

Bottle-feeding Mismanagement and its Management

Mohammed H. Alsabawi^{1*}, Ammar M. Atallah², Saud H. Mohammed³

¹C. A. B. P., Ibn sena hospital, Department of Pediatrics, Mosul, Iraq.

²D. C. H., Ibn sena hospital, Department of Pediatrics, Mosul, Iraq.

³F. I. C. M. S., Mosul General hospital, Department of Pediatrics, Mosul, Iraq.

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***Corresponding author:** Mohammed H. Alsabawi, C. A. B. P., Ibn sena hospital, Department of Pediatrics, Mosul, Iraq.

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Abstract:

Introduction: Bottle-feeding is an important substitute of the breast feeding and many infants can grow well with formula feeding if done properly. In this research we discuss the skills of bottle-feeding and the mistakes that is done by many mothers (or care-givers) which have led to substantial number of specific organic diseases or other disorders that misinterpreted as an organic illnesses which led to many unnecessary investigations and treatment.

Methods: This research is done by a survey through a questionnaire of 1000 mothers (and care-givers) over about 1year duration. The interview involves interrogation about the skills of bottle feeding and also giving advises to the mother about proper management for the mistakes when they present.

Results: It reveal a great majority of them have some sort of mismanagement during bottle-feeding.

Conclusion: Bottle-feeding mismanagement is a common problem that should be actively resolved by the pediatrician because it may cause serious harms to the baby.

Keywords: bottle-feeding; skills; level scoop; boiling water; mother

Introduction

Bottle-feeding is an important substitute of the breast feeding and many infants can grow well with formula feeding if performed properly. Infant formula is indicated for infants whose intake of breast milk is contraindicated for infant factors (e.g. inborn errors of metabolism) or maternal factors. In addition, infant formula is used as a supplement to support inadequate weight gain in breastfed infants (1).

In this research we will not discuss the difference between the breast milk versus the formula milk, but rather we will discuss the skills of Bottle-feeding and the mistakes that is performed by the mother (or care-giver) which have led to substantial number of specific organic diseases; on the other hand, some of these disorders are misinterpreted as an organic disorders which led to many unnecessary investigations and treatment.

There are many articles that discuss this issue; but this research will discuss it in a specific manner and try to fulfill all the aspects of this issue along with advises about solutions of these mismanagements.

Method

This research is performed by a survey through a questionnaire of 1000 mother (or care-giver) over about 1 year duration (between 2021-2022). The survey is performed by direct interview with the mother in the hospitals, clinics, and community in Mosul city and by electronic survey in the internet. The interview involve also advises given to the mother about proper management for the mistakes when they present. The questionnaire involves the following 8 questions: -

1. Did the mother read the instructions on the can of formula about preparation of milk and sterilization of bottle?
2. How much water did she put in the bottle for each (level) scoop of milk powder?
3. Does she put cold or hot water in the bottle?



1. Does she sterilize the bottle with boiling water before each feed?
 2. Does she discard the remaining milk after 1 hour of consumption?
 3. How many feeds per day and how much milk offered in each feed?
 4. Does the mother enlarges the hole of the teat of bottle?
 5. Does she let the baby sucking air (accidentally) during feeding?
- The concentrated milk will cause hypernatremic dehydration, colic, irritability, and constipation.
- Some mothers put water more than the recommended amount either not intentionally or sometimes intentionally to save the amount of milk powder as much as possible due to economic issue e.g. poverty. This diluted milk may cause increase bowel motion (which is misdiagnosed as diarrhea), water intoxication, electrolyte disturbances (especially hyponatremia), and convulsion (2,4).

Results

The results of the above questionnaire are as follow:-

1. (88%) of mothers did not read the instructions on the can of formula about preparation of milk and sterilization of bottle.
2. (64%) put water in the bottle above or below the recommended amount for each level scoop of milk powder.
3. (33%) put water in the bottle either cold or hot.
4. (45%) of them did not sterilize the bottle before each feed.
5. (47%) did not discard the remaining milk after 1 hour of consumption.
6. (39%) feeds her baby above or below the recommended amount and frequency of feeding according to the age and condition of baby.

Note: This question is only applicable for those with exclusive bottle-feeding.

7. (33%) enlarge the hole of the teat of bottle.
8. (41%) let the baby sucking air (accidentally) during feeding.

The data above may be less than the real data because some mothers may cheat in their answers during interrogation due to the fear from criticism.

Discussion

After interrogation of the mothers (or care-givers) by the questionnaire during survey, it reveals that the great majority of them have some sort of mismanagement during bottle feeding.

These mismanagements are more common among uneducated, low IQ., and young age mothers, mothers from rural areas, mother with first baby, and lack of experienced older woman in the family e.g. grandmother.

Now we will discuss each item of the above questionnaire separately:-

1. The mothers did not read the instructions on the can of formula about preparation of milk and sterilization of bottle, this is due to either nobody told her about it or she do not care about it.
2. Most mothers put water in the bottle at the level of ounces (oz) for each leveled scoop of milk powder, whereas all formula companies calculate the added water in milliliter (ml) rather than in ounce. Although the difference is small between 30 ml and 1 oz of water used to prepare milk with 1 (level) scoop of milk powder, but this gap will increase when more scoops are used to prepare more milk, so the resulting milk will be concentrated. This is also happened when the mother put milk powder first in the bottle then put water to the desired level, or if the powder is not leveled at the scoop.
3. Some mothers add cold water (after boiling it especially in cold environment) to the bottle which can cause colic in the infant; whereas some mothers put hot water to the milk powder in the bottle then try to cool the milk, this hot water will inactivate some heat-labile vitamins (e.g. B₁ and C) and probiotics (3,4).
4. Some mothers did not sterilize the bottle before each feed properly with boiling water, but only clean it with tap water. This will increase the risk of bacterial contamination which leads to gastroenteritis in the baby.
5. Some mothers did not discard the remaining milk after 1 hour of consumption but re-offer it to the baby for second and even third times. This is either due to economic issue or laziness of mother, this also will increase the risk of bacterial contamination (because milk is a good culture for bacteria in room temperature) which leads to gastroenteritis in the baby.
6. Some mothers feed her baby too much amount of milk or too frequent feeds above the recommended amount and frequency of feeding according to the age and condition of the baby. This will make the baby vomits the extra-amount of milk which may be misdiagnosed as gastro-esophageal reflux disease (GERD) or hypertrophic pyloric stenosis. Also it may cause frequent bowel motion which may be misdiagnosed as diarrhea.
7. On contrary, some mothers feeds her baby too little amount of milk or less frequent feeds below the recommended amount and frequency of feeding. This will leads to poor weight gain and even failure to thrive (FTT) of the baby. See the table below for the recommended amount and frequency of feeding.
8. Some mothers enlarge the hole of the teat of bottle to increase milk production during sucking to decrease the period of feeding. This will leads to choking of baby and even aspiration pneumonia. Therefore every baby who complain of choking and apnea during feeding, it is mandatory to test the hole of the teat by upside down the bottle to see if the milk drip steadily or pour out.
9. Some mothers let the baby sucking air (accidentally) during feeding either because the level of milk drop below the hole of teat or after consumption of all milk in the bottle while the teat is still in the baby's mouth. This will cause gases in the stomach which leads to irritability, abdominal distention, and may be vomiting.

Note: Some formula manufacturers (e.g. Similac Neosure®) use double size scoop which necessitate double amount of water for mixing.

Recommendations

Breast feeding is the best for the infants because it is sterile, do not need preparation, and its contents are ideal for infants; however if



the mother prefer to feed her baby with bottle-feeding, its management can be performed simply by the following solutions:-

1. Advice the mother to read the instructions on the can of formula about preparation of milk and sterilization of bottle (if she is educated), otherwise the pediatrician should learns her about it.
2. Advice the mother to put water in the bottle at the level of 30 ml rather than 1 ounce (oz) for each (level) scoop of milk powder. Also inform her that concentration or dilution of milk is harmful to the baby.
3. Advice the mother to put water in the bottle neither cold nor hot but near the body temperature.
4. Advice the mother to sterilize the bottle with boiling water before each feed properly to decrease bacterial contamination which leads to gastroenteritis in the baby.
5. Advice the mother to discard the remaining milk after 1 hour of consumption also to decrease bacterial contamination. Otherwise she can store the prepared milk in the refrigerator for up to 24 hours.
6. Advice the mother to feeds her baby the recommended amount and frequency of feedings according to the age and condition of the baby (see Table-1).
7. Advice the mother to not enlarge the hole of the teat of bottle because this may make the baby chocking.
8. Advice the mother to not let the baby sucking air during feeding by continuous attendance and observation during feeding. Also it is better to “burping” the baby after each feeding.

When the mother decide to feed her baby with bottle, it is the job of pediatrician is to learn her about the skills of bottle-feeding (by the above recommendations), which should be emphasized at each visit to the pediatric clinic. In addition to that, communication media e.g. TV and social media can actively participate in this issue.

Conclusion

Bottle-feeding mismanagement is a common problem that should be actively resolved by the pediatrician because it may cause serious harms to the baby. However it can simply be managed by the above advices to the mother.

Authors' contributions:-

Mohammed H. Alsabawi contributed to data collection and study design.

Ammar M. Atallah contributed to data collection and the introduction.

Saud H. Mohammed contributed to data collection and the discussion.

Statement of Ethics: *This study was performed in line with the principles of the Declaration of Helsinki. This study protocol was reviewed and approved by the committee of Nineveh health directorate no. 112 at 16th of march-2022.*

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Age	Number of feeds and amount each feed	Total amount each day
Up to 2 weeks	7–8 feeds per day 60–70ml per feed	420–560ml per day
2–8 weeks	6–7 feeds per day 75–105ml per feed	450–735ml per day
2–3 months (9–14 weeks)	5–6 feeds per day 105–180ml per feed	525–1,080ml per day
3–5 months (15–25 weeks)	5 feeds per day 180–210ml per feed	900–1,050ml per day
About 6 months (26 weeks)	4 feeds per day 210–240ml per feed	840–960ml per day
Feeding after 6 months		
7–9 months	Milk could be offered at breakfast (150ml), lunch (150ml), tea (150ml) and before bed (150ml).	About 600ml per day
10–12 months	Milk could be offered at breakfast (100ml), tea (100ml) and before bed (200ml).	About 400ml per day
1–2 years	Milk could be offered at snack times twice a day (100ml x 2) and as a drink before bed (200ml).	About 400ml per day of whole cows' milk or another suitable milk drink

Table-1: shows the recommended amount and frequency of feeding according to age (with permission)