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Original Research Article

Study of prevalence for lactose malabsorption in malnutrition

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ABSTRACT

Background: Milk is the major food in the diet of the infant mammal and consequently has always attracted considerable interest from the physician, the industrialist and the mother. The concentration of lactose in milk varies from species to species. Main objective is to study the prevalence of malabsorption in malnutrition.
Methods: Sixty-seven children ranged between ages of 6 months to 3 years, of both sex and varying grades of malnutrition, were studied. Study conducted between July 1979-December 1979. All children were grouped into 4 grades of malnutrition according to Indian Academy of Pediatrics recommendation.
Results: Out of 67 cases, 50 were followed up. Severe malnutrition of grades III and IV (less than 60 percent of expected body weight) comprises 58.2 percent (39 out of 67) in first seen group, and 52 percent (26 out of 50) in follow up group. 59.7 percent Males and 40.3 percent females in first seen cases. 58 percent males and 42 percent females in follow up cases. 24 cases (53.33 percent) of lactose malabsorbers were males and 21 cases (46.67 percent) were females.
Conclusions: Lactose malabsorption is common in protein-energy malnutrition. This can be determined by simple ward tests and abnormal lactose tolerance curve after oral lactose load. Lactose malabsorption increases with the severity of malnutrition. Malnutrition leads to lactose malabsorption and lactose malabsorption is an important contributory factor in production of malnutrition.

Keywords: Malnutrition, Lactose malabsorption, Prevalence

INTRODUCTION

Milk is the major food in the diet of the infant mammal and consequently has always attracted considerable interest from the physician, the industrialist and the mother. It is only recently, in the history of man approximately 6,000 years that milk has served as a dietary constituent beyond infancy and in the adult. The carbohydrate of milk, lactose, is the prime carbohydrate in the diet of infants. In those societies, in which breast feeding continues for the traditional period of time, it serves as the major carbohydrate in diet until approximately the age of two years.[1]

The concentration of lactose in milk varies from species to species. The milk of Californian sea lion contains no lactose.[2] Until a few decades ago, it had been accepted that hydrolysis of the disaccharides into their component monosaccharide's had to precede their absorption and entry into the further stages of metabolism. The disaccharides lactase, sucrose, maltase was secreted by unspecified cells of intestinal mucosa into the lumen of gut and hydrolyses respective disaccharide.[3]

A study on intestinal digestion and absorption in man observed that the glycosidase activity of the intestinal contents during digestion was too low to account for any

considerable digestion of disaccharides. Rapid absorption of lactose in test-meal suggested that the intestinal glycosidase were present in the cells of the intestinal mucosa.[4]

METHODS

Sixty-seven children ranged between ages of 6 months to 3 years, of both sex and varying grades of malnutrition, were studied. Study conducted between July 1979-December 1979.

All children were grouped into 4 grades of malnutrition according to Indian Academy of Pediatrics recommendation, (Ghai, 1972). In all the children height/ length and mid-arm circumference were taken. A detailed history of present illness, relevant past history, an accurate dietetic history, thorough general and systemic examination, stool examination, hemoglobin, serum protein, B.C.G. test and x-ray chest were done. In all cases family size, social class and per capita income were taken into consideration.

Lactose tolerance test was done in all the cases by loading 2gm. per kg. body weight, which is supplied by the National Institute of Nutrition, Hyderabad, in the form of 10% lactose solution after 4hours fast. Blood glucose estimation was done at 0, 30, 60minutes after oral lactose load.

All these patients were observed for a period of 8hours for any side-effects of lactose oral load and stool samples before and after the lactose oral load were collected for pH determination. Blood glucose estimation was done by Eye tone reflectance calorimeter. After lactose tolerance test and barium meal examination parents were instructed to exclude milk from the diet of the child.

The study was carried out for a period of 6 months and permission from Institutional Ethics Committee was obtained. From each and every patient included in the study, initially informed individual consent was taken.

RESULTS

Out of 67 cases, no of cases in grade I malnutrition 12 cases, grade II 16 cases, grade III 26 cases, grade IV 13 cases were seen. Out of 67 cases, 50 were followed up. Severe malnutrition of grades III and IV (less than 60 percent of expected body weight) comprises 58.2 percent (39 out of 67) in first seen group, and 52 percent (26 out of 50) in follow up group (Table 1).

Sex distribution of total cases

Out of 40 male and 27 female cases in grade I 9 male and 2 female follow up cases. In grade II 7 male and 6 female follow up cases, in grade III 8 male and 9 female follow up cases, in grade IV 5 male and 4 female follow up cases were seen and 59.7 (40 out of 67) percent males and 40.3 (27 out of 67) percent females in first seen cases. About 58 (29 out of 50) percent males and 42 (21 out of 50) percent females in follow up cases (Table 2).

Table 1: Total cases studied: first seen and followed up.

Grades of Malnutrition	No of Cases	%	No of follow up cases	%
I	12	17.91	11	22
II	16	23.89	13	26
III	26	38.80	17	34
IV	13	19.40	9	18
Total	67	100.00	50	100

Table 2: Sex Distribution of total cases studied (first seen and last seen/follow up).

Grades of malnutrition	Male	Female	Male (follow up)	Female (follow up)
I	10	2	9	2
II	10	6	7	6
III	13	13	8	9
IV	7	6	5	4
Total	40	27	29	21
Percent	59.7	40.3	58	42

In grade I malnutrition no male and female cases were present, in grade II 5 male and 3 female cases, in grade III 12 male and 12 female cases, in grade IV 7 male and 6 female cases were seen.

Out of 45, 24 cases (53.33 percent) of lactose malabsorbers were males and 21 cases (46.67 percent) were females. This difference was not significant statistically (Table 3).

Table 3: Sex distribution in lactose malabsorbers.

Grades of malnutrition	Male	Female
I	0	0
II	5	3
III	12	12
IV	7	6
Total	24	21
Percent	53.33	46.67

In grade I malnutrition only 1 case, in grade II 15 cases, in grade III 41 cases, in grade IV 10 cases were present. Out of 67 cases, 41 (61.19 percent) belongs to social class III, which was statistically significant. Only one case was from class, and none from class V.

Out of 67 cases first seen, 45 and out of 50 cases followed 32 were found to be lactose malabsorbers (Table 4).

Table 4: Socio-economic status in total cases studied.

Grades of malnutrition	I	II	III	IV	V
I	0	4	6	2	0
II	0	2	12	2	0
III	0	6	16	4	0
IV	1	3	7	2	0
Total	1	15	41	10	0
Percent	1.49	23.39	61.19	14.93	0

Out of 67 first seen cases, in grade I malnutrition total number of cases 12, in grade II 16 cases, in grade III 26 cases and in grade IV 13 cases were seen.

Out of 50 follow up cases, in grade I malnutrition total number of cases 11, in grade II 13 cases, in grade III 17 cases and in grade IV 9 cases were seen. Out of 67 cases first seen, 45 and out of 50 cases followed 32 were found to be lactose malabsorbers and this difference was not significant statistically (Table 5, 6).

Table 5: Distribution of lactose malabsorbers in various grades of malnutrition (first seen cases).

Grades of malnutrition	Total No. of cases	No. of male cases	Percent	No. of female cases	Percent
I	12	0	0	12	54.54
II	16	8	17.79	8	36.37
III	26	24	53.33	2	9.09
IV	13	13	28.88	0	0
Total	67	45		22	

Table 6: Distribution of lactose malabsorbers in various grades of malnutrition (follow-up).

Grades of malnutrition	Total No. of cases	No. of male cases	Percent	No. of female cases	Percent
I	11	0	0	11	61.1
II	13	7	21.88	6	33.3
III	17	16	50	1	5.6
IV	9	9	28.12	0	0
Total	50	32		18	

Symptoms in lactose malabsorbers

Fever, cough, failure to thrive, anorexia, irritability, vitamin A deficiency, anemia, and prolapsed rectum. About 32 cases cough, 25 cases failure to thrive, 25 cases show anorexia, 24 cases irritability, 22 cases vitamin A deficiency, 17 cases of anemia, 11 edema cases and 3 cases show prolapsed rectum.

Table 7: Presenting symptoms in lactose malabsorbers.

Symptoms	No. of cases	Percent
Fever	32	71.1
Cough	32	71.1
Failure to thrive	25	55.5
Anorexia	25	55.5
Irritability	24	53.3
Vitamin A deficiency	22	48.8
Anemia	17	37.7
Edema	11	24.4
Prolapsed rectum	3	6.6

DISCUSSION

According to McLaren at any given time something of the order of 4,000 million pre-school children suffer from severe degree or the other form of protein energy malnutrition and therefore constitute one of the serious health hazard.[5] This observation is in accordance with that of Balagopal Raju et al who reported an incidence of 65 percent.[6]

Udani et al, found high incidence of lactose malabsorption in upper socio-economic group in contrast in the present study. The reason being 70 percent of the children in their study belong to upper income group.[7]

Malnutrition is known to cause atrophic changes in intestinal mucosa producing malabsorption according to Trowel.[8]

These changes may also be responsible for carbohydrate malabsorption, as the sugar splitting enzymes are localized in the cytoplasm according to Bowie et al (1965).[9]

Because of the deficiency of disaccharides, the ingested disaccharides are not hydrolysed. The unhydrolysed sugar passes down the intestine, absorbs water by osmosis. Bacteria in the terminal ileum and ascending colon ferment these disaccharides to low molecular weight organic acids, carbon-di-oxide and methane according to Weijers et al.[10]

It has been proved beyond doubt that depressed intestinal enzyme activity is associated with malnutrition even of a mild clinical degree, because lactase enzyme being most sensitive and present at the lowest activity, falling lowest and recovers last during the disease process according to Stanfield.[11]

Lifshitz et al, reported 77 percent incidence of lactose malabsorption in Mexican children. Diarrhea persisted for more than 3 weeks in 62 percent of the infants with severe malabsorption if lactose was not removed from diet.[12]

Chandrashekharan et al, reported 40 percent incidence of lactose malabsorption. Amongst the infant with significant dehydration 83.3 percent had lactose malabsorption, while mildly dehydrated infant showed 22.7 percent.[13]

The only known naturally occurring source of the disaccharide lactose is the milk of placental animal. "Saccharum lactis", disaccharide lactose, is synthesized in the mammary gland by the transfer of galactose from U.D.P.-galactose to glucose. This reaction requires the participation of two proteins, the enzyme N-acetyl galactosyl transferase and alpha-lacto albumin according to Brodbeck and Ebner (1966).[14]

CONCLUSION

Lactose malabsorption is common in protein –energy malnutrition. This can be determined by simple ward tests and abnormal lactose tolerance curve after oral lactose load. Lactose malabsorption increases with the severity of malnutrition. Incidence of lactose malabsorption is more in low socio-economic group. Malnutrition leads to lactose malabsorption and lactose malabsorption is an important contributory factor in production of malnutrition.

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