

Caloric Food Intake of Primipara Mothers and Its Influence on the Growth of One-month Old Infant

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Abstract: *Infancy is one of the most sensitive stages of life, requiring precise and even meticulous care. After birth, nutrition and the first year of life are two factors that affect the healthy growth and development of infants, and breastfeeding is the best and ideal way to provide optimal nutrition for the healthy growth and development of infants, which can significantly reduce infant morbidity. To investigate the relationship between calorie intake and infant growth and development. Sampling for non-probabilistic purposes. The sample size for the study was 75 mothers who met eligibility criteria. Summary variables that served as predictors were collected from participants and their mothers. The researchers used dietary questionnaires to measure calories. In the end, the caloric intake of the first woman was significantly related to the weight, height and weight of the baby, while the caloric intake of the first woman was not significantly related to the head circumference of the baby. First-time mothers in China are able to meet the required caloric intake to produce an adequate supply of breast milk that contributes to the growth and development of their babies, in terms of height, weight, weight, but not in terms of head circumference.*

Keywords: *Caloric intake; Primipara breastfeeding mothers; Infant; Growth*

1. Introduction

Infancy is one of the most sensitive stages of life, requiring precise and even meticulous care. After birth, nutrition and the first year of life are two factors that affect the healthy growth and development of infants, and breastfeeding is the best and ideal way to provide the best nutrition for the healthy growth and development of infants, which can significantly reduce infant morbidity.

In China, there are many traditional diets for mothers after childbirth, such as "Zuoyuezi", which means that during this period, mothers should eat nutritious food according to Chinese principles, such as fish soup, chicken soup, eggs, etc. For more than one week after delivery, we should eat more semi-liquid food, light and easily digestible food, and insist on eating more and less meals a day. Reasonable diet and rich nutrition of primipara are the key to improve the quality of breastfeeding [1]. The standard daily diet for breastfeeding women should include whole grains, fruits, vegetables, legumes, nuts and seeds. During the first six months of breastfeeding, women consumed an average of 330 more calories per day [2]. Unfortunately, in the Philippines and China, nurses tend to focus on providing mothers with more family guidance on breastfeeding techniques, feeding frequency and food intake, which is often negative, which only shows that what to eat becomes the sole responsibility of the mother. Therefore, this study is very important in new mothers, which makes the researchers interested in conducting research. Therefore, this study aimed to analyze the caloric food intake of mothers and its effect on infant growth.

2. Method

2.1. Research Design

This study used quantitative method, non-experimental, specifically a descriptive correlational design. Descriptive correlational research refers to a type of study in which information was collected without making any changes to the study subject [3]. In this study, the researcher determined the relationship

between caloric food intake of primipara breastfeeding mothers and its influence on the development of infant.

2.2. Population and Sampling

In this study, the sample size in this study were 75 mothers who passed the eligibility criteria. the researcher used a non- probability specifically quota sampling. Purposive sampling referred to a non-probability sample that was selected based on characteristics of a population and the objective of the study.

The researcher selected participants based on the inclusion criteria: (a) Exclusive breastfeeding mothers, (b) ages 20-30, (c) normal delivery, (d) primigravida mothers, (e) with no disease condition and complication, (f) compliant to breastfeeding practice, (g) admitted from September to October 2018. (h) with a healthy newborn baby.

The exclusion criteria: (a) mothers who had mastitis, (b) breastfeeding mothers who are not first- time mothers, (c) those who breastfed but shifted to bottle feeding using milk formula. (d) those mothers with diseases such as lactational mastitis, HIV, syphilis, AIDS. (e) those mothers who underwent Caesarean section.

2.3. Research Local

This study was conducted in Shexian First People's hospital, Huangshan City, Anhui Province, China. It is a grade-2 level-A hospital, and it is the best public hospital in that area. The hospital offers a clinical training center and provides excellent health care services. It has 1000 bed capacity. The OB ward has around 100 beds which are open to public, conditions and facilities in that ward is good. In fact, the researcher did her clinical practice in this hospital for 10 months and is therefore very familiar with it. Consequently, the head nurse and all the staff gave full support to the researcher to do the study.

2.4. Research Tools

The self-built instrument experienced two stages of validity and reliability. In terms of effectiveness, the researchers consulted three experts: dietitians, mothers and obstetric nurses to validate the tool. In terms of reliability, the instrument was pilot tested on 20 mothers, calculated by Cronbach's alpha using SPSS version 24 software. The researchers used Cronbach's Alpha for reliability test of the calculated results of each project in parallel form, and the result $r=0.72$ was considered reliable. Because Cronbach's Alpha $0.7 \leq r < 0.8$ shows that this is an acceptable tool.

2.5. Statistical Methods

SPSS25.0 was used for statistical analysis, and the samples were topic to recurrence analysis, to answer the first study question, the researchers used frequency and percentage distributions to answer. For questions two and three, the researchers used average scores. For problem four, the t test and ANOVA were used to determine the relationship. For the fifth question, the researchers used personr, Computed Phi and Crammers to answer.

3. Results

3.1. Sample Distribution

Table 1: Sample Distribution 1

Profile	n	%
Age		
21	1	1
22	3	4
23	6	8
24	22	29
25	18	24
26	16	21
27	6	8
28	2	3
Education		

Elementary	1	1
High-school	18	24
Undergraduate	51	68
Post Graduate	5	7
Occupation		
Medical	5	7
Educational	17	23
Business	6	8
Service	47	62
Religion		
Taoism	2	3
None	73	97
Family Support		
Yes	72	96
No	3	4
Income		
<4000 RMB/month	8	11
4000-6000 RMB/month	41	54
>6000 RMB/month	26	34
Married Status		
Married	75	100

Table 2: Sample Distribution 2

Profile	n	%
Prepares Food		
Husband	8	11
In laws (Parents)	65	86
Yourself	2	3
Knowledge about what food to eat		
Internet	35	47
Books	11	15
Experience mothers	14	18
Nurses	11	15
Others	4	5
Influence on what food to eat		
Parents(In-laws)	6	8
Parents	20	27
Internet	26	35
Health teaching of health provider	19	25
Self-preference	4	5
Knowledge on the kind of food to eat that influence the growth of the baby		
Yes	39	52
No	36	48
Awareness on the need to eat more		
Yes	69	92
No	6	8
Nurses' teachings on what to eat and discuss its benefits		
Yes	58	77
No	17	23
Kind of food prefer to eat		
Staple food	4	5
Porridge	19	25
Poultry, egg and fish	5	7
Vegetables	16	21
Soup	17	23
Fruits	14	19
Appetite during the period		
Good	13	17
Moderate appetite	43	58
Little appetite	10	16
No appetite	7	9
Nurses' insights on appropriate calorie food intake		
Yes	4	5
No	71	95
Frequency of breastfeeding the baby per day		
Six times	9	12
Seven times	24	32
Eight times	27	36
Nine times	10	13

Table 1 and table 2 displays the frequencies and percentages of the demographic profile and food-related profile of primiparas breastfeeding mothers. In the aspect of age, table 1 shows that 1 or 1% belonged to the age of 21 years, 3 or 4% belonged to the age of 22 years, 6 or 8% belonged to the age

of 23 years, 22 or 29% belonged to the age of 24 years, 18 or 24% belonged to the age of 25 years, 16 or 21% belonged to the age of 26, 6 or 8% belonged to the age of 27 years, 2 or 3% belonged to the age of 28. Data shows that majority of primiparas breastfeeding mothers are at 24 years old. From the table, it can be seen that all respondents are undergraduate diploma holders, most probably they are around 22 or 23 years when they graduated, then got married and delivered their baby around 24 years old. This situation is very common among women in China. In terms of education, the table displays that 1 or 1% of respondent's education was at primary school, 18 or 24% belonged to the range of high school, 51 or 68% belonged to the range of undergraduate students. 5 or 7% belonged to the range of graduate students. Most of the respondents were undergraduate degree holder. Undergraduate degree holder means vocational college or university. This educational attainment in China is very common especially vocational college because there is no strict requirement and tuition fee is not expensive.

For occupation, data showed that 5 or 7% of respondents' occupation were related to medical, 17 or 23% belonged to the range of educational, 6 or 8% belonged to the range of business, while the remaining of 47 or 62% belonged service. Majority of breastfeeding mothers are employed under the service occupation. It can be seen in the data that majority of the respondents are undergraduate diploma holder. Hence, if they want to be an educational or medical graduate, most of them need to get a master's degree. Service jobs include driver, worker, waiter and other non-professional jobs that most people can apply for. As to the family support, data showed that 72 or 96% were supported by the families, while only 3 or 4% were not supported by their families. Because responders are primipara breastfeeding mothers, it is their first baby for the family, and China has one child policy, so the family support very much. In terms of economic status, the data revealed that 8 or 11% of respondents' economic status is less than 4000 RMB/month, 41 or 55% belonged to the range of 4000-6000 RMB/month, while the remaining 26 or 34% was in the group of more than 6000 RMB/month. Because in the city where the researcher did the research, the average income is 4000-6000 RMB/month, therefore, majority of the respondents have average income. This indicates that the income of the family is enough to sustain the needs of the household. With reference to marital status, 100% or all of the respondents are married. Because there is a policy in China, if the women get pregnant and they must get married, otherwise, they will be brought to hospital for abortion. Data elucidates that 8 or 11% of food eaten by mothers was prepared by their husband, 65 or 86% was prepared by their in-laws (parents), while the remaining 2 or 3% was prepared by the mother themselves. This is because it is a custom in China that breastfeeding mothers need to spend more time in bed and have a good rest after delivery during the first month. Thus, few mothers go out of the room. Therefore, majority of food were prepared by parents or in laws as they have experience on how to prepare food. With the reference to knowledge about what food to eat, the data revealed that 35 or 47% was obtained through internet, 11 or 15% was through books, 14 or 18% was through the experience mothers, 11 or 15% was from the nurses, and the remaining 4 or 5% came from other means. Regarding the influence on what food to eat, 6 or 8% primiparas breastfeeding mothers were influenced by parents (in laws), 20 or 27% primiparas breastfeeding mothers were influenced by parents, 26 to 35% primiparas breastfeeding mothers were influenced by the internet, 19 or 25% primiparas breastfeeding mothers were influenced by health insights of the health provider, the last 4 or 5% primiparas breastfeeding mothers were self-preference. As people in the modern society cannot live without the internet so when the mothers want to know something, they search information through the internet. Therefore, majority of respondents get their knowledge from the internet. In terms of knowledge on the kind of food to eat that influences the growth of the baby, there was 39 or 52% knew about that, and 26 or 48% didn't know about that. Expectedly, after the mothers' delivery of the baby, they focused more on baby's growth, therefore majority of the responders were willing to gain knowledge on the kind of food to eat that influences the growth of the baby. On the aspect of awareness on the need to eat more, the data showed that 69 or 92% primiparas breastfeeding mothers had awareness, and just 6 or 8% primiparas breastfeeding mothers didn't have awareness. Because the mothers know that if they eat more, they can produce more milk for their baby, therefore majority of them have awareness to eat more although they do not have appetite sometimes. As to the nurses providing nutritional teaching on what to eat and discussed its benefits, the data revealed that 58 or 77% nurses did, and 17 or 23% nurses didn't. Because it is the responsibility of the nurses, and they need teach clients.

In connection with the kind of food preferred to eat by breastfeeding mothers, the data revealed that 4 or 5% preferred to eat staple food, 19 or 25% preferred to eat porridge, 5 or 7% preferred to eat poultry, egg and fish, 16 or 21% preferred to eat vegetables, 17 or 23% preferred to drink soup, while the remaining 14 or 19% preferred to eat fruits. In fact, there is a tradition in China that breastfeeding mothers need to drink more soup, porridge and eggs after delivery, so majority of them eat soft food. In the aspect of appetite during the period, the data showed that 13 or 17% had good appetite, 43 or 58% had moderate appetite, 10 or 16% had little appetite, and 7 or 9% had no appetite. Because all of the respondents had

normal delivery, they just stayed in the hospital for three days then they ate what they wanted therefore, most respondents had moderate appetite.

As to nurse teach on appropriate caloric food intake, the data showed that just 4 or 5% primiparas breastfeeding mothers were taught by nurses, and 71 or 95% primiparas breastfeeding mothers were not taught by nurses. Because nurses tended to focus on giving home instruction to mothers more on breastfeeding techniques and frequency of feeding, food intake was often negated, therefore only few mothers were taught an appropriate caloric food intake by nurses. For the number of times to breastfeed the baby per day, the data showed that 9 or 12% breastfed six times per day, 24 or 32% breastfed seven times per day, 27 or 36% breastfed eight times per day, 10 or 13% breastfed nine times per day, 3 or 4% breastfed ten times per day, the remaining 2 or 4% breastfed more than ten times.

Table 3: Caloric Intake

Caloric Intake	Frequency	Percentage
<1800 kcal	3	4%
1800-2200 kcal	58	77%
>2200 kcal	14	19%
	Mean	SD
Total Caloric intake (kcal)	2145	124.97
Carbohydrate (kcal)	1056	174.35
Protein (kcal)	486	110.76
Fat (kcal)	528	124.58

Table 3 shows caloric food intake of primiparas breastfeeding mothers after one month. As can be seen from the data, result shows that 58 or 77% primiparas breastfeeding mothers' caloric intake are between 1800-2200 kcal. While the remaining 14 or 19% primiparas breastfeeding, caloric intake was above 2200 kcal per day and only 4% of primiparas breastfeeding mothers' have caloric intake of < 1800kcal. This means that majority of the respondents have an average caloric intake of 1800-2200 kcal on one -month period post-partum. It suggests that breastfeeding mothers has sufficient caloric intake to produce milk necessary for the requirement of infant's development. Some Researchers proposed the daily caloric intake requirement for breastfeeding mothers about 1800-2200 calories per day as opposed to the one required by Susana which is 2200 – 2500 calories per day^[4].

For the carbohydrate, the primipara breastfeeding mothers ate around 1056kcal per day, as to protein, the primipara breastfeeding mothers ate around 486kcal per day and for the fat, the primipara breastfeeding mothers ate around 528kcal per day. Among three, carbohydrate is the highest. All of that are in required standard as Li (2023) claimed that adults should consume 45 to 65 percent of their daily calories from carbohydrates^[5], consume 10 to 35 percent of their energy intake from protein and suggest adults should eat 20 to 35 percent of their daily calories from fats.

Table 4: Profile of the infant development

	After Delivery		After One Month	
	Mean	SD	Mean	SD
Weight (g)	3165.60	431.91	4533.33	589.97
Length (cm)	49.91	1.26	54.33	1.76
Head Circumference (cm)	33.9	0.81	37.48	0.77
	Frequency	Percentage	Frequency	Percentage
Underweight	12	16%	2	3%
Normal	57	76%	54	72%
Overweight	6	8%	19	25%
TOTAL	75	100%	75	100

Table 4 focuses on the profile of the infant development after delivery and one month after. As can be seen from table 4, the data shows that the weight of the infant was 3165.60g on average after delivery and later became 4533.33g after one-month average. This indicates an increase of 1367.73g in one months' time. This can be supported as seen on table 4 which shows that breastfeeding mothers' caloric intake satisfy on the standard requirement, so that the mothers can produce sufficient milk, therefore the development of the infants' weight is within normal standard. The World Health Organization stated that the baby's development after delivery is 2.7kg-3.8kg, and within one month is expected to be 3.4-5.7kg in terms of weight. The data showed that the length of the infant after delivery was 49.91cm on average. After one month, the length of the infant increases to 54.33cm. It revealed an increase in growth (length) after one month of about 4.42 cm. This can be supported as seen on table 3 which shows that breastfeeding mothers' caloric intake satisfy on the standard requirement, so that the mothers can produce sufficient milk, therefore the development of the infants' height is within normal standard.

According to WHO, the baby’s development after delivery should be around 47.7cm-52.8cm, within one month is expected to be 51.1-58.4cm in terms of length^[6]. About the head circumference, after delivery, the average head circumference of the infant is 33.9cm. Then one month after, the head circumference of the infant is 37.48 on average. Data revealed an increase in growth (head circumference) after one month of about 3.58 cm. This can be supported as seen on table 2 which shows that breastfeeding mothers’ caloric intake satisfy on the standard requirement, so that the mothers can produce sufficient milk, therefore the development of the infants’ head circumference is within normal standard. According to WHO, the baby’s development after delivery is 30.9cm-36.3cm, within one month it is expected to be 35.1-39.5cm in terms of head circumference. The data from table 3 shows after delivery, 12 or 16% infants were underweighted, however, one month after, just 2 or 3% infants were underweighted. 57 or 76% infants were normal after delivery, one month after, 54 or 72% infants were normal. The remaining 6 or 8% infants were overweight after delivery, one month after, 19 or 25% infants were overweight. So, majority of the infants are normal after one month since most of the women ate the required caloric intake for breastfeeding mothers.

Variables	Caloric intake After One Month				Pearson- r Values	Sig. (p-value)	Meaning	I	Decision
	Mean	SD	Mean	SD					
Caloric Food Intake vs Weight	2145	124.97	4533.33	589.97	0.59	0.01	Moderately Strongly	S	Reject Ho
Caloric Food Intake vs Length	2145	124.97	54.33	1.76	0.60	0.01	Moderately Strongly	S	Reject Ho
Caloric Food Intake vs Head Circumference	2145	124.97	37.48	0.77	0.21	0.06	Weak	NS	Do not Reject Ho
	f	%	f	%					
IBW									
Underweight	12	16	2	3	Computed Phi and Crammers 0.83 and 0.59	0.01	Strong & Moderately Strong	S	Reject Ho
Normal	57	76	54	72					
Overweight	6	8	19	25					

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant I: Interpretation S: Significant NS:

Not significant

Figure 1: Relationships between caloric food intake of primipara breastfeeding mothers and infant growth profile

Figure 1 focuses on relationships between caloric food intake of primipara breastfeeding mothers and infant growth profile. In aspect of caloric food intake vs weight, a Pearson- r was used for weight. There was relationship in caloric intake (M=2145, SD=124.97) and weight after one month (M=4533.33, SD=589.97, r (74) =0.59, p=0.01). These results suggest there was relationship between relationships between caloric food (after one month) intake of primipara breastfeeding mothers and infant’s weight. The higher caloric especially more fat primipara breastfeeding mothers took, the more milk they can produced. The normal standard of carbohydrate intake for breastfeeding mothers is 810-1170 kcal per day, protein is 180-630 kcal per day, fat is 360-630 kcal per day. However, it can be seen from the table 3, the mothers ate 1056 kcal for carbohydrates, ate 486 kcal for protein and ate 528 kcal for fat on average per day. All of these are in required standard, and mothers can get enough nutrition to produce sufficient milk for their babies. Because when mothers are breastfeeding, the body needs more energy than it does when mothers are not breastfeeding, so they get extra energy through the foods that mothers eat^[7]. And breast milk contained many complex proteins, lipids and carbohydrates, the concentrations of which alter dramatically over a single feed, as well as over lactation, to reflect the infant’s needs^[8]. This can be supported as seen on table 3 which shows that breastfeeding mothers’ caloric intake satisfy on the standard requirement, and mothers ate all required carbohydrates, protein and fat, so that the mothers can produce sufficient milk, therefore the development of the infants’ weight is within normal standard.

In aspect of caloric food intake vs height, a Pearson- r was used for height. There was relationship in caloric intake (M=2145, SD=124.97) and height after one month (M=54.33, SD=1.76, r (74) =0.60, p=0.01). These results suggest there is relationship between relationships between caloric food (after one

month) intake of primipara breastfeeding mothers and infant's height. The higher caloric especially fat primipara breastfeeding mothers took, the more milk they can produced. The normal standard of carbohydrate intake for breastfeeding mothers is 810-1170 kcal per day, protein is 180-630 kcal per day, fat is 360-630 kcal per day. However, it can be seen from the table 3, the mothers ate 1056 kcal for carbohydrates, ate 486 kcal for protein and ate 528 kcal for fat on average per day. All of these are in required standard, and mothers can get enough nutrition to produce sufficient milk for their babies. Because when mothers are breastfeeding, the body needs more energy than it does when mothers are not breastfeeding, then get that extra energy through the foods that mothers eat^[9]. And breast milk contained many complex proteins, lipids and carbohydrates, the concentrations of which alter dramatically over a single feed, as well as over lactation, to reflect the infant's needs^[10]. This can be supported as seen on table 3 which shows that breastfeeding mothers' caloric intake satisfy on the standard requirement, so that the mothers can produce sufficient milk, therefore the development of the infants' height is within normal standard.

In aspect of caloric food intake vs head circumference, a Pearson- r was utilized to head circumference. There was no relationship in caloric intake ($M=2145$, $SD=124.97$) and head circumference after one month ($M=37.48$, $SD=0.77$), $r(74)=0.21$, $p=0.06$. These results suggest there is no relationship between relationships between caloric food (after one month) intake of primipara breastfeeding mothers and infant's head circumference. From the Figure 1 can be seen that head circumference is the slowest growth among weight, height and head circumference. According to the study by Evan, Graber (2016) showed that head circumference reflects the brain size and is routinely measured up to 36 mo. At birth, the brain is 25% of adult size, and head circumference averages 35 cm. Head circumference increases an average 1 cm/Mo during the 1st yr; growth is more rapid in the 1st 8 Mo, and by 12 Mo, the brain has completed half its postnatal growth and is 75% of adult size. Although the breastfeeding mothers' caloric intake satisfy on the standard requirement, however the result indicates there was no relationship between relationships between caloric food (after one month) intake of primipara breastfeeding mothers and infant's head circumference.

In aspect of caloric food intake vs IBW, a Phi and Cramm's was conducted to IBW. There was relationship in caloric intake ($M=2145$, $SD=124.97$), underweight after delivery ($f=12$, $\%=16\%$), normal after delivery ($f=56$, $\%=76\%$), overweight after delivery ($f=6$, $\%=8\%$) and underweight after one month ($f=2$, $\%=3\%$), normal after one month ($f=54$, $\%=72$), overweight after one month ($f=19$, $\%=25\%$), $\Phi(74)=0.83$, $C(74)=0.59$, $p=0.01$. These results suggest there is relationship between relationships between caloric food (after one month) intake of primipara breastfeeding mothers and IBW. The higher caloric primipara breastfeeding mothers took, the more milk they can produced. If the mothers want get more caloric, they will eat more fat compared protein and others. The normal standard of carbohydrate intake for breastfeeding mothers is 810-1170 kcal per day, protein is 180-630 kcal per day, fat is 360-630 kcal per day. However, it can be seen from the table 3, the mothers eat 1056 kcal for carbohydrates, eat 486 kcal for protein and eat 528 kcal for fat on average per day. All of these are in required standard, and mothers can get enough nutrition to produce sufficient milk for their babies. Because when mothers are breastfeeding body needs more energy than it does when mothers are not breastfeeding, then get that extra energy through the foods that mothers eat^[11]. And breast milk contained many complex proteins, lipids and carbohydrates, the concentrations of which alter dramatically over a single feed, as well as over lactation, to reflect the infant's needs. And the production of the breastmilk composition in terms of its nutritional value was affected by, among others, the diet of a breastfeeding mother. Some researchers further revealed that a woman's diet could influence her milk composition via several intertwined metabolic pathways that produced direct effects on infant development^[7]. This can be supported as seen on table 3 which shows that breastfeeding mothers' caloric intake satisfy on the standard requirement, so that the mothers can produce sufficient milk, therefore the development of the infants is normal.

4. Conclusion

Chinese primipara breastfeeding mothers were able to satisfy the required caloric intake necessary to produce abundant supply of milk that can help build the infant's growth and development in the aspect of height, weight, IBW but not on head circumference. Moreover, data likewise revealed that certain food-related factors such as education, income, food preparation, knowledge on the kind of food to eat, and the number of frequency of breastfeeding were found to influence a higher caloric food intake from lactating mothers as opposed to other aspects such that of age, occupation, religion, family support, married status, knowledge about what food to eat, influence on what food to eat, kind of food prefer to eat, appetite during the period, nurse teach on appropriate caloric food intake.

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