

Research Article

Growth Assessment in Exclusively Breastfed Against Mixed Fed Infants in Two Hospitals of Fako Division, Southwest Region, Cameroon

Naiza Monono^{1,2*}, Verla Vincent^{1,3}, Sandra Mokom¹, Nana Njamen⁴

¹Department of Internal Medicine and Paediatrics, Faculty of Health Sciences, University of Buea, Cameroon

²Regional Hospital Limbe, Fako Division, Southwest Region, Cameroon

³Regional Hospital Buea, Fako Division, Southwest Region, Cameroon

⁴Department of Obstetrics and gynecology, Faculty of Health Sciences, University of Buea, Cameroon

*Correspondence author: Naiza Monono, Department of Internal Medicine and Paediatrics, Faculty of Health Sciences, University of Buea, Cameroon and Regional Hospital Limbe, Fako Division, Southwest Region, Cameroon; Email: docnaiza@gmail.com

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Abstract

Background: Improving breastfeeding rates around the world could save the lives of more than 820,000 children under age 5 every year, the majority (87%) being under 6 months of age. The optimal duration of exclusive breastfeeding is one of the crucial public health issues of WHO. Although breastfeeding provides many health benefits to infants, there is not enough information in our setting to support this assertion.

Objective: To determine the prevalence of exclusive breastfeeding and evaluate the growth of exclusive breastfed against mixed fed babies in two hospitals of Fako division.

Materials and Methods: A hospital-based, analytic cross-sectional study was carried out with 186 mother-infant pairs from February to April 2022. Data collection consisted of the administration of a pretested questionnaire and anthropometric measurements were taken. Nutritional status and prevalence of respiratory and gastrointestinal infections were then assessed. Bivariate and Multiple logistic regression analysis was done with p-value set at <0.05. **Results:** The prevalence of exclusive breastfeeding in our setting was 43% while the prevalence of mixed feeding was 57%. The main reasons for practicing mixed feeding were: maternal school or work resumption (43.4%) and insufficient breastmilk (34%). The most common reason for practicing exclusive breastfeeding was medical advice (70%). On multivariate analysis, having a paid job (OR: 0.44, 95 % C.I: 0.203-0.968, p= 0.04) was the only significant predictor of mixed feeding. The incidence of diarrhea was significantly more prevalent (OR: 7.583, 95% C.I: 2.527-22.753, p=0.00) in mixed fed infants compared to exclusively breastfed infants.

Conclusion: The prevalence of exclusive breastfeeding in our setting is low so there is need to improve and strengthen breastfeeding education during Antenatal visits. Our findings

highlight the importance of breastfeeding to protect against diarrhea-specific morbidity and strengthens the current WHO recommendation of exclusive breastfeeding till 6 months. These results prove the relationship between feeding method and infant morbidity and provides more data with the aim of encouraging more mothers to practice exclusive breastfeeding hence reducing infant morbidity and mortality.

Keywords: Exclusive Breastfeeding; Growth; Infant Morbidity; Limbe Regional Hospital Mixed Feeding

Introduction

Exclusive breastfeeding is the act of giving infants only breast milk and no other liquids or foods with the exception of vitamins, minerals and medicines for the first 6 months of infant's life [1]. As of 2019, the global prevalence of exclusive breastfeeding in

infants less than six months of age was 43.5% [2]. In Africa, only 37% of infants under 6 months of age were exclusively breastfed in 2017 [3]. In Cameroon, as of 2019, only 40% of babies were exclusively breastfed for six months [4]. This falls below the World Health Organization's Global Nutrition Target of 50% exclusive breastfeeding prevalence by 2025 [5]. Studies done in 2 hospitals in Kumba (South West Region Cameroon) revealed that there was a low prevalence (14%) of exclusive breast feeding [6]. Exclusive breastfeeding from birth to six months can prevent 13% of child mortality [7]. Unlike exclusive breastfeeding in the first few months of life, partial or no breastfeeding is associated with a 2.23-fold higher risk of infant deaths resulting from all causes and 2.40 and 3.94 fold higher risk of deaths attributable to pneumonia and diarrhea, respectively [8].

Breast feeding of infants as recommended by World Health Organization (WHO) has been shown to provide sufficient nutritional needs protective against foreign substances that cannot be digested or excreted [7]. Exclusive breastfeeding protects very young infants from infections such as gastrointestinal infections through passive immunity and through reduction in the intake of potentially contaminated food and water. Benefits of BF are both short term and long term [9]. Examples of long-term benefits include reducing the risk of overweight and obesity in childhood and adolescence [1]. Due to the anti-infective properties of breastmilk, breastfed babies tend to have less incidence of or less pronounced symptoms of ear infections, respiratory illness, allergies, diarrhea and vomiting. High concentration of IgA prevents micro-organisms from adhering to the intestinal mucosa. Also due to the digestibility of breastmilk, breastfed babies are rarely constipated [10]. Studies have shown that marital status, advance maternal age and household income level are determinants of EBF [11].

Infant nutritional status is associated with infant feeding method which can in turn affect infant morbidity and mortality [12]. Breastfeeding especially exclusive breastfeeding, is one of major strategies to improve infant's nutritional status and survival [13]. The WHO strongly recommends exclusive breastfeeding for the first six months of life. At six months, other foods should complement breastfeeding for up to two years or more. In addition, breastfeeding should begin within an hour of birth, it should be "on demand", as often as the child wants day and night; and bottles should be avoided [14]. Though EBF till 6 months has been recommended by WHO as the best method of infant feeding, there isn't enough data in our setting proving that babies who are exclusively breastfed are healthier than those who are mixed fed.

Hence this study to evaluate the prevalence of EBF, compare growth in exclusively breastfed against mixed fed babies at LRH and BRH and compared the frequency of GI and RI in EBF and MF infants. These results will surely identify the strengths of breastfeeding in terms of growth and reducing morbidity, thus paving the way forward to encourage, support and strengthen breastfeeding.

Methodology

This was a hospital-based analytic cross-sectional study carried out from 21st February 2022 to 29th April 2022 at the Infant Welfare Clinics (IWFC) of the Buea Regional Hospital (BRH) and Limbe Regional Hospital (LRH) of the South-west Region. The IWFC of the BHR has 2 rooms (the waiting room and the vaccination room). The unit has 4 nurses and they receive mothers and their babies for vaccination on Wednesdays and Fridays. The IWFC of the RHL has 4 rooms (the waiting room, the head of unit's office, the vaccination room and a mini lab for pregnant women). This unit has 5 nurses. They receive mothers and their babies on Mondays and Thursdays. These 2 hospitals were chosen because they are the main referral hospitals found in the most populated towns of the region.

The study included all mothers with babies at 6 months who were either exclusively breastfed or mixed fed and accepted to participate in the study, attending IWFC at the BRH and LRH during our study period. All babies born with congenital malformations and those who were born preterm were excluded from the study. A convenience sampling technique was used to obtain our data, where among the 4 hospitals in Fako division, BRH and LRH were chosen because they have a greater patient turnover so that results gotten from the study could reflect that of the whole division. Then patients were recruited in a consecutive manner at the IWFC in both hospitals. Using the prevalence of EBF (14%) from the study done by Kapso, et al., in Kumba hospitals in 2021, the sample size (n) was determined by using the Cochrane formula and we obtained a minimum sample size of 185 participants [15]. Ethical and administrative clearance was obtained from the Institutional Review Board, Faculty of Health Sciences, University of Buea (IRB-FHS, UB), followed by administrative clearance from the Regional Delegation of Public Health, Southwest Region and the Directors of the Buea Regional Hospital and Limbe Regional Hospital. The heads of the units were also informed about the study to obtain permission before collection of data.

A data collection form was pretested at Mount Mary Hospital Buea with 10% of study population (20 participants). Participants were met on the various vaccination days of each hospital and after informed consent was gotten, physical examination of the infant was performed including measuring anthropometric parameters then the pretested data collection form was used to fill all needed information from the mothers. This information included the socio-demographic data of mothers (like age, marital status, occupation etc), nutritional history of infant, factors influencing choice of feeding, feeding practices (eg sterilization of feeding bottles) frequency of infections since birth (GI and RI). With respect to the anthropometric parameters, a measuring scale was placed on the table and zeroed, a clean cloth provided by each mother was used to weigh each infant naked and the weight recorded to the nearest 0.1 kg. An infantometer was used to measure the infant's length. With the baby lying supine on the infantometer, gentle pressure was applied at the knees to straighten the legs. The baby's length was read and recorded. Participants were given codes instead of using their names for identification to ensure confidentiality. Also, the interview was done one-on-one by the main investigator at the IWFC of the hospitals with the participant. The consent form containing the names was kept separate from the data collection forms. Then data was analyzed using statistical package for social science version 26. The prevalence of EBF was calculated as the total number of babies who were exclusively breastfed divided by total number of babies recruited in our study expressed as percentage and the prevalence of MF as the total number of babies who were mixed fed divided by the total number of babies recruited in our study expressed as percentage. We defined reasons for practicing EBF and MF as explanations or justifications for practicing either EBF or MF. The data was presented as frequency distributions with proportions and percentages. We also defined predictors as independent variables which provide information on an associated dependent variable (EBF and MF in our case). After univariate analysis, we adjusted for parity, birth interval and religion at $p < 0.2$ to know the factors that will be included in the model before doing multivariate analysis. We then carried out a logistic regression analysis to study the predictors of exclusive breastfeeding. To compare basic growth parameters in EBF versus MF infants, the standard nutritional indicators used were weight-for-height (Wasting), weight-for-age (Underweight) and height-for-age (Stunting). These were expressed as standard deviations (Z-scores) from the mean of the international reference population according to WHO [16]. -2 to -3 standard deviation indicated that the children were moderately malnourished, < -3 SD indicated severely malnourished children while <2 SD and >-2 SD reflected well-nourished children, z-scores beyond 2 indicated over nutrition [17]. The data was initially presented as frequency distributions with proportions and percentages. Chi-square test was used to check relationship between growth and breastfeeding method. To compare the occurrence of RI and GI according to baby feeding methods, episodes of disease occurrence was presented as frequency distributions using proportions and percentages. Chi-square test was used to check the relationship between infant morbidity and breastfeeding method. To control for potential confounding factors, multivariate analysis was used with a p-value less than 0.05 ($P < 0.05$) with 95% CI considered as statistically significant.

Results

We recruited a total number of 230 mother-infant pair at the IWFC of both BRH and the LRH, amongst these 14 babies were born preterm, 5 mothers denied consent and 25 infants had already begun complementary feeds before 6 months. Finally, we included 80 exclusively breastfed infants and 106 mixed fed infants. Majority 104(55.9%) of mothers were between 26-30 years of age. Also, 184(98.9%) were Christians, most of them 118(63.4%) were married while 67(36.0%) were either self-employed or unemployed. The sex ratio of the infant was 1.1:1 in favor of boys and majority of them 162(87.1%) had birth weights between 2500-4000 g.

Exclusive breastfeeding up till 6 months was 43.0% while 57.0% practiced mixed feeding as seen in Fig. 1. Amongst the mothers who practiced exclusive breast feeding, 56(70.0%) of mothers reported that they were encouraged to practice exclusive breastfeeding by the hospital staff while 12(15.0%) of mothers said they were encouraged by their family members and 12(15.0%) by themselves as shown on Table 1. While among the mixed fed infants 46(43.4%) did mixed feeding due to schooling responsibilities or work resumption and 36(34.0%) taught that they produce insufficient milk for their infants. Mothers with paid jobs had a significant decrease in probability of choosing EBF compared to those who were unemployed or self-employed ($p = 0.041$, OR 0.443, C.I: 0.203-0.968) as seen on Table 2.

With respect to mix feeding, majority of mothers (30.2%) gave formula to their babies within 3-4 months, 20 (18.9%) added just water while 86 (81.1%) mothers added cowmilk to breastmilk. Majority of mothers 71(91.0%) used mineral water in preparing the milk substitutes and all participants sterilized their utensils with the majority 69(80.2%) using hot water as method of sterilization. 79(91.9%) of mothers did not give left-over formula while 7(8.1%) gave left over feeds amongst mix fed mothers.

Chi square test was used to represent the growth parameters of boys exclusively breastfed vs. mixed fed. Though there was no significant difference between exclusively breastfed and mixed fed babies, looking at W/A, 7 mixed fed infants had >3SD, looking at L/A, 8 mixed fed infants had <-3SD and looking at W/L, 7 mixed fed infants had <-3SD as shown on Table 3. Comparing the growth parameters of the girls, 6 mixed fed girls had L/A <-3SD, 4 mixed fed girls had >2SD on the W/A growth curve and 1 mixed fed girl was >3SD on the W/L, though none was statistically significant (Table 4).

Diarrhea was significantly associated with mixed feeding with the odds of having diarrhea being 7 times more in mixed fed compared to exclusive breastfed babies (OR; 7.583, 95% C.I: 2.527-22.753, p-value 0.000) (Table 5). There was no significant association between method of feeding and acute respiratory infection. (Table 6).

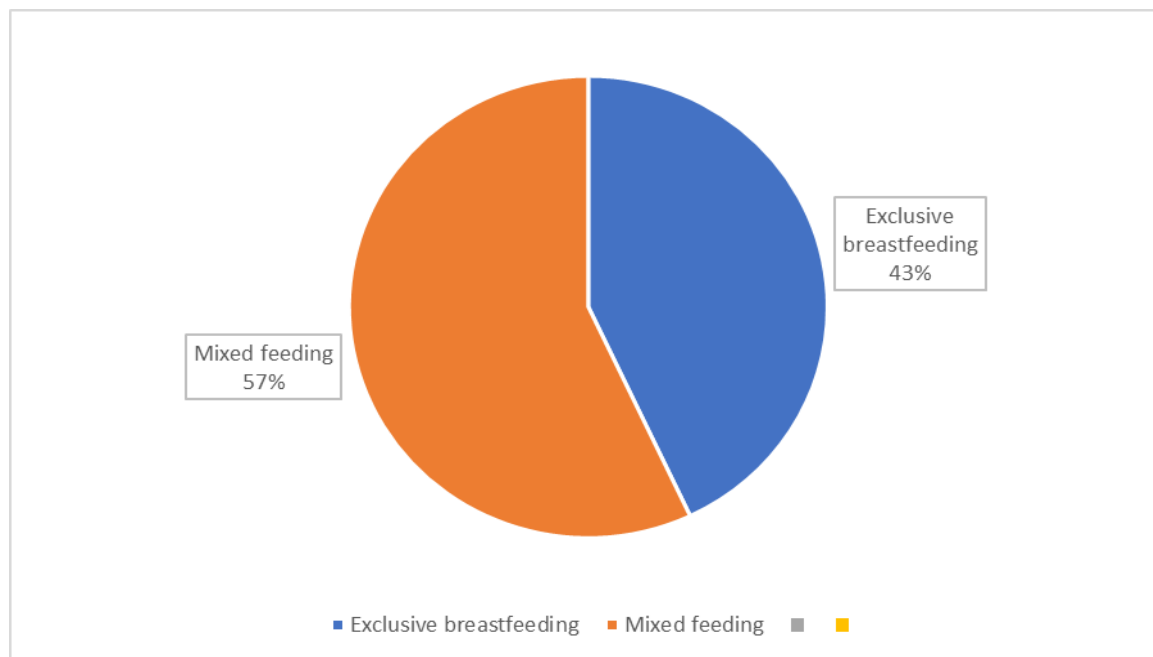


Figure 1: Prevalence of mixed and exclusive breastfeeding of infants attending IWFC at the BHR and LRH at 6 months of age.

Who encouraged you to do EBF (n=80)	Frequency (N)	Percentage (%)
Hospital	56	70
Family	12	15
Friends	0	0
Self	12	15
Total	80	100

Table 1: Sources of encouragement to practice exclusive breastfeeding.

Variable	Sig	OR	95% C.I.	
			Lower	Upper
Age	0.203	0.961	0.904	1.022
Marital status- single	0.225	0.667	0.347	1.283
Occupation- paid job	0.041	0.443	0.203	0.968
Household monthly income (<50000)	0.462	1.491	0.514	4.323
Household monthly income (50000- 100000)	0.132	2.003	0.811	4.95

Table 2: Predictors of exclusive breastfeeding.

	EBF (n=80)		MF (n=106)		
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	p-value
W/L					0.289
Severe wasting (<-3SD)	0	0	7	12.5	
Moderate wasting (<-2SD)	1	2.5	4	7.1	
Normal (>-2SD)	35	87.5	37	66.1	
Overweight (> 2SD)	2	5	8	14.3	
Obese (> 3SD)	2	5	0	0	
Total	40	100	56	100	
L/A					0.192
Severe stunting (<-3SD)	0	0	8	14.3	
Moderate stunting (<-2SD)	7	17.5	11	19.6	
Normal (>-2SD)	33	82.5	37	66.1	
Total	40	100	56	100	
W/A					0.118
Severely underweight (<-3SD)	0	0	0	0	
Moderately underweight (<-2SD)	0	0	2	3.6	
Normal (>-2SD)	40	100	45	80.3	
Overweight (> 2SD)	0	0	2	3.6	
Obese (> 3SD)	0	0	7	12.5	
Total	40	100	56	100	

Table 3: Comparing growth parameters in exclusively breastfed versus mixed fed boy infants.

	EBF (n=80)		MF (n=106)		
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	p-value
W/L					0.125
Severe wasting (<-3SD)	2	4.2	2	4.8	
Moderate wasting (<-2SD)	2	4.2	5	11.9	
Normal (>-2SD)	39	81.3	30	71.4	
Overweight (> 2SD)	5	10.3	4	9.5	
Obese (> 3SD)	0	0	1	2.4	
Total	48	100	42	100	
L/A					0.245
Severe stunting (<-3SD)	1	2.1	6	14.2	
Moderate stunting (<-2SD)	7	14.6	36	85.7	
Normal (>-2SD)	40	83.3	0	0	
Total	48	100	42	100	
W/A					0.367
Severely underweight (<-3SD)	0	0	0	0	
Moderately underweight (<-2SD)	1	2.1	2	4.8	
Normal (>-2SD)	47	97.9	36	85.7	
Overweight (> 2SD)	0	0	4	9.5	
Obese (> 3SD)	0	0	0	0	
Total	48	100	42	100	

Table 4: Comparing growth parameters in exclusively breastfed versus mixed fed girls infants.

		EBF (n=80)	MF (n=106)		95% C. I		
	Category	Frequency (N)/ Percentage (%)	Frequency (N)/ percentage (%)	Odds Ratio	Lower	Upper	p- value
Diarrhea	YES	4 (5)	26 (24.5)	7.583	2.527	22.753	0.000
	NO	74 (95)	80 (75.5)	Ref			
	TOTAL	80 (100)	106 (100)				

Table 5: Relationship between feeding method and diarrhea.

	EBF (n=88)	MF (n=98)			95% C.I.	
	Frequency (N)/ Percentage (%)	Frequency (N)/ Percentage (%)	p-value	Odds ratio	Lower	Upper
ARI						
Catarrh	24(12.9)	37(19.9)	0.128	0.618	0.332	1.152
Cough	25(13.4)	33(17.7)	0.439	0.782	0.419	1.46
Difficulty in breathing	0(0)	2(1.1)	0.178	0.980	0.952	1.008

Table 6: Relationship between feeding method and acute respiratory infection.

Discussion

This study showed that the prevalence of EBF at 6 months was 43% which is far below the recommended target of 90% of women exclusively breastfeeding their infants in the first 6 months of life, which is associated with a reduction of 10% of under-five deaths [18]. This was higher than that of the 2018 Demographic Health Surveys (DHS) in Cameroon which showed that 40% of children under six months were exclusively breastfed in Cameroon [19]. It was also higher than the rate (20%) recorded by Kaptso, et al., in neighbouring Kumba in 2021 who reported that the low prevalence could be because the caregivers at Kumba district Hospital were not fully convinced on the nutritional quality of breastmilk [6]. Our results were higher than 25.4% in Madrid [20] and 37.7% in India [9]. This could be explained by the difference in study designs and population. The results were however similar to 45.2% recorded by study done on determinants of exclusive breastfeeding by Tambe, et al., in Yaounde, Cameroon [11]. Though there were some similarities with rates of Ayisi, et al., in Kenya (45.5%) and 42.8% in Uganda, the rate was lower as compared to Tewabe, et al., in 2015 (50.1%), 86.4% gotten by Seid, et al., in 2017 [21-24] both in Ethiopia and prevalence rate in Nigeria that had 85% of infants who were exclusively breastfed up till 6 months [25]. This high rate reflects the positive impact of the Baby Friendly Hospital Initiative (BFHI) programme coupled with the nutrition education given to mothers during their antenatal clinic days.

A great proportion of participants in our study introduced mixed feeding within 3-4 months. This age of introduction of mixed feeding was similar to a study done by Chiabi, et al., in Yaounde [26]. The similarity in the two studies corresponds to the end of maternity break of the working class in our country.

The main reason mothers in our study gave for not exclusively breastfeeding their babies for 6 months was maternal school load or work resumption (43.4%). This was similar to findings of previous studies in Cameroon and other parts of the world like Pakistan whose findings revealed maternal work resumption as the main reason why mothers did not practice EBF [26,27]. Majority (70%) of mothers practiced exclusively breastfeeding because of medical advice. This could be explained by the health talks given to women on the benefits of breastfeeding during their antenatal care hospital visits after delivery and during vaccination visits. Similar results were obtained by Chiabi, et al., in 2014 who found out that medical advice (49.3%) and concern for the child's health (42.5%) were the two main reasons for practicing exclusive breast-feeding for the first six months of life.

There was no significant association between maternal age and exclusive breastfeeding. Our findings were similar to those of Kandeel, et al., in Egypt [28]. Those with paid jobs had a significant lower probability of doing EBF compared to the unemployed or self-employed and so easily stopped exclusive breastfeeding earlier. An employed mother may tend not to breastfeed her baby exclusively for many reasons such as: short period of maternity leave (which is 3 months in our setting), lack of time, distance of her workplace from home, lack of private space for breastfeeding or expressing milk at the workplace and inflexible work schedule. Women who are unable to take an extended leave from work following the birth of their child are less likely to

continue breastfeeding when they return to work. Employment of any form can affect EBF negatively. Work of any form outside the home can complicate plans to breastfeed. Some women can juggle both a job and breastfeeding, but others find it too difficult and decide to formula-feed instead. These findings were similar to those of previous studies in Nigeria and Ethiopia [25,29].

There was no significant association between low income and EBF which was contrary to findings from Ethiopia who explained that mothers who earn less money have no other option than to do exclusive breastfeeding as breastmilk is readily available and affordable and they have no money to buy other food for the baby [23].

In this study, married women practiced exclusive breastfeeding more than singles. This might be because a husband plays a major role in the decision making about family and household issues including infant feeding practices. Single mothers as heads of households might have less family support. Without this support, activities outside the home such as having a job might hinder EBF. However, this association was not significant contrary to results in Ethiopia and Ghana [29,30]. Our study did not show any significant association between higher level of education and EBF which is similar to findings of Chiabi, et al., in Yaounde [26]. This could be because most of the mothers with higher level of education were working class women who did not have time to practice EBF. Contrarily, previous studies done in India [9] showed a positive relationship between higher level of education and EBF. This can be explained by the fact that mothers with higher level of education have a better knowledge of the importance of breastmilk.

Looking at the Z scores weight for age in both boys and girls, a greater proportion of infants mixed fed were obese compared to infants exclusively breastfed. Also, the length for age Z scores showed that more mixed fed babies were stunted. The comparison between the two groups did not yield statistically significant differences in all the parameters. The explanation could be due to the differences in frequency and quantity of feeds in both groups which could greatly impact nutritional status. However, the observed trends were worth mentioning. Though, there were 2 obese boys on breastmilk, this is to show that breastmilk has a better growth benefit on infants.

These findings were similar to the findings in Kenya by Ayisi, et al., in 2014 who showed that there was no significant association between EBF and wasting or underweight [21]. However, his study showed that there was rather a significant association with stunting ($p=0.047$). This difference could be due to difference in study population in which his study was community based with 10 villages as compared to our study which was hospital based. Another study in Nigeria also demonstrated a significant association where a significantly higher prevalence of severe stunting (16.6 %) was observed in infant's non-EBF versus 7.3 % in infants EBF [31]. 0.8 % of infants EBF were severely underweight while 1.1 % non-EBF were severely underweight.

Worldwide, these findings were similar with results in Pakistan but different from findings in India where it was seen that the infants who were exclusively breastfed were having normal weight for age compared to those who were not on exclusive breast feed [9,27].

In looking at the relationship between the type of feeding and specific morbidities, our study showed that, mixed fed infants had a significant higher risk of having diarrhea 7 times more compared to exclusively breastfed infants. (OR; 7.583, 95% C.I: 2.527-22.753, p -value 0.000). EBF protects infants from diarrheal diseases in two ways: firstly, breast milk contains immune antimicrobial factors; secondly, exclusive breastfeeding decreases the intake of potentially contaminated food and water. Even though the mothers in our study reported that they practiced good feeding hygiene, mixed feeding deprives the infant of the natural immunity that breast milk gives hence increases risk of diarrhea. Also, the good feeding hygiene reported by the mothers was relative. This significant association with diarrhea was also observed by Diallo, et al., in Conakry but was contrary to findings in Kenya [12,21].

Our study did not show any significant association between ARI (common cold, flu, otitis media) contrary to previous studies in Guinea and India [9,12]. The similarities in the occurrence of these respiratory symptoms in both groups could be due to common viral infections and not bacterial infections. However, it is worth noting that the proportion of infants with ARI was greater in mixed fed babies than exclusively breastfed babies.

Conclusion

Our findings revealed, the prevalence of EBF in our setting is 43% which is below the global target. Maternal school or work resumption are the main reasons mothers gave for not practicing exclusive breastfeeding up to 6 months and having a paid job was the only negative significant predictor of EBF. There were no significant association between the growth status of exclusively breast fed and mixed fed infants, though growth parameters were better in exclusively breastfed infants. The incidence of diarrhea was significantly more prevalent in mixed fed infants compared to exclusively breastfed infants. However, there was no significant association between mixed feeding and acute respiratory infection.

Conflict of Interest

The author has no conflict of interest to declare.

Financial Disclosers

The authors have no financial relationships relevant to this article to disclose.

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