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COMPARATIVE STUDY OF EXCLUSIVE BREASTFEEDING AND MIXED BREASTFEEDING IN INFANTS AGED 0 TO 6 MOMTHS ADMITTED TO THE COTONOU / BENIN CHU-MEL

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ABSTRACT

The objective of this study is to compare the impact of exclusive breastfeeding and mixed breastfeeding on the nutritional and growth status of infants aged 0 to 6 months admitted to the CHU-MEL of Cotonou/Benin. Thus, we conducted a descriptive study among 30 breastfeeding mothers and took a sample of seventeen (17) infants aged 0 to 6 months. Anthropometric measurements and analyses of biochemical parameters were used to compare exclusive breastfeeding (AME) and mixed breastfeeding (Amixte). The results showed that the choice of breastfeeding type was not significantly influenced by the educational level of the mothers and their professions. Regarding the impact of the type of breastfeeding (AME and Amixte) on the general growth and nutritional status of the children, the analysis of anthropometric parameters did not reveal any significant differences between the two types of breastfeeding. In both cases, the children showed good growth and a satisfactory apparent nutritional status. The analysis of biochemical parameters revealed some metabolic dysfunctions in urea and total protein in both types of breastfeeding. However, the difference between the two types of breastfeeding is not significant, it should be noted that the dysfunctions are more important in the case of Amixte.

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INTRODUCTION

Men, regardless of their age group, need a balanced meal every day to maintain good health. The infant who is living his first days also needs a healthy diet that not only provides him with nutrients but also a means to fight against the various infections of his young organism: breastfeeding (Dakpo et al, 2013). While breastfeeding is widely desired and adopted by mothers all over the world, the success of breastfeeding depends on several factors. The available studies sound a real alarm bell in the face of the observed decline in the practice of breastfeeding (Slama, 2010). According to WHO (2003) the term breastfeeding is reserved for the feeding of the newborn or infant with the milk of its mother. The WHO has recommended, since May 2001, exclusive breastfeeding during the first six months of the baby's life and the continuation of this breastfeeding until the age of 2 years, or even more depending on the mother's wishes. Since milk is a child's first food, its quality has always been and remains to this day a problem. When the child comes into the world, the most appropriate food is breast milk, but for various reasons, socalled "mixed" breastfeeding is carried out, that is to say the use of another breast milk. more than that from its mother (Keita et al, 2004). According to WHO 2003, continued exclusive breastfeeding for six months promotes optimal development of infants and should be encouraged. Introducing complementary feeding between four and six months does not provide any particular benefit. Indeed, the role of exclusive breastfeeding in the prevention of infections, allergies and chronic diseases as well as in favorable cognitive development has been highlighted in recent scientific literature (Bouanene et al, 2008). Globally, only 38% of infants 0-6 months of age are exclusively breastfed, yet in several industrialized countries, breastfeeding practice has resumed. In other countries, a real wake-up call is being sounded in the face of the observed decline in breastfeeding practice (Nadia, 2018). In Benin, the situation is also deteriorating, as shown by the available studies. According to UNICEF (2015), alone, four in 10 infants are exclusively breastfed for up to six months and five in 10 babies born alive are latched within an hour of birth. However, breastfeeding in the first hour of life helps strengthen the immunity of the newborn (UNICEF / BENIN, 2015). Nutritionists and physicians around the world play a key role in breastfeeding advocacy and interact with mothers and children throughout their working lives. In order to recommend breastfeeding, to inform

families about breastfeeding, and to ensure a diet for nursing mothers, these nutritionists and doctors must also be informed and have skills on the management of breastfeeding, prevention of breastfeeding. problems, their nutritional quality and their treatment. The lack of training and preparation for the support and follow-up of breastfeeding mothers has been well documented in the medical literature. In view of these findings, this work will propose to carry out a comparative study of exclusive breastfeeding and mixed breastfeeding in children aged 0 to 6 months admitted to the Cotonou / Benin CHU-MEL.

General Information about the two types of breastfeeding:

General Information on Exclusive breastfeeding: Exclusive breastfeeding assumes that the infant absorbs only breast milk. He does not receive any other liquid or solid food, not even water, except oral rehydration solutions, or drops / syrups of vitamins, minerals or drugs according to WHO (2003).

General information on exclusive breastfeeding: Breast milk is the ideal food for infants during the first months of life. Its advantages are considerable:

For the infant Nutritional aspect: Human milk is undoubtedly the best food for the newborn. Its variable nutritional composition makes it possible to adapt to the needs of the baby and the bioavailability of the nutrients in this milk is also very high. Colostrum facilitates the excretion of meconium, and the establishment of the bifidus flora; the latter protects the baby against the proliferation of pathogenic germs. The bioavailability of certain elements (example: iron, calcium, zinc) is higher in human milk (Picciano, 2000). The optimum quantity and quality of proteins (casein / albumin ratio), the presence of alpha lactalbumin, as well as that of certain amino acids (cysteine, taurine) are particularly suitable for the baby's needs. The proteins in human milk are well digested and absorbed. The composition and configuration of fatty acids aid digestion and absorption of fluids. A lower electrolyte content and a lower osmotic load can meet the water needs of the child. The change in consistency of milk during breastfeeding is believed to be a mechanism for controlling appetite. The baby's stools have a soft consistency even if they do not come off for a few days. This characteristic can be explained by the lactose content of milk.

Immunological aspect: certain immunological (lactoferrin, lysozymes), cellular (macrophages, lymphocytes, neutrophils) and biological factors (lactose content, acid residue of milk in the large intestine, etc.) offer anti-infectious and anti-allergic protection to the child. We note the presence of essential fatty acids. The entire production chain for lipids essential for brain development is represented. The action of oligosaccharides, present in the sugars of breast milk, helps to enrich the intestinal flora of the newborn. One hundred and thirty oligosaccharides have been identified in breast milk while that of most mammals, including cows, is almost devoid of them (Keita et al 2005). There is also a faster and more complete absorption of minerals, especially iron and zinc, by the baby's body.

Physiological aspect: mother-child contact during breastfeeding promotes maximum sensory stimulation from a visual (child-gaze), tactile, auditory, taste and olfactory (mother's milk) point of view. Breastfeeding mothers are likely to cuddle, rock, touch, and sleep with their babies. This proximity also makes it possible to better observe the reactions of the baby.

For Mother:

- ✓ Breastfeeding, in addition to the many benefits it brings to children, has many benefits for mothers.
- ✓ Breastfeeding reduces the risk of bleeding after childbirth; it helps a mother lose weight more quickly, lowers her chances of having anemia (by delaying the return of her period) and it reduces the need for insulin in women with diabetes. In the long term, it also lowers the risk of developing osteoporosis, breast, ovarian or uterine cancer. Finally, it acts on the hormonal level and lowers the mother's stress level. Breast milk is ready to use, the temperature is normal, the quantity sufficient, the mother does not have to do anything except cleaning the breasts; she does not waste her energy and can breastfeed in all positions (Nathalie, 2017).

Benefits for the community

- ❖ Apart from the medical benefits for the health of the mother and the child, the family and the society realize a consequent saving on:
- ❖ -the direct cost of purchasing infant milk, mineral water and bottles;
- ❖ -the cost of maintaining baby bottles (washing and sterilization);
- ❖ -Medical costs as a result of infectious diseases "preventable" by breastfeeding;
- ❖ -the cost of maternal contraception for the first 6 months;
- ❖ -Helps develop the child's ability to love, which reduces the risk of crime and violence in adults (Sobgui, 2015)

The disadvantages of exclusive breastfeeding: Apart from the many benefits of exclusive breastfeeding, the latter has some rare disadvantages, namely the fairly common leaks of milk, the surges can be unpleasant not to mention the bites. In addition, mastitis (inflammation of the breasts which is sometimes accompanied by infection) or breast abscesses that occur require medical attention.

General information on mixed breastfeeding

- ❖ Mixed breastfeeding involves combining breast milk with any other food, usually formula. This practice is popular with many mothers around the world. Several causes can explain this.
- ❖ Indeed, mixed breastfeeding is practiced most often in case of unavailability of mothers due mostly to professional reasons (business, employment, etc.) and certain prejudices about the deformation of the breasts by breastfeeding (aesthetics). Also unavailability due to certain pathologies.
- ❖ Mixed breastfeeding for a variety of reasons has its advantages as well as its disadvantages.

Benefits of mixed breastfeeding: Artificial milk is a food supplement provided to any infant in order to overcome the multiple deficiencies that may arise. However, it may be recommended by a doctor to address the poor health of the infant. In any case, mixed breastfeeding is beneficial for the mother who is often busy with professional obligations. A mother's absence can be made up by bottle-feeding. Another benefit that comes from this is the involvement of the dad in bottle feeding which will strengthen the bond with his baby, thus helping the mom.

Disadvantages of a mixed diet: In mixed breastfeeding, the baby can quickly develop a preference for the bottle, which has a noticeable flow rate and is faster than the breast. Formula does not have the same nutritional value as breast milk and it can cause many illnesses like diarrhea, constipation and the baby does not get the same protection that breast milk provides. For mothers, mixed breastfeeding becomes too cumbersome when traveling (less practical) with the bottle accessories. The less the baby comes to the breast, the slow rate of milk excretion. This practice is more work, because in addition to breastfeeding, you now have to prepare milk, bottle-feed and clean the bottles. It can also increase the risk of passing diseases such as AIDS to the infant if the mother is a carrier. Economically, mixed breastfeeding increases colossal expenses: water, electricity, gas, infant milk, etc.

MATERIALS AND METHODS

Study setting and working conditions: The present study was conducted at the Centre HospitalierUniversitaire de la Mère et de

l'Enfant (CNHU-MEL) in Cotonou for the data collection phase followed by the analysis at the Laboratoire de Biomembranes et Signalisationcellulaire (LBSC) of the Faculté de Sciences et Techniques de l'Universitéd'AbomeyCalavi (FAST/UAC) This is a descriptive study, which compares exclusive breastfeeding with mixed breastfeeding in children aged 0 to 6 months. The study was conducted from August 11 to November 27, 2020. The study population consisted of healthy patients aged 0 to 6 months admitted to the Pediatric Service of the CHU-MEL for systematic controls. The present study took into account all mothers who voluntarily agreed to be part of this experiment. Indeed, they are free of HIV nor of diseases responsible for chronic inflammation nor under immunosuppressive treatment but having opted for exclusive or mixed breastfeeding. Women who gave birth to stillborn or premature babies and newborns transferred to neonatology were excluded. Also noteworthy is the refusal of some women to participate in the study (especially those who gave birth by cesarean section and those accompanying babies whose mothers died at birth). For this study, a sample of seventeen (17) infants aged 0-6 months was selected. The choice of this number can be explained by the availability of different mothers who responded favorably to the study and also the number that can be statistically significant. The data collected concerned the blood samples of infants admitted to the CHU-MEL and meeting the inclusion criteria and having been breastfed exclusively or mixed, The different variables in the study were:

- Age, gender, weight, height, head circumference,
- Biological examinations: dyslipidemia, Glycemia, Alanine aminotransferase (ALAT/GPT), Aspartate aminotransferase (ASAT/GOT), uremia, and proteinemia.

MATERIALS

Several materials were used in this study. We can mention among others the biological and laboratory materials.

Biological material: The biological material used for this study was venous blood collected from babies admitted to the CHU-MEL who were exclusively breastfed and those who were mixed breastfeeding.

Laboratory equipment: The laboratory equipment and consumables used in this study were the usual laboratory equipment and reagents for the determination of biochemical parameters (Glucose, Triglycerides, Total proteins, ALAT, ASAT and Urea) of the BIOLABO brand.

Data analysis: The data collected on the samples during the survey were analyzed and processed using Excel 2019 and Epi-info 7,2,6 specific spreadsheets, T and Chi2 tests were performed and with a significance threshold of 5%.

RESULTS AND DISCUSSION

RESULTS

Socio-demographic aspects: Table I presents the distribution according to the type of breastfeeding of children aged 0 to 6 months admitted to the CHU-MEL of Cotonou. From this table, it appears that mothers practicing exclusive breastfeeding are in the majority, i.e. 58.82%. The average age of children aged 0 to 6 months admitted to the CHUMEL in Cotonou and who participated in our study was 2.41 ± 1.16 months, with extremes of 1 month and 5 months, Table II presents the distribution according to age and type of breastfeeding of children aged 0 to 6 months admitted to the CHU-MEL of Cotonou. It appears from this table that the age group of 3 to 6 months following a mixed breastfeeding regime is the most represented, i.e. 57.14%. Table III presents the distribution according to sex and type of breastfeeding of infants aged 0 to 6 months admitted to the CHU-MEL of Cotonou. Analysis of the table shows that among children following an exclusive breastfeeding regime, girls are more represented (60%), while among children following a mixed breastfeeding regime, boys are more represented (57.14%). Table IV presents the distribution according to head circumference and type of breastfeeding of children aged 0 to 6 months admitted to the CHU-MEL of Cotonou. The analysis of the table shows that only the children following a mixed breastfeeding regime have microcephaly or macrocephaly, i.e. 14% respectively, which explains why these children have a delay in the growth of their head. Table V presents the distribution according to weight, height and type of breastfeeding of children aged 0 to 6 months admitted to the CHU-MEL in Cotonou.

Table I: Distribution according to the type of breastfeeding of children aged 0-6 months admitted to the MEL-CHU in Cotonou

Type of breastfeeding	Workforce	Percentage (%)
Exclusive	10	58,82
Mixed	07	41,18
TOTAL	17	100,00

Table II: Distribution according to age and type of breastfeeding of children aged 0 to 6 months admitted to the MEL-CHU in Cotonou

Cranial perimet er	Exclusive breasfeeding		Mixtedbreasfeeding	
	Worceforce	Percentage (%)	Workforce	Percentage (%)
Microcephaly	00	00,00	01	14,29
Macrocephaly	00	00,00	01	14,29
Normal Cranial perimet er	10	100,00	05	71,43
TOTAL	10	100,00	07	100,00

Girls were the most represented (52.94%) with a sex ratio of 0.88.

Table III. Distribution of infants aged 0-6 months by sex and type of breastfeeding

Sex	Exclusive breasfeeding		Mixtedbreasfeeding	
	Workforce	Percentage (%)	Workforce	Percentage (%)
Male	04	40,00	04	57,14
Female	06	60,00	03	42,86
TOTAL	10	100,00	07	100,00

Table IV. Distribution according to head circumference and type of breastfeeding of children aged 0 to 6 months admitted to the MEL-CHU in Cotonou

Cranial perimeter	Exclusive breasfeeding		Mixtedbreasfeeding	
	Worceforce	Percentage (%)	Workforce	Percentage (%)
Microcephaly	00	00,00	01	14,29
Macrocephaly	00	00,00	01	14,29
Normal Cranial perimeter	10	100,00	05	71,43
TOTAL	10	100,00	07	100,00

Table V. Distribution according to biochemical parameters and type of breastfeeding of children aged 0 to 6 months admitted to the CHU-MEL in Cotonou

Table VI. Distribution of mothers by education level and breastfeeding mode

Breastfeeding mode	Exclusive breasfeeding		Mixed breasfeeding		TOTAL	
Level education	Workforce	%	Workforce	%	Workforce	%
None	0	0	1	14,25	1	14,25
Primary	2	20	0	0	0	
Secondary	4	40	2	28,5	6	68,5
Higher	4	40	4	57,25	8	97,25
Literate	0	0	0	0	0	0
TOTAL	10	100	7	0	17	100

Table VI. Distribution of mothers by occupation for each type of breastfeeding

Occupation	Exclusive breasfeeding		Mixed breasfeeding	
	Workforce	%	Workforce	%
Civil servant	4	40	0	0
Housewife	0	0	1	14
Pupil - Student	0	0	2	29
Business woman	5	50	3	43
Other	1	10	1	14
TOTAL	10	100	7	100

The function of the mothers is very important in the choice of the type of breastfeeding. Physical availability will allow for the adoption of a particular type of breastfeeding. The table above presents the distribution of mothers according to their activities for each type of breastfeeding. The analysis of the table reveals that the majority of mothers are traders, with 5 individuals, i.e. 50%, who practice exclusive breastfeeding, while those who have other occupations, i.e. civil servants, pupils and students, practice mixed breastfeeding with 43%.

Paramètresbiochimiques

Glycémie

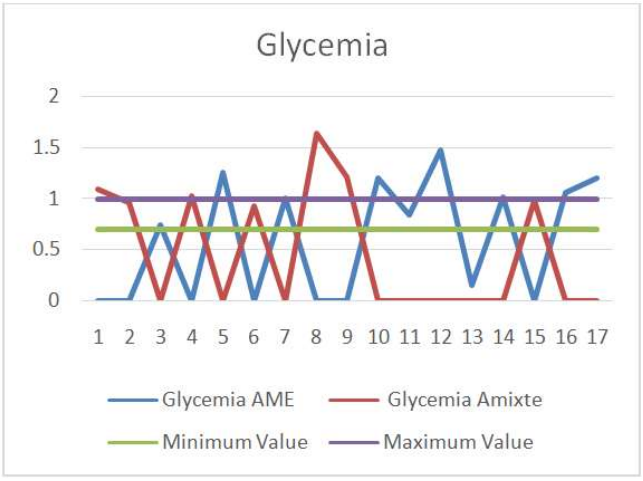

Figure 1. Glucose concentration

1: Sample 1; 2: Sample 2; 3: Sample 3; 4: Sample 4; 5: Sample 5; 6: Sample 6; 7: Sample 7; 8: Sample 8; 9: Sample 7; 10: Sample10.

We have a total of ten infants aged 0 to 6 months following exclusive breastfeeding and seven (7) following mixed breastfeeding. Figure 1 shows the concentration curves of AME and Amixte of the glucose assay. Analysis of the figure reveals that the concentration curves have a sinusoidal movement with a peak of 1.5 for the AME concentration and 1.6 for the mixed A concentration. Both of these observed peaks are above the minimum value.

This reflects hyperglycemia. On the other hand, a drop in Exclusive breasfeeding concentration of up to 0.15 is observed, indicating hypoglycemia.

Triglycerides

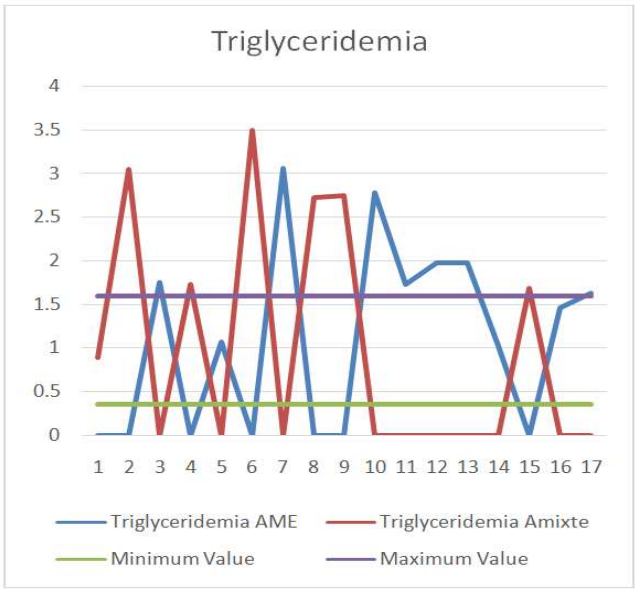

Figure 2. Triglyceride concentration

1: Sample 1; 2: Sample 2; 3: Sample 3; 4: Sample 4; 5: Sample 5; 6: Sample 6; 7: Sample 7; 8: Sample 8; 9: Sample 7; 10: Sample10.

We have a total of ten infants aged 0 to 6 months following exclusive breastfeeding and seven (7) following mixed breastfeeding. Figure 2 shows the concentration curves of Exclusive breasfeedingand mixed A of the triglyceride assay. Analysis of Figure 3 shows that the mixed A concentration curve has a peak of 2.72 while the Exclusive breasfeeding concentration curve has a peak of 1.73.

Both peaks are higher than the maximum value of 1.6. This indicates a hypertriglyceridemia. On the other hand, we note a drop in the Exclusive breasfeeding concentration with a value of 1.03 but higher than the minimum value.

ASAT

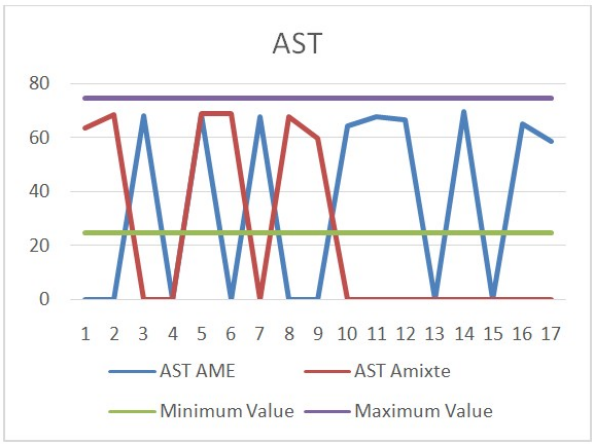

Figure 3. ASAT concentration

Figure 3 shows the concentration curves of Exclusive breasfeeding and mixed A of ASAT assay. Figure 3 shows that the values of both concentrations are below the maximum value with 65.43 and 69.10 respectively the concentration values of Exclusive breasfeeding and mixed A. In addition the fall is observed in the concentrations until reaching a value of 7 which is above the minimum value.

ALAT

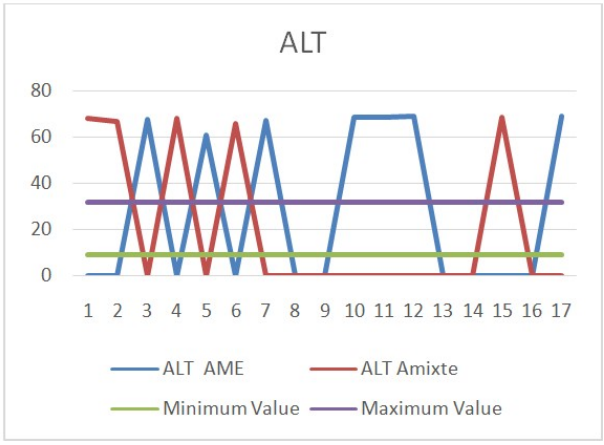

Figure 4. ALT concentration

Figure 4 shows the concentration curves of Exclusive breasfeeding and mixed A from the ALAT assay. Figure 4 shows that the AME and mixed A concentrations have a respective peak of 69.31 and 68.49 and are well above the normal value (32). This reflects a high level of ALAT.Urée

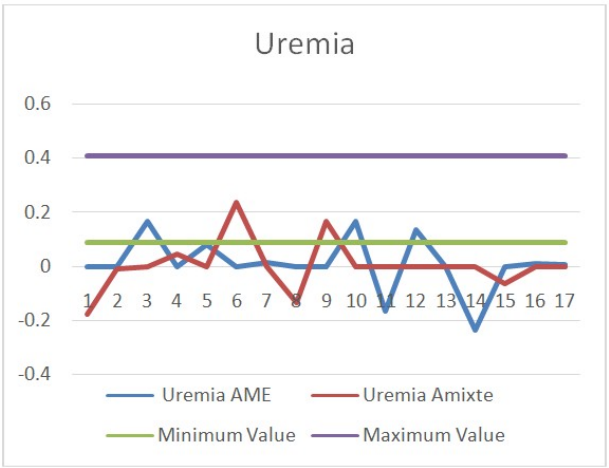

Figure 5. Urea Concentration

Figure 5 above shows the concentration curves of Exclusive breasfeeding and mixed A from the Urea assay. Analysis of Figure 5 reveals that both concentrations peak at the 0.63 level which is above the standard. There is also a drop in both concentrations to the 0 point which is below the standard.

Total Protein

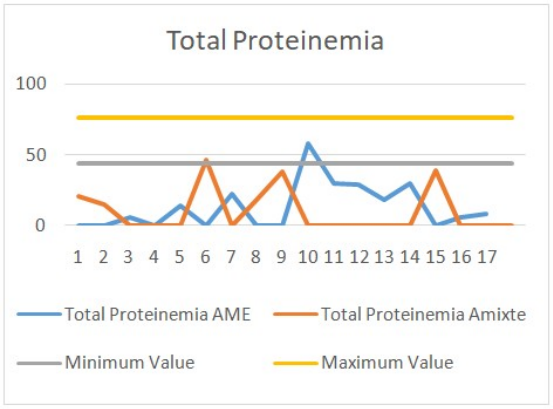

Figure 6. Total protein concentration

Figure 6 shows the concentration curves of Exclusive breasfeeding and Amixte from the protein assay. The analysis of the figure reveals that both concentrations show a drop at the 0.20 and 5.66 level which is below the standard.

DISCUSSION

Our work involved 30 breastfeeding women but we only collected 17 infants, coming to consult at the Cotonou Mother and Child University Hospital Center. Our study aims to compare exclusive breastfeeding and mixed breastfeeding in order to show the place of breast milk in infant feeding, to assess the nutritional status and growth status of exclusively breastfed infants and infants following a mixed breastfeeding diet with respect to breast milk and formula, respectively, and then check the impact of breastfeeding on the biochemical parameters. As we know, breast milk should have an important place in the diet of the newborn baby. Regarding the method of breastfeeding, 58.8% of the children concerned by our study are breastfed exclusively with breast milk, compared with 41.2% with which another food is associated with the milk given by the mother. This distribution is in contradiction with the indexmundi report (CIA World Factbook, 2019) of the distribution by sex of births in Benin, which gives a masculinity index of for age groups from 0 to 5 years of 1.5 men for a woman. . This difference could be explained by the small size of our sample which may not be representative of the general population. It should especially be noted that it is the traders who practice for the most part exclusive breastfeeding while those who have ad hoc occupations such as civil servants, pupils and students practice mixed breastfeeding.

The study found that the frequency of Exclusive breasfeeding up to six months was 58.82%. This result is consistent with that of DIALLO (2004) which is 57% and close to that of DAKPO which is (52,%) in 2013 in Benin. However, this rate is different from those obtained 38.8% by MARIKO (2009), (41.5%) by Slama in 2010 who worked on “Exclusive breastfeeding and mixed breastfeeding: knowledge, attitudes and practices of first-time mothers”. This exclusive breastfeeding rate could be explained by the importance Beninese women place on the benefits of breast milk, its nutritional value and its protection against disease. The results obtained during the surveys showed that 41.18% of infants following a mixed breastfeeding diet are in the same proportions (43%) by DIALLO (2004) in MALI but lower than the results obtained by Slama (2010) on exclusive breastfeeding and mixed breastfeeding in Tunisia (58.5%). This could be explained by the indisposition of female civil servants, students and pupils. At the end of our study, we received

40% of the male children against 60% of the female sex following the exclusive breastfeeding regime and 57% of the male sex against 43% of the female sex of the children with which it is associated another. milk-fed food given by the mother. This also denotes the configuration of the girl-boy ratio of the population of our study, the girls being more numerous than the boys. In the representation we made as part of our study, the most represented age group is 0 to 3 months with a rate of 80% of children following an exclusive breastfeeding regime and 85% for mixed breastfeeding. This is explained by the fact that the children we had to follow in our study were in their first three months and they are in a normal growth state.
The distribution according to head circumference and type of breastfeeding of children aged 0 to 6 months admitted to the Cotonou CHU-MEL shows that only 14% of children following a mixed breastfeeding regime have microencephaly or macroencephaly; this shows growth retardation in some children on a mixed breastfeeding regimen.

Our main results showed that about 20% of the women with a low level of education (illiterate or primary education, housewife and graphic designers) included in our study do not practice exclusive breastfeeding. These factors are very important in making decisions about adopting any behavior. Indeed, the high level of education is a factor regularly associated with a prolonged duration of breastfeeding (Dubois, 2003). Analyzes of selected biochemical parameters in infants aged 0-6 months allowed us to compare the nutritional status of infants on an exclusive breastfeeding regiment and on a mixed breastfeeding regiment. The level of glucose released by the liver of babies in this study was not significant in both types of breastfeeding ($p = 0.92$), because we did a post-meal sample. We can say that out of six (6) parameters analyzed, the mean value of each biochemical parameter of children following a mixed breastfeeding diet is not within the reference intervals, that none of these results were not significant at namely triglycerides, ASAT, ALT, protein, glycose and urea. For transaminases, the probabilities are not significant in the two types of breastfeeding ($P = 0.38 > P = 0.05$), this could be explained by the fact that there is no abnormal release of these two enzymes by liver and muscle cells so no food poisoning in infants aged 0 to 6 months.

Hypoproteinemia results in nutritional diseases such as marasmus and kwashiorkor and in case of hyperproteinemia we expect cases of kidney disease and myocardial infarction but in our study the level of proteinemia is not significant ($P = 0.79$). Urea comes from the destruction of proteins. Its excretion is mainly by the kidneys and its rate reflects the overall functioning of the kidneys (DAVOGOMSOU et al, 2019). There is a decrease and increase in urea level in infants, so we can state that some factors such as protein-energy malnutrition and liver dysfunction can decrease uremia (Lagrange, 2010), but in newer ones. born, this can happen because they only consume breast milk. We can say that the relationships between the types of breastfeeding and the independent variables such as Age, Sex, Head Perimeter, Glucose, Triglycerides, AST, ALT, Total protein, Urea, weight, height, education level and occupation, are not significantly associated.

CONCLUSION

Breastfeeding is a key factor in newborns. However, breastfeeding is widely desired and adopted by mothers all over the world. The present study carried out at CNHU MEL in Cotonou aims to compare the impact of exclusive breastfeeding and mixed breastfeeding on the health of infants.

At the end of our study, we note a similarity in the results in that both types of breastfeeding participate in infant feeding. In the case of anthropometric measurements, infants are within the reference standards. These results remain in the proportions reported by several studies and confirm the need for the importance of breastfeeding. On the other hand, there are some metabolic dysfunctions with regard to the biochemical parameters (urea and total proteins) in the 2 types of breastfeeding, especially at the level of mixed breastfeeding. It is important to do more studies related to dietary factors that can affect the growth of newborns.

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