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REVIEW ARTICLE

Maternal nutrition education as a tool to optimize the Infant feeding practices- A narrative review

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Adequate nutrition during infancy is regarded essential for lifelong health and wellbeing. The timeline from birth till first year is a critical period for growth and development of child. As dynamic growth taking place during infancy is most expeditious than any other age, the insufficient nutrition intake during this stage may lead to consequences in later life. About 1/3rd of deaths among children with age less than five years are linked back to direct or indirect effects of malnutrition. The infant mortality rate in Pakistan is only 62/1000 live births showing that most of the babies are likely to not survive the first year of life. This review assesses the protocols of infant's diet and the effect of maternal knowledge on infant feeding practices. A positive relation was found between maternal nutrition related knowledge and good infant feeding practices.

Keywords: Breast-feeding, Nutrition Education, Maternal Education, Nutrition Program, Weaning

INTRODUCTION

The global recommendations in regard to child nutrition is that breastfeeding should be carried out exclusively for at least first six months and after that, the infants should receive nutritionally requisite, responsive, age suitable and safe complementary feeding. Yet barely one in three infants is exclusively nursed during the initial six months of life. Studies have shown that exclusive and partial breastfeeding during first year of life can result in considerably reduced rate of infant mortality (Motsa, Ibisomi, Odimegwu, & journal, 2016). Weaning time period is one of the most critical periods in the development and growth of a child as the child is prone to infections and malnutrition at this stage (Cribb, Warren, & Emmett, 2012). It has been shown that the incorporation of complementary food items after 4 months of age, the nature of first food introduced and the heterogeneity of complementary food predicts improved nutritional status (Dadán, Daza, Higuera, & Calderón, 2018). That is why; promoting sound feeding practices should be focus of community projects of nutrition and health departments.

2. Importance of breastfeeding and weaning

Exclusive breast feeding is one of the strongest forecaster of newborn survival especially among less privileged settings (Biks, Berhane, Worku, Gete, & Nutrition, 2015). Breast-feeding during early days of lifespan has a remarkable effect on neonatal jaundice, stool passage frequency and urination. In a retrospective study of medical records of mother-child pairs, a direct correlation between breast-feeding and hyperbilirubinemia was observed (Chen et al., 2011). Artificial feeding is linked with a higher probability of childhood leukemia. Literature suggests that obesity in the late childhood and teenage is much less common among children who are breast-fed and a dose response effect is observed with the longer duration of breast feeding.

Colostrum is the initial breast-feed that is a thick and yellow fluid. It is produced during lactogenesis from day 1 to day 3 of infant birth. It has a low fat and energy content but high protein content (Dritsakou et al., 2017). It is purgative, clears meconium, and assists the defense against Jaundice. It has growth factors which helps the intestine to mature, prevents intolerance and allergy. It is also vitamin A rich and lowers certain infections such as diarrhea and measles. It also has protective action against vitamin A related eye disease. There are many advantages of human milk over cow milk as it has been proven that human milk is more

easily digested
and will completely be absorbed by the infant than cows or buffaloes milk.
Whereas cows or buffaloes milk is too heavy for the infant to digest and can cause gastrointestinal tract bleeding. It contains increased amount of proteins, sodium and phosphate and brings about a burden on the infant's kidneys. Furthermore, human milk has immunological factors which provide the initial immunity to the new born infant whose own immune system has not yet developed while bottle feeding leads to contamination by bacteria. Babies who are bottle fed have high arched palates because the upper teeth become distorted which effects the facial configuration. Respiratory tract infections and infections of ear are much more common in bottle feeding babies.
Moreover, from 6 months of age, an infant's requirement for nutrients and energy start to surpass what is delivered by breast milk and complementary feeding becomes essential to complete the energy and nutrient requirement. Weaning is defined as "the systematic process of introduction of suitable foods at the right time in addition to mother's milk in order to provide nutrients to the baby". The food should be thoroughly cooked and should be easy to chew for the infant. According to studies since the introduction of commercially prepared weaning foods is on the rise special attention by health specialists should be given to the making of home prepared food especially including fresh fruits and vegetables (Foterek, Hilbig, & Alexy, 2015). New parents may unintentionally choose the food products for infants on basis of their own perceptions rather than on infant's requirements. Such selections can cause problem when they raise the chance of choking.

3. Infant feeding stratagies

In 2002, UNICEF and WHO adopted the global scheme for infants and children feeding. This approach was designed to draw the attention of the word to the influence that the feeding practices have on the status, development, growth, survival and health of infants and children. In the policy it was pointed out that 6-month exclusive breast-feeding and nutritionally sufficient and safe complementary-feeding started at the age of six months with continued breast-feeding up to two years of age or beyond could significantly bring about a change in infant mortality and morbidity. Moreover, according to research, in efforts to encourage the exclusive breastfeeding, there is a need to provide social support to females in a tangible and compassionate way especially those with lower education (Laugen, Islam, Janssen, & epidemiology, 2016). According to another study it is essential for infant-feeding plans to address socio-economic hinders to exclusive breastfeeding in order to cause a positive uptake. Researchers investigated the impacts of common socioeconomic factors which may hinder the adoption of exclusive breastfeeding practice. The potential interventions include educating the men, nutrition awareness programs on exclusive breast feeding and strengthening the local health worker program (Muchacha, Mtetwa, & AIDS, 2015).

4. Role of mothers in optimal feeding practices

4.1 Importance of Maternal Knowledge:

Approximately only 34.8% of infants worldwide are exclusively breast-fed for the initial six months of their lives, the majority of them receive some other fluid or food product in the early months. Complementary-foods that are incorporated too early or too late are mostly nutritionally insufficient and unsafe. Other common additional problems and concerns, related to improper food being introduced, are Iron-deficiency anemia, food allergies, constipation and dental caries. Moreover, according to some studies, mothers have a critical influence on the diet of infants and therefore improvement of the maternal feeding knowledge can lead to beneficial changes in the health of the infant and hence the future child. A cluster randomized control trial was conducted on studying the impacts of novel educational activities delivered to mothers on dietary quality of infants. Findings showed that maternal feeding knowledge plays an important role in impacting infant diet quality (Spence et al., 2014). Mother's education remains to be a vital factor in improving the nutritional status of a child and breaking through the norms of poverty. Data derived from maternal and child health project nested within the Nairobi Urban Health and Demographic Surveillance System shows that mother's education is an independent and strong predictor of child's nutritional status in urban slum settings (Abuya, Ciera, & Kimani-Murage, 2012). It has been known that poor breast-feeding and impaired complementary feeding practices are widespread and lead to common additional problems and concerns, which includes failure to thrive. According to a study failure to thrive is one of the serious health issues of the underdeveloped world which can lead to serious health consequences in the future and this can be overcome to some extent by educating mothers and caretakers about infant feeding. In a case control study, it was noted that duration of breastfeeding and maternal educational level is a significant determinant of failure to thrive in infants (Habibzadeh, Jafarizadeh, Didarloo, & Hygiene, 2015). Proper positioning and placement of baby near the breast improves the breast feeding practice and support should be given especially to the primi paras so that they can feed their babies comfortably. In a cross sectional study conducted to observe the adoption of WHO breastfeeding recommendations, it was concluded that about half of primi para mothers have poor positioning of infant during breastfeeding (Degefa et al., 2019).
Not only mothers should be educated about the importance

of exclusive breast-feeding and its advantages but also, they should be counseled to bring about a healthy change in the weaning practices which can lead to a healthy individual in future. At the same time, the families of mothers should also be educated including the husband and specially the mother-in-law who is a prominent figure of joint family systems. She should also be educated to bring about a future perspective change in this society with that rejection of myths and adaptation to the new scientific methods of feeding and weaning. Because, breast feeding is not a matter of decision solely dependent on mother, social machinery must be established for its promotion. The breast feeding duration is affected by the family structure, income level and the living conditions of the lactating mother (NKh, Mingazova, & Gaĭnutdinova, 2008). WHO and UNICEF'S global recommendations for optimal infant feeding involves exclusive breast-feeding for the first six months. Exclusive breastfeeding is the healthiest method of feeding in term infants (Geoghegan-Morphet et al., 2014)

4.2 Benefits for Mothers:

Mothers have both the short and long term advantages of breast-feeding. The probability of postpartum hemorrhage can be decreased by breast-feeding right after the delivery. It helps in the involution and contraction of uterus. Hence, also reduces the risk of anemia arising from increased blood loss. It gives a sense of satisfaction to the mother to feed her baby. Breastfeeding also protects the mother against breast and ovarian cancer. Research shows that breastfeeding for more than six months may shield the women against many high risk diseases such as breast cancer (MJ, CA, López, & Peña, 2010). Diet of lactating mother is very crucial because of already depleted nutrient stores during pregnancy. A well balanced diet with increased calories is usually recommended to lactating women. The components of breast milk rely on the mother's status of nutrition. Protein calorie malnutrition can result in decrease in energy that eventually lowers the milk production volume. But it usually does not affect the milk composition. It has been evident from several studies that even in the state of modest negative energy balance, milk production is well maintained.

There has been emerging interest in human milk lipids. It stems from sharing developmental advantages shown by docosahexaenoic acid and cholesterol. Supplements and maternal diet can change the level of DHA in human milk. For example, a Norwegian study illustrates that DHA supplementation through cod liver oil during pregnancy is linked with higher IQ scores at 4 years of age in breastfed versus bottle fed infants. (Helland, Smith, Saarem, Saugstad, & Drevon, 2003)

5. Importance of nutrition training

A study directed to check the effectiveness of nutrition training of the caretakers and health care professionals regarding to feeding practices for children of six months to two years showed that up to forty-two percent of feeding practices of mothers were improved after the awareness provided by the health care professionals (Sunguya et al., 2013). Several other reviews on the effect of educational interventions to increase breastfeeding have been conducted. Peer counseling has been shown to effectively improve the time period and initiation of breastfeeding exclusively. A systematic review of twenty-six peer reviewed publications showed that breastfeeding peer counseling initiatives are effective for both developed and developing parts of the world (Chapman, Morel, Anderson, Damio, & Pérez-Escamilla, 2010). Another review has shown that during pregnancy, consultation regarding lactation practices, peer counseling and a proper breastfeeding education increase breast feeding time and duration (Lumbiganon, Martis, & Festin, 2012). In developing countries, educational interventions have been regarded important for enhancing breastfeeding rates. In a systematic review of seventeen published randomized and quasi-randomized trials, it was found that nutritional counseling of mother alone can result in remarkable raise in weight and height in infants 6-24 months of age (Imdad, Yakoob, & Bhutta, 2011).

6. Nutrition education plan:

A holistic approach in assessment and planning for intervention in infant and childhood nutrition is need of the hour (Elizabeth, 2016). Changing feeding practices, such as care of infant's outdoor and early introduction of foods markedly affect nutritional status of infants. Nutrition education programs are an important way of spreading valuable information to the community for promoting good health. Studies have shown that maternal education and awareness considerably improves health indicators (Islam, Rahman, Islam, & Samad, 2013). Nutrition education authorizes a mother to maximum use of available resources around her for health of her child. Appropriate nutrition counseling can significantly improve the health of a growing child (Ogundele & Ogundele, 2015). Women education and awareness program is necessary to educate mothers about advantages of breastfeeding which is the major nutrient food for infants till the age of six months and weaning with appropriate foods in a clean environment.

Postnatal care provides an amazing chance to evaluate how the mother is getting along with her infant, especially with regard to feeding. Studies have shown that early intervention in food and nutrient intake of infants and good maternal diet and counseling leads to better infant and child health in future (Fangupo et al., 2015). In addition to maternal health and knowledge, infant feeding is also affected by socio cultural and economic factors. In the developing countries where there are lack of resources, simple nutrition education messages which are easy to understand and aimed at improving infant diet have shown to improve infant health (Owais et al., 2017).

Significant increase in knowledge scores for prenatal care has been observed in post intervention responses in a study conducted in Istanbul (Aktaç, Sabuncular, Kargin,

Gunes, & nutrition, 2018). Nutrition education plan is completed by writing out each lesson, deciding about visual aids, charts and practical demonstration if required in the class. At the end of the lectures evaluation can be done by putting forward some questions to see the gain in awareness about health education that has been given. The essential steps of planning a nutrition education program in a community is getting to know the community. For example, the significance of understanding the culture related health tradition is essential for public health workers to ensure there is acceptance of intervention. Studies have been conducted solely for the purpose of exploring cultural based practices through qualitative research tools in order to provide guidelines for effective interventions that are applicable in communities (Cidro et al., 2015). It has been found that family education and peer counseling in promoting breast feeding has proved to be most helpful (Jones & Bartlett Learning)

7. Health Belief Model:

Health Belief model is a psychological model commonly used in health related education and health promotion. It is a guiding structure for health and behavior interventions. It predicts the health associated practices by focusing on the beliefs and attitudes of individuals. It is found on the concept that personal perceptions and beliefs about a health condition determine the health behavior. Its constructs include perceived susceptibility, benefit, barrier, severity and self-efficacy that predict the behavior. By educating the subjects to reduce the barriers, one can decrease adverse effects, alter the attitudes and increase the positive behaviors. Community Nutritionists can works hand in hand with gynecologists to reduce the perceived barriers that influence the mothers and their decisions regarding the infant diet negatively. These barriers can be lack of social support, poor nutrition related education, negative beliefs about breastfeeding or weaning, and low socio-economic status. Perceived severity of consequences of inadequate infant diet and perceived benefits of optimal infant feeding practices also play an important part in it. There is a vast body of literature supporting the use of Health Belief Model to improve infant feeding practices. In a randomized control trial conducted in Ethiopia, the consequence of nutrition education based on this model was found to be effective to improve the dietary knowledge and practices of pregnant women (Diddana, Kelkay, Dola, Sadore, & Metabolism, 2018). Another study found it effective to teach complementary feeding messages to mothers (Tariku, Whiting, Mulualem, Singh, & nutrition, 2015).In China, Health Belief Model based interventions improved the breastfeeding satisfaction, behavior and knowledge in cesarean women (Hu, Ding, Hu, & Luo, 2020).

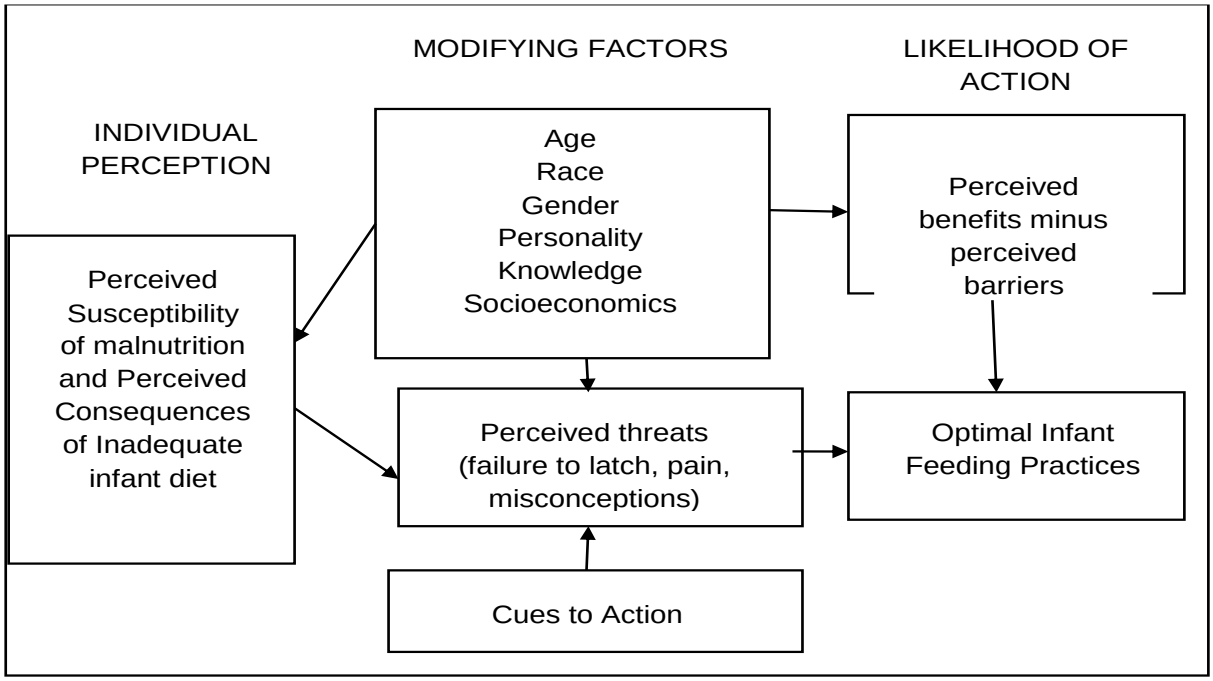

Figure 1: Health Belief Model theory components and linkages

8. Infant feeding practices in pakistan

Pakistan is a developing country and problems like poverty, high fertility rate, less family spacing, lack of governmental support, low literacy rates and financial restrictions contributes to high infant mortality and morbidity in the

country. The infant mortality rate in Pakistan is still very high around 62 per thousand live births showing that around 400,000 infants are likely not to survive the first year of life. Mothers are not aware of infant feeding practices that lead to malnourishment and diarrhea. Results from a cross-sectional study have shown that the conditions are not progressing even with the struggles of health policy makers. Even if the women know about the advantages of breastfeeding over bottle feeding as well as the disadvantages, but a gap has been observed in their implementation and perceptions of breastfeeding. Another cross sectional study, directed in a semi urban community of Pakistan, showed that about half of the sampled women exclusively breastfed their babies. Breastfeeding was regarded to cause weakness in mothers by the sample (Ali, Ali, Imam, Ayub, & Billoo, 2011). Therefore, it is vital that interventions that focus on application of effective breastfeeding practices be formulated, as well as more research is needed to gather important data that may lead to future accomplishments in this area (Safdar, Jabeen, Kousar, Shahzadi, & Gilani, 2017).

DISCUSSION

The particular issues should be addressed and the problems should be sorted out in the best of the ways. Nutrition education should be imparted and solutions should be found for all issues and all classes of the society in the developing world. Increased nutritional knowledge and improved food environment can improve adult health (Matthews, Zok, Quenneville, & Dworatzek, 2014). It has been found that lactation counseling significantly increases the rate of breast feeding. A randomized trial showed that exclusive breastfeeding can be enhanced by maternal counseling (Handajani, Pamungkasari, & Retno, 2018). Education given to lactating mothers about breast feeding influence their choice of breast feeding (Sawadogo et al., 2018). Breastfeeding and correct weaning techniques are essential to cover the milestones of life and to acquire healthy nutritional status of children less than five years of age. Breast feeding programs should consider women's different traits. Health professionals should also offer breast feeding workshops during post-natal support. A study investigating the relationship between breast feeding self-efficacy and social support found a positive relation between them. Therefore, support and encouragement is necessary for women to choose breast feeding. (Maleki-Saghooni, Amel Barez, Karimi, & Medicine, 2020). More behavior change communication should be made to eliminate the harmful perceptions and cultural beliefs and to increase the awareness regarding benefit of exclusive breast feeding (Khan & Kabir, 2021). Micro nutrient deficiencies should also be addressed through food supplementation and fortified foods.

CONCLUSION

Mothers should be educated concerning the importance of feeding in the initial first year of infant's life including the importance of exclusive breast-feeding, weaning at a proper time with complementary foods and care of sanitation and hygiene in preparation of weaning food and it's storage. Nutrition education exposes a mother to maximize her resources assessable to her for the health of her infant and the future adult and therefore helps her to bring about a positive change in the community. Nutrition education if properly planned for public can help in increasing awareness of women and can lead to changing attitudes towards better infant feeding practices.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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Add acknowledgements here

AUTHOR CONTRIBUTIONS

Add contribution of each author (with abbreviated name) here. For example WEP designed and performleed the experiments and also wrote the manuscript. EW, OA, and IDJ performed animal treatments, flow cytometry experiments, tissue collection, and data analysis. AS and MR designed experiments and reviewed the manuscript. All authors read and approved the final version.

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