

BENEFITS OF MOTHER'S OWN MILK TO PRETERM INFANTS AND HEALTH PROFESSIONAL'S SUPPORT IN NEONATAL INTENSIVE CARE UNIT (NICU)

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ABSTRACT: *Background:* World Health Organization (WHO), reported that annually, about 20 million infants are born with low birth weight (LBW) either due to intrauterine growth restriction or preterm, world-wide. Preterm infants are babies born before reaching 37 complete weeks of gestation age. Preterm births accounts for about 15million worldwide and are the chief cause of neonatal mortality rate accounting to about 1 million babies dying annually. Studies revealed that, at least 80% of neonatal deaths happen in sub-Saharan region and south Asia. Malawi is having the vast figure of preterm births and highest neonatal mortality rate among high ranking ones.

Objective: This article highlights some of the benefits of mothers own milk to preterm infants and the support lactating mothers needs from health professionals.

Results: It was revealed that, preterm babies need extra care and optimizing nutrition is one of the championing strategies to support their health needs. WHO recommends breast milk especially from baby's own mother as the optimal nutrition for preterm infants. Mothers own milk (MOM) is the best as compared to donor human milk or infant formula in these special infants. The health care professionals support on feeding these special babies is essential. Human milk's composition is usually adapted to the unique needs of each particular infant and suitable for gestation age.

Conclusion: Mothers own milk (MOM) is fundamental in risk reduction of neonatal morbidity and mortality due to its digestibility, bioavailability and suitability to preterm infants. MOM is the best for preterm infants as it is gentle on the baby's digestive system yet provides more nourishment.

KEYWORDS: Preterm infants, mothers own milk (MOM), Donor milk, infant formula, expressed breast milk, NICU, benefits, feeding support.

1 INTRODUCTION

World Health Organization (WHO) reported that over 20 million infants are born with low birth weight (LBW) (less than 2500g) each year, world-wide [1], [2], [3]. LBW can be due to either intrauterine growth restriction, preterm delivery (born before completed 37weeks gestation) [4], [5], [6]or by a combination of both and the vast majority of about 96% is in low and middle-income countries [1], [3], [4], [5], [7], [8]. Fig.1, shows global prevalence and distribution of preterm births. Among low birth weight babies, 15million babies are premature [6], [9], [10] and prematurity is the major drive of neonatal mortality rate [8], [11]accounting to about 1 million babies dying annually [5], [7], [11]. More so, it is estimated by WHO that, LBW babies account for >80% of neonatal deaths in sub-Saharan Africa and South Asia [2], [3], [11].

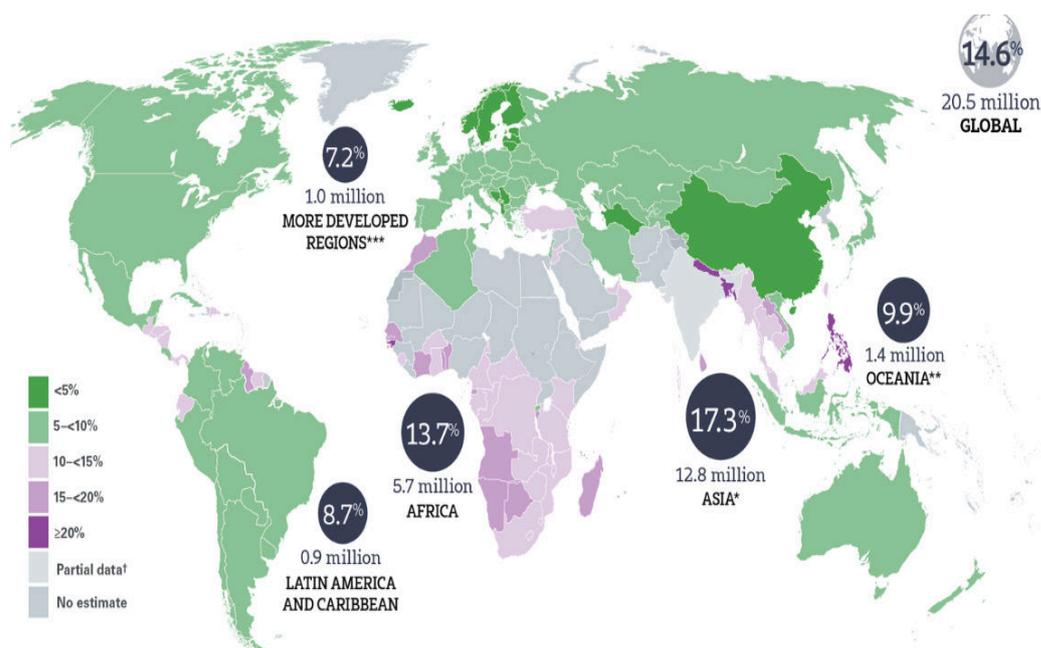


Fig. 1. Global prevalence and distribution of preterm births [2], [4]

Malawi is not an exceptional, as it has the higher-ranking on preterm births and with the highest neonatal mortality rate [12]. Preterm babies are likely to face some of the complications such as neuro-cognitive impairment [10] and non-communicable disease as they grow as compared to their term counterparts [3], [4], [5], [7], [8] hence needs specialized and comprehensive care and optimizing nutrition is one of the strategies. Nonetheless, breast milk which contains the optimal nutrients necessary for child growth and development, prevent the occurrence of some of these complications, such as bronchopulmonary dysplasia, respiratory distress syndrome, necrotizing enterocolitis (NEC), feeding difficulties and visual and hearing problems [10], [13], [14]. Breastfeeding is therefore recommended strategy to improve nutritional, immunological and developmental outcome in preterm infants [3], [4], [8], [15], [16]. Studies have revealed that breast milk comprises of all the essential nutrients (minerals and vitamins) and antibodies hence provides optimal nutrition for both term and preterm infants [17], [18], [19].

Additionally, suckling at the breast is the ideal way for infants to receive breast milk and for the mother's body to make more milk. In the act of suckling, hormonal actions are induced to facilitate milk production as well as milk ejection. Breast feeding is not always possible with the fact that some babies may born prematurely and others may be sick, hence unable to suckle because of their weak jaws, which necessitate supplementary feeding [20], either by cup, bottle, syringe or nasal gastric (NG). Breast milk or formula is commonly used even in Neonatal Intensive Care Units (NICU) [21], [22]. However, mother's own milk (MOM) is the best and recommended form of nutrition for all infants [23], because it helps in risk reduction of neonatal morbidity and mortality [16] due to its digestibility, bio-availability and suitability to preterm infants [22]. Therefore, mothers with premature babies are encouraged and assisted to express the breast milk and feed the infants because most of premature babies cannot suck the breast easily. This paper reviews the benefits of mother's own milk to her preterm baby and the support the lactating mother needs from health professionals.

1.1 SITUATION IN MALAWI

Malawi ranks the highest among the countries with the upmost rates of premature births in the world with about 1 in 5 babies born before 37 weeks gestation by the year 2015 [5], [12]. Globally, prematurity related complications, such as difficulty in feeding, breathing and body temperature regulation, are the largest drive of neonatal death [12]. In order to survive, these babies need specialized care and equipment where feeding is one of them and needs resources and health professional support is very important to these special infants [12], [24], [25].

In Malawi, approximately 120,000 babies are born prematurely every year and about 4,800 under five children die due to direct complications of immaturity [22]. Through acceptance of global policies and program which aim at increasing access to life-saving newborn and child health interventions, Malawi managed to achieve Millennium Development Goal 4 (MDG4) which

aimed at reducing under-5 mortality by two-thirds by 2015, however, 44percent of deaths continues to occur among these babies before completion of first month of life [12].

In 2015, Malawi's neonatal mortality rate was estimated as 22/1000 live births [3], [26]. Moreover, preterm birth rate is ranked the highest in the world [3], [12]and as the foremost cause of neonatal deaths in Malawi [26]as shown on the fig. 2. To improve the situation, Malawi adopted Every Newborn Action Plan developed by WHO and UNICEF's with the purpose of reducing neonatal mortality rate to 17 per 1 000 births by 2030 [12].

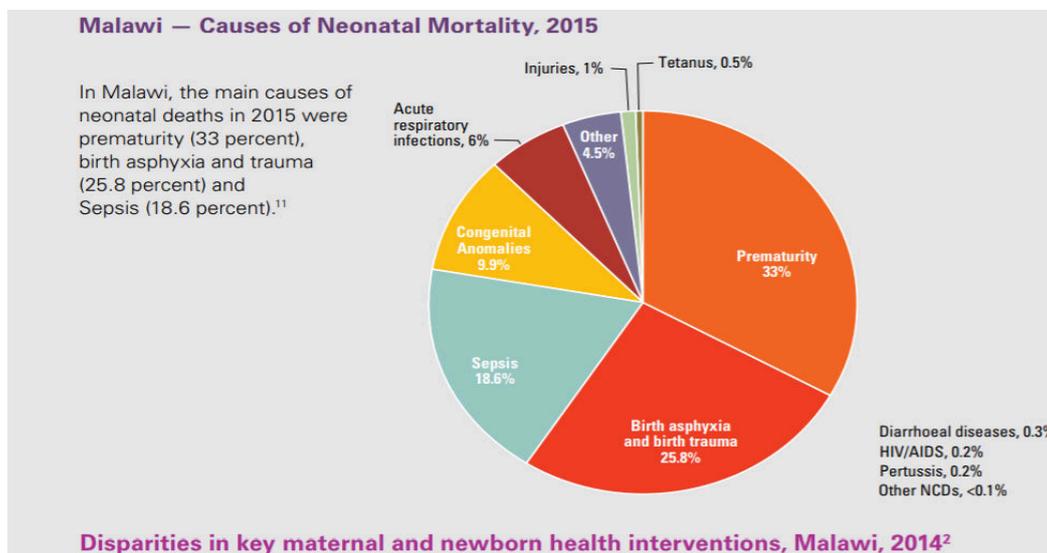


Fig. 2. Causes of Neonatal Mortality Rate in Malawi [26]

WHO recommends breast milk as the optimal food for new born [1], [19], [24]. Malawi is using breast feeding as one of the championing interventions to ensure the well-being of both preterm and term infants. Women with preterm babies are encouraged to breast feed directly or express the milk and use cup or bottle depending on the health condition of the baby or/and gestation age at which the baby was born.

1.2 PRETERM INFANTS

According to WHO, Preterm babies are infants born alive before reaching 37 complete weeks of gestation [4], [5], [6]. Preterm babies are categorized in extremely (those born at less than 28 weeks), very preterm(born between 28-32 weeks of gestation) and moderate to late preterm(born between 32 to less than 37weeks) [5]. Prematurity is a global issue although the vast majority of about 96.5% are from underdeveloped countries such as Asia and sub-Saharan Africa [3], [11]. Prematurity is the major cause of neonatal death, and preterm birth complications are the chief causes of death in under five children [8], [10], [11], [14], [27].

Furthermore, there is significant rapid fetal growth as well as organ maturation and development in the third trimester of pregnancy [28]. The organ immaturity and increase in nutrition requisite in preterm infants combine to render it difficult to attain dietary intakes that will assist preterm infants to match the growth rate of their counter parts in utero [19], [28], [29]. Some preterm infants also have on going medical conditions [30] for example chronic lung disease, which eventually amplifies nutritional requirements more [31] and are at greater risk of developing non-communicable diseases later in life such as diabetes [3], [19], [32]. Literature is lacking to show specific metabolic impact of preterm infants' illness in relation to nutrition absorption and utilization. Merely, sickness in these special infants just like in any other person increases metabolic demands hence amplifying the nutrition needs such as energy, iron, and protein [31].

Preterm infants have been ascertained to have delayed gross motor development as compared to their counter parts born at term [33]. The challenges make it difficult to feed a preterm baby, especially breastfeeding direct at the breast or bottle feeding because of their weak jaw muscles making them unable to suck or maintain suctioning [34]. Nevertheless, supplementary feeding of either expressed MOM, donor milk(DM) or formula by the cup or tube is required [31]. Some studies are of the view that expressed breast milk should be given to the preterm babies [34], others believed in fortified infant

formula [30] for the infant to grow very fast. It is recorded elsewhere that mother's own breast milk is preferable [35], [36] than donor milk and formula [1], [37] especially when the mother is available. Preterm nutrition provided should be aggressive [8] to enable them receive the very amount of nutrition with same composition of nutrients as they would have received in utero [31].

2 NUTRITIONAL REQUIREMENT FOR PRETERM INFANTS

First and foremost, the nutritional requirements for premature infants are considerably contrary to those of the term infants. Preterm infants require aggressive nutritional support due to their inflated nutrition demands [31], [38], [39] especially for energy, protein, long-chain polyunsaturated fatty acids [32], iron, zinc, calcium and Selenium [29]. Nevertheless, feeding preterm infants comes with challenges [40], especially in the early weeks of postpartum life. There is the risk of intolerance resulting from physiological immaturity of gastrointestinal tract (GIT) and feeding abilities [13], [36]. High intake of nutrients is required to fill the nutritional gap to catch up with fetus of the same gestation age in utero [38], [40].

Secondly, preterm babies are vulnerable to some medical conditions such as hypertension, acidosis, infection and hypoxia [13], [41] which increases energy requirement due to increased metabolic rate [19], [22], [30]. In addition, poor nutrition in preterm infants is associated with poor psychomotor and mental skills [33], [39] low Intelligent Quotient (IQ) [13], [25], cerebral palsy and autism [2], [8]. For these reasons, it is critical to improve optimal nutrition early enough to achieve survival and promote growth and development [33], [40], [42], [39]. Therefore, advanced care in the NICU is necessary and centered on vital organ development [27]. Feeds may be introduced and gradually increasing as the infants grow in order to meet their unique needs [33], [43]. Preterm infants start with MOM or fortified donor milk or formula feeds by tube, bottle or cup, until they mature and able to manage sucking the feeds and coordinate with swallowing and breathing [15], [21].

Likewise, American Academy of Pediatrics states that, breast milk is the primary form of nutrition for infants [20], [44], and improves the health outcome of the infants. Breast milk provides a particular protection against infections [45], [11] such as necrotizing enterocolitis [1], [25], [42], improves respiratory and enhances neurodevelopmental outcomes for preterm infants [13], [18], [28], [30], [32], [44], [46].

In addition, human milk (HM) is connected with significant health benefits to preterm infants [39], [46], [42]. Human milk (HM) especially from the infant's own mother is essential to preterm infants and represent one of the cost-effective strategies to reduce disease burden and associated costs in preterm infants [33]. Mother's own milk is the best preference [27], [35] and if not possible, fortified donor milk is the best alternative [13], [37] than formula [1], [16], [23], [28], [30], [35].

3 BENEFITS OF MOTHER'S OWN MILK (MOM)

Breast milk especially MOM is the best for preterm infants [33] [32], [47] and WHO recommends that LBW babies should be fed mothers own milk [1], [16], [27], [28]. Human milk's composition is usually adapted to the special needs of each particular infant and suitable for gestational age [23]. Mothers with preterm infants produces milk with higher amounts of key immune compounds than those from mothers of term infants [23], [48]. Research suggested that preterm milk is higher in protein, decisive minerals, and antimicrobial properties [28], [36], [48]. Preterm babies benefit a lot when receiving mothers own milk than donor milk or formula. MOM has unique elements that help to improve brain development, reduce feed intolerance, reduce infection and lowers the risk of necrotizing enterocolitis [11], [13], [28], [33], [36], [39], [47]. This explains that protection acquired through breastfeeding corresponds to the degree of infant's immaturity.

Moreover, numerous studies have depicted that, preterm milk is pretty different from the term milk (most donor milk) [28], [49] such that preterm milk contains more fat, proteins and minerals, like sodium, chloride and iron [36]. MOM's composition is more beneficial to the premature infant as it matches those of the similar baby in utero [27]. Growth and development (especially brain and nervous system) [38], [50] is rapid, due to the fatty acids in their right quantity in the milk [18]. On the other hand, proteins are crucial for building tissues which was missed in the fetus which would be achieved in utero [38] and protein content believed to be high in preterm milk [28], [48], [49]. It also act as anti-infective property particularly in the gastrointestinal [40] and respiratory infections [34], [22], [47], [48].

Likewise, human milk has anti-infective features, fighting factors that provide the body's defense against infections [22], [30], [36], [45]. These antibodies are high in preterm milk which enhance the immune system to function effectively [28]. Babies receiving the MOM are less probable to acquire allergic skin conditions [13], [25], [38]. Premature infants who feed on their mother's own breast milk stand less chance of developing gastrointestinal problem such as diarrhea and necrotizing enterocolitis (NEC) frequently even in NICU [13], [22], [47], [51] meaning that preterm infants feeding MOM are associated with significantly reduced rate of infections such as NEC hence reducing NICU costs [1], and improving neurodevelopment [52],

[36]. Some studies revealed that premature infants that are given MOM, have reduced rate of developing metabolic syndrome later in life, for instance, high blood pressure and low-density lipoprotein levels, as well as diabetes [18], [23], [32] when they reach adolescence, compared to premature infants receiving formula [13], [28]

Similarly, digestibility is one of the characteristics identified with mother's own milk. It is nutritious and easy to digest [22]. Minimal effort is used to digest the milk into its basic units like antibodies and nutrients. This is suitable for the immature digestive tract of a preterm [48]. Suitability of breast milk enables digestibility and allows bio-availability to occur efficiently [22], [28].

Bioavailability, on some other hand, talks of utilization of nutrients by the body. Utilization is high in human milk especially MOM and beneficial for babies, especially premature ones [28], [36], [47]. The nutrients are easily absorbed and effectively used by the body in low quantity, as compared to infant's formula [22], [37].

3.1 DONOR MILK (DM) AND FORMULA

In contrast, alternative milk can be obtained from the donor of which in most cases is from the mothers who delivered full term infants [23], [53]. This normal happens when the receiving baby's mother cannot breastfeed due to medical conditions or death [28]. The donor milk do not contain the exact nutrient as compared to the baby's own mother [28], [47], [49]. The donated milk goes through pasteurization leading to the decrease in concentration of essential component such as lactoferrin, immunoglobulins, lysozymes and human milk cells [23], [47], [54]. This process is also recorded to decrease bactericidal activity by 25% [23]. Donor milk is therefore fortified by essential nutrient to meet the nutritional requirement for premature babies [23], [28]. Infant formula special for preterm babies is the other option if human milk is not obtainable but comes with its own disadvantages, as it does not match the bio-active factors which are in human milk.

4 FEEDING PRACTICES FOR PRETERM INFANTS

Feeding practices can have an impact on development in preterm infants [25], [41]. Good feeding strategies with the purpose of providing the optimal food to the preterm will likely improve the immediate and long-term health and well-being of the individual infant hence having significant impact on neonatal and infant mortality rate [2], [25], [50], [41], [39]. In view of this, nutrition in preterm can be provided through several ways depending on the health status of the baby and suckling abilities [55]. Suckling abilities depends on the gestation age at which the baby born. Mostly, preterm babies born before 34 weeks gestation have more suckling problems than those born after 34 weeks [11], [55]. So, it is sensible to provide expressive breast milk to preterm infants. Preterm infants have weak jaws making them unable to maintain suckling during feeding and sometimes manifested by respiratory problems [56] hence need extra support for breast feeding e.g. supplementing by expressing [41] and cup or tube feeding (depending on the condition) and not the bottle [11], [21]. However, it has been suggested that bottle feeding interfere with exclusive breast feeding success [43]. Mothers with preterm babies need more and special support from professional health workers especially when in NICU [27], [50], [25].

5 HEALTH PROFESSIONALS' SUPPORT

Nurse-mother relationship may facilitate interaction hence improves mothers involvement in the care of their babies especially on breastfeeding which is of the utmost importance to premature infants in NICU [6], [25]. Baby's inability to latch and feed on the breast affects lactation overtime and eventually cease. This possibly increases maternal stress, leading to a decrease in milk production and maternal drive to breastfeeding [27]. Poor lactation may eventually lead to inadequate nutrition leading to weight loss or infant's stunted growth [57]. Hence, the need for words of encouragement from health workers and give a hand to mothers to express the breast milk and feed the infant.

Besides, safe and neonatal oral feeding capability is a convoluted dynamic system that relies on the coordination of multiple physiologic functions, behavioral state dynamics, and social interactions. Premature infants find difficult to latch on the breast and not able to maintain the suckling reflex when feeding direct from the breast due to immature nutritive sucking skills which makes them not to endure [55]. Therefore, expressive breast milk (either by pump or by hand) is the best to be given to premature infants and the amount taken by the infant should be assured. This justifies the need for health professional's support for these infants to get enough milk from their own mother [27]. Continuous support as well as maternal education on breast milk expression [50], [9], [41], [45] including frequency and quantity is very important [18].

Cricco-Lizza, R. 2016, concluded that mothers in NICU need support from the nurses during bedside breastfeeding [17]. In other hand, the same study revealed that nurses felt anxious and embarrassed to support due to the breast feeding challenges

in NICU [17]. Other studies depicted that professionals' knowledge on breastfeeding affects the support system to the mother which can lead to successful breastfeeding [52], [18], [9], [46]. Therefore, NICU needs well trained and competent nurses who can appreciate the challenges mothers meet when breastfeeding their preterm infants, hence promote and support to express milk and breastfeed their infants [9], [25]. Babies who receive MOM are more probable to improve and reach the average weight earlier and can be discharged faster than the infants who are getting other types of feeding [18].

6 CONCLUSION

In conclusion, infants who are born before reaching 37 complete weeks of gestation have high probability of developing a wide range of illnesses, such as intraventricular hemorrhage, bronchopulmonary dysplasia and prematurity retinopathy, due to the immature physiological systems and processes. This in turn, increases their risk to pathetic physical and neurodevelopmental health outcomes, such as blindness, deafness and cerebral palsy. Comprehensive and specific care should be provided to these vulnerable infants to minimize the risks.

Nonetheless, optimizing nutrition especially MOM is essential to the infant's health. Naturally, MOM developed specifically for own baby and contains the proper amount of nutrients and easily digested and used by the infant's immature body system. MOM is gentle on the baby's system and changes its properties as the infant grows hence providing more nourishment. MOM helps to lessen stress on the infant's essential organs such as heart, lungs, bowels and kidneys which allows the high risk infant to utilize much energy for growth and protection by creating the medication that no hospital can make. Preterm birth is a critical global health problem required to be tackled in order to encounter the Sustainable Development Goals by reducing neonatal and child mortality both globally and locally. Therefore, Health professionals support on breastfeeding is fundamental.

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