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Colostrum knowledge among mothers in Riyadh, Saudi Arabia

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ABSTRACT

Background: Colostrum is a secretion produced by a mother's mammary glands days before birth and lasts for a few more after. Colostrum is rich in various immunologic and nutritional content and is essential for the newborn. However, there are many misconceptions and a lack of knowledge about colostrum and its properties. *Aim:* This study aimed to measure the knowledge and attitudes towards colostrum among mothers in Riyadh, Saudi Arabia. *Subjects and methods*: A cross-sectional study was conducted among mothers in Riyadh, Saudi Arabia. A self-administered questionnaire was distributed among mothers using an online platform. The questionnaires include demographic data, general knowledge and awareness about colostrum, knowledge about colostrum formation, duration, color, and appearance, and general attitude and practice toward colostrum. *Results:* Of the 680 mothers who took part, 86.9% heard about colostrum, while 86.8% and 74% were aware of its correct meaning and benefits. The overall knowledge level of mothers regarding colostrum formation, duration, color, and management was good (91.8%), while only 8.2% had a poor knowledge level. Factors associated with increased knowledge level were having more than five pregnancies, having heard of colostrum, knowing its meaning and usage, and receiving advice to breastfeed a child with colostrum. *Conclusion:* Even though Saudi mothers' understanding of colostrum was rated sufficient, there is still space for improvement. Mothers who have had more than five pregnancies and have been encouraged to breastfeed a kid with colostrum are more informed than the rest.

Keywords: Colostrum, mothers, children, awareness, knowledge

1. INTRODUCTION

Colostrum is produced by mothers in the first days postpartum, and it's known for its distinct appearance and volume (Harakeh et al., 2020; Joshi et al., 2012). Colostrum is high in proteins, carbs, vitamin A, and sodium chloride but lacks lipids and potassium when compared to regular milk (Joshi et al., 2012; Aisha et al., 2016). The concentration of nutrients in the low volume of colostrum benefits the newborn's premature digestive system

(Tejaswini et al., 2021). For both mothers and infants, the benefits of colostrum range from physiological to psychological (Mohammed et al., 2014). It connects the mother and child through emotional bonding, decreases infants' morbidity and mortality, has a laxative effect that helps with the passage of the baby's first stool, which in turn aids in the removal of excess bilirubin that is produced in large quantities before birth, preventing the development of neonatal jaundice. It is also composed of different immunoglobulins like IgA, IgG, and IgM, increasing the infant's ability to defend against various infections (Tejaswini et al., 2021). Lactoferrin, lysozyme, lactoperoxidase, complement, and protein-rich peptide (PRP) are some of the other immunological components that can be found in colostrum. It also contains cytokines and growth factors (Harakeh et al., 2020; Joshi et al., 2012; Aisha et al., 2016).

PRP aids in the treatment of viral illnesses such as herpes and HIV, as well as bacterial and viral infections that are difficult to treat, various cancers, asthma, allergies, and autoimmune diseases. It helps reduce one of the leading causes of death in Saudi Arabia, diarrhea and ARI (Joshi et al., 2012; Aisha et al., 2016). Breastfeeding can reduce neonatal mortality by 33% if moms start breastfeeding at a young age. Several studies have found that beginning breastfeeding later increases infant morbidity and death. Systematic review research found that babies who started nursing after 1 hour had a 33% higher risk of newborn death (Smith et al., 2017; Abie et al., 2019). Many women avoid colostrum-feeding because of certain cultural attitudes, a lack of understanding, ignorance, and unfavorable socio-cultural views and prejudices. Many factors lead to a lack of understanding and a poor attitude toward the Colostrum feeding, mothers who have had multiple children, visited the ANC and were counseled and educated on the importance of colostrum feeding, and received support from family members are more knowledgeable on colostrum feeding than their counterparts who have had fewer children, less ANC visits and poor support from their family members (Yeshambel Wassie et al., 2020).

Mothers who believed that formula feeding was nutritionally superior to breast milk viewed formula feeding as a status symbol and lacked the will to breastfeed are less likely to initiate breastfeeding (Tejaswini et al., 2021; Geetha, 2015). Mothers who had prolonged labor or underwent surgical delivery gave fewer colostrum feedings (Tejaswini et al., 2021). In addition, mothers whose children were ill within four days of delivery or were unable to feed properly because of deformity are less likely to give colostrum to their child compared to others (Yeshambel Wassie et al., 2020; Tejaswini et al., 2021; Kumari et al., 1988). This, in turn, will pose a significant risk of malnutrition, infections, and stunting to children (Harakeh et al., 2020; Mohammed et al., 2014). This research aims to evaluate mothers' knowledge, attitudes, and actual practices in Riyadh, Saudi Arabia.

2. METHODS

A cross-sectional study was conducted in Riyadh city, Kingdom of Saudi Arabia, between October 2021 and April 2022. The study's participants were any Saudi mothers aged 18 and above living in Riyadh. Ethical approval was obtained from Imam Muhammad ibn Saud Islamic university, college of medicine, Riyadh. The sample size was 385 participants. The participants were collected from northern, eastern, western, southern, and central Riyadh areas. Verbal and informed consent was obtained from all participants. They all informed that the study was utterly nameless, willingly, and dedicated to scientific and research purposes. Data were collected using a validated questionnaire.

Statistical Analysis

The knowledge regarding colostrum was measured using 12-item questionnaires, where 3-point Likert scale categories were the answer options ranging from "disagree/false" coded as 1 to "agree/true" coded as 3. Colostrum knowledge was divided into three domains: "knowledge about formation" (4 items), "knowledge about duration" (5 items), and "knowledge about color and appearance" (3 items). Negative questions had been re-coded reversely to avoid bias in the score. The total knowledge score has been obtained by adding all 12 items. A possible score range from 3 to 36 points had been generated, which indicates that the greater the score the greater the knowledge about colostrum. By using 60% as cutoff points to determine the level of knowledge, participants were classified as having poor knowledge if the score was 60% or below, and above 60% were classified as good knowledge.

Demographic data were categorized to calculate numbers and percentages whereas continuous variables were summarized using mean and standard deviation. The association between the total knowledge score and the socio-demographic characteristics of women was conducted using Mann Whitney Z-test. The overall distribution of data was measured using Shapiro Wilk test. The knowledge score follows the non-normal distribution. Thus, non-parametric tests were applied. Correlation procedures were performed using the Pearson correlation coefficient. A p-value of <0.05 was shown to be statistically significant, while $p<0.01$ was

taken as highly statistically significant. The SPSS for Windows, version 26.0 (IBM Corp., Armonk, NY, USA) was used to analyze all the data.

3. RESULTS

680 mothers responded to our survey. Table 1 presents the socio-demographic characteristics of the mothers. Most of them were married (92.6%), with more than half (55.1%) having 5 or fewer pregnancies and nearly two-thirds (64.9%) having 5 or fewer baby birth. With respect to education, 54.1% had bachelor's degrees. Almost all (80.6%) were living in the villa, of which 79.9% indicated owning the house. Approximately 55.4% were housewives, while 39.4% were full-time employed. Only 23.4% reported high monthly earnings (>12,000 SAR). When required to rate their children's overall health, 60.7% expressed that their child/children had excellent overall health. The proportion of mothers associated with chronic diseases was 20.6%, while the proportion of mothers who intend to get pregnant again was 30.6%.

Table 1 Socio-demographic characteristics of the mothers (n=680)

Study variables	N (%)
Marital status	
Married	630 (92.6%)
Divorced	26 (03.8%)
Widowed	24 (03.5%)
Number of pregnancy	
≤5	375 (55.1%)
>5	305 (44.9%)
Number of birth	
≤5	441 (64.9%)
>5	239 (35.1%)
Educational level	
Illiterate	03 (0.40%)
Primary school	09 (01.3%)
Average school	31 (04.6%)
Secondary school	119 (17.5%)
Diploma	105 (15.4%)
Bachelor degree	368 (54.1%)
Postgraduate studies	45 (06.6%)
Living type	
Apartment	132 (19.4%)
Villa	548 (80.6%)
Accommodation type	
Owned	543 (79.9%)
Rent	137 (20.1%)
Occupational status	
Employee (full time)	268 (39.4%)
Employee (part-time)	35 (05.1%)
Housewife	377 (55.4%)
Monthly salary (SAR)	
<3000	06 (0.90%)
3000-6000	22 (03.2%)
6000-9,000	53 (07.8%)
9000-12000	63 (09.3%)
>12000 riyals	159 (23.4%)
None (Housewife)	377 (55.4%)

If you have children already, how would you rate their overall health?	
Very good	413 (60.7%)
Good	217 (31.9%)
Acceptable	38 (05.6%)
Bad	01 (0.10%)
Do not apply	11 (01.6%)
Do you suffer from chronic diseases?	
Yes	140 (20.6%)
No	540 (79.4%)
Do you want to get pregnant again?	
Yes	208 (30.6%)
No	472 (69.4%)

In Table 2, the prevalence of mothers who have heard about colostrum was 86.9%. Only 5.1% participated in filling out a questionnaire related to colostrum. Nearly all mothers (86.8%) were aware of colostrum, and nearly three-quarters (74%) knew how to use it. 52.2% agreed that colostrum could be found in breast milk only. When asked if they were ever advised by their doctor or child's doctor to breast a child with colostrum, 61.3% of them said "yes"; however, the actual breastfeeding of colostrum was reported by 87.5% of mothers. Hence, 77.4% of them indicated that they would indeed breastfeed their child with colostrum again in the future. In addition, most mothers were aware that the most common disorder of the child was immune system disorder (82.8%) and child growth factors (72.2%).

Depicted the sources of information about colostrum. It can be shown that family was the most prevalent source of colostrum knowledge (67.2%), followed by the internet (16.8%) and attending physician (16%) (Figure 1).

Table 2 General awareness of mothers toward colostrum (n=680)

Statement	N (%)
Have you ever heard of colostrum?	
Yes	591 (86.9%)
No	89 (13.1%)
Have you previously filled out a questionnaire on colostrum?	
Yes	35 (05.1%)
No	645 (94.9%)
Do you know what colostrum is?	
Yes	590 (86.8%)
No	90 (13.2%)
Do you know the use of colostrum?	
Yes	503 (74.0%)
No	177 (26.0%)
Is colostrum found in breast milk only?	
Yes	355 (52.2%)
No	325 (47.8%)
Has your doctor or your child's doctor ever advised you to breastfeed your child with colostrum?	
Yes	417 (61.3%)
No	263 (38.7%)
If you already have children, did you breastfeed them with	

colostrum?	
Yes	595 (87.5%)
No	49 (07.2%)
Do not apply	36 (05.3%)
Will you breastfeed your children with colostrum in the future?	
Surely	526 (77.4%)
Depends on the situation	112 (16.5%)
According to the advice of the doctor, nurse, and relatives	22 (03.2%)
I don't think it's important	05 (0.70%)
I will not breastfeed them	15 (02.2%)
Heard of child disorder *	
Child's immune system	563 (82.8%)
Underdevelop digestive system	390 (57.4%)
Increased red blood cells	313 (46.0%)
Child growth factors	491 (72.2%)

* Variable with multiple response answers.

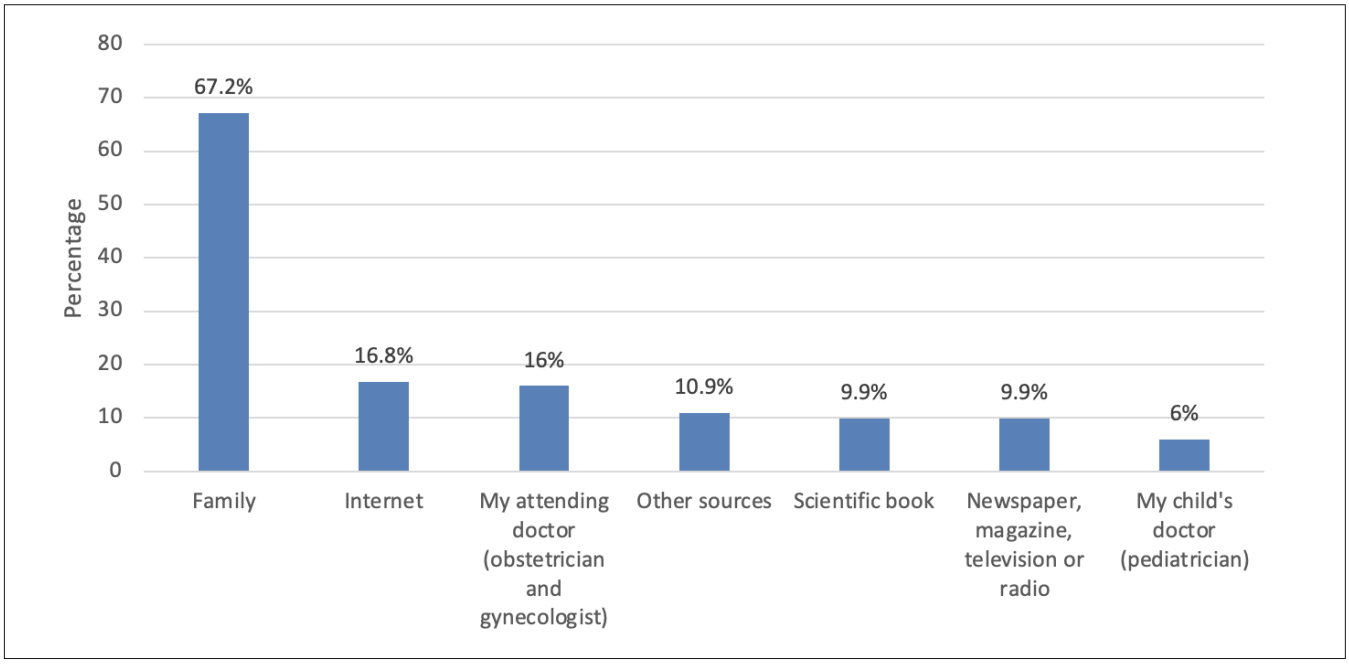

Figure 1 Sources of information about colostrum

Regarding the knowledge about colostrum formation, 26.9% of the respondents stated there is a truth that "colostrum is formed in the mother's breast 9 months during pregnancy", 31.3% said that the "colostrum formed in the mother's breast during late pregnancy", 58.1% agreed that the "colostrum formed in the mother breast immediately after birth", while 47.8% knew that the "colostrum is formed in the mother's breast as soon as the mother starts breastfeeding after childbirth" (Figure 2).

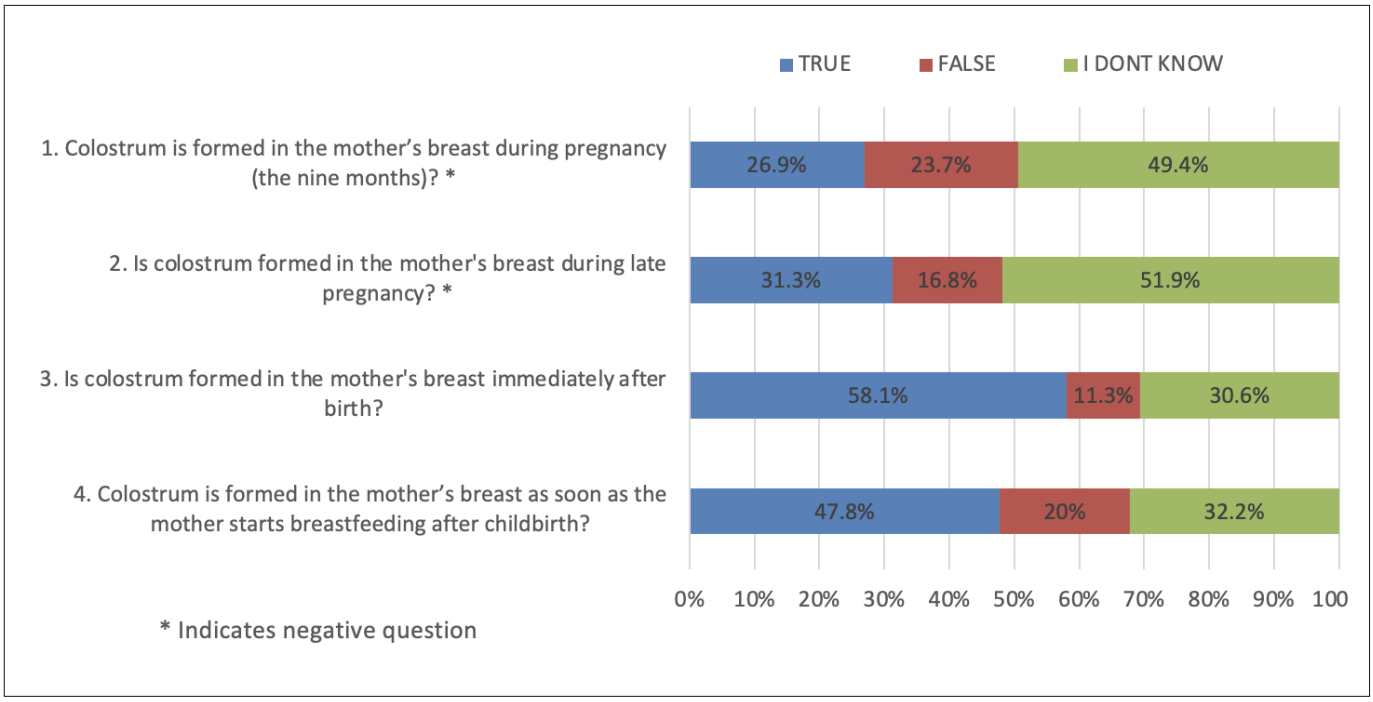

Figure 2 Knowledge about colostrum formation

Mothers disagreed with most of the statements related to the knowledge about colostrum. Duration, including "The colostrum remains in the mother's breast for one year (disagree: 73.1%), "The colostrum remains in the mother's breast for two years after birth until his/her baby weaned (disagree: 70.7%), "The colostrum remains in the mother's breast for one day after birth" (disagree (51.5%) and "The colostrum remains in the mother's breast for a week after birth (disagree: 45.7%). Only the statement about "The colostrum remains in the mother's breast for three days after birth", where more mothers agreed (agree: 44.4%) (Figure 3).

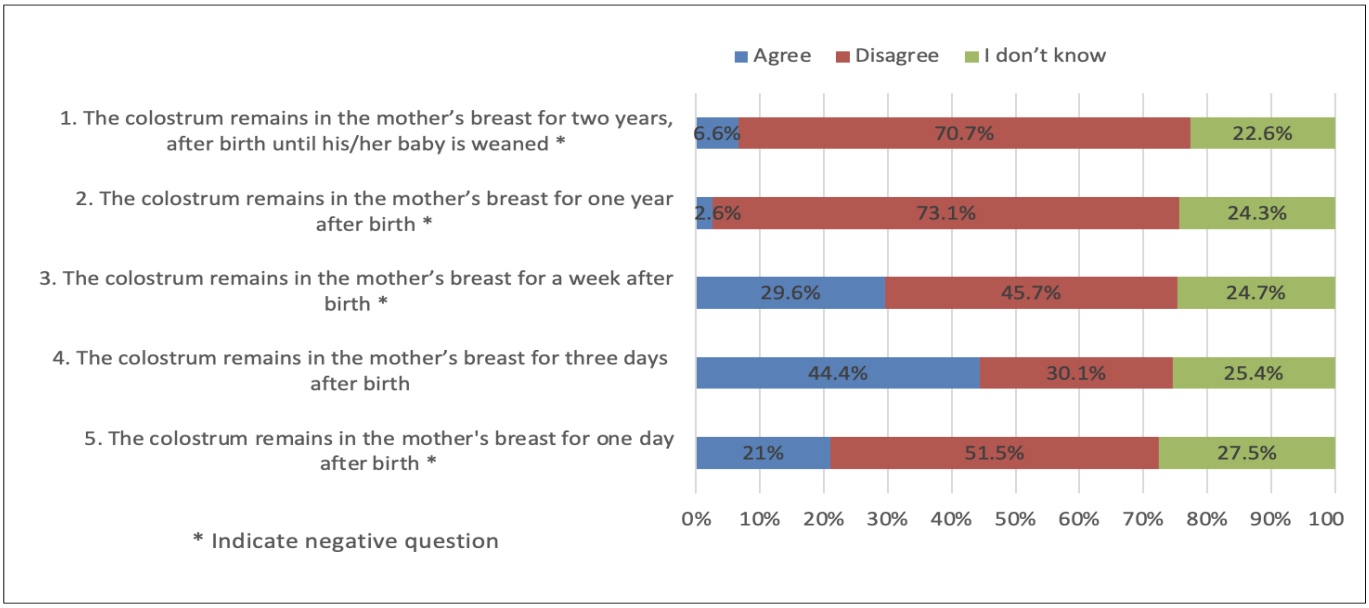

Figure 3 Knowledge about colostrum duration

Regarding the knowledge about the color and appearance of colostrum, Most mothers disagreed that "colostrum is normal blood secreted in the first breast milk" (disagree: 61.3%) and "Colostrum is a colorless substance that dissolves in breast mild" (disagree: 52.5%). On the other hand, most mothers agreed that "Colostrum is a sticky yellow substance in breast milk" (agree: 71.3%) (Figure 4).

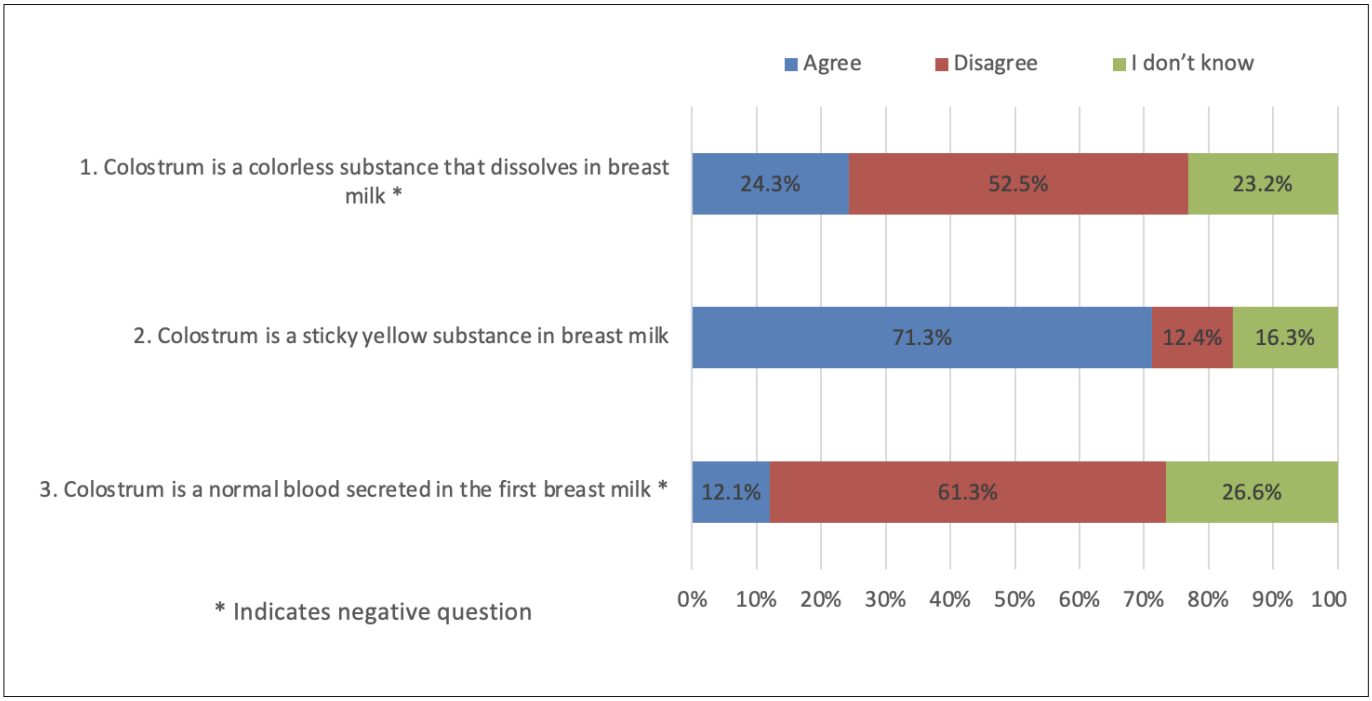

Figure 4 Knowledge about color and appearance of colostrum

Most mothers (68.1%) agreed that their attending doctor explained the usefulness and healthy substance of colostrum, 49.3% agreed that their attending doctor had given them advice that colostrum is secreted only in the first week of birth, and 47.4% agreed that their treating doctor told them that colostrum is a sticky yellow substance that forms in the last days of pregnancy (Figure 5).

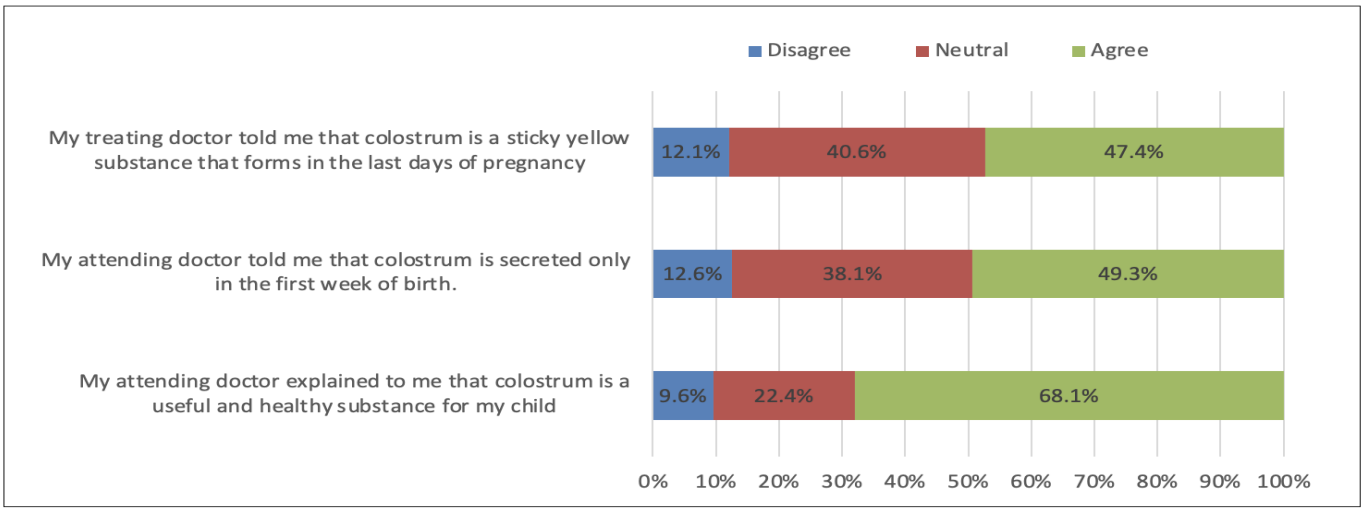

Figure 5 Attitude of the women regarding colostrum after receiving advice from attending physician

86.2% agreed that they breastfeed their baby right after birth or one after birth (45.7%). In contrast, 62.5% and 61.8% disagreed about the statement "I don't usually breastfeed my baby for the first three days, the mother's milk is not pure for the first three days" or "I don't usually breastfeed my baby in the first week, the mother's milk is not pure in the first week" (Figure 6).

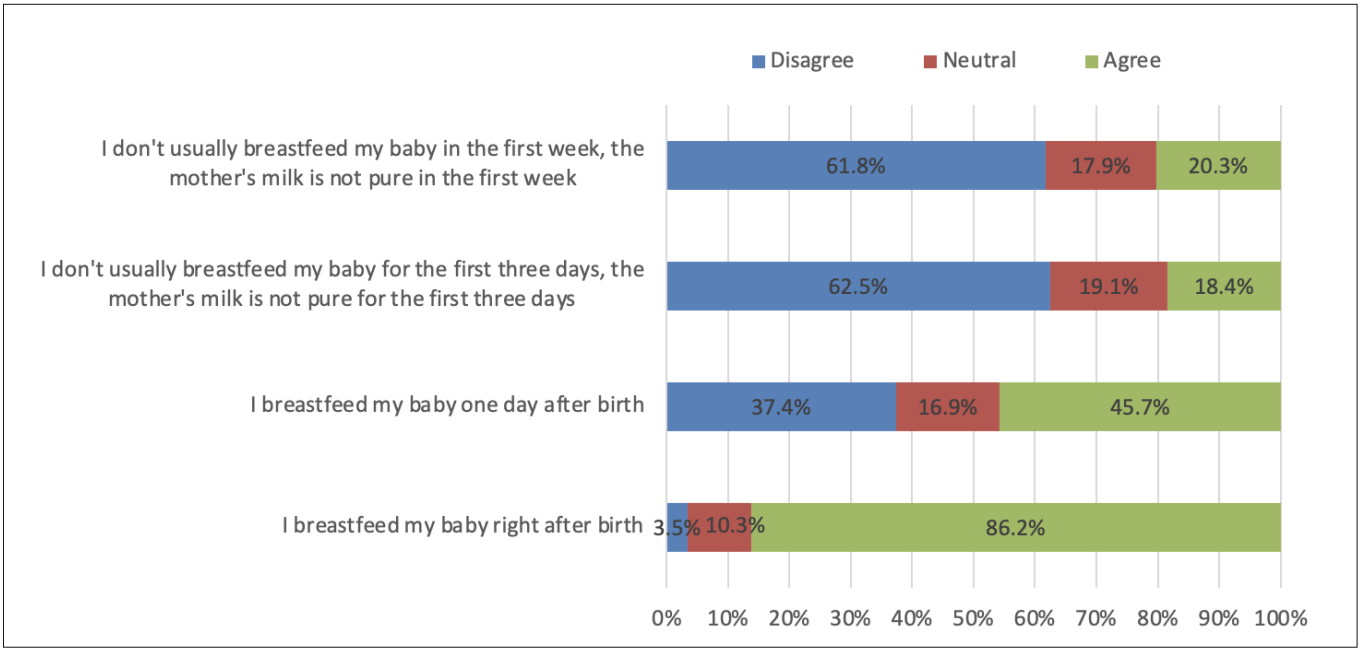

Figure 6 Practice of the women breastfeeding the child based on personal experience

The descriptive statistics of the knowledge about colostrum formation, duration, color, and appearance are given in Table 3. It can be shown that the overall mean score for formation knowledge was about 8.57 (SD 1.76), with poor and good levels found among 19.1% and 80.9%, respectively. Regarding the knowledge about duration, the overall mean score was 11.9 (SD 2.09), where poor and good knowledge were detected among 7.5%and 92.5%, respectively. Regarding the knowledge about color and appearance, the overall mean knowledge score was 7.36 (SD 1.57), and poor and good knowledge levels were found among 14.7% and 85.3%, respectively. Out of this, the overall mean knowledge score was 27.9 (SD 3.54), with poor and good knowledge levels observed among 8.2% and 91.8%, respectively.

Table 3 Prevalence of the knowledge about colostrum formation, duration, color, and appearance (n=680)

Knowledge	N (%)
Knowledge about formation score (mean ± SD)	8.57 ± 1.76
Level of knowledge about the formation	
Poor	130 (19.1%)
Good	550 (80.9%)
Knowledge about duration score (mean ± SD)	11.9 ± 2.09
Level of knowledge about the duration	
Poor	51 (07.5%)
Good	629 (92.5%)
Knowledge about color and appearance score (mean ± SD)	7.36 ± 1.57
Level of knowledge about color and appearance	
Good	100 (14.7%)
Poor	580 (85.3%)
Overall knowledge about colostrum score (mean ± SD)	27.9 ± 3.54
Level of knowledge about colostrum	
Poor	56 (08.2%)
Good	924 (91.8%)

In Table 4, there was a positive, highly statistically significant correlation between the overall score of knowledge among its domains, including knowledge about colostrum formation (r=0.556) and knowledge about colostrum duration (r=761), and knowledge about color and appearance (r=0.618).

Table 4 Correlation (Pearson-r) between the total knowledge score among the scores of colostrum formation, duration, color and appearance (n=680)

Knowledge domains	Overall knowledge	
	R-value	P-value
Formation	0.556	<0.001 **
Duration	0.761	<0.001 **
Color and appearance	0.618	<0.001 **

** Correlation is significant at the 0.01 level (2-tailed).

In Table 5, results revealed that a higher knowledge score was more associated with having more than 5 pregnancies (Z=2.011; p=0.044), having heard of colostrum (Z=8.995; p<0.001), were aware of the correct meaning of colostrum (Z=9.810; p<0.001), knowledge about the use of colostrum (Z=7.111; p<0.001) and received advice from a doctor to breastfeed the child, with colostrum (Z=3.537; p<0.001). Other variables included in the test did not show significant differences, with the knowledge score, including marital status, the number of birth, educational level, accommodation type, occupational status, chronic diseases, intention to get pregnant again, and the knowledge of whether the colostrum can be found in breast milk only (p>0.05).

Table 5 Association between the total knowledge score and the socio-demographic characteristics of the mothers(n=680)

Factor	Knowledge Score (36) Mean ± SD	Z-test	P-value §
Marital status			
Married	27.9 ± 3.52	0.851	0.395
Divorced or widowed	28.3 ± 3.82		
Number of pregnancy			
≤5	27.6 ± 3.52	2.011	0.044 **
>5	28.2 ± 3.55		
Number of birth			
≤5	27.7 ± 3.49	1.832	0.067
>5	28.3 ± 3.60		
Educational level			
Diploma or below	27.7 ± 3.61	0.960	0.337
Bachelor or higher	27.9 ± 3.49		
Accommodation type			
Owned	27.9 ± 3.54	0.594	0.552
Rent	27.8 ± 3.54		
Occupational status			
Employed	27.7 ± 3.31	1.017	0.309
Housewife	28.0 ± 3.72		
Do you suffer from chronic diseases?			
Yes	27.9 ± 3.47	0.051	0.959
No	27.9 ± 3.56		
Do you want to get pregnant again?			
Yes	27.6 ± 3.42	1.190	0.234
No	28.0 ± 3.59		
Have you ever heard of colostrum?			

Yes	28.3 ± 3.44	8.995	<0.001 **
No	24.8 ± 2.54		
Do you know what colostrum is?			
Yes	28.4 ± 3.44	9.810	<0.001 **
No	24.7 ± 2.29		
Knowledge about the use of colostrum			
Yes	28.4 ± 3.44	7.111	<0.001 **
No	26.3 ± 3.36		
Is colostrum found in breast milk only?			
Yes	27.7 ± 3.46	1.514	0.130
No	28.1 ± 3.62		
Has your doctor or your child's doctor ever advised you to breastfeed your child with colostrum?			
Yes	28.2 ± 3.61	3.537	<0.001 **
No	27.3 ± 3.36		

§ P-value has been calculated using Mann Whitney Z-test.

** Significant at p<0.05 level.

4. DISCUSSION

The purpose of this research is to determine the level of knowledge of mothers regarding colostrum, its formation, duration, color, and appearance. The knowledge of mothers regarding colostrum was composed of three domains, including knowledge about formation, knowledge about duration, and knowledge about color and appearance, wherein most mothers exhibited good knowledge, with 80.9%, 92.5%, and 85.3%, respectively. For the overall knowledge, it was revealed that 91.8% were classified into good knowledge levels, and the rest were poor (8.2%). Consistent with these findings (Harakeh et al., 2020) reported that the knowledge of Saudi mothers about colostrum formation, duration, color, and appearance was classified as good to high levels. Similarly (Yeshambel Wassie et al., 2020) noted that two-thirds (66.1%) of the mothers attending antenatal care were knowledgeable about colostrum feeding, with only 11.4% showing a lack of knowledge about it.

In India (Tejaswini et al., 2021), research was published to compare colostrum knowledge between urban and rural mothers. Investigators revealed that both mothers were almost parallel in knowledge. Approximately 46.7% of urban mothers and 48% of rural mothers showed a moderate colostrum level of knowledge. However, both groups of mothers demonstrated deficient knowledge about colostrum feeding and had inappropriate practices about it. Appropriate measures are necessary to address the gaps in colostrum knowledge.

Results of this study indicate that better knowledge was demonstrated by mothers who had more than 5 pregnancies, those who had heard of colostrum, were aware of its meaning and its benefits and received counseling for breastfeeding a child with colostrum. These findings are virtually identical to those reported in the study by (Yeshambel et al., 2020). They assumed that mothers who have more than 4 children, mothers who had 4 times and above antenatal care visits, received education about colostrum feeding were predicted to have significantly better knowledge about colostrum feeding in Jeddah, Saudi Arabia (Harakeh et al., 2020) they documented that the knowledge about colostrum composition and duration had significant correlation with age and educational levels which did not coincide with our reports.

Regarding respondents' specific knowledge about colostrum formation, 58.1% of mothers affirmed that colostrum formation of colostrum happens during late pregnancy or right after the mother starts breastfeeding (47.8%). However, most of them did not affirm whether the colostrum formed in the mother's breast during the nine months of pregnancy or the late pregnancy. Concerning mother's knowledge about colostrum duration, many of them disagreed that the colostrum stays in the breast of mothers for two years (70.7%), or 1 year (73.1%), or 1 week (45.7%) or 1 day (51.5%), however, 44.4% believed that the colostrum lingers in mother's

breast for at least 3 days. Regarding knowledge about color and appearance, the majority (71.3%) believed that colostrum has a sticky yellow substance in breast milk, while 61.3% and 52.5% disagreed that colostrum is normal blood secreted in initial breast milk or it is a colorless substance that melts in breast milk. Poor understanding of colostrum formation, duration, color, and appearance could be attributed to the socio-economic factors of the sample population or related to the differences in education as well as the monthly income of the subjects (Harakeh et al., 2020).

The general awareness of mothers regarding colostrum feeding is crucial after delivery. Mothers who had better awareness were assumed to have better attitudes and practices about it. In our study, although most mothers had never participated in filling out a questionnaire related to colostrum, however, 86.9% has heard about it and were known about the benefits of colostrum to a child. Consistently, it has been reported by (Joshi et al., 2012) that 69% of the mothers knew that colostrum is nutritious milk to be fed to a newborn baby. However, in a study conducted by (Aisha et al., 2016). They have learned that despite 65% of the respondents heard about colostrum, however, 35% falsely claimed that there was something harmful about it to which they perceived that it is not good for the newborn, while only a quarter knew that this is the milk to be fed to baby and 15% indicated that this type of mother's milk should be disposed of. Misconception about the benefits of colostrum should not be discounted. Thus, extensive effort is required to improve mothers' knowledge, attitude, and practices toward colostrum feeding.

Physician counseling would provide a significant role in mothers' awareness, attitudes, and practices. In connection with this, most mothers in our study received adequate information from their attending physicians about the color and appearance of colostrum and its useful benefits to a newborn baby. However, approximately 63% of mothers disagreed that their milk in the first three days or first week was not pure, while on the other hand, most of them (86.2%) agreed that the newborn baby should be breastfed right after birth or one day after birth (45.7%). Incidentally, their practices toward breastfeeding a child right after birth were better than their perceived knowledge, as 87.5% of mothers breastfed their child with colostrum after birth, and they even planned to breastfeed their future child with colostrum (77.4%).

A similar finding was reported in Nepal (Joshi et al.,2012) accordingly, they found out that of those mothers with previous children, 80% of them fed their children with colostrum, and 89% were planning to do so with their future child, which was consistent with the reports of (Abie et al., 2019). In an opposing view, (Aisha et al., 2016) indicated that few women (9%) believed in the protective effect of colostrum on a child as well as few of them (6%) were aware that colostrum is nutritious milk for a newborn baby.

5. CONCLUSION

Although the knowledge of Saudi mothers regarding colostrum was deemed adequate, however, there is still room for improvement. Mothers who had more than 5 pregnancies who were aware of the colostrum benefits and were told to breastfeed a child with colostrum tend to be more knowledgeable about colostrum formation, duration, color, and appearance compared with the rest of the mothers. The gaps in colostrum knowledge can be addressed through continuous awareness. Such education can be of great help in raising the awareness of mothers about the importance of colostrum feeding. Hence, their commitment to practice it in every delivery is vital to achieving better nutrients in the newborn baby. Adherence to antenatal visits could be a breakout point wherein more information about the importance of colostrum feeding can be obtained through counseling given by the attending physician.

Declaration

Author's Contributions: Khalid Almahmoud**,** Abdulaziz Almousa and Lama Albalawi contributed to the design, prepared the study protocol and questionnaire. Khalid Almahmoud, Abdulaziz Almousa, Lama Albalawi, Renad Althobaiti, Abdulrahman Alothman and Rheem Almhizai contributed to the data collection, analysis and interpretation of the result. Abdulrahman Alothman, Rheem Almhizai**,** Khalid Almahmoud and Renad Althobaiti contributed to drafting of the manuscript. Abdulrahman Alothman, Rheem Almhizai and Khalid Almahmoud contributed to reviewing and editing the manuscript. The final version of the manuscript was approved by all authors.

Ethical Approval

The ethical research committee of the Institutional Review Board (IRB) of Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia, approved this study (HAPO-01-R-001, Project No. 208-2022, session no. 53). All participants in the research gave their verbal and written informed consent.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

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