

## Meta-Analysis: Early Weaning and its Relationship with Malnutrition and Reduced Physical Activity

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### Abstract

Children who are exclusively fed on breast milk within the required duration tend to be healthier as they get important nutritional elements from the breast milk. This study reviews various publications through the CASP model to establish the connection between breastfeeding, malnutrition in children, and the development and growth patterns of children. A total of five peer-reviewed journals specifically addressing the issue of breastfeeding in the Middle East (Saudi Arabia and Kuwait) were reviewed. There seems to be a very strong correlation between the health of the children and their breastfeeding duration. Early weaning in children means that the breastfeeding duration is significantly reduced, thus inferring that the children are denied the opportunity to access vital nutrients contained in breast milk. This therefore means that children who are suppressed of breast milk tend to be malnourished. This is based on the fact that breast milk contains a lot of mineral elements that are vital for the development of the baby. With the right nutrients, breast milk is an essential precursor to growth and development in children. Children who are exclusively fed on breast milk tend to be stronger in terms of their physical development and cognitive growth. It is thus imperative that mothers who are keen on preventing malnutrition and the associated effects should exclusively feed their children on breast milk. Further, any form of physical and cognitive development in children can be enhanced through exclusive feeding of breast milk by avoidance of early weaning. This study equally establishes that there are many factors that influence the duration of breastfeeding. These factors include the educational level of mothers, the employment status of mothers, and the income capacity of mothers. Developing a framework for promoting exclusive breastfeeding requires that these predictors are addressed.

**Keywords:** Bottle-Feeding; Complementary Feeding; Exclusive Breastfeeding; Weaning; Malnutrition

### Introduction

Parental instigation of complementary feeding for infants before the infants reach the recommended age bracket has been noted to be risky in terms of exposing toddlers to health risks [1]. In fact, a study commissioned by the WHO in 2015 revealed that shortening the breastfeeding period of children has heightened mortality and morbidity rates amongst children [2]. This is particularly prevalent within developing countries. Optimal feeding practices during infancy and even during early childhood stages are therefore encouraged by the WHO if the health of children is to be improved [1].

Breastfeeding is an unrivalled feeding plan for the child based on the nutritional content of breast milk [3]. Many publications aver that the mother is obliged to feed children as much breast milk as possible and introduce weaning progressively [4]. The micronutrients and macronutrients contained in breast milk are fundamental requirements for the growth of the child and, thus, must be encouraged by all means possible [3].

But other than the nutritional value of the breast milk, many studies have revealed that breast milk has a lot of immune protective factors that conventionally augment the developing immune system of the child. The fact that breast milk forms a principal component of the child's immune system makes it an essential factor in the child's feeding program. Al Juaid, *et al.* agree that, since the development of the child's immune system is based on the contents of the breast milk, the children should be fed on the mother's milk for as long as possible [5].

Infants who feed on formula instead of breast milk are at a greater risk of infection and other health issues [6]. Specifically, the health complications that are common to infancy are very frequent among children who are formula fed as compared to those who feed exclusively on breast milk [7]. There is a very strong correlation between the health status of children exclusively fed on breast milk and the health status of toddlers.

Based on the assertions of the WHO and UNICEF, the recommended feeding duration for infants is 6 months, after which progressive weaning of the child should be pursued [2]. But while the recommended weaning period is six months, not many parents are keen to breastfeed their children exclusively for six months. Globally, less than 37% of mothers exclusively feed their children on breast milk [6]. This has been attributed to many factors including socio-economic ones.

Based on the benefits of breast milk, many nutritionists admit that early weaning of toddlers should be discouraged. The health implications of limiting the consumption of breast milk are significant. Based on this account, there is a need to develop a clear framework to encourage mothers to feed their children on breast milk exclusively [7].

### Objective and Justification of the Study

The objective of this study is to investigate the extent to which early weaning of infants has led to malnutrition in infants and stunted development in terms of their physical activity. Many studies have revealed that various socio-economic issues have affected the decision of mothers to exclusively feed their children on breast milk. Currently, many mothers are weaning their children earlier than the recommended six months, thus limiting the duration that toddlers consume breast milk. This has led to impaired physical activity amongst these children owing to their deteriorated health status as a way of responding to a deficiency in the nutritional elements found in breast milk. Understanding the extent to which breast milk is critical to the enhancement of the health of toddlers is relevant to encouraging mothers to feed their children exclusively on breast milk.

### Literature Review

#### The concept of breastfeeding

Elbur, *et al* and Al Faleh agree that breastfeeding entails the feeding of babies with milk from the breast [3,7]. The concept of breastfeeding could as well mean nursing the baby [1]. The explanation given by WHO emphasizes the significance of breastfeeding as compared

to the majority of other publications such as that by Hanafi, *et al* [4]. According to the WHO, breastfeeding refers to the “normal” method of providing young infants with the nutrients they require to grow healthy and develop wholly [2]. The WHO calls it the “normal” method because they do not suggest that there should be any form of replacement of breast milk unless there are medical conditions barring the process [2].

Evidently, many scholars seem to be in agreement on what breastfeeding means except that others give more weight to the process of breastfeeding. A further evaluation of the literature revealed that there is a systematic pattern of defining breastfeeding that varies immensely from older publications to contemporary studies. Contemporary studies such as that by Hanafi, *et al.* seem to emphasise the importance of breastfeeding to the life of the baby [4]. The older publications simply define breastfeeding as the act of feeding the baby from the mother’s breast milk without giving more weight to the action. This could be based on contemporary researchers’ acknowledgement of the fact that the majority of mothers are quick to replace breast milk with other forms of food for their baby and, therefore, need to be reminded of the benefits of breast milk for the development of the child.

### Breastfeeding as an answer to malnutrition

There is a general agreement amongst nutritionist that breast milk is the best food that can be given to babies if their development is to be guaranteed. The majority of scholars admit to this fact that breast milk is an essential component of the baby’s food that cannot be replaced unless there is a medical condition that prevents the mother from feeding the baby [8]. The nutritional value of breast milk has been noted to be its most important attribute that makes it an essential meal. The colostrum contains many nutritional elements that are critical to the growth and development of the baby [9].

In his analysis of the nutritional value of breast milk Jones, *et al.* aver that there are different types of breast milk depending on the lactation stage, each with varying nutritional content that serves the needs of the baby [2]. Breast milk has also been noted to vary in terms of nutritional composition with the time of day depending on the nutritional demands of the baby. Based on this variability of the nutritional content of breast milk with the time of day depending on the needs of the baby, nutritionists are unable to precisely establish the nutritional content of breast milk. Based on the approximations of Azzeh, breast milk is mostly made up of energy and iron, which are critical elements to the development of the child [9]. Other elements contained in breast milk include micronutrients such as sodium, calcium, and phosphorous [10]. The contents of breast milk are considered as critical to the growth of the baby and any replacement of the feeding patterns of the baby essentially sets the stage for malnutrition.

### Breastfeeding and weaning: a review of the connection

The concept of weaning refers to the introduction of other foods to the baby to supplement breast milk [10]. Through weaning, the baby gets to develop independence from the consumption of breast milk in a gradual manner till it reaches a stage where the baby is strong enough to survive on these foods. According to the recommendations of the WHO, weaning should begin after six months and continue progressively as the baby grows. The WHO further recommends that breastfeeding should continue up to two years or beyond based on the health benefits that it gives to the baby [2].

Scholars seem to be in agreement that babies should have as much time as they can to consume breast milk since it is attached to many health benefits. Weaning must be progressive; mothers must not be in a rush to replace breast milk with other forms of food since this would be detrimental to the development of the baby [3]. Many studies have indicated that children who are introduced to weaning at an earlier stage of their development have a higher morbidity rate. This is based on the obvious fact that the children miss out on crucial nutrition and other health benefits of the milk.

In essence, it therefore means that children who are weaned early tend to be vulnerable to malnutrition. They miss out on essential nutritional elements that are unique to breast milk. Nutritionists agree that, although some of these nutrients can be commercially pro-

duced to suffice the contents of breast milk, they cannot replace breast milk entirely. These findings have been further affirmed by Al Juaid, who correlated the feeding patterns of children to their physical growth [5]. The physical growth of children is facilitated by the nutrients that they consume. Children who are well fed tend to have more pronounced physical growth as compared to those children who are not well fed in terms of their nutritional requirements [6]. Since breast milk is a crucial reservoir of these nutrients, many scholars admit that children who are exclusively fed on breast milk are more physically active. Their patterns of growth in terms of physique and cognitive ability seem to be much more pronounced relative to those who are weaned earlier than the recommended time.

### Materials and Methods

Various literatures were reviewed under the CASP program to ascertain the relevance of breast milk to the growth and development of babies. Multiple studies were evaluated through the meta-analysis design and the thematic assertions of the studies were compared germane to the topic of study. Meta-analysis combines the inferences from various studies to come up with a single disposition since a single study does not meet the validity and reliability threshold for any meaningful inference to be made. The study selected a total of five peer-reviewed journals focusing on breastfeeding, weaning, malnutrition, and child development as the core themes.

#### Article selection

Various online journals were evaluated to establish their relevance to the themes under study. The journals were specifically selected from two online databases-NCBI and MDPI. A Boolean search of the databases was made with the keywords weaning, malnutrition, and physical development. The study focused on journals that were published within the past five years meaning the oldest reviewed article was published in 2014. The study was restricted to those within the Middle East and, specifically, Saudi Arabia. The initial Boolean search of the keywords mentioned above returned 6711 articles which were reduced to 1971 when the search was limited to the past five years within the selected journal databases. On introduction of the term "peer-reviewed journals", this was further reduced to 66 studies. A review of the abstracts of the studies limited the articles to five articles whose contents were considered as relevant to the study. Therefore, five articles were selected for this meta-analysis.

### Results and Discussion

#### Breast milk, malnutrition and health

The practice of breastfeeding in Saudi Arabia, according to the findings of this study, is gradually declining. This is based on several factors; salient amongst them is the economic dynamics of the society. The study used a cross-sectional study design focusing on children that attend routine "well-baby" clinics within selected hospitals in Riyadh. A questionnaire was administered to the attendees to establish sociodemographics, wheezing symptoms, asthma, and atopic disease.

In total, Al-Makoshi, *et al.* recruited 622 children as part of the study, and 36% of them were established to be exclusively feeding on breast milk while 75% were never breastfed [8]. Twenty percent of the respondents were established to have been fully breastfed for less than three months. The study revealed that breastfeeding of the children was associated with a significantly reduced likelihood of reports that the child had any form of wheezing in the last 12 months and of developing asthma. There were no associations established between full or never breastfeeding and atopic eczema.

The findings of this study confirm what the majority of publications have revealed in the discussion regarding breastfeeding as a precursor to health. Although breastfeeding does not seem to be the ultimate protection to certain diseases and ailments, the mothers who expose their children to breast milk for a longer time make reduced hospital visits due to diseases. Since full breastfeeding is associated with reduced cases of eczema and wheezing, there is a need to develop a strategy to promote breastfeeding amongst the women in Riyadh as a mode of enhancing protection against common ailments. These findings further affirm the recommendations of the WHO that efforts must be made by stakeholders within the healthcare sector to ensure that mothers breastfeed their children effectively as this has many implications for their health.

The implications of the findings of this study for policy formulation regarding childcare cannot be overemphasized. As earlier noted, many societies today, especially within the urban setup, are struggling to encourage young mothers to exclusively feed their children to shield them from preventable ailments. Policy action can thus be developed based on the findings of Al-Makoshi, *et al.* to ensure that mothers are given ample time by their employers to be able to ensure that their children are fed exclusively on breast milk.

Alahmari admits that one of the critical issues Saudi Arabia is facing in child care today is the high morbidity rate among children [10]. Specifically, the study singles out anaemia as an issue of concern that is associated with malnutrition in children. The study used a quantitative non-experimental design. Children between 4 and 5 years and with anaemia were interviewed in the study. The study further interviewed the family of the participants to establish the feeding patterns of the children during their infant ages. The findings revealed that the majority of the patients were not beneficiaries of exclusive breastfeeding. Eighty percent of the seriously anaemic participants in the study were breastfed for less than three months after which weaning began. Ten percent of the participants with less severe anaemia were exclusively breastfed for six months before weaning, with the remaining 10% of participants in the study noted to be having periodic episodes of anaemia. These findings fundamentally support the majority of the findings that have correlated health with breast milk.

As adduced by Al-Makoshi, there is an inviolable correlation between breast milk and health, which is related to malnutrition [8]. One of the major causes of early instances of malnutrition in Saudi Arabia has been traced to the breastfeeding patterns of children. Mothers who feed their babies exclusively on breast milk have experienced lower instances of malnutrition, thus ensuring that their children are completely insulated from various health risks that are associated with malnutrition. Comparatively, the findings of Alahmari and Al-Makoshi are conjoined in their assertion that limited breastfeeding is a foundation for poor health based on the fact that babies who have not received the benefits of feeding on breast milk exclusively lack vital nutrients that are relevant in the prevention of diseases. The fact that disease is quite eminent in babies who have not been fed well through breast milk essentially furthers the assertion that the health of the baby and breast milk are related in terms of nutrition.

### Weaning and breastfeeding

Dashti, *et al.* have given an insightful analysis of the factors that are associated with the duration of breastfeeding [11]. The study recruited a cohort of 373 hospital maternity wards and followed them from birth to 26 weeks post-birth. The study explored the factors influencing full breastfeeding, and, through multivariate analysis, predictor models were established. The study found that, at six months, 39% of infants were receiving some breast milk. In contrast, 2% of the children had not received breast milk fully after 26 weeks. Various factors were established to be predictors of breastfeeding duration including the level of education of the mothers, higher parity, and preference of breastfeeding by the infant's father and paternal grandmother. The introduction of a pacifier before one month of age when the mother intends to resume work by six months was noted to affect the duration of breastfeeding.

Evidently, the majority of decisions to begin weaning earlier in infants seemed to stem from external factors. This study confirms the duration of feeding amongst women in Saudi Arabia. The majority of women seem to be beginning the weaning process earlier than recommended at the expense of the children. For industry stakeholders; this is a trend that requires an urgent solution based on the health implications of early weaning for children. For policy makers, perhaps, the declining pattern of breastfeeding will generate debate on the need to develop a socio-legal and economic framework to enable infants to feed exclusively on breast milk for a longer period of time.

The instigation of early complementary feeding is a health and development risk for infants. This is affirmed by Alzaheb in his evaluation of complementary feeding practices in Saudi Arabia and the relevance of delaying weaning in infants to ensuring that they benefit more from exclusive breastfeeding [12]. The study embraced a cross-sectional study design where 632 mothers of infants whose ages ranged between one month to two years and who were in attendance at the primary healthcare centre between July and December 2015 were interviewed. The data collected focused on the socio-demographic attributes and complementary feeding practices of the mothers. The factors associated with weaning were established through a regression analysis and it was established that 62.5% of subjects received solid food before 17 weeks. Some of the maternal factors that influenced early weaning as established in the study included employment, the education level of mothers, and the income of the mothers.

There are several predictors to weaning in Saudi Arabia today. This study makes an admission that early weaning has many implications for the development of children. Poor nutrition, arising from insufficient feeding of the children on breast milk, not only interferes with the general health of the child, but also their physical development. Many children who are denied the opportunity to breastfeed exclusively through early weaning have been noted to be weak in terms of their physical development. Their vitality is reduced owing to the fact that they lack the basic nutritional elements that are central to the enhancement of the child's physical development. While the study vouches for more exclusivity in terms of breastfeeding, the study is equally cognizant of the factors that are associated with early weaning in Saudi Arabia.

Educational level and income capacity of the mothers have been noted to be one of the key predictors of early weaning of children. There is, however, a slight difference between the predictors to early weaning in Saudi Arabia to those in Kuwait as indicated in earlier studies. Dashti mentioned that, in Kuwait, the grandmother and father of the child have a say in the duration of breastfeeding of the infant, an issue that has not been observed in Saudi Arabia. Based on these predictors of weaning, this study proposes that public health intervention measures be implemented to reduce early complementary feeding in children with a focus on mothers who are at high risk of early weaning.

Azzeh gives a consummate assessment of the determinants of exclusive breastfeeding in Saudi Arabia through a cross-sectional study of 814 mothers in Saudi Arabia [9]. The mothers were interviewed to ascertain family sociodemographics, the health status of the mothers, and the postpartum habits of breastfeeding. The patterns of complementary feeding and bottle feeding were studied and a binary logistic regression analysis undertaken. The study revealed a very sharp reduction in the exclusive breastfeeding rate from 50.6% during birth to 15% during the fifth month. Other predictors of exclusive feeding were employment of the mother, postnatal diseases in the infants, and pacifier use for infants. Intermediate education of the mothers tended to increase exclusive breastfeeding as compared to an advanced education level of the mothers.

There is a general sense that, in Saudi Arabia, based on the reviewed studies, the rate of exclusive breastfeeding is very low as compared to international standards. The patterns of complementary feeding and bottle feeding vary immensely from the recommendations given by the WHO. This calls for the development of a strategy to reverse such occurrences based on the healthcare implications associated with early weaning in infants. For practitioners within the sector as well as policy makers, this is an opportunity to formulate action plans to promote breastfeeding amongst lactating mothers. National campaigns should be instituted as a way of promoting early breastfeeding within the country.

### Limitation of the study

The inclusion and exclusion criteria used in the selection of the articles for review may have omitted certain articles that would have been more relevant to the study.

### Conclusions

Exclusive breastfeeding is critical for infants in terms of their health. Many studies aver that the nutritional benefits of breastfeeding for children cannot be supplemented by any other form of feeding, and so it is imperative that children are exclusively breastfed as long as possible. Early weaning suppresses exclusive breastfeeding, thus heightening the health and development risks of the children stemming from malnutrition. This study corroborates the findings of many other studies that early weaning in children impairs their growth and development since it denies the children vital nutrients. In addition, this study affirms that there are several predictors to early weaning in Saudi Arabia. In order to develop an effective framework to promote exclusive breastfeeding, there is a need to focus on these predictors to prevent early weaning of children.

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