed that Kangaroo Care was considered socially acceptable and had the highest possible levels of satisfaction.

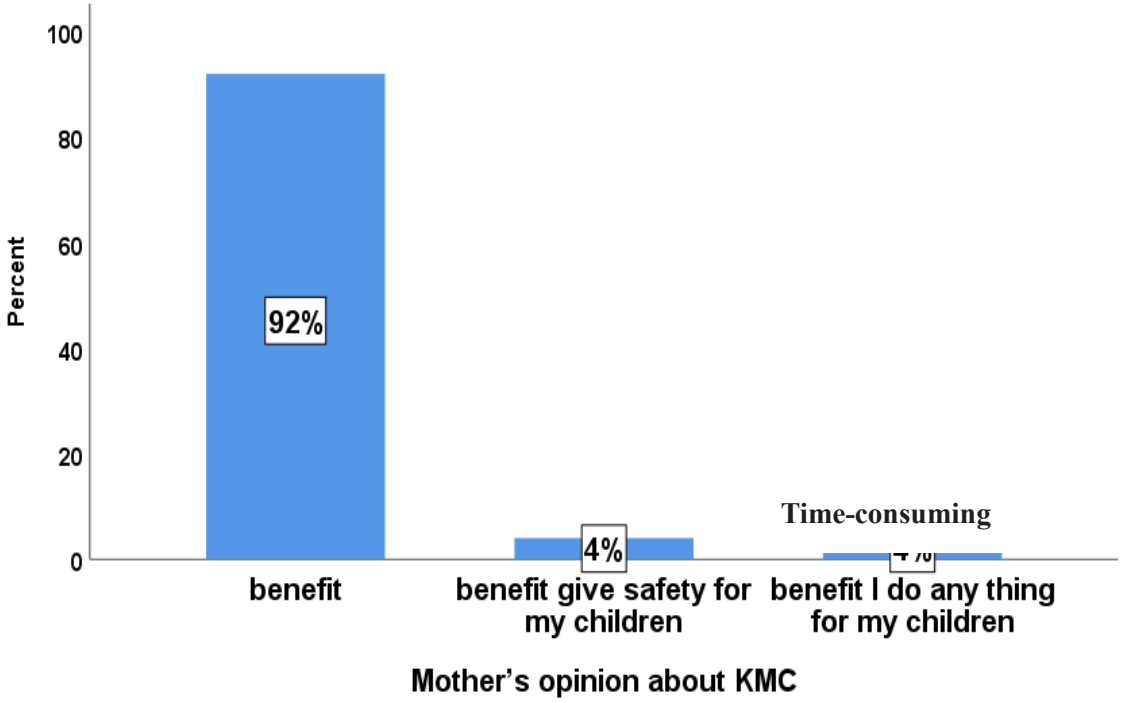

Figure4 Mother's opinion about Kangar

Chapter Four

❖Discussion❖

Discussion

Premature infants require extra care to ensure their survival, growth, and development. WHO recommended KMC as a routine care for all preterm or low birth weight infants around the world to ensure their preventive and promotive care can be applied without any special equipment, especially in developing countries, that's declared by the American Journal of Maternal/Child Nursing in 2024 by (Callister, 2024)

Mothers contributing in this study had the age range of (16-37) years with M±SD (27.6± 5.5) most of them were from urban residences, complete secondary education, housewife in employment status, had an intermediate income 76%, 82% of KMC and control groups sequentially. All sociodemographic characteristics of mothers showed no significant difference was observed between both groups (P-value>0.005). Large portion of both the case and control mothers had birth via cesarean section 54%, 52% subsequently (Annual Statistical Report 2023). Majority of both groups were multigravida.

No significant differences in baseline neonatal characteristics: sex, birth weight, gestational age of enrolled newborn and control group, male made up the majority of the gender. (Annual Statistical Report total birth 2023)

The expected mortality rate is can be reduced to desirable levels by 2030 by this affordable and scalable kangaroo method according to the results of a research study in southern India (Thomas *et al.*, 2024), Thomas found the mortality rate was 6.4% among KMC-initiated babies, the present result of this study showed (mortality rate 2%).

Application of KMC broadly encourages breastfeeding that enhanced health benefits by following up on both groups' newborns over precisely six months, supported by the results of other studies, which showed a

relationship between KMC and breastfeeding rate (Flacking, Ewald and Wallin, 2011)) formed on 103 very preterm (VP) and 197 preterm infants (PT) revealed that mothers of VP and PT infants spent more time in breastfed at 1, 2, 5, and 6 months. Also, the feeding mode in the infants of KMC groups was significantly higher, with exclusive breastfeeding (100%) In comparison, (80%) of the control groups had mixed feeding; because of the prolonged separation from their moms, others accomplished in Western Australia (Mundhra, Desai and Nanavati, 2021)and Shenzhen/China (Li *et al.*, 2024) conveyed the same outcomes.

The exclusive breastfeeding is sufficient to guarantee increased weight; kangaroo infants significantly increased their weight by (90%) meanwhile, weight gain in (58%) of control groups; this finding is compatible with other previous studies (Samra, El Taweel and Cadwell, 2013) who concluded that KMC was effective intervention and strategy for delated weight gain. Other studies in various countries are well-suited with this result, a study in Egypt institute that kangaroo care can improve the vital signs and weight gain of critically ill and premature newborns (Alhoot, Elbanna and Elgebaly, 2024)). Another study in Iran confirms that KMC improves neonatal weight gain and decreases hospitalization. This advantage in weight gain throughout the neonatal period was observed unrelated to the infant's sex, gestational age, or birth weight category (Karimi *et al.*, 2020).

Results Found significant increment in the length of kangaroo preterm infants, and that`s similar to a study in China which confirmed the association between KMC admission and length increment, promoting that KMC infants had significantly increased body weight and body length at hospital discharge and more body weight, body length, and head circumference increases in follow-ups (Wang *et al.*, 2021).

Another notable improvement in Kangaroo infant`s developmental activities, matching the results that obtained with a cohort study on 144 preterm infants conclude that early and prolonged KMC have better language and behavioral development (Bisanalli *et al.*, 2023).

Intermittent skin-skin contact is merely utilized by the mothers to hold her/his infants, 60% of kangaroo mothers carried their preterm neonate twice a day each S-SC lasting almost four hours per day, these results are similar to study in Pakistan about intermittent KMC infants that evaluate intermittent kangaroo mother care was found to be effective for improving weight-gain in neonates (Rehman *et al.*, 2020).

Of all Eastern Mediterranean countries, Most KMC research has been carried out in Iran evaluates the benefit of KMC to the mother by improve bonding with their preterm infants showed that the benefit was significantly high, in line with many research (Karimi *et al.*, 2024) determined that kangaroo care resulted in higher maternal-preterm emotional attachment, another study (Mehrpisheh *et al.*, 2022) in SARI/Iran (Journal of Neonatal Nursing–Elsevier) believed that skin-to-skin contact causes the mother to feel closer to her neonate and be aware of their needs. Furthermore, (Erduran and Yaman Sözbir, 2023) in Ankara/Turkey, on the impaction of KMC maternal attachment, it was found that the intervention groups had greater scores of maternal-infant relationships.

Based on the present results, the mean duration of daily S-SC was (7.47±1.05) with a maximum of 9 hours/day, analogous to study reported that S-SC should strive for a minimum of 8 hours per day of kangaroo care (Hall *et al.*, 2024). Another meta-analysis in Delhi/India suggests that KMC should preferably be initiated within 24 hours of birth and provided for at least 8 hours daily (Sivanandan and Sankar, 2023).

The average length of hospital stay for the KMC group was (11.28±5.05) referred to early home discharge and reduce the length of hospital, probably identical to a meta-analysis study on 300 infants with S-SC duration shorter than six hours daily, revealed that KMC had the effect of dropping the hospital stay duration varies from 7 days and 3 hours to 2 days and 4 hours, with a mean hospital stay duration 4 days in the group submitted to this intercession (Narciso, Beleza and Imoto, 2022), another study finding in Brazil prove an infants are discharged after successfully adjusting to the kangaroo position and nutrition referred to early discharge, reduce financial equipment and hospital-acquired infection (Campanha *et al.*, 2024).

Additionally, only 24% of kangaroo infants had been readmitted to the Hospital, while 66% of control groups were readmitted as of several causes distributed by the highest percentage (56% fever, 24% jaundice, GI 14%); proof that Kangaroo infants get less percentage of readmission to the Hospital, in agree with results of (Mandal and Murugesan, 2024) in India revealed that Readmissions accounted for 5.9% of total NICU admissions. Infections and jaundice accounted for 76% of all the readmissions.

Kangaroo mothers group believed that KMC was beneficial by 92% as an open-ended question about whether kangaroo care was socially acceptable and provided the highest levels of care, similar to A qualitative study in Sulaymaniyah/Iraq (Aziz, 2024) on postnatal mother's experience practicing kangaroo mother care, the results validated KMC as an effective neonatal care technique that provides a holistic approach to enhancing the health of mothers as well as newborn.

kangaroo care can be used with high proportion of benefit rate resulted in earlier improvement of outcomes that`s greater in kangaroo group than non-Kangaroo control groups. to achieve the target effect of KMC

should involve skin-skin contact as soon as possible after birth, exclusive breast milk and early discharge, and follow-up monitoring (Ekwueme *et al.*, 2024) in Ethiopia that proves a considerable key predictor of KMC is three scale-up phases to reach the beneficial target.

Limitations of Study

1. Some families delayed follow-up appointments, especially control groups from rural areas, far distances, and poor cooperation as excuses for the difficult communication.

2. Because the study was only conducted in one city, the results can only be generalized to one city. As such, it is suggested that more research be done across many cities.

3. Since this study was a prospective chart review, need more time than 6 months to follow up for more than one year, especially since the preterm infant's development required more than six months.

4. After discharge home, some mothers don't commit to the exact duration of 9 hrs. S-SC, as much as they had done in the Hospital, is a home responsibility, so they need extra encouragement to adopt and fulfill prescriptions of daily duration.

Despite these limitations, this study provides important participation as it assesses the value of kangaroo mother care and its essential role in preterm infants' health outcomes, also benefits the mother, Hospital, and community, and highlights the advantages of kangaroo admission in contrast to the traditional care.

Chapter Five

❖Conclusions & Recommendations❖

Conclusions

Results yield that KMC is a safe, essential, inexpensive method of care; it has the potential effects that significantly improve the newborns' health outcomes, sufficient nutrition by exclusive lactation to increase neonatal survival, decrease mortality rate and better physical growth of the kangaroo group than the conventional control group.

In addition, Kangaroo admission encourages early hospital discharge and shortens the average length of hospital stays, which lowers the need for expensive devices.

Recommendations

1. Regular kangaroo mother care (KMC) is suggested for all preterm or underweight newborns. KMC viewed as a means of humanizing the delivery process, and should be strongly imposed as many hours as possible and started after neonates' stabilization in hospitals and upon early discharge.

2. Most babies who received Kangaroo Mother care exposed a notable improvement in key physiological markers without needing specific technology, proving that this method can give neonates superior care. This method should apply to all Iraqi hospitals.

3. Mothers should be trained by KMC in the prenatal periods to educate mothers about the benefits of Kangaroo care and encourage the value of it.

4. Other research needs to be done about starting KMC immediately with continuous kangaroo applications after birth, even non-stabilized newborns.

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Appendix

Questionnaire on the Impact of Kangaroo Mother Care unit on Newborn Health Outcomes of Preterm Infants in Alzahraa Teaching Hospital, Najaf 2024

Dear Participant,

We are researching Kangaroo Mother Care unit to assess the impact regarding this unit on preterm infants. This research will help us understand the specific informational needs and will be useful for recommending appropriate interventions to improve the lives of the newborn. Your name will not be written in this form. We greatly appreciate your help in responding to this questionnaire.

Mother Information

1. **Age (year):**
2. **Residence:** ☐ Urban ☐ Rural ☐ Semiurban Area
3. **Educational Status:**

   ☐ Illiterate ☐ Primary School

   ☐ Secondary School ☐ College

   ☐ Postgraduate Study
4. **Economic Status:**

   ☐ Weak ☐ Moderate ☐ Good
5. **Work Status:**

   ☐ Unemployed ☐ Government Employee ☐ Private Employee
6. **Mode of Delivery:**

   ☐ Normal Vaginal Delivery ☐ Caesarean Section
7. **Number of Births:**

   ☐ Primiparous ☐ Multiparous

8. **Diseases During Previous Pregnancy:**

   ☐ Gestational Diabetes ☐ Pregnancy-Induced Hypertension

   ☐ Anemia ☐ Previous Preterm Delivery

   ☐ Antepartum Hemorrhage ☐ Others (Mention): _____

9. **Do You Have Previous Admission to ICU?**

   ☐ Yes ☐ No ☐ Don't Remember

Neonatal Information

1. **Gestational Age (weeks):**
2. **Birth Weight (gm):**
3. **Gender:** ☐ Male ☐ Female
4. **Feeding Methods:**

   ☐ Exclusive Breastfeeding ☐ Bottle Feeding ☐ Mixed Feeding

5. **Breastfeeding Frequency:**

   ☐ Every 1 hr. ☐ Every 2 hrs. ☐ Every 3 hrs. ☐ On Need

6. **Initiation of Kangaroo Mother Care:**
   - Age (day): _____
   - Weight (kg): _____
   - Date: _____
7. **Condition of Baby Before Admission:**

   ☐ Difficult Breathing ☐ Difficult Feeding ☐ Others (Mention):

   _____

8. **Frequency of Skin-to-Skin Contact:**

9. **Daily Duration of Skin-to-Skin Contact (hr.):**

10. **Presenting Illness:**

    ☐ Congenital Anomaly ☐ Thalassemia ☐ Neonatal Jaundice

    ☐ Seizure ☐ Others (Mention): _____ ☐ None

11. **Mean Duration of Total KMC (in days):**

Follow-Up Questionnaire

1. **Do Your Infant's Condition Change Before and After KMC Admission?**

   ☐ Yes ☐ No ☐ Don't Know ☐ Somehow
2. **Weekly Weight Gain (gm):** _____
3. **Monthly Length Increment (cm):** ☐ Yes ☐ No Changes
4. **Weekly Overall Activity and Movements:**

   ☐ Improved ☐ Don't Changed ☐ Somehow
5. **Feeding Method:**

   ☐ Exclusive Breastfeeding ☐ Bottle Feeding ☐ Mixed
6. **Readmission to Hospital:**

   ☐ Yes ☐ No
7. **Episodes of Illness:**

   ☐ Respiratory Distress ☐ Fever ☐ Jaundice ☐ Others (Mention):

   _____
8. **Does the Position of Skin-to-Skin Contact Restrict Your Activities?**

   ☐ Yes ☐ No ☐ Bothersome
9. **Do You Think KMC Improves Bonding Between Mother and Baby?**

   ☐ Yes ☐ No ☐ Don't Know ☐ Somehow
10. **Is Admission to Kangaroo Mother Care Unit (KMC) Beneficial?**

    ☐ Yes ☐ No ☐ Don't Know ☐ Somehow
11. **What's Your Opinion About Kangaroo Unit?**

استبيان حول تأثير وحدة رعاية الأم الكنغر على النتائج الصحية لحديثي الولادة عند الخدج في مستشفى الزهراء التعليمي بالنجف 2024

عزيزي المشارك،

نحن نجري بحثًا عن وحدة رعاية الأم الكنغرية لتقييم تأثير هذه الوحدة على الأطفال الخدج. سيساعدنا هذا البحث على فهم الاحتياجات المعلوماتية المحددة، وسيكون مفيدًا في التوصية بالتدخلات المناسبة لتحسين حياة الأطفال حديثي الولادة. لن يتم كتابة اسمك في هذا النموذج. نحن نُقدّر بشدة مساعدتك في الرد على هذا الاستبيان.

رقم الاستبيان_____ :

معلومات الأم

1. **العمر** _____ **:**سنة
2. **الإقامة** ☐ **:**حضري ☐أرياف ☐العشوائيات
3. **الحالة التعليمية:**
   ☐أميّة ☐مدرسة ابتدائية
   ☐مدرسة ثانوية ☐كلية
   ☐دراسات عليا
4. **الوضع الاقتصادي:**
   ☐ضعيف ☐متوسط ☐جيد
5. **حالة العمل:**
   ☐ربّة منزل ☐موظف حكومي ☐أعمال حرة/خاصة
6. **طريقة الولادة:**
   ☐ولادة مهبلية طبيعية ☐عملية قيصرية
7. **عدد المواليد:**
   ☐بكر ☐متعدد الولادات
8. **الأمراض أثناء الحمل السابق:**
   ☐سكري الحمل ☐ارتفاع ضغط الدم
   ☐فقر دم ☐ولادة مبكرة سابقة
   ☐نزف قبل الولادة
9. **هل قادمة من البيت أو كنتِ داخل المستشفى؟**
   ☐من البيت ☐من المستشفى

معلومات حديث الولادة

1. **عمر الحمل (بالأسابيع)_____ :**

2. **الوزن عند الولادة (بالكيلوغرام)_____ :**

3. **الجنس** □ **:**ذكر □أنثى

4. **طريقة التغذية:**

□رضاعة طبيعية حصرية □رضاعة صناعية □رضاعة مختلطة

5. **بداية الدخول إلى ردهة الأم الكنغر :**

- العمر (بالأيام)_____ :
- الوزن (بالكيلوغرام)_____ :
- التاريخ_____ :

6. **حالة الطفل قبل الإدخال إلى ردهة الأم الكنغر:**

□صعوبة في التنفس □صعوبة في الرضاعة □غيرها_____ :

7. **المدة اليومية للتلامس بين الجلد والجلد (بالساعة)_____ :**

8. **عدد مرات تكرار التلامس بين الجلد والجلد_____ :**

9. **حالة المريض الحالية:**

□الشذوذ الخلقي □أمراض دم (تلاسيميا) □يرقان الوليد

□الصرع □غيرها □ _____ :لا يوجد

10. **متوسط مدة إجمالي الدخول إلى ردهة الأم الكنغر (بالأيام)_____ :**

استبيان المتابعة

1. **هل تغيرت حالة طفلك قبل وبعد دخوله إلى وحدة الأم الكنغر؟**

□نعم □لا □لا أعلم

2. **زيادة الوزن الأسبوعية (بالكيلوغرام):**

□نعم □لا تغيير

3. **زيادة الشهرية للطول (بالسنتيمتر):**

□نعم □لا تغيير

4. **النشاط والحركات الأسبوعية الشاملة:**

□تحسن □لا تغير

5. **طريقة التغذية:**

□رضاعة طبيعية □رضاعة اصطناعية □رضاعة مختلطة

6. **هل تم إدخال الرضيع إلى المستشفى مرة أخرى؟**
☐نعم ☐لا

7. **نوبات المرض:**
☐ضيق التنفس ☐الحمى ☐يرقان الوليد
☐التهاب القصبات الهوائية ☐غيرها_____ :

8. **هل وضع الطفل بطريقة الجلد للجلد يقيّد من حركتك؟**
☐نعم ☐لا ☐نوعًا ما

9. **هل تعتقد أن ردهة الأم الكنغر يحسن الترابط بين الأم والرضيع؟**
☐نعم ☐لا ☐لا أعلم ☐نوعًا ما

10. **هل تعتقد أن الانضمام إلى وحدة الأم الكنغر له فائدة؟**
☐نعم ☐لا ☐لا أعلم ☐نوعًا ما

11. **ما رأيك في هذه التجربة؟**

الخلاصة

الخلفية

الأطفال الخدج هم السبب الأكثر خطورة للوفاة بين الرضع، وخاصة في البلدان النامية. تعتبر رعاية الأم على طريقة الكنغر (KMC) رعاية مبكرة مميزة مهمة بأقل تكلفة من المعدات للسماح بصحة ورفاهية الأطفال المولودين، من خلال حمل الأطفال حديثي الولادة على صدر الأم العاري مع ملامسة الجلد للجلد (وضع الكنغر) والرضاعة الطبيعية الحصرية (تغذية الكنغر) المرتبطة بالخروج المبكر من المنزل. أوصت منظمة الصحة العالمية بـ KMC لجميع الأطفال حديثي الولادة، وخاصة الخدج.

الهدف: هدفت الدراسة إلى تقييم تأثير نهج KMC على نتائج صحة الأطفال الخدج في مستشفى الزهراء التعليمي في مدينة النجف / العراق.

الطريقة

دراسة مستقبلية بتصميم مراقبة لأطفال الخدج، شملت الدراسة عينة من 100 طفل حديثي الولادة (50 منهم خضعوا لمجموعات الكنغر، والباقي 50 كانوا مجموعة مراقبة) ولدوا في مستشفى الزهراء التعليمي بوزن عند الولادة أقل من 2000 جرام وعمر حملي 28-35 أسبوعًا لكلا المجموعتين، تم استخدام عينة متتالية على الأطفال الخدج لجمع البيانات، تم إشراك جميع أمهات الأطفال الخدج وإجراء مقابلات معهم باستخدام استبيان مصمم مسبقًا لجمع معلومات عنها وعن الأطفال حديثي الولادة، ثم تم جمع البيانات، بعد الخروج من المنزل، تمت متابعة كل طفل حديث الولادة لمدة ستة أشهر، وتم إجراء مقارنة بين الأطفال الخدج الذين تم إدخالهم إلى وحدة رعاية أمهات الكنغر والأطفال الخدج الذين لم يتم إدخالهم.

النتيجة

يتكون إجمالي عدد المشاركين من 100 طفل حديث الولادة قبل الأوان، مع عدم وجود فروق كبيرة في الخصائص الاجتماعية والديموغرافية للأمهات، وطريقة الولادة، ووزن الولادة في حدود 980-1700 (جم) ولكن لا توجد فروق كبيرة في القيمة الاحتمالية. أظهر أطفال KMC على عكس مجموعة التحكم زيادة في الوزن بنسبة (90%) (95%CI 1.2-1.99) RR 1.55. و(90%) زيادة في الطول (95%CI 1.7-3.5) RR 2.50، (100%) رضاعة طبيعية حصرية، وكشفت الأنشطة التنموية للرضيع (100%) (95%CI 1.9-4.0) RR 2.77، وكان متوسط مدة دخول المستشفى

لمجموعة الكنغر (7.47±1.05) بينما في مجموعة الحالة (11.28±5.05)، كانت القيمة الاحتمالية لكل هذه الاختلافات المتابعة ذات دلالة إحصائية (<0.001).

الاستنتاج

تشير النتائج إلى أن رعاية الأم الكنغر هي واحدة من الطرق الأساسية وغير المكلفة، ولها تأثيرات محتملة تعمل على تحسين النتائج الفسيولوجية للمواليد بشكل كبير، والتغذية الكافية لضمان زيادة الوزن من خلال الرضاعة الطبيعية الحصرية، وزيادة بقاء الأطفال حديثي الولادة، وتحسين ارتباط الأم بالطفل وتشجيع الخروج المبكر من المستشفى.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة كربلاء
كلية الطب

تأثير رعاية الام الكنغر على النتائج الصحية للخدج في مستشفى الزهراء التعليمي في مدينة النجف الاشرف 2024

دراسة

مقدمة إلى مجلس كلية الطب/ فرع طب الأسرة /جامعة كربلاء كجزء من متطلبات نيل درجة الدبلوم العالي في طب الأسرة

قدمت من قبل

ورود نعمان هادي

بكالوريوس الطب والجراحة عامة

بإشراف

الدكتور البروفيسور
علي عبد الرضا أبو طحين
استشاري طب الأسرة

الدكتور البروفيسور
علاء جمعة النصراوي
استشاري طب الأطفال وحديثي الولادة والخدج

2024م **1446هـ**