Hepatic Enlargement of Breast-fed Infants and its Relation to Nutritional Dystrophy of their Mothers

Studies on the Nutrition of Children in Hirosaki Area

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By

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According to Arakawa *et al.*¹⁾ the incidence of hepatic enlargement was higher among the children with nutritional dystrophy than among those without it.

In the present paper, hepatic enlargement of the breast-fed infants and its relation to nutritional dystrophy of their mothers and to the riboflavine content in the mother's milk will be reported.

EXPERIMENTAL

Materials and Method

The materials subjected to this investigation were restricted to those who were exclusively breast-fed, of the age under 12 months and were free from any complaints of illness.

These infants were selected from those who attended at a Baby show which was held on August 28, 1935 in two rural villages (Miyoshi-village and Rokugo-village, both situated at Tsugaru District in Aomori Prefecture).

These infants were divided into two groups: Group A consisted of those who were fed on the milk from the mothers without nutritional dystrophy and Group B consisted of those who were fed on the milk from the mothers with nutritional dystrophy.

Riboflavine content in mother's milk was estimated by means of lumiflavin-fluorometric method²⁾.

The palpation of the liver was made on the right nipple line and measured in centimeters below the costal margin. The "liver palpable 3 cm.", for example, means "the liver was palpable and 3 cm. long below

the costal margin on the nipple line”.

Results and Comment

Relation between nutritional dystrophy of mothers and hepatic enlargement of the breast-fed infants (Cf. Tables I and II).

TABLE I

Relation between Enlargement of the Liver of Breast-Fed-Infants and Riboflavine Content in Milk from the Mothers with or without Nutritional Dystrophy

Group	No. of case	Age (m.) and sex	Liver (cm.)	Riboflavine in mother's milk (γ%)	Group	No. of case	Age (m.) and sex	Liver (cm.)	Riboflavine in mother's milk (γ%)
Group A (Mothers without nutritional dystrophy)	1	2. ♂	3	34.3	Group B (Mothers with nutritional dystrophy)	27	6. ♀	1.8	28.3
	2	2. ♂	2	35.5		28	2. ♀	2.5	39.9
	3	2. ♀	1.5	37.2		29	2. ♀	1.8	37.2
	4	2. ♂	—	46.3		30	2. ♀	3.5	19.2
	5	2. ♀	1.5	26.9		31	5. ♀	3.5	25.6
	6	3. ♀	—	22.3		32	4. ♀	1.8	20.8
	7	3. ♂	0.5	26.8		33	4. ♂	1.0	18.9
	8	4. ♂	2.0	32.4		34	7. ♂	1.8	30.0
	9	4. ♀	—	49.4		35	6. ♂	3.5	23.3
	10	4. ♀	—	20.3		36	7. ♀	1.0	15.3
	11	4. ♀	—	22.3		37	4. ♂	1.8	30.2
	12	4. ♀	—	22.3		38	5. ♂	—	19.4
	13	4. ♀	4.0	48.0		39	6. ♂	1.0	16.5
	14	4. ♀	1.0	33.4		40	1. ♀	1.8	30.9
	15	5. ♀	—	36.7		41	3. ♂	1.8	25.9
	16	5. ♀	—	26.6		42	4. ♂	1.0	14.8
	17	5. ♂	—	38.6		43	3. ♂	1.8	24.2
	18	5. ♂	3.5	36.0		44	4. ♀	3.5	23.2
	19	5. ♂	2.5	33.4		45	6. ♂	3.5	31.6
	20	5. ♀	—	31.5		46	6. ♀	3.5	29.2
	21	7. ♀	—	35.1		47	4. ♀	2.5	32.4
	22	7. ♀	—	35.3		48	1. ♂	2.5	16.3
	23	7. ♀	1.5	40.3		49	4. ♂	3.5	11.5
	24	11. ♂	2.0	20.6		50	7. ♀	1.0	28.5
	25	11. ♀	—	25.0					Average 24.6±3.3
	26	12. ♀	1.5	30.0					
				Average 32.7±2.7					

Out of the 50 cases examined, 14 cases were those without palpable liver, and of which 13 cases (92.8%) belonged to Group A and only one

TABLE II
Relation between Nutritional Dystrophy of Mothers and
Enlargement of the Liver of the Breast-fed Infants

Group	Nutritional dystrophy of the mothers	The liver of the breast-fed infants (cm. below the costal margin on the right nipple line)			
		Not palpable (cases)	Less than 3 cm. (cases)	3 cm. or more (cases)	Total
A	(-)	13 (50.0%)	10	3 (11.5%)	26
B	(+)	1 (4.1%)	16	7 (29.1%)	24
	Total (cases)	14	26	10	50

cases to Group B. On the other hand, the cases with the liver palpable 3 cm. or more were 10 cases out of the 50 cases examined, and of which 7 cases (70.0%) belonged to Group B and only 3 cases to Group A.

In the normal infants of the age under 12 months, the liver was palpable 1 to 2 fingers breadth³⁾ or 2 to 3 cm.⁴⁾⁵⁾ below the costal margin on the right nipple line.

Concerning Japanese healthy infants, Matumoto and Tsukine⁶⁾ reported that the liver was not palpable in 303 (41.1%) out of 734 cases of the infants of the age under 6 months and in 569 (53.5%) out of 1064 cases of the infants of the age from 7 to 12 months, and they also reported that the liver palpable 3 cm. or more was found in 166 (9.2%) out of 1798 cases of the infants of the age under 12 months.

In the present investigation, the liver was not palpable in 13 (50.5%) out of the 26 cases of Group A, and in only one case (4.1%) out of the 24 cases of Group B. On the other hand, the liver which was palpable 3 cm. or more was found in 7 cases (29.1%) of Group B and 3 cases (11.5%) of Group A.

It may therefore be concluded that the incidence of the cases in which the liver was palpable 3 cm. or more was higher in Group B than in Group A and that the incidence of the cases without palpable liver was lower in Group B than in Group A.

Relation between the hepatic enlargement of the breast-fed infants and riboflavine content of their mother's milk (Cf. Table III).

According to Kagaya⁷⁾, one of us, there was a close relation between ariboflavinotic signs (such as angular stomatitis, cheilosis and atrophy or/and swelling of the lingual papillae) and the blood riboflavine level of the children with nutritional dystrophy.

As will be seen from Table I, the averages of riboflavine content in

TABLE III
Relation between Riboflavine Content of Mother's Milk and
Enlargement of the Liver of Breast-fed Infants

Riboflavine content in mother's milk (r%)	The liver of the breast-fed infants (cm. below the costal margin on the right nipple line)			
	Not palpable (cases)	Less than 3 cm. (cases)	3 cm. or more (cases)	Total
Below 25.0	5	8	4	17
21.5~35.0	2	13	4	19
Above 35.1	7	5	2	14
Total (cases)	14	26	10	50

mother's milk were 32.7 ± 2.7 r% and 24.6 ± 3.3 r% in Group A and Group B respectively, that is to say, riboflavine content was significantly lower in the milk from the mothers with nutritional dystrophy than in that from those without nutritional dystrophy. But, as will be seen from Table III, any significant relations were not found between the riboflavine content in mother's milk and the incidence of the cases with or without liver enlargement.

According to Sebrell *et al.*⁸⁾⁹⁾¹⁰⁾ gross fatty liver was said to develop in riboflavine deficiency.

We are of the opinion that ariboflavinotic signs, which were found commonly among children in Hirosaki area, are not to be taken merely as symptoms of ariboflavinosis, but ought to be considered as one of manifestations of nutritional dystrophy¹¹⁾¹²⁾.

Arakawa *et al.*¹⁾ found that the incidence of the cases in which the liver was palpable 4 cm. or more was higher in children with nutritional dystrophy than in those without it. Sato and Arakawa¹³⁾ reported 3 cases of hepatomegalic liver in chronic miliary tuberculosis of children and described that a main cause of hepatic enlargement must be sought in the nutritional dystrophy prevalent among children in this area.

The components of mother's milk were decidedly altered by thiamine deficiency of the lactating mothers¹⁴⁾.

Agostini¹⁵⁾ reported, after milk analysis of many pellagrous mothers, that the milk showed a composition not different from that of the normal in fats and sugars, but that it showed a deficiency in casein and excess in salts.

Lucaletto¹⁵⁾ called attention to the deficiency of iron in the milk of pellagrins.

Simonini¹⁵⁾ found that, in addition to an increase in salt and a decrease in casein, there was also a deficiency in iron, and he also suspected the presence of unidentified toxic principles in the milk of pellagrins.

From the present investigation, it may therefore be concluded that the high incidence of hepatic enlargement of the infants who were fed on the milk from the mothers with nutritional dystrophy, is not to be ascribed merely to the low riboflavine content in the milk, but to possible alteration in other factor or factors in the milk of the mothers with nutritional dystrophy.

SUMMARY AND CONCLUSIONS

The high incidence of hepatic enlargement was found among the infants who were fed on the milk from the mothers with nutritional dystrophy.

The hepatic enlargement of the breast-fed infants seemed to be closely related to nutritional dystrophy of the lactating mothers, but it may be not merely ascribed to the low riboflavine content in the milk of those mothers.

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