



Impact of attitude and knowledge on intention to breastfeed: Can mHealth based education influence decision to breastfeed exclusively?



Yossef Alnasser^{a,b,*}, Nouf Almasoud^c, Dhaherah Aljohni^c, Rawan Almisned^c, Basel Alsuwaine^c, Rawa Alohal^c, Ohoud Almutairi^d, Reem Alhezayen^a

^a Pediatric Department, King Saud University, Saudi Arabia

^b British Columbia Children Hospital, University of British Columbia, Canada

^c School of Medicine, King Saud University, Saudi Arabia

^d School of Medicine, King Saud Bin Abdulaziz University for Health Sciences, Saudi Arabia

ABSTRACT

Background: Exclusive breastfeeding has been endorsed as the healthiest

feeding choice for newborns. This study aims to assess impact of expecting mothers' knowledge and attitude toward intention to breastfeed exclusively. Utilizing mobile health (mHealth) as educational tool can offer a widely distributed and affordable platform to promote exclusive breastfeeding.

Research aims and questions: This study aims to assess impact of expecting mothers' knowledge, attitude and beliefs on decision to breastfeed exclusively. Furthermore, it purposes mobile health (mHealth) as educational tool offering a widely distributed, affordable and accessible platform to promote exclusive breastfeeding.

Methods: The study was conducted in prenatal clinics' waiting areas to interview expecting mothers utilizing a translated version of Infant Feeding Practices Survey II (IFPS II, CDC). After completing the survey, an educational video was shown utilizing a tablet and the question was re-asked about intention toward breastfeeding exclusively.

Results: Most expecting mothers indicated having some awareness about breastfeeding (67%) but only 46.1% intended to initiate exclusive breastfeeding early in life prior to the intervention. Moreover, only 53.7% believed breastfeeding is the best nutritional choice. Actually, 39.5% of participants considered breastfeeding equal to formula. Most working mothers complained of lack of workplace support to breastfeed. Also, they were not comfortable breastfeeding in front of others except spouse. Additionally, most participants found nurses and media as poor information resources. Resources utilizing social media and Internet were found useful. After watching the educational video, the majority expressed positive intention to breastfeed exclusively (80.8%). Positive intentions were associated with advance maternal age, prior breastfeeding knowledge and willingness to hear experts' opinions.

Conclusion: Saudi women have limited knowledge about exclusive breastfeeding and early initiation. They feel unprepared, unsupported, lack resources and socially challenged. An educational material utilizing mHealth can alter intentions to breastfeed exclusively.

1. Introduction

WHO and UNICEF have endorsed exclusive breastfeeding as the healthiest feeding choice for newborns [1]. Exclusive breastfeeding is recommended at least for six months and should be started within first hour of life [2].

Breastfeeding is a choice made by mothers based on many circumstances and factors. Among the leading factors are knowledge, attitude and perceptions of expecting mothers toward importance of breastfeeding [3].

Worldwide, initiatives have been created to promote breastfeeding in unique and innovative ways. Mobile phone-based tools, or "mHealth," are becoming highly popular for uses beyond means of communication. Utilizing mHealth as educational tools can offer a

widely distributed, affordable and accessible platform to promote public health [4].

In Saudi Arabia, there has been reluctance in practicing exclusive breastfeeding [5]. With sparse data about exclusive breastfeeding for six months in Saudi Arabia, it has been reported to be as low as 12%–14% despite high initiation rate [5]. [6] A study conducted in central Saudi Arabia uncovered that only 36.8% of surveyed mothers viewed exclusive breastfeeding as the best feeding choice for their newborns [7]. Exclusive breastfeeding might become even less popular with unlimited formula advertisement [8]. Currently, mixing formula with breastfeeding is the most popular infant feeding choice in Saudi Arabia [9]. Mixing formula with breastfeeding might limit health benefits gained by breast milk especially antibacterial factors [10]. There has not been extensive research to explore reasons regarding

* Corresponding author. Pediatric Department, King Saud University, Saudi Arabia.

E-mail address: yossef.alnasser@gmail.com (Y. Alnasser).

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popularity of mixed feeding as far as we know. Saudi Arabia would be a good example of breastfeeding practice in a conservative developing country.

This study aims to assess impact of expecting mothers' knowledge, attitude and beliefs about exclusive breastfeeding toward intention to breastfeed. It was designed to cover expecting mothers' knowledge, attitude and beliefs about breastfeeding. Then, knowledge and attitude toward breastfeeding were compared between different educational level, social and employment status. At a final stage, an education platform based on mHealth was tested to assess ability to alter intention to breastfeed. We hypothesize that despite poor knowledge and negative attitude, an educational platform utilizing mHealth can alter intention to breastfeed and augment a positive decision to initiate early exclusive breastfeeding for six months. The main goal of the study is to propose an innovative tool to support exclusive breastfeeding at low cost and scalable measure. Additionally, the study predicts identifying demographic and culturally sensitive factors that can support exclusive breastfeeding in Saudi Arabia.

2. Methods

2.1. Study population

This was a cross sectional study held in antenatal clinics' waiting areas to survey third trimester pregnant women (beyond 24 weeks gestational age). Inclusion Criteria included expecting mothers following at King Saud University Medical Center (KSUMC) antenatal care clinics, able to give an informed consent, Saudi citizenship, willingness to finish the study. On the other hand, initial Exclusion Criteria contained expecting mothers who does not speak Arabic, non-communicative expecting mothers, expecting mothers with improper cognitive function, not willing to participate and finish the study. The survey along with nine minutes video lasted 25 min and participants were informed about the invested time while obtaining consent. Demographic data were collected as part of the survey involving age, level of education, employment status and economic class. At the end, sample size was determined after calculating a minimum power of 80% and confidence interval of 95% to be 245 participants.

2.2. Questionnaire development and implementation

A modified version of Infant Feeding Practices Survey II (IFPS II, CDC) validated questionnaire was adopted. The questionnaire was translated to Arabic which affected its validity. At the end of survey, expecting mothers were asked about their intention to breastfeed exclusively and duration of exclusive breastfeeding. A pilot study was carried toward the end of 2016 Over two months (November to end of December 2016) to assess questionnaire clarity and general quality. The pilot study surveyed 20 expecting mothers prior to implementing both questionnaire and educational video. Their feedbacks helped in restructuring our questionnaire and adjusting video length. Later, the questionnaire was finalized and data collection was started.

2.3. mHealth based educational video

An educational video was designed in a tablet platform with Arabic narrator. The video included recommendations from WHO, UNICEF and Saudi Ministry of Health. Then, it was reviewed by Saudi senior pediatrician and Saudi lactation consultant. Later, the educational video was tested along with utilized questionnaire in a pilot study. The pilot study explored voice clarity, image haziness and tablet applicability. As most participants criticized video length, it was condense by 2 min without jeopardizing envisioned educational message. After pilot study, the video was adopted and viewed after finishing the questionnaire. The final length was nine minutes. The educational video addressed value of exclusive breastfeeding, early initiation, health

benefits, technics of successful breastfeeding and latching. Following filling questionnaire and watching the educational video, questions about intention to breastfeed and duration were re-asked.

2.4. Statistical analysis

To assess expecting mothers' characteristics and attitudes toward breastfeeding, student t- Test, chi square along with one-way ANOVA were employed. To explore relationships between expecting mothers' characteristics, attitude and knowledge to their intention to breastfeed, multivariate linear regression analysis was adopted. Furthermore, standard deviations and relative importance indices were recruited to analyze questions utilizing likert scale.

2.5. Research ethics

The study was approved by research ethics board of King Saud University for one year starting November 2016 until November 2017, project number **E-16-2038**. All participants were offered an informed consent with clear explanation of lack of impact on their prenatal care and freedom to withdraw at any moment prior to data analysis.

3. Results

3.1. Expecting mothers demographic information and characteristics

This study enrolled 245 expecting mothers at various stages of their pregnancy. Participants' ages were distributed as following: 16 expecting mothers were aged below 22 years (6.5%), the majority (n = 147, 60%) were aged between (23–30) and the remainder were aged older than 30 years (n = 82, 33%). Only 22 participants (9%) were diagnosed with gestational diabetes. Their educational backgrounds were either high school diploma and less (n = 55, 22.4%), a bachelor's degree (n = 178, 72.7%) or higher educational degrees (n = 12, 4.9%). Most of participating pregnant women were unemployed or housewives (n = 145, 59.2%). The number of employed participants was 99 expecting mothers representing 40.4%. Among employed participants, 6.1% were not satisfied with their salaries. On the other hand, 29% employed women had medium satisfaction and 5.7% had high satisfaction in their jobs' payments. Regardless of job status, majority of expecting mothers did not contribute to their families' monthly incomes (n = 157, 64.1%). Furthermore, only 68 expecting mothers stated they have a paid maternity leave (27.8%). Among the 68 expecting mothers whom have paid maternity leave, only 51 (75%) have their leave extending beyond 6 weeks. Additionally, 57% of expecting mothers anticipate returning to work within first year of giving birth (Table 1).

3.2. Knowledge and attitude toward breastfeeding

Among all participants, only 132 expecting mothers (53.7%) considered exclusive breastfeeding as the best nutritional choice for their babies. but, only 37% of expecting mothers were confident regarding sustainability of exclusive breastfeeding. Moreover, 39.5% participants considered formula and breastfeeding are equal in quality. Luckily, relative importance indices revealed that more than 80% of participants believed breastfeeding could protect their babies from otitis media, obesity, diarrhea and respiratory infections (Fig. 1). In general, 165 expecting mothers (67.3%) indicated that they have enough information about breastfeeding. Also, 156 participants (63%) admitted they have been exposed to at least one educational material about breastfeeding. However, Saudi expecting mothers are not comfortable breastfeeding in front of others. They are very uncomfortable breastfeeding their babies in front of female family members (52%), male family members (78%), female friends (60%) and strangers (83%). Their highest comfort level was to breastfeed in front of their spouse

Table 1

T-2 Women's Demographic characteristics, Working conditions & baby-care associated factors. N = 245.

	Frequency	Percentage
Age		
18–22 Years	16	6.5
23–30 Years	147	60
31–40 Years	82	33.5
Educational level		
Secondary Education or less	55	22.4
University Degree	178	72.7
Higher Education.	12	4.9
Employed		
No	145	59.2
Yes	100	40.8
Payment satisfaction		
Unemployed	145	59.2
Low satisfaction	15	6.1
Medium satisfaction	71	29
Highly satisfied	14	5.7
Contributing to family income		
No	150	61.2
Yes	95	38.8
Amount of income contribution		
No contribution	150	61.2
LT than half	53	21.6
Nearly the half	23	9.4
Greater than the half	19	7.8
Hours of work changed since pregnancy		
Not employed	145	59.2
No to little change	85	34.7
Yes, it decreased	9	3.7
Yes, Increased	6	2.4
Paid maternity leave		
Unemployed	145	59.2
Unknown	7	2.9
No	25	10.2
Yes	68	27.8
Paid maternity leave weeks		
Unemployed	145	59.2
No leave	11	4.5
Less than 4 weeks	17	6.9
4–6 Weeks	21	8.6
More than 6 Weeks	51	20.8
Work place supportive to breastfeeding		
Unemployed	145	59.2
Uncertain	17	6.9
NO	58	23.7
SOMEHOW	13	5.3
YES	12	4.9
Plans to return to work first year after birth:		
No	104	42.4
Yes	141	57.6
Caring for baby during working hours:		
Myself at Home	104	42.4
Myself while working outside	12	4.9
Non-family member	40	16.3
A family member	89	36.3

(60%) (Table 2). Among all working participants, only 12 participants thought their work places are supportive of breastfeeding.

3.3. Source of information about newborns' nutrition

Expecting mothers found nurses in Saudi Arabia are not resourceful (52.2%) in general about maternal and child's nutrition. Nevertheless, a reasonable proportion of expecting mothers (35.9%) indicated that nurses are resourcefully useful on maternal nutrition, but less useful for child's nutrition (11.8%) which was statistically significant ($p < 0.001$).

Likewise, significant percentage of expecting mothers (41.2%) believed friends and relatives provide useful information on the maternal nutrition but to a smaller proportion (24.5%) about child's nutrition ($p = 0.006$). In the same manner, most of expecting mothers (58%)

implied that videos and books are not informative ($p < 0.001$). Magazines and newspapers were considered as not useful resources for information regarding nutrition by the majority of participants (59.2%). Similarly, TV and radio were perceived as inadequate resources by the majority of study population (59.2%). Interestingly, the chi squared test of Goodness-of-Fit showed that large percentage of participants (46.1%) found social media as useful resource especially for maternal nutrition ($p < 0.001$). Also, Internet resources were highly rated as useful source of information by the majority of expecting mothers (56.3%) (Table 3).

3.4. Newborns' feeding intentions

When expecting mothers were asked about type of intended feedings in first couple weeks of life, large number of participants selected mixed formula and breastfeeding ($n = 116$, 47.3%). However, an almost equal number ($n = 113$, 46.1%) indicated that they would breastfeed their infants exclusively while the remainders were either uncertain ($n = 12$, 4.9%) or would feed formula only ($n = 4$, 1.6%) (Fig. 2). When asked about timing of introducing formula, 79 participants (32%) planned to give formula since birth. Despite the majority planned to use formula after 6 months of age ($n = 120$, 49%), another 46 participants (18%) considered formula within first 6 months of life. Intentions to cease breastfeeding were scattered between 1 and 3 months, 3–6 months, 6–12 months and beyond 1 year of age at 9.8%, 14.3%, 35.1% and 40.8% consequently. Nonetheless, only 37.6% were confident they can fulfill their intended duration of breastfeeding.

3.5. Factors influencing intention to breastfeed exclusively in the first six months of life

To assess impacts of demographics, expecting mothers' characteristics and attitude on intention to breastfeed exclusively, multiple statistical analysis where employed. The intention was scored by variable factors and reported with a final score of 30. Expecting mothers who indicated having enough knowledge about breastfeeding had better intention to breastfeed exclusively (mean = 26, SD = 4.3). One-way ANOVA test indicated that participants who planned to cease breastfeeding at 1–3 months time had more negative intentions toward breastfeeding exclusively (mean = 22.9, SD = 5.1). In contrast, expecting mothers who expressed desires to breastfeed beyond one year are more likely to have positive intentions to breastfeed their babies exclusively (mean = 26, SD = 3.9, $p = 0.020$).

Furthermore, expecting mothers who believed that breast milk is the best feeding choice held more positive intentions toward exclusive breastfeeding (mean = 26.2, SD = 4). The Multivariate Linear Regression Analysis found expecting mothers' intentions grow with age positively toward exclusive breastfeeding ($p = 0.030$) (Fig. 3). Additionally, those who valued others' opinions on their decision to breastfeed (pediatricians, obstetricians, mothers, mothers in law, spouse) tended to have positive intentions ($p = 0.031$).

Entertainingly, expecting mothers' perspectives on importance of others' opinion on their decision varied between their mothers, husbands, mothers-in-law, pediatricians and obstetricians. Expecting mothers highly valued pediatricians' opinions, mean = 3.8 out of 5 and the Relative Importance rating (RII) was equal to 76.8% out of a 100%, denoting that pediatricians' opinions on breastfeeding were the most important. Also, they found obstetricians' opinions almost as valuable (3.7 out of 5 and RII equal to 73.7% out of a 100%). Their mothers' opinion came next followed by Child's father (Table 4). Expected mothers who indicated that offering balanced mixture of breast and formula as their preferred feeding plan carried negative intentions to breastfeed exclusively ($p < 0.001$). However, education, employment status, length of maternity leave, work place support and contribution to family income did not alter their intentions toward breastfeeding.

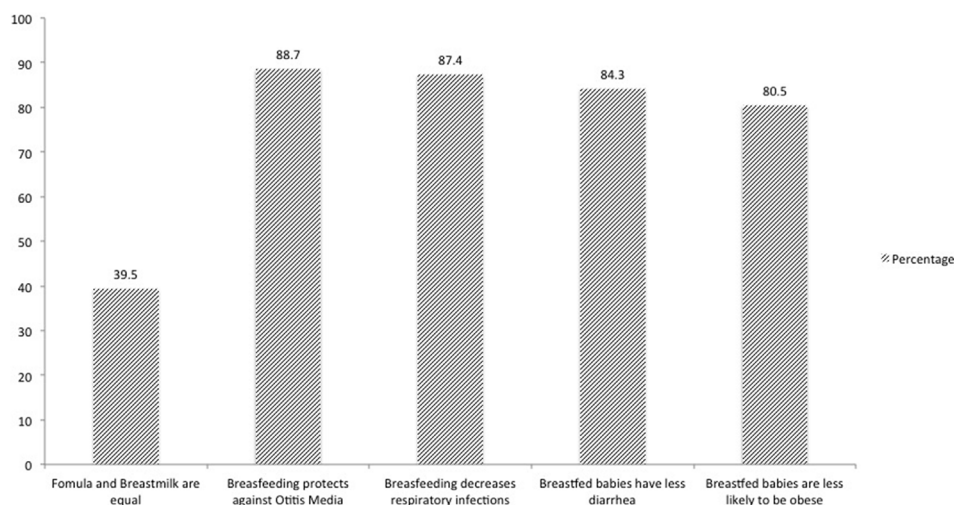


Fig. 1. Despite a big proportion of expecting mothers perceived breast milk is equal to formula, the majority of participants showed good awareness of breastfeeding health benefits to their babies.

Table 2

T-4 Women's comfort level Breastfeeding their babies in front of others.

	Very Uncomfortable	Slightly Comfortable	Very Comfortable	$\chi^2(2)$ value	p
Female family member	125 (52.3%)	81 (34%)	32 (13.4%)	54.6	< 0.001
Female friend	143 (60.4%)	65 (27.5%)	28 (11.9%)	87.6	< 0.001
Spouse	36 (15.2%)	58 (24.5%)	143 (60.3%)	80.84	< 0.001
Male family member	184 (78.6%)	29 (11.8%)	21 (8.6%)	216.5	< 0.001
Strangers	204 (86.8%)	17 (6.9%)	14 (6%)	302.5	< 0.001

Table 3

T-8 Source of information regarding maternal and child nutrition. N = 245.

	No Information	Baby's Nutrition	Maternal Nutrition	$\chi^2(2)$ value	p
Nurses	128 (52.2%)	29 (11.8%)	88 (35.9%)	60.7	< 0.001
Friends & Relatives	84 (34.3%)	60 (24.5%)	101 (41.2%)	10.4	0.006
Videos and Books	142 (58%)	44 (18%)	59 (24.1%)	68.2	< 0.001
Magazines and Newspapers	145 (59.2%)	49 (20%)	51 (20%)	73.7	< 0.001
TV and Radio	145 (59.2%)	39 (15.9%)	61 (24.9%)	76.6	< 0.001
Social Media	61 (24.9%)	71 (29%)	113 (46.1%)	18.6	< 0.001
Internet Sources	42 (17.1%)	65 (26.5%)	138 (56.3%)	61.5	< 0.001

3.6. Role of mHealth based education on influencing decision to breastfeed exclusively

As asked at the beginning of survey, expecting mothers indicated poor intentions toward exclusive breastfeeding (46.1%). Then, they were offered to watch a 9-min video regarding exclusive breastfeeding, early initiation and its benefits. Later, they were asked again about their breastfeeding intentions. Majority of participants responded positively to exclusive breastfeeding (80.8%). The educational video was able to alter intentions of those who were considering mixed feeding with no major impact on those who already decided on formula. Furthermore, only 146 participants (66.1%) expressed desire on practicing early initiation and feeding within first hour of life (Fig. 4). Lastly, almost 90% of participants found mHealth based education using a tablet very beneficial on formulating a decision about breastfeeding.

4. Discussion

Exclusive breastfeeding is considered the best feeding choice for healthy newborns in their first six months of life [2]. It has major benefits on general newborns' health and wellbeing [11]. These benefits exaggerate in developing countries as one of the cheapest intervention

to preserve health [12].

Exclusive breastfeeding in Saudi Arabia is very low while mix-feeding practice is common [5]. [13] This study tried to explore reasons of such practice. Knowledge regarding exclusive breastfeeding is limited despite good understanding of health benefits of breastfeeding [14]. Saudi women have shown variable levels of knowledge in the literature regarding breastfeeding in general [15]. [9] However, awareness about exclusive breastfeeding has been reported as deficit [5]. This could be one of the major reasons affecting intentions to breastfeed exclusively.

Earlier studies have shown that Saudi women have negative attitude toward exclusive breastfeeding [9]. [16] Unfortunately, those negative attitudes were reported to be higher among educated, higher socio-economic status and employed women [15,16]. Furthermore, attitude toward breastfeeding has been documented more positively with advance maternal age, exclusive breastfeeding awareness, multiparity and receiving breastfeeding classes [6,13,14,17,18]. In this study, we found positive association between advance maternal age, awareness, willingness to learn and intention to breastfeed exclusively. There was no association in our findings between employment status and educational level.

Higher education does not mean deeper knowledge about

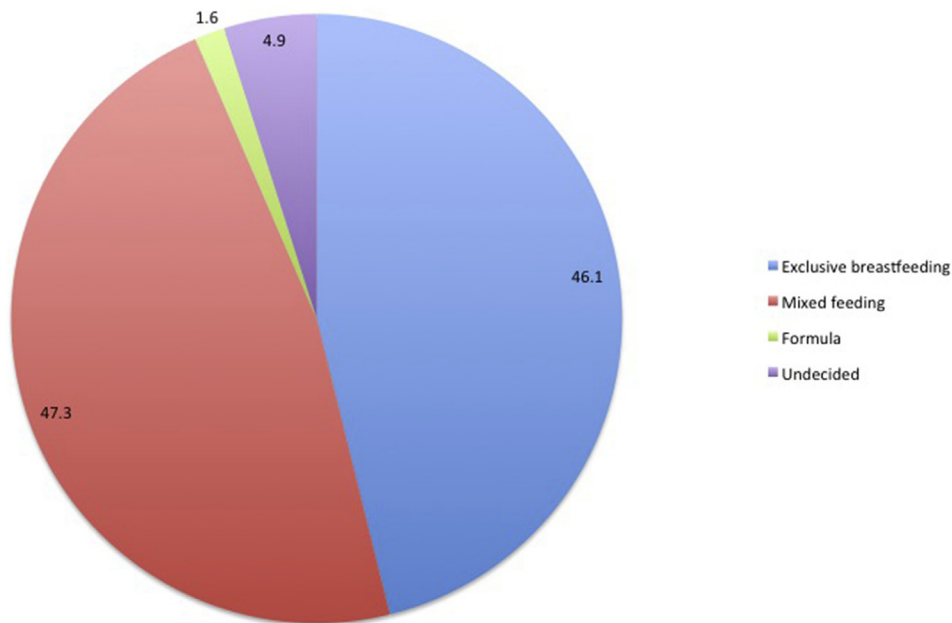


Fig. 2. Prior to being exposed to mHealth based educational video, 47.3% of participating expecting mothers intended to use mixed feeding while 46.1% anticipated exclusive breastfeeding. Among all participants, 4.9% had not made a decision on their babies nutrition with 1.6% planned to use formula.

importance of breastfeeding due to limited motherhood classes and breastfeeding support initiatives in the young kingdom [9]. Even Baby Friendly Hospital Initiative is limited to only 28 hospitals out of 400 hospitals around the country [19]. Still, medical practice in Saudi Arabia delay exposure to rich breastfeeding resources like pediatricians or lactation consultants to postnatal care when decision about breastfeeding has been already made [20]. Our findings showed an opportunity for obstetricians in Saudi Arabia to play a public health role in promoting breastfeeding. Mothers viewed their opinions almost as valuable as pediatricians. Similarly, educating maternity nurses about breastfeeding can play a role in promoting breastfeeding and provide mothers with another resource.

Exclusive breastfeeding seems like a natural practice. Yet, It is very challenging and requires a lot of support. Saudi women are set to fail in their attempts to breastfeed. With limited knowledge, negative attitude and lack of support, breastfeeding becomes overwhelming. Additionally, uncontrolled advertisement and availability of formula intensify unsupported mothers' challenges [21]. This could explain high

Table 4

T-7 Importance and relative Importance of the opinion of others on women decision to breastfeed her baby.

	Mean(SD)	RII(%)	Rank
Overall mean value of the others opinion perception (1–5 score)	3.4 (0.9)		
Pediatrician	3.8 (3.8)	76.8	1
Obstetrician	3.7 (1.3)	73.7	2
My mother	3.3 (0.9)	66.3	3
Childs's Father	3.3 (0.9)	65.1	4
Mother in Law	2.7 (1)	53.8	5

initiation rate in Saudi Arabia but early cessation [5,6,18]. Also, they face a lot of social barriers [14]. They are very shy and cannot feed in front of others. They also lack resources in how to initiate and establish a successful breastfeeding [13]. Beside doctors, Saudi women found social media and Internet based educations are favorable resources. Despite being hard to control and questionable information quality,

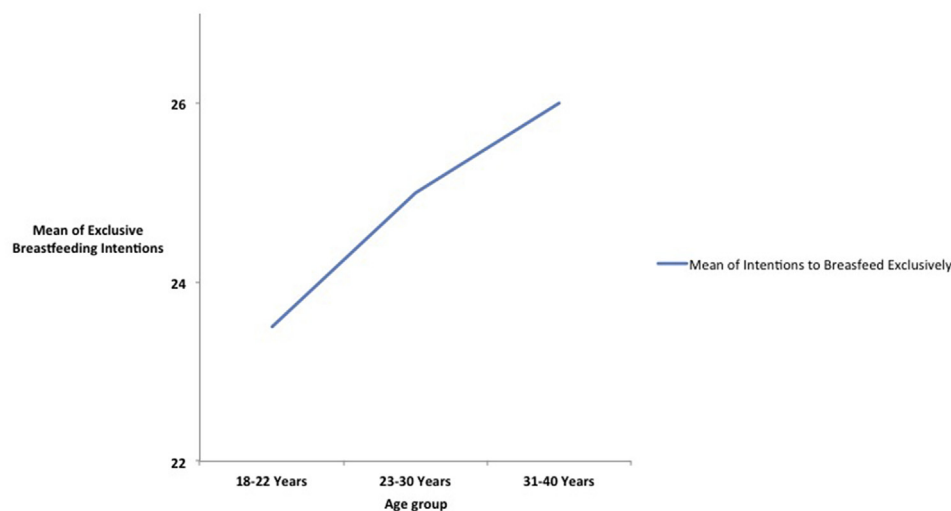


Fig. 3. Intentions to breastfeed exclusively grow parallel to age and reached a maximum mean score of 26 out of 30 total for those older than 30 years old.

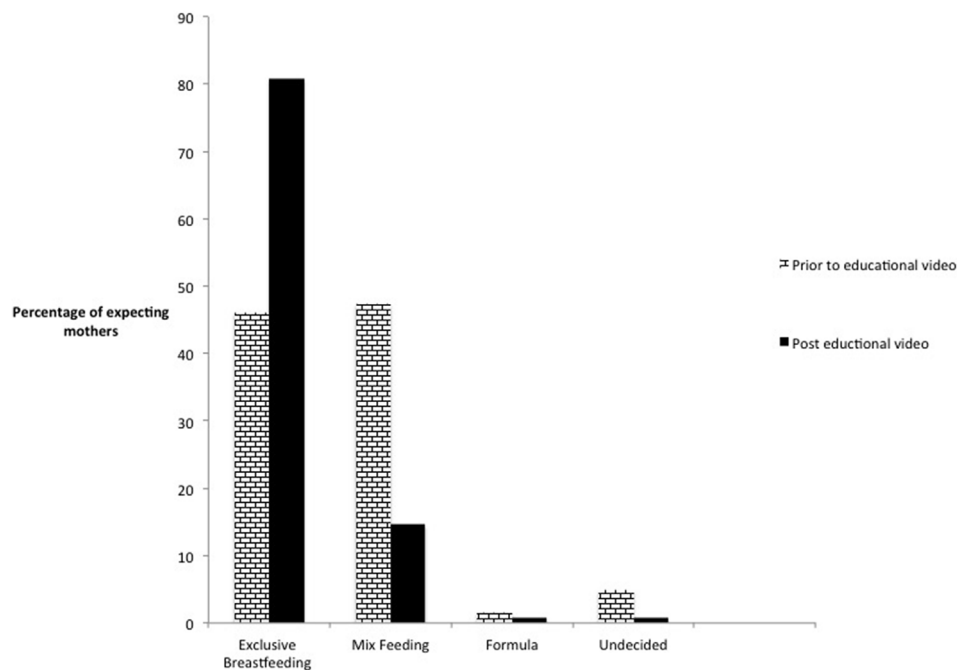


Fig. 4. mHealth based education augmented and altered intentions toward exclusive breastfeeding mainly in those were in its favor or planned mixed feeding. Although it helped in formulate a decision among formula and undecided groups toward exclusive breastfeeding, the findings were not statistically significant.

Internet and social media based education are easy to implement, cheap, widely distributed, accessible and can be scaled up with advancement of technology [22].

Breastfeeding practice is declining among Saudi women in modern age as documented in Aljuaid D et al. systemic review of Saudi breastfeeding literature [23]. Fortunately, Saudi women are driven to breastfeed by Islamic religious-based beliefs of importance of breastfeeding for two years [9]. It has been shown how simple interventions can augment breastfeeding in Saudi Arabia [24]. Tablet based mHealth education was able to alter intention to breastfeed exclusively quite significantly. Although mass media campaign was successful in promoting breastfeeding [25], cost can make it quite hard to implement in developing countries. Our study provides evidence how tablet based mHealth education can alter intention to breastfeed. Tablets are common in Saudi Arabia which might not be applicable in low income countries. But, using a smart phone based mHealth could offer an alternative design with possible similar advantages.

For mHealth to play a role in promoting exclusive breastfeeding, it should be implemented early in pregnancy or even earlier. This would allow expecting mothers and their families to formulate a decision and implement all needed supports. Additionally, early education can allow emotional and psychological preparation along with finding new resources. Such early education can augment early initiation especially in the golden “first hour” of life.

Further research is needed to test impact of intensified education utilizing mHealth on rate of successful exclusive breastfeeding and lowering burden on mothers.

5. Limitation

This is a single center study reflecting urban settings. The data cannot be generalized nation wide. Additionally, translating IFPS II into Arabic might have affected its validity. The questionnaire itself could be a source of gained knowledge that adds another limitation on study design. The use of tablet as a tool to share educational video might not be applicable in lower income countries which require further research to assess impact of using smart or featured phones as educational platforms.

6. Conclusion

Saudi expecting mothers have limited knowledge toward importance of exclusive breastfeeding. They are unprepared, unsupported and lack resources to practice exclusive breastfeeding. Their intentions to exclusively breastfeed are related to their attitude toward breastfeeding, knowledge, age and access to expert opinions. Arabic resources can be delivered utilizing social media and Internet. Obstetricians and maternity nurses can play a role in promoting breastfeeding along with prenatal pediatric visit if possible.

Utilizing tablet-based mHealth can alter intention to breastfeed exclusively. Also, it can support decision on early initiation to some extent.

Funding and conflict of interest

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Provenance and peer review

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Ethical approval

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Statistical analysis: YA, BA, RA, AA.

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Conflicts of interest

No conflicts to declare.

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References

- [1] S. Chen, C.W. Binns, Y. Liu, B. Maycock, Y. Zhao, L. Tang, Attitudes towards breastfeeding - the Iowa infant feeding attitude scale in Chinese mothers living in China and Australia, *Asia Pac, J. Clin. Nutr.* 22 (2013) 266–269, <https://doi.org/10.6133/apjcn.2013.22.2.09>.
- [2] K. Ms, R. Kakuma, Optimal duration of exclusive breastfeeding (Review), *Cochrane Database Syst. Rev.* (2012), <https://doi.org/10.1002/14651858.CD003517.pub2> www.cochranelibrary.com.
- [3] E.S. Mohammed, E.R. Ghazawy, E.E. Hassan, Knowledge, attitude, and practices of breastfeeding and weaning among mothers of children up to 2 Years old in a rural area in el-minia governorate, Egypt, *J. Fam. Med. Prim. Care* 3 (2014) 136–140, <https://doi.org/10.4103/2249-4863.137639>.
- [4] A.B. Labrique, L. Vasudevan, E. Kochi, R. Fabricant, G. Mehl, mHealth innovations as health system strengthening tools: 12 common applications and a visual framework, *Glob. Heal. Sci. Pract.* 1 (2013) 160–171, <https://doi.org/10.9745/GHSP-D-13-00031>.
- [5] H.M. Nafeelsayed, Exclusive breastfeeding , prevalence and maternal concerns : Saudi and egyptian mothers, *J. Educ. Pract.* 7 (2016) 5–11.
- [6] A. Hassa, S. Arabia, T. Amin, Determinants of initiation and exclusivity of breastfeeding, *Breastfeed. Med.* 6 (2011) 10–12, <https://doi.org/10.1089/bfm.2010.0018>.
- [7] Y.A. Alwelaie, E.A. Alsuhaibani, A.M. Al-harthi, R. Radwan, Breastfeeding knowledge and attitude among Saudi Women in Central Saudi Arabia, *Saudi Med. J.* 966 (2010) 193–198.
- [8] E. Seidelman, *Successful Initiatives to Limit Formula Marketing in Health Care Facilities Strategic Approaches and Case Studies*, (2014).
- [9] A.-J. MS, E.-B. BM, M. SK, A.-N. AA, Infant feeding in Saudi Arabia: mothers' attitudes and practices, *East. Mediterr. Health J.* 12 (2006) 6–13 <http://pesquisa.bvsalud.org/portal/resource/es/mdl-17037217>.
- [10] C.R. Martin, P.-R. Ling, G.L. Blackburn, Review of infant feeding : key features of breast milk and infant formula, *Nutrients* (2016) 1–11, <https://doi.org/10.3390/nu8050279>.
- [11] J.P. Felice, C.M. Dieterich, E. O'Sullivan, K.M. Rasmussen, Breastfeeding and health outcomes for the mother-infant dyad, *Pediatr. Clin.* 60 (2013) 31–48, <https://doi.org/10.1016/j.pcl.2012.09.010.Breastfeeding>.
- [12] WHO, *Global Strategy for Infant and Young Child Feeding*, (2003).
- [13] N. Al-Nuaimi, G. Katende, J. Arulappan, Breastfeeding trends and determinants implications and recommendations for gulf cooperation council countries, *Sultan Qaboos Univ. Med. J.* 17 (2017) 155–161, <https://doi.org/10.18295/squmj.2016.17.02.004>.
- [14] H. Saied, A. Mohamed, A. Suliman, W. Al Anazi, Breastfeeding knowledge , attitude and barriers among Saudi women in riyadh, *J. Nat. Sci. Res.* 3 (2013) 6–14.
- [15] A.M. Al-Binali, Breastfeeding knowledge, attitude and practice among school teachers in Abha female educational district, southwestern Saudi Arabia, *Int. Breastfeed. J.* 7 (2012) 10, <https://doi.org/10.1186/1746-4358-7-10>.
- [16] M. Alshehly, B. Sobaih, Attitudes of Saudi mothers towards breastfeeding, *Sudan, J. Paediatr.* 16 (2016) 31–36.
- [17] K.J. Torres, C.E. Castrillon, E.L. Moss, M. Saito, R. Tenorio, D.M. Molina, H. Davies, D.E. Neafsey, P. Felgner, J.M. Vinetz, D. Gamboa, Genome-level determination of plasmodium falciparum blood-stage targets of malarial clinical immunity in the peruvian amazon, *J. Infect. Dis.* 211 (2015) 1342–1351, <https://doi.org/10.1093/infdis/jiu614>.
- [18] R.A. Alzaheb, Factors influencing exclusive breastfeeding in tabuk , Saudi Arabia, *Clin. Med. Insights Pediatr.* 11 (2017) 1–8, <https://doi.org/10.1177/1179556517698136>.
- [19] M.H. Labbok, Global baby-friendly hospital initiative monitoring data: update and discussion, *Breastfeed. Med.* 7 (2012), <https://doi.org/10.1089/bfm.2012.0066>.
- [20] P. Vijayalakshmi, S. T, D. Mythili, Knowledge, attitudes, and breast feeding practices of postnatal mothers: a cross sectional survey, *Int. J. Health Sci.* 9 (2015).
- [21] K.M. Alfaleh, Perception and knowledge of breast feeding among females in Saudi Arabia, *J. Taibah Univ. Med. Sci.* 9 (2014) 139–142, <https://doi.org/10.1016/j.jtumed.2013.11.003>.
- [22] S. Kärkkäinen, T. Keinonen, A. Hartikainen-ahia, K. Vainio, An internet-based medicine education intervention : fourth graders ' perspectives, *Educ. Sci.* 7 (2017) 2–13, <https://doi.org/10.3390/educsci7020046>.
- [23] D.A.M. Al Juaid, C.W. Binns, R.C. Giglia, Breastfeeding in Saudi Arabia : a review, *Int. Breastfeed. J.* 9 (2014) 1–9.
- [24] C. Mosher, A. Sarkar, A.A. Hashem, R.E. Hamadah, A. Alhoulan, Y.A. Almakadma, T.A. Khan, A.K. Al-hamdani, A. Senok, Self-reported breast feeding practices and the Baby Friendly Hospital Initiative in Riyadh , Saudi Arabia : prospective cohort study, *BMJ Open* 6 (2016) 1–9, <https://doi.org/10.1136/bmjopen-2016-012890>.
- [25] J.A. McDivitt, S. Zimicki, R. Hornik, A. Abulaban, The impact of the healthcome mass media campaign on timely initiation of breastfeeding in Jordan, *Stud. Fam. Plann.* 24 (1993) 295–309.