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Maternal nutrition education as a strategy to increase exclusive breastfeeding practices: a systematic review

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ABSTRACT
Background: Appropriate child feeding is the foundation for good nutritional intake and healthy development and is a critical factor for health in adults. Exclusive breastfeeding that is giving the baby no solids or liquids besides breast milk other than vitamins and medication has been considered to be one of the most effective prevention strategies to reduce infant mortality. One way to increase the target of breastfeeding coverage can be through education nutrition for the mother. Objective: The objective of this systematic review was to identify the effectivity of maternal nutrition education in increasing exclusive breastfeeding practices. Methods: The articles searched through the database Scopus, Science Direct, Pubmed, Pro Quest, and Research Gate. Results: The analysis from the article searches resulted 15 suitable articles with the term required. Conclusion: Maternal nutrition education by professional, using lecturer technique, and application based internet as the media is reliable and effective to increase exclusive breastfeeding practices.
Keywords: Mother, Nutrition, Education, Breastfeeding, Practices

BACKGROUND

Appropriate child feeding is the foundation for good nutritional intake and healthy development and is a critical factor for health in adults (Wu *et al.*, 2020). As a part optimal feeding practices, exclusive breastfeeding is recognized as a cornerstone of child survival and health, by providing essential irreplaceable nutrition for a chlid's growth and development (Wu *et al.*, 2020). Exclusive breastfeeding that is giving the baby no solids or liquids besides breast milk other than vitamins and medication has been considered to be one of the most effective prevention strategies to reduce infant mortality in developed and low income countries (Birungi *et al.*, 2015).

With respect to optimal duration of exclusive breastfeeding, a Cochrane review included that exclusive breastfeeding for six months has advantages over exclusive breastfeeding for three to four month such as reduced risk of gastrointestinal infection and more rapid maternal weight loss after birth (Birungi *et al.*, 2015). Therefore, the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) recommended that children should be exclusively breastfed until they are 2 years old or older. More over, one of the WHO global nutrition targets for 2025 is increasing the exclusive breastfeeding rate in the first 6 months of life to at least 50% (Birungi *et al.*, 2015).

One way to increase the target of breastfeeding coverage can be through education nutrition for the mother. According to (Adhikari *et al.*, 2021) mentioned that there was significant relationship between knowledge and breastfeeding practices. Mothers who had knowledge about nutrition, had better in feeding practices. (Naja *et al.*, 2022) stated that mothers's behavior of exclusive breastfeeding was better than mothers who did not have education nutrition. The objective of this systematic review was to identify the effectivity of maternal nutrition education in increasing exclusive breastfeeding practices.

RESEARCH METHODS

The study began with a systematic literature search. The next step was to determine the keyword chains, and the two components were used as the search terms to identify studies on 'maternal nutrition education as a strategy to increase breastfeeding practices': (1) maternal nutrition education and breastfeeding, (2) maternal nutrition education and breastfeeding practices. The results of this keyword formulation were used to find relevant literature in 5 databases (Scopus, Science Direct, Pubmed, Pro Quest, and Research Gate). The keyword chain was as follows: ("maternal nutrition education") AND ("breastfeeding practices").

The first screening was based on the titles and abstract. At this stage, the publication was considered to be potentially relevant if the title and abstract had a link to the review topic. Articles that met the inclusion criteria were selected for all content. The selected articles totaled 15. This type of analysis requires themes that are relevant to the purpose of the review. The theme groups used for the review and for this form of analysis were: (1) what kind of maternal nutrition education technique, and (2) ability of breastfeeding practices. The limitation regarding publication year was that it had to be between 2012 and now. The search results concluded on July 13th, 2022 with a keyword chain and limitation criteria, and obtained 1850 articles. Various inclusion and exclusion criteria were applied; the publications must be in English and the sample must mothers that pregnant. Articles that were only a trial and that did not contain written results were not included.

RESULTS AND DISCUSSION

The search results used a predefined keyword chain that generated 1850 publications. In the first screening, 1750 publications were excluded after reading the titles based on the inclusion/exclusion criteria. In total, 150 publications were included in the second screening. For the second screening, the publication was downloaded. Of the 150 articles, 135 publications were excluded after reading the full text. The reasons for exclusion because the sample was not mother that pregnant. After the second screening, 15 publications were selected for the systematic review. A detailed description of the publications has been presented in the Appendix.

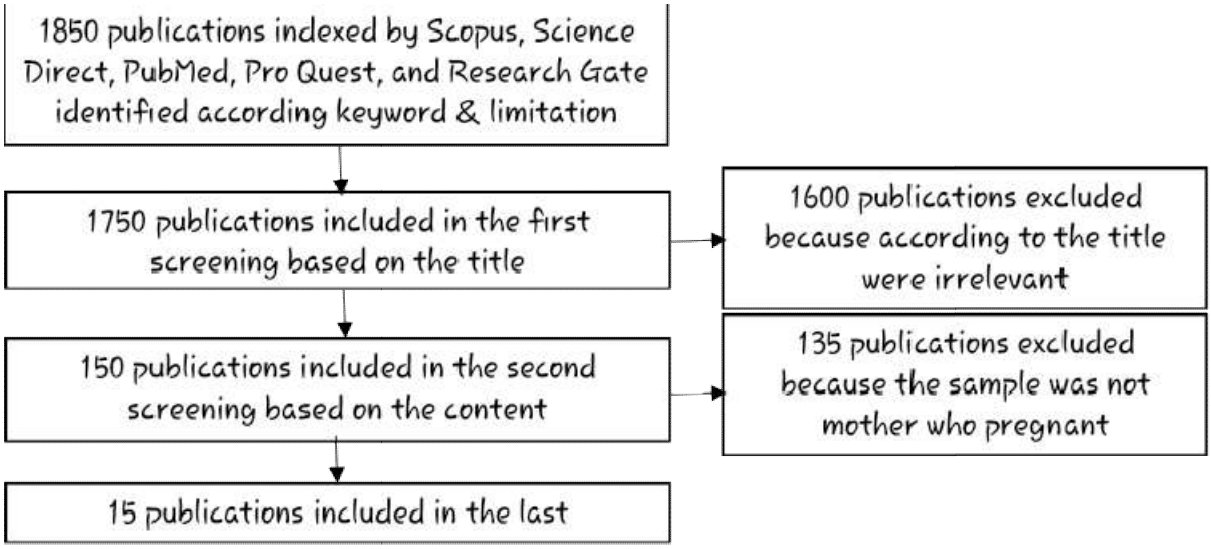

Figure 1. Results and selection procedure

Table 1: The selected publications list

No.	Author(s)
1.	(Admasu *et al.*, 2022)
2.	(Patil *et al.*, 2022)
3.	(Tahir and Al-Sadat, 2013)
4.	(Demirci *et al.*, 2021)
5.	(Omidi *et al.*, 2022)
6.	(Abdulahi M, Fretheim A, Argaw A, 2021)
7.	(Abuidhail, Mrayyan and Jaradat, 2019)
8.	(Eluri, Swathi; Baliga, B. Shantharam; Rao, Suchetha S; Vinayagamoorthy, V.; Kamath, 2022)
9.	(Nabulsi *et al.*, 2019)
10.	(Nikièma *et al.*, 2017)
11.	(Birungi *et al.*, 2015)
12.	(Pound *et al.*, 2015)
13.	(Kushwaha *et al.*, 2014)
14.	(Nguyet, Huy and Kim, 2021)
15.	(Wu *et al.*, 2020)

This systematic review discussed the relation between maternal nutrition education and breastfeeding practices. Fifteen articles have been reviewed. The results of this review showed that mother who received education were more likely to practice breasfeeding and exclusive breasfeeding than who did not receive it. Technique of education, media education, and whom give education were determinants of exclusive breastfeeding and breastfeeding practices.

Based on the articles that have been reviewed showing that technique of education could use lecturer, counselling, discussion, training, and peer support. The media of education can use poster, application based internet, telephone, video, and booklet. And the givers of education were professional (BSc Nurse, certified lactation counsellors, Community Health and Butrition Workers), and peer supporters (mother support group).

Researchers on twelve articles used lecturer technique, professional as the education giver and application based internet (text, animation, pictures, and video) as the media of education. Furthermore researchers on three articles used peer support as the education giver.

CONCLUSION AND RECOMMENDATION

Maternal nutrition education by professional, using lecturer technique, and application based internet as the media is reliable and effective to increase exclusive breastfeeding practices.

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PICOT ANALYSIS

NO	Title	Population	Intervention	Comparison	Outcome	Time
1.	Effect of maternal nutrition education on early initiation and exclusive breast-feeding practices in South Ethiopian: a cluster randomized control trial 2022	All pregnant women whose gestational age was 26-32 weeks and who resided in Hawella Tulla sub-city of Hawassa town	Nutrition education using lecturers was given by health professional (BSc Nurse) using local language, poster, manual, and discussion on topics relevant to the study	Women in the control group received the routine care offered by the HEWs and WDA leaders working in their cluster	An early initiation of breast-feeding was signifacntly higher among women who received breast-feeding education than those who did not receive, and exclusive breast-feeding practice was also signicantly higher among women who received	Once every week for 3 weeks
2.	Can digitally enabling community health and nutrition workers improve services delivery to pregnant women and mothers of infants? Quasi-experimental evidence from a national-scale nutrition programme in India 2021	1200 respondent from 200 villages	Education (growth monitoring and provision of supplementary nutrition) by Community Health and Nutrition Workers (CHNWs) using mHealth Application	Women in the control group received the routine services	Digitally enabling CHNWs can complement but not substitute efforts for strengthening helath systems and addressing structural barriers. This digital health intervention resulted in higher home visits and life-stage specific counsellng to mothers of children <12 months	3 months

3.	Does telephone lactation counselling improve breastfeeding practices?: A randomised controlled trial 2013 Randomized control trial	357 mothers, each of whom had delivered a full term, healthy infant via spontaneous vaginal delivery	Mothers were followed up for 6 months. The intervention group (n = 179) received lactation counselling via telephone twice monthly by certified lactation counsellors in addition to receiving the current conventional care of postnatal breastfeeding support.	The control group (n = 178) received the current conventional care of postnatal breastfeeding support	Telephone lactation counselling provided by certified lactation counsellors from the nursing profession was effective in increasing the rate of exclusive breastfeeding for the first postpartum month but not during the 4 and 6 month postpartum intervals.	12 counselling sessions

4.	Structured antenatal milk expression education for nulliparous pregnant people: results of a pilot, randomized controlled trial in the United States 2022 Randomized control trial	Target of sample size n=45	AME (Antenatal Milk Expression) education Participants viewed a video modeling hand-expression of milk. This video exemplar was cho-sen because it featured close-up footage of a model self-expressing milk using similar techniques advised by the study IBCLC during participant individual instruc-tion (e.g., breast massage prior to and during expression, "c" or "u" shape finger placement back from the nipple, 3-step Marmet technique, rhythmic pace while alter-nating between breasts)	Participants in the education control group met with study staff during study visits in pregnancy to receive handouts from Lactation Education Resources. Handouts addressed a new theme each week pertaining to breastfeeding preparation and prevention of common lactation problems (Week 37: "Sore Nipples"; Week 38: "Five Keys to Successful Breastfeeding"; Week 39: "Signs of a Good Feeding" and "Is my Baby Getting Enough?"; Week 40: "I wish someone had told me …"). Control group participants did not receive any education on AME or additional lactation education from study staff. Handouts did not address AME. The rationale for offer-ing handouts to the	AME education and independent practice beginning at 37 weeks of pregnancy was feasible	Between December 2016 and February 2018

5.	The effect of a planned lactation education program on the mother's breastfeeding practice and weight gain in low birth weight infants: a randomized clinical trial study 2022 Randomized clinical trial	The participants were selected randomly and divided into an experimental group and a control group, each with 40 mothers	The intervention for the experimental group included routine education and planned lactation training containing five 20-minute face-to-face teaching sessions, with two sessions being held during the mothers' hospitalization and at discharge time and three sessions being held in the comprehensive health centers at 5, 14–15, and 60 days after the infants' birth. Furthermore, the mothers received a CD and a written instruction booklet regarding breastfeeding and infant weight gain at the first session. The training content emphasized the importance	The control group attended a routine education program, including one 10-minute session held in hospital and two 15-minute sessions held in the comprehensive health centers with a similar educational content provided to mothers in the experimental group, 14–15 days and 60 days after the infants' birth. However, they did not receive any CDs or written booklets	Comparing the LBW infants' weights and mothers' breastfeeding practice revealed no statistically significant difference between the two groups pre-intervention. However, significant differences were observed between the two groups post-intervention in terms of weight gain in the LBW infants over 14–15 days and two months of age ($F = 4720.6$, $p < 0.001$) and the mothers' breastfeeding practice for 14-15-day-old infants ($p < 0.001$).	A planned lactation education program was implemented in the experimental group in two sessions in the hospital and three 20-minute sessions in comprehensive health centers.

6.	Breastfeeding education and support to improve early initiation and exclusive breasfeeding practices and infant growth: a cluster randomized controlled trial from a rural Ethiopian setting 2021	The writer randomly assigned 36 clusters into either an intervention group (n = 249) receiving BFESI (Breasfeeding Education and Support Intervention) by trained Women's Development Army (WDA) leaders or a control group (n = 219) receiving routine care	Peer-supporters made home visits to women in the intervention clusters according to a pre-specified schedule. During pregnancy, theymade two home visits in the last trimester of pregnancy: during the 8th and 9thmonth. Visits after delivery were scheduled on the 1st or 2nd, 6th or 7th and 15th day, and thereafter monthly until the infant was five months. During the two antenatal visits, peer-supporters encouraged delivery at the nearby health centre, emphasized the importance of initiating breastfeeding within 1 h of delivery, feeding colostrum first, discouraging	Women in the control group received the routine care offered by the HEWs and WDA leaders working in their cluster, similar to that received by women in the intervention group. The current Ethiopian standard/routine prenatal and postnatal care by HEWs includes providing four focused prenatal visits, developing an individualized birth preparedness and complication readiness plan, accompanying a woman to a health facility during delivery, and conducting four postnatal visits. Moreover, as part of the community-based nutrition program, HEWs are expected to deliver the following key breastfeeding and nutrition messages to mothers during the monthly growth monitoring	Training WDA leaders to provide BFESI substantially improves Early Initiation and Exclusive Breasfeeding practices and attitude towards breasfeeding	The duration of each visit was typically 20–40 min.

7.	Evaluating effects of prenatal web-based breastfeeding education for pregnant mothers in their third trimester of pregnancy: Prospective randomized control trial 2019 Randomized control trial	112 pregnant mothers	Participant in the experimental group would be given an ac-cess to the website of the education program. Web-based breastfeeding education program: the program can be visited by the participating mothers through visiting a website from their own computers or smart phones or any device can be connected with internet. Participating mothers can visit the web-site as much as they need according to their queries during the time period of education sessions (two weeks prenatally). The web-based breastfeeding education program composed of many topics as: the benefits of	Mother in the control group would be remained without any access to the website. So they would be dealing with breastfeeding according to the knowledge and information from their experience or rela-tives	Participants of the experimental group were at moderate level of BSES in pre and post inter-vention with increasing the number of mothers in the same level post intervention. Participants were at a neutral level of IIFAS in both groups generally, they were neither positive to breastfeeding nor to bottle feeding. There was no significant difference between the experimental and control groups on post-intervention scores on BSES and IIFAS	

8.	Can flip-chart assisted maternal education improve essential new born care knowledge and skills? A randomized controlled trial 2022 Randomized control trial	120 promigravidae	A flip chart was designed to communicate ENC (Essential Newborn Care) knowledge and skill	Control group received verbal advice on ENC from the postna- tal ward nurses, as per the existing hospital policy.	Postnatal flip-chart assisted maternal education had significant impact on ENC skills and precipitated higher knowledge scores at the end of 6 months	15-20 min duration

9.	A multi-component intervention to support breastfeeding in Lebanon: A Randomized clinical trial 2019 Randomized clinical trial	This is a parallel group, randomized clinical trial, in which 362 healthy pregnant women with singleton pregnancy were randomly allocated a multi-component intervention that included antenatal breasfeeding education, professional, and peer support, delivered in hospital and home settings for six months (experimental, n =174), or to standard care (control, n = 188)	Participants in the experimental group received the following intervention components: a) prenatal breastfeeding education to address common community misconceptions about breastfeeding and improve maternal knowledge and expectations, b) postpartum professional lactation support to avoid, and/or overcome technical breastfeeding challenges that mothers experience, and improve maternal self-efficacy through empowerment, c) postpartum peer (lay) support to provide emotional support, and build maternal social capital. Our multi-component intervention was	Participants in the control group received standard prenatal and postnatal care. In Lebanon, standard prenatal care is provided by obstetricians only, and is mainly focused on obstetrical care. Information relating to breastfeeding is not currently part of prenatal care in any region of the country. Advice on infant feeding is provided by pediatric physicians and nurses or midwives, usually after delivery. Moreover, hospitals and maternities do not have lactation consultants on their staff.	Combining education with peer and professional breastfeeding support improved six-month breasfeeding exclusivity and knowledge	6 months

10.	Effectiveness of facility-based personalized maternal nutrition counseling in improving child growth and morbidity up to 18 months: a cluster-randomized controlled trial in rural Burkina Faso 2017 Cluster randomized control trial	2253 mother-child pairs quarterly until the child was aged 18 months	The nutrition counseling intervention was implemented in the intervention centers within the usual care environment. The intervention aimed to: i) improve communication between care providers and women at any contact for prenatal visits and children's services; and ii) enhance the nutrition component of the existing maternal and child national program, which includes prenatal care, immunization, and healthy and sick child consultation	In the control centers, routine preventive, promotional, and curative services were provided to pregnant and lactating women, and children aged <5 years as per national policy.	Training primary healthcare providers to provide a facility-based patient-centered educational intervention to promote good feeding practices for pregnant and lactating women and young children was associated with improved IYCF practices, and increased child birth weight	The scheduled follow-up visita at 3, 6, 9, 12, 15, or 18 months

11.	Effect of breasfeeding promotion on early childhood caries and breastfeeding duration among 5 years old children in Eastern Uganda: A cluster randomized trial 2015 Cluster randomized trial	765 pregnant women (intervention clusters: 456, control clusters: 430)	Women in the intervention group received home based individual peer counselling to support exclusive breasfeeding for 6 months from lay counsellors in terms of information and encouragement in 5 visits. One visit was prenatal and the other visits were in the first, fourth, seventh and tenth week post delivery	The control group received standard care from the public health services	Although exclusive breastfeeding trial had a substantial impact on breastfeeding exclusivity, the intervention had no effect on breasfeeding duration as reported by mothers at the 2 and 5 year follow up visits	5 visits; One visit was prenatal and the other visits were in the first, fourth, seventh and tenth week post delivery

12.	Lactation support and breastfeeding duration in Jaundiced Infants: a randomized controlled trial 2015 Randomized control trial	Mothers of all infants admitted to CHEO (The Children's Hospital of Eastern Ontario) with jaundice during the study period were screened for eligibility. CHEO, located in Ottawa, Canada, is a tertiary-care pediatric hospital. Mothers of infants 4 weeks of age admitted to hospital with jaundice and breastfeeding any amount were eligible (99 participants)	Mothers randomized to the intervention group received the current standard of medical care for jaundice at CHEO (i.e. phototherapy and intravenous fluids) and met with one of two International Board of Lactation Consultant Examiners-certified lactation consultants (LC) once during the infant's hospitalization. The LC's intervention was based on established clinical practice guidelines and included a review of the benefits of breastfeeding as well as an assessment of the mother's breastfeeding techniques, with correction as needed. Mothers were	Mothers randomized to the control group received the current CHEO standard of medical care for jaundice (fluids and phototherapy). They received no formal, standardized breastfeeding support. As part of the standard of care at our institution, mothers in this group could receive advice and recommendations from the nurses or physicians caring for the infant while in hospital, but such advice or recommendations was not standardized. No care was withheld from the control group, as LCs are not available at our institution. However, mothers in both groups could consult private LCs as well as public health nurses once discharged from the hospital.	99 participants were recruited, and 86 analyzed for primary outcome. There was no difference in exclusive breastfeeding at 3 months between groups or in the secondary outcomes. 31 participants were included in the qualitative analysis. Participants in the intervention group described an increase in comfort and confidence levels with breastfeeding. Participants in the control group reported limited lactation support.	Recruitment process from October 2009 to April 2011, but continued until Pctober 2012 due to slow recruitment

13.	Effect of peer counselling by mother support groups on infant and young child feeding practices: The Lalitpur Experience 2014 Quasi experimental before and after study	Total sample of size 421 (base line/T0), 480 (second phase/T1), 593 (third phase/T3)	Home visits by Mother Support Group (MSG) 10 visits in first 6 months, 6 visits in the next 6 months and 3 visits in 2nd year the the MSG give counselling and helping mothers with feeding difficulties and reinforcing optimal practices	T0	T0 vs. T1: The intervention had significant effect on the infant and young child feeding (IYCF) practices evaluated at the first reassessment (T1). All the practices evaluated improved after the intervention. T0 vs. T2: Similar effect was seen at the 2nd re-assessment (T2) with all the IYCF practices showing significant improvement over the baseline data.	A base line survey (T0) was done in the 6 blocks of the district in November 2006 and 421 mothers were interviewed in the preintervention period. Data collection in the baseline survey was started in the 2nd week of November, 2006 and was completed by the last week of November, 2006. In the post-intervention periods at T1 (Jan 2008) and T2 (Dec 2011), 480 and 597 mother infant pairs respectively were selected to see the impact of the intervention.

14.	Effect of newborn care education program using ubiquitous learning on exclusive breasfeeding and maternal role confidence of first time mothers in Vietnam: a quasi experimental study 2021 Quasi experimental study with a nonequivalent control group design	Experimental group (n=27), control group (n=25)	Mothers in the experimental group received UL-NCEP (Ubiquitous Learning-Newborn Care Education Program) through tablet personal computers in addition to routine care in the hospital. Then, the educational content was provided to mothers by their smartphone for reviewing at home. UL-NCEP was developed based on the World Health Organization's "Essential Newborn Care Course" guidelines	Mothers in the control group received only routine care	At 4 weeks postpartum, the experimental group showed a significantly higher level than the control, for exclusive breastfeeding rate ($p<.05$) as well as mean maternal role confidence ($p<.05$). UL-NCEP was a feasible and effective intervention in increasing first-time Vietnamese mothers' exclusive breastfeeding rate and maternal role confidence level. This program may be integrated into routine care for postpartum mothers to promote mother and infant health among first-time mothers in Vietnam.	June 26 to July 31, 2018

15.	Effectiveness of WeChat for improving exclusive breastfeeding in Huzhu County China: Randomized controlled trial 2020 Randomized control trial	444 women were listed. The writer determined that a sample size of 93 pregnant women for each (intervention and control) group was needed for this study. To compensate for attrition and loss ti follow uo, the writer planned to enroll 200 pregnant women in each group	Women in both intervention and control groups were asked to follow the WeChat account called Huzhu County Maternal and Child Health Family Planning Service Centre on their smartphone by scanning the 2D code at the back of random number cards. There was a special module called Ke Xue Wei Yang (Optimal Feeding) within the WeChat Official Account which was developed by an information technology company, ZYZY (Beijing) Pioneer of Cultural Essence Co Ltd and pretested in Huzhu County in Aug 2018 [28]. Pregnant women allocated to the	Pregnant women in the control group were not able to register with the Ke Xue Wei Yang module and did not have access to the information in the module, to preclude contamination between grops through direct sharing of messages sent via WeChat	At 0-1 month postpartum, the exclusive breastfeeding rate was significantly higher in the intervention group than that in the control group (81.1% vs 63.3%; odds ratio [OR] 2.75, 95% CI 1.58-4.78; P<.001). Similarly, mothers in the intervention group were more likely to provide predominantly breast milk (OR 2.77, 95% CI 1.55-4.96; P<.001) and less likely to give dairy products to their children (OR 0.40, 95% CI 0.21-0.75; P=.005). There was no statistically significant difference for exclusive breastfeeding rate 2-3 months (P=.09) and 4-5 months postpartum (P=.27), though more children in the intervention group were exclusively breastfed	May 9, 2019 until April 3, 2020