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Survey on the Quality of Dietary Diversification in Malnourished Children Aged 6 to 24 Months Hospitalised at the Ureni of the Reference Health Centre in Commune V of the Bamako District

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Abstract **Original Research Article**

Introduction*:** According to the WHO, dietary diversification is the introduction of any other food other than breast milk, with the exception of vitamin and mineral supplements, drinking water and rehydration solution. The objective of the study was to determine the quality of dietary diversification in severely malnourished children. ***Methodology: This was a cross-sectional study which took place at the Csref of commune V of the Bamako district. Its target was children aged 6 to 24 months hospitalized at intensive nutritional education and recovery unit (URENI). The survey was carried out from May 2 to August 1, 2018. The sampling was exhaustive, including all children meeting the inclusion criteria. ***Results*:** 126 children aged 6 to 59 months hospitalized from May 2 to August 1, 2018 at the URENI of the reference health center in commune V of the Bamako district. One hundred and ten children aged 06 to 24 months were included, i.e. a frequency of 87.30%. The male gender was predominant with 53%. The age group of 12 to 24 months was the most represented with 61%. Breastfeeding was the most frequent mode of feeding with 72.72%. Children aged 12 to 24 months were fed meals prepared at home. Soup, fruit(s) and vegetable(s) and porridge were the foods most used for dietary diversification (12.73%). Boys were more diverse at 6 months (33.64%) than girls (27.27%). ***Conclusion*:** Diversification mistakes are common. The forms of poor dietary diversification observed were early dietary diversification and late dietary diversification.

Keywords: Food diversification, malnourished, CSRéf CV, Mali.

1. INTRODUCTION

The first few months of life are a stage during which the needs, assimilation capacities and dietary methods differ from those of other ages. The needs of growth must be optimised, while respecting digestive immaturity. From time immemorial and in all cultures, the diet of infants has consisted of two phases, an initial period of exclusive milk feeding and a progression towards dietary diversification. In 1923, Jundell, in Sweden, reported that the earlier practice of dietary diversification, at around 6 months of age, was associated with better growth in height and weight in infants. Confirmation by other authors of the beneficial effect on weight gain and resistance to infection of this earlier diversification led the American Medical Association in 1937 to recommend it from the age of 6 months [1].

According to the WHO, diversification is the introduction of any food other than breast milk, with the exception of vitamin and mineral supplements, drinking water and rehydration solution. [2]. One observation can be made about Feeding infants and young children (ANJE) indicators, which remain low at national level: 32.6% of children under 6 months are exclusively breastfed, and 53.4% continue to breastfeed until the age of 2; 13.5% of children aged 6-23 months have a minimum diversified diet and 6.0% of non-breastfed children aged 6-23 months have received at least 2 milk meals and a minimum dietary diversity [3]. According to

the Demographic and Health Survey VI (EDSM-VI), in Mali 40% of children under 6 months are exclusively breastfed, 7% of infants in this age group have received complementary foods in addition to breast milk [4]. We initiated this study with the aim of determining the quality of food diversification in severely malnourished children in order to highlight the errors made and to specify the role of poor diversification in the onset of malnutrition. For this survey, we interviewed parents and looked for risk behaviours.

2. MATERIALS AND METHODS

This was a cross-sectional study conducted at the URENI of the Csref in Commune V of the Bamako district. The total duration of the survey was set at 3 months (02 May to 01 August 2018), in order to reach a large number of children and for practical reasons. An initial two-week phase was used to check parents' understanding of the various questions asked. Sampling was exhaustive, including all children who met the inclusion criteria. The total number of children surveyed during the period was 110. All children aged between 6 and 24 months hospitalised at the URENI during the study were included. Twins were also included but only counted as one child in the data analysis. Not included were all children under 6 months and over 24 months and those whose parents had refused to participate in the study.

Data Collection Technique

The prospective survey was conducted as a single cross-sectional study. We conducted a study based on the completion of a questionnaire by the parents of hospitalised infants. The questionnaire consisted of three distinct parts. The first included general information (socio-demographic characteristics), the second focused on food diversification and the third on weaning.

Measurement technique or anthropometric measurements:

Measuring the child's height

The UNICEF height gauge was used for this measurement.

The height was taken lying down for children with a height of less than 87 cm. The procedure was as follows: The height gauge was placed flat on a hard surface and the child was then laid on the gauge with the help of the mother, with his feet on the side of the cursor. The child was in the middle of the bed. The mother took the child's head between her hands at ear level and held it firmly by placing the child's hands on her knees with the legs extended. The cursor was placed flat against the soles of the feet, making sure they were not unstuck, and the reading was taken.

The height was taken standing for children whose height reached or exceeded 87 cm. The measurement was taken standing on a flat surface, if possible against a wall. The child's shoes were removed. The child stood upright in the middle of the test frame, touching the vertical plane of the frame. The assistant held the child's head, shoulders, buttocks, knees and ankles against the height gauge while the measurer positioned the head and picker. The height was read to the nearest 0.1 cm.

Weight measurement:

The SECA scale was placed on a surface for weight measurement. Before each measurement, the children were undressed, the scale tared and the accuracy checked using a standard weight.

Brachial perimeter (BP) measurement

A tape was used to measure the brachial perimeter (Shakir tape). The BP was measured on the left for right-handed patients, halfway between the shoulder and the elbow, with the arm relaxed. A special tape measure was used and placed around the arm. The reading was taken in the window of the tape measure by squeezing it moderately. The measurement was recorded with an accuracy of 1mm.

Search for bilateral oedema

This is an oedema in breeches taking the cup searched by pressing gently with the thumb for a few seconds on the top of each foot, the child to oedema if a mark remains on his foot when the thumb is removed.

Statistical Analysis

Statistical analysis was performed using Epi info 7 software (version: 7.2.1.0), results were presented in tabular and graphical form using Excel 2007 and Epi info7 software.

Ethics: Parental consent was obtained with each inclusion. The survey was approved by the Csref administration.

3. RESULTS

During the study period, 126 children aged 06 to 59 months were hospitalised at the URENI of the reference health centre in commune V of the Bamako district. 110 children were aged 06 to 24 months, i.e. 87.30%. The predominant sex was male (53%). The 12-24 month age group was the most represented with 61%. Nearly half the fathers (44.5%) were shopkeepers and more than half the mothers were housewives (67.27%) (Table 1).

Table I: Breakdown of mothers by occupation

Mother's occupation	Numbers	Percentage
Other	2	1,82%
Tradeswoman	29	26,36%
Civil servant	5	4,55%
Housewife	74	67,27%
Total	**110**	**100,00%,**

Table II: Breakdown of children by mother's level of education

Mother's level of education	Numbers	Porcentage
No schooling	**31**	**28,18%**
Koranic school	26	23,64%
Primary	16	14,55%
Secondary	27	24,55%
Higher	10	9,09%
Total	110	100,00%

Breast milk was the most common food for infants (72.72%). Children aged 12 to 24 months were fed mainly home-prepared meals. Soup, fruit and vegetables and porridge were the foods most commonly used for dietary diversification (12.73%).

According to the mothers, eighty-nine per cent of infants ate fruit and vegetables only "a few times a day". The frequency of feedings was judged to be good (37, 27%) in the 12 to 24 months age group. Breastfeeding rhythm was judged to be good (37, 27%) in the 12 to 24 month-olds. Boys were more diversified at 6 months (33.64%) than girls (27.27%). Pregnancy was the main cause of sudden weaning, accounting for 25.71%. The main source of information on diversification for parents was "doctors" with 81.82%. Breast milk was the food of choice before 6 months with 40.00% of housewives.

4. COMMENTS AND DISCUSSION

During the survey, 126 children aged between 06 and 59 months were hospitalised, of whom 110 were aged between 6 and 24 months, i.e. 87.30% of cases. Among the patients aged 6 to 24 months, the age group 12 to 24 months was the most represented, i.e. around 61%. Our results are better than those reported in Madagascar, where the average age of infants was 12.8 ± 5.6 months [5], and at the Gabriel Touré University Hospital, where 57.4% of infants in the same age group were treated [6]. This could be explained by the fact that this age group is the weaning age for most mothers. At this age, the food offered for weaning is not qualitatively and quantitatively sufficient to cover the needs of growth, which causes deficiencies and makes the child more vulnerable to infection.

The sex ratio was 1.1 in favour of boys. This figure is similar to that of the SMART 2016 survey, which found a ratio equal to 1.01 [3]. This male predominance is found in many studies in other fields and is not specific to malnutrition. Some studies report a female predominance, such as at the Gabriel Touré University Hospital with 50.5% [6] and 53.3% in Yaoundé [7].

Shopkeeper fathers were the most represented with 45.55% and housewife mothers 67.27%. This result is higher than that reported in the DRC (55.3%) for housewives [8] and higher than the rate for the Garoua regional hospital in Cameroon [9] with 70.7% housewives. 64.55% of men and 71.87% of women had received instruction; Diarra in 2014 in Koutiala reported frequencies lower than ours, i.e. 26.1% for men and 15.4% for women [10].

In this survey, breast milk was the infant's main food in 73% of cases before 6 months, compared with 18.18% for substitute milk and 9.10% for mixed feeding. In Congo, 30.67% of mothers breastfed exclusively up to 6 months, and 69.33% of mothers surveyed did not breastfeed exclusively, the reasons being recurrent crying perceived as a lack of satiety linked to insufficient milk production [11]. In Antananarivo, 89.2% of infants were breastfed before diversification, 52.7% exclusively. Exclusive breastfeeding was continued until the age of six months in 43.2% of cases. Breast-milk substitutes were used in 34.7% of cases. Twenty-eight infants (12.6%) were given inappropriate drinks (whole cow's milk, sweetened condensed milk, tea, sweetened water) before the age of six months [5]. A survey of infant feeding in urban Cameroon found that 17.10% of infants were exclusively breastfed, 68.9% mixed breastfeeding, 12.69% artificial breastfeeding and 1.31% no milk at all [12].

With regard to diversification by sex, 51.72% of boys and 46.15% of girls were diversified at 6 months. On the other hand, 43.10% of boys and 34.62% of girls were diversified before 6 months (early) and after 6 months with 5.17% for boys and 19.23% for girls (late). In Antanarivo, the average age at which diversification began was 5.5 ± 0.7 months, with extremes of three and seven months. Diversification was started before the age of six months in 34.2% of cases and from the age of seven months in 1.4% [5]. In the DRC, the average age at which mixed feeding was introduced was 3.37 ± 0.855 months [8]. When new foods were introduced at the start of dietary diversification, industrial preparations were most commonly used in infants under 1 year of age (53% of cases). On the other hand, mothers resorted to home-prepared meals (over 77% of cases) as their children grew older. This could be explained by the lack of confidence mothers have in providing a suitable preparation for young infants, but also by the ease of access (ready-to-use) and the promotion of industrial porridges. These formulas have a number of advantages: they are ready-to-use, have a smooth texture and are perfectly homogenous, making them easier to digest.

They also make it possible to vary fruit and vegetables whatever the season. Our results were comparable to those reported in France in 2007 [13].

As for the foods used for diversification, the results showed that 8.18% of mothers used 4 food groups for their child's dietary diversification, 31.82% of mothers used 3 groups, 34.55% of mothers used 2 groups and 25.46% of mothers used just one food group. This means that 8.18% of the children surveyed had a good level of dietary diversification, 31.82% had a fair level, 34.55% a poor level and 25.46% a very poor level. In fact, porridge (11.82%) was the most commonly used food for dietary diversification in Commune V of the Bamako health district, as cereals were the foods most commonly consumed at mealtimes. This predominance was also noted in the national study carried out in 2010, which showed that staple cereals were consumed on a daily basis more than other foods (fruit, vegetables, milk, meat and poison) [14]. In Madagascar, the food most frequently given on the first day of diversification was rice cooking water (75.2%), while 11.7% of infants received biscuits [5]. In the DRC, in 36.67% of cases, food diversification was carried out with unsuitable transition foods (based on maize flour and wheat flour) [8]. According to the dietary diversification score, 37.3% had a poor score [9]. Of the 110 children surveyed, 81 eat fruit and vegetables, but at different frequencies. The vast majority (89.00%) do so a few times a week, compared with 6.00% once a day and 5.00% more than once a day. The vast majority of the 81 children who eat fruit and vegetables (89.00%) do so only a few times a week. This is due to the fact that these foods are not taken into account in eating habits and consumption patterns; the level of knowledge about the nutritional value of these foods is low [14]. In Algeria, diversification before the age of 4 months was found in 13.76% of children, 67.47% had begun diversification between 4 and 6 months and 18.86% had been diversified by the age of 6 months. The type of breastfeeding, the birth rank and the birth weight of the children are factors statistically linked to the age of initiation of diversification. Diversification before the age of 6 months appears to be associated with malnutrition. In this study, 8.66% of children were overweight and 9.17% stunted [16]. Factors associated with poor diversification were the young age of the mothers (under 20), their low level of education (less than secondary school) and the 3rd rank in the siblings of infants in Garoua [9]. According to the parents, the main sources of information on food diversification for infants were their doctor (81.82%), advertising (26.36%), their family (20.91%) and reading (9.09%). A French study carried out in 2004 [15] revealed the same sources of information. Advice for dietary diversification came from relatives in 52.2% of cases and from nursing staff in 41.9% of cases in the Malagasy series [5].

The main reason given by mothers for weaning was pregnancy (25.71% for abrupt weaning and 5.71% for gradual weaning). The second reason given was age at weaning, with 20.00% for abrupt weaning and 2.86% for gradual weaning, followed by illness, with 20.00% for abrupt weaning and 5.72% for gradual weaning, and other reasons, with 17.14% for abrupt weaning and 2.86% for gradual weaning. According to some mothers, a pregnant woman should not continue to breastfeed her child, because they believe it is harmful to the infant's health. Others say that the milk was no longer of good quality, and that the child would become ill if he continued to suckle. The age range between 18 and 23 months was the most common for weaning, with 41.67% of children of mothers not attending school. The age range 12 to 17 months was the most represented as the weaning age interval with 57.14% among children of mothers with primary education. The age range 06 to 11 months was the most represented at weaning, with 57.14% of children of mothers with secondary education. A Cameroonian study reported an average age at the end of weaning of 8.4 months. The main cause cited was drying up [12].

5. CONCLUSION

Diversification errors are common. The forms of poor dietary diversification observed were early dietary diversification and late dietary diversification. The main complications associated with early dietary diversification were anorexia, stunted growth and stunted weight. The best way to promote dietary diversification would be to use local products and raise mothers' awareness through talk sessions. These strategies could help to ease the management of poor dietary diversification. We also need to raise public awareness of the consequences of poor dietary diversification.

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