Research on the Growth and Development of 6-Month-Old Infants by SPSS Feeding Method Under the Background of Social Big Data

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Abstract. To investigate the effects of feeding patterns on the growth and development of 6-month-old infants based on social big data. A cross-sectional retrospective study was conducted to investigate the height, weight and feeding methods of 2156 infants at the age of 1 month, 3 months and 6 months, which were documented from January 2014 to December 2020. SPSS software was used to compare the effects of different feeding methods on infant growth and development. The weight and length of 1-month-old, 3-month-old and 6-month-old male infants were higher than those of female infants ($P < 0.05$). The rates of exclusive breastfeeding, mixed feeding and artificial feeding were 17.25% (372/2156), 76.52% (1650/2156) and 6.22% (134/2156), respectively, within 6 months of age. At the age of 3 months and 6 months, the weight of the exclusively breastfed infants was greater than that of the mixed feeding ($P < 0.05$); the length of the exclusively breastfed infants within 6 months was greater than that of the mixed feeding ($P < 0.05$). At only 1 month of age, the weight of exclusive breastfeeding was higher than that of mixed feeding ($P < 0.05$). The overall nutritional status of infants within 6 months of age is good, but overweight or obese infants are relatively high. Mixed-feeding is the main method, and the rate of exclusive breastfeeding is low. The growth and development of infants who are exclusively breastfed is to some extent superior to that of mixed and artificial feeding.

Keywords: Social Big Data · 6-month-old infants · Feeding method · Growth and development · SPSS

1 Introduction

Breast milk is the best natural food for infants, whose nutrition can not only meet the growth and development needs of infants, but also avoid overfeeding, so that infants can obtain the best growth rate. China's Nutrition Association recommends: adhere to exclusive breastfeeding for 6 months; Supplement food and continue breastfeeding from 6 months of age (Yang 2016). According to the latest data of UNICEF in 2019, the exclusive breastfeeding rate within 6 months of age in China is only 21% (UNICEF

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2020), and there is regional imbalance. The purpose of this study was to investigate 6-month-old infants and their main caregivers in Shaoyang City, Hunan Province, to understand the feeding patterns and growth and development of infants in this area, and to analyze the effects of different feeding patterns on the growth and development of infants in 6-month-old, so as to provide scientific basis for rational feeding of infants.

2 Information and Method

2.1 General Information

In this study, a cross-sectional retrospective study was conducted to select infants who participated in health examination and recorded in 8 community health service centers in Shaoyang City, Hunan Province from January 2014 to December 2020. Inclusion criteria:(1) informed consent of infant parents; (2) The infant and its parents are the resident population of Shaoyang City, and the infant's parents have the intention to have a physical examination of the infant in the cooperative community; (3) single term infants; (4) Birth weight 2.5 ~ $<$ 4.0 kg; (5) No neonatal asphyxia or fetal distress in utero; (6) No birth defects; (7) the mother has no complications or complications during pregnancy. A total of 2156 follow-up data were obtained at the age of 1 month, 3 months and 6 months, including 1134 boys (52.59%) and 1022 girls (47.41%).

2.2 Research Methods

2.2.1 Physical Examination and Nutritional Status Evaluation

In accordance with the standards in "Technical Specifications for Child Health Examination Services", a trained medical practitioner or nurse measures the baby's weight and length to an accuracy of 0.01 kg and 0.1 cm, respectively. Infant weight/age $<$ median (M) -2s was low weight; Body length/age $<$ M-2S was growth retardation; Weight/body length $<$ M-2s was defined as emaciation, $\geq$ M + S as overweight, $\geq$ M + 2s as obesity. Malnutrition rate (%) = [(number of infants with low weight, stunted growth and wasting)/total number of infants] $\times$ 100%; Overweight rate (%) = (number of overweight infants/total number of infants) $\times$ 100%; Obesity rate (%) = (number of obese infants/total number of infants) $\times$ 100%.

2.2.2 Feeding Methods

The examining doctor of the community child care department will directly ask the baby's guardian to know the feeding method. Exclusive breastfeeding means feeding only breast milk; Mixed feeding refers to feeding with breast milk and formula milk powder at the same time. Artificial feeding refers to non-breastfeeding (Yu 2021).

2.3 Statistical Methods

SPSS20.0 statistical software was used for statistical analysis. Measurement data were expressed as ($\overline{\chi} \pm$ S). T test was used for comparison between two groups, and F test was used for comparison between multiple groups. $P < 0.05$ was considered as statistically significant difference.

3 Results

3.1 Basic Information of the Research Object

A total of 2156 pairs of infants and their parents were followed up in this study, including 1134 boys (52.59%). There were 1022 female infants, accounting for 47.41%. At the age of 1 month, the male weight was (4.79 ± 0.59) kg and the female weight was (4.61 ± 0.53) kg. Male (55.18 ± 1.80) cm, female (54.51 ± 1.58) cm; At the age of 3 months, the male weight was 6.53 ± 0.67 kg and the female weight was 6.21 ± 0.57 kg. Male (61.44 ± 2.43) cm, female (60.48 ± 2.08) cm; At the age of 6 months, the male weight was 7.98 ± 0.80 kg and the female weight was 7.62 ± 0.72 kg. Male (67.18 ± 2.54) cm, female (66.26 ± 2.54) cm. All of them were higher than the WHO standards for children's physical growth and development (UNICEF 2020), and the weight and body length of boys at 1 month, 3 months and 6 months were higher than those of girls ($P < 0.05$).

There were 30 (1.38%) one-month-old infants who were emaciated, 596 (27.64%) overweight and 109 (5.06%) obese. Among 3-month-old infants, 162 (7.51%) were overweight and 17 (0.88%) were obese. Fifty-two (2.41%) 6-month-old infants were emaciated, 115 (5.33%) overweight, and 13 (0.60%) obese. The details are shown in Table1.

3.2 Status of Feeding Methods at 1 month, 3 months and 6 months of Age

There were 372 patients (17.25%) who were exclusively breastfed. Mixed feeding 1650 people (76.52%); Artificial feeding 134 patients (6.22%). With the increase of the month age, feeding patterns within 6 months of age did not change much.

Table 1. The number and detection rate of weight loss, overweight and obesity in infants within 6 months of age (n, %)

	Thin			Super Heavy			Fat		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1 months									
n	14	16	30	234	362	596	45	64	109
Detection rate (%)	0.64	0.74	1.38	10.85	16.79	27.64	2.09	2.97	5.06
3 months									
n	0	0	0	54	108	162	17	0	17
Detection rate (%)	0	0	0	2.50	5.01	7.51	0.88	0	0.88
6 months									
n	47	5	52	35	80	115	2	11	13
Detection rate (%)	2.41	2.18	0.23	1.62	3.71	5.33	0.09	0.51	0.60

3.3 Effects of Different Feeding Methods on the Growth and Development of Children Aged 6 months

At the age of 3 months and 6 months, the body weight of the exclusive breast-feeding group was higher than that of the mixed feeding group ($P < 0.05$). The body length of those who were exclusively breastfed at 1, 3 and 6 months of age was higher than that of those who were mixed fed ($P < 0.\ 05$), and the body weight of female infants at 1 month of age was higher than that of those who were mixed fed ($P < 0.05$). In other periods, there were no significant differences in body weight and body length among infants with different feeding styles ($P > 0.05$). The details are shown in Table 2.

Table 2. Effects of Different Feeding Methods on the Growth and Development of Children Within 6 months of Age ($\overline{\chi} \pm S$)

	Weight (kg)		Height (cm)	
	Male	Female	Male	Female
1 months				
Exclusive breastfeeding	4.82 ± 0.61	4.67 ± 0.51^{a}	55.67 ± 1.79^{a}	54.27 ± 1.89
Mixed feeding	4.80 ± 0.59	4.38 ± 0.58^{b}	55.08 ± 1.78^{b}	54.54 ± 1.53
Artificial feeding	4.61 ± 0.64	4.42 ± 0.43	55.04 ± 1.96	54.86 ± 1.24
F	2.086	13.008	4.724	1.731
P	0.125	0.000	0.009	0.178
3 months				
Exclusive breastfeeding	6.70 ± 0.67^{a}	6.09 ± 0.53	62.27 ± 2.07^{a}	60.32 ± 1.77
Mixed feeding	6.50 ± 0.66^{b}	6.22 ± 0.57	61.22 ± 2.52^{b}	60.44 ± 2.10
Artificial feeding	6.50 ± 0.73	6.33 ± 0.72	61.51 ± 1.74	60.53 ± 2.41
F	4.117	2.391	7.908	1.925
P	0.017	0.093	0.000	0.137
6 months				
Exclusive breastfeeding	8.28 ± 0.84^{b}	7.52 ± 0.65	68.16 ± 2.34^{a}	66.09 ± 1.88
Mixed feeding	7.89 ± 0.77^{a}	7.62 ± 0.73	66.89 ± 2.56^{b}	66.25 ± 2.68
Artificial feeding	8.20 ± 0.65^{b}	7.85 ± 0.80	67.73 ± 1.96	66.82 ± 2.17
F	11.906	2.222	11.970	0.901
P	0.000	0.109	0.000	0.407

Note: The superscript letters are different in the groups, and the difference between the groups is statistically significant.

4 Discussion

4.1 General Situation of Infants Aged 6 months in Shaoyang City, Hunan Province

The body weight and body length of infants within 6 months in Shaoyang city were all higher than WHO Standards for Physical Growth and Development of Children (UNICEF 2020) and China Reference Standards for Growth and Development of Children Under 7 years old. The body weight and body length of male infants at 1 month, 3 months and 6 months were all higher than female infants, which were consistent with the survey results of nine cities in China (Zong 2020). It may be that the genetic difference between genders determines the different growth potential and trajectory of boys and girls (Zhang 2019).

There were 30 (1.38%) one-month-old infants who were emaciated, 596 (27.64%) overweight and 109 (5.06%) obese. Among 3-month-old infants, 162 (7.51%) were overweight and 17 (0.88%) were obese. Fifty-two (2.41%) 6-month-old infants were emaciated, 115 (5.33%) overweight, and 13 (0.60%) obese. The detection rates of wasting, overweight and obesity were all lower than the results of Chen Guoying et al. (Chen 2020).

The results showed that the overall nutritional status was good, and the number of emaciated people was relatively small, but the number of overweight or obese people was lower than that in the developed coastal areas, which may be related to lifestyle and living standard. In addition, the nutritional composition of current formula milk powder is closer to breast milk, and with the popularization of nutritional feeding knowledge, parents' parenting skills are constantly improved, reducing the occurrence of malnourished children and obese children.

4.2 Feeding Status of Infants Aged 6 months in Shaoyang City, Hunan Province

This survey showed that three feeding methods co-existed, mainly mixed feeding (76.52%), which was significantly higher than the average level in Asia (35%) (UNICEF 2020).The rate of exclusive breastfeeding (17.25%) is lower than the rate of exclusive breastfeeding in China (21%) published by UNICEF in 2019 (UNICEF 2020), far lower than the rate of exclusive breastfeeding in low and middle income countries worldwide (37%) (Carmen 2020), and even lower than the rate of exclusive breastfeeding in rural areas of a certain region of China (35.13%). It is still far from the goal of exclusive breastfeeding rate of infants aged 0–6 months in China's National Nutrition Plan (2017–2030) of over 50%. Therefore, the situation of breast-feeding of infants within 6 months of age in Shaoyang City of Hunan Province is not optimistic, and the reasons should be properly solved.

4.3 Effects of Different Feeding Methods on the Growth and Development of Children within 6 Months of Age

Studies show that feeding pattern is an important factor affecting the growth and development of infants (Srour 2016). The results showed that at 3 and 6 months of age, the weight of breast-fed boys was higher than that of mixed breast-fed boys ($P < 0.05$). The body length of those who were exclusively breastfed at 1, 3 and 6 months of age was higher than that of those who were mixed fed ($P < 0.05$). The body weight of those who were exclusively breastfed at 1 month of age was higher than that of those who were mixed fed ($P < 0.05$). It is similar to the study of Fang Lin. (Fang 2014). Therefore, the growth and development of infants who are exclusively breastfed within 6 months of age is better than that of mixed feeding and artificial feeding to a certain extent. The reason may be related to the composition of breast milk. As the best food for infants, breast milk is rich in high-quality protein, fat and lactose, as well as minerals and vitamins with appropriate proportions to meet the growth and development needs of infants within 6 months.

5 Conclusion

The overall nutritional status of infants within the age of 6 months is good, but the proportion of overweight or obese infants is relatively high. Exclusive breastfeeding, mixed feeding and artificial feeding coexist, with mixed feeding as the main method and low rate of exclusive breastfeeding. The growth and development of infants who are exclusively breastfed is to some extent superior to that of mixed and artificial feeding.

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References

Carmen M (2020). Mixed milk feeding: a systematic review and meta-analysis of its prevalence and drivers J. Pubmed.20(1): 58.

Chen G Y (2020). Effects of different feeding patterns on early growth and development of 6-month-old infants.J.Journal of hubei university for nationalities (medical edition), 37 (2): 78–80.

Fang L (2014). Chinese Journal of Maternal and Child Health Research, (06): 927–929.

Srour ML (2016). The Role of Breastfeeding in the Prevention of Childhood Malnutrition. J. World Rev Nutr Diet, 115: 82-97.

UNICEF. (2020). The State of the World's Children 2019 Statistical Tables [EB/OL] (2020–02–01).

Yang YX (2016). Feeding guidelines for infants aged 7 to 24 months.J. Journal of Clinical Pediatrics, 34(5): 381–387.

Yu H (2021), Comparison of physical growth and nutritional status of 6-month-old infants with different feeding styles. J. Journal of Preventive Medicine, 33(6): 636-638.
Zhang L (2019). Analysis of growth level and pattern and its influencing factors in early postnatal preterm infants D. Qingdao: Shandong University, 2019.
Zong XN (2020), A cross-sectional investigation on the physical growth level of infants with different feeding styles in nine cities of China. J. Chinese journal of evidence-based pediatrics,15 (2): 108–113.