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Anemia and Hemoglobin Level in Angamis Children of Kohima District, Nagaland

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Abstract

The present study has been undertaken to estimate the hemoglobin content with the aim to find out the different levels of hemoglobin content among the Angami children (between 6-10 years) of Jotsoma, Kohima district, Nagaland. A total of 100 blood samples was collected from the children of various houses in different areas of the Jostoma village, Kohima district, Nagaland. Major percentage of children were normal and few under the category of moderate and mild. The boys and girls can equally have grouped into the same state of hemoglobin concentration, but no single girl found to be anemic in the age group of 6 and 10 years. However, more number of boys were anemic than girls.

Keywords: Angamis; Nagaland; Tenyidie; Malnutrition; Nutritional anaemia.

Introduction

Anemia is defined as a decreased concentration of hemoglobin and red blood cell mass compared with that of age and sex matched controls (Fauci et.al. 1998; Ghai, 2000). Anaemia is one of the most common nutritional problems in many parts of the world; especially in developing countries. Kumari and Jain (2005) stated that the school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence. According to Dreyfuss et.al. (2000) two billion children are affected with iron deficiency anemia worldwide. In recent years, several studies indicated that Iron-deficiency anemia leads to serious health problems, such as poor cognitive and motor development, behavioral problems in children (Grantham-McGregor and Ani, 2001).

Literature Review

Mallika and Kupputhai (1995) studied the nutritional status of pre-school children belonging to Kond, Gadaba and Porja tribes of Andhra Pradesh. They assessed the nutritional profile through anthropometric and clinical examination of all the subjects and hemoglobin estimation. The majority of the pre-school children were found to be malnourished, which calls for effective programs by the Government. Vidya (2003) evaluated the nutritional status of the children of Dharwad Slums. Certain parameters like-anthropometric, clinical examination, hemoglobin

estimation, dietary survey, morbidity patterns and socio-economic conditions were used to assess the nutritional status of Dharwad Slum children. There was malnutrition among the children since their parents were casual labours. Other factors which were associated with the malnutrition of the children were poor environmental factors, inadequate health care facilities and poor dietary patterns and so on. The researcher suggests certain welfare measures which would boost the economic status of slum dwellers in general and nutritional status of slum children in particular. Prabhakar and Gangadhar (2009) studied the prevalence of anaemia among Jenu Kuruba tribal children of Mysore district, Karnataka state. In this study 175 children ranging in age group 6-10 years were selected and estimated the hemoglobin level by the Cyanmethemoglobin method. The study revealed that, 36.57% of children were moderately anaemic, 26.29 percent were mildly anaemic and 14.86 percent severely anaemic. On the whole 77.71% were suffering from different forms of anaemia. The prevalence of anaemia was more among the girls than boys.

Kanani and Gopaldas (1983) investigated the nutritional impact of nutrient and health inputs in Baroda municipal primary schools among 113 boys of 5 to 13 years who belong to low income group. The results revealed that the midday meal supplement could not bridge the gap. There was a deficit of calories and proteins in the home diet, mostly of iron and vitamin A hemoglobin levels and clinical signs of Xerophthalmia are increased significantly. Padmaja et.al. (1987) attempted to study the interrelationship between diet, anthropometry, hemoglobin and riboflavin status among the urban school boys studying in class 3 and 4 from low income families in Hyderabad. The data reveal that riboflavin deficiency and anaemia was complex. Income and diet tend to influence on riboflavin status, but not on hemoglobin status.

Sharma and Chawla (2005) examined the impact of nutrition counseling on anthropometric and biochemical parameters of school girls (7-9 years). They observed that the biochemical parameters like hemoglobin level of school girls was 9.47 and 9.6 g/dl in control and environmental group at baseline, which significantly increased to 10.5 g/dl in the experimental group after the nutritional counseling. Bhatnagar et.al. (2003) investigated the hemoglobin estimation, total red blood cell count, total leukocyte count and different leukocyte count on a cross sectional sample of 100 Vokkaligas (90 males and 10 females) of Mysore ranging from 6-20 years from schools in Belvadi and Kigali villages of Mysore. The results revealed a trend of increase in hemoglobin level in males up to 17-18 years, whereas in females the level of hemoglobin fell with increase of age from 7 years onwards. No significant age changes were observed in red blood cell count and total leukocyte count in both the sexes.

Angelova et.al. (1988) investigated the reference values of hemoglobin, hematocrit and erythrocytes in children aged from two to six by percentile method. The children are from Sofia, brought up at home and visiting children's institution. Their physical development and health status have been evaluated by their health files. The children have been selected according to WHO requirement. The 15th percentile value of hemoglobin values obtained corresponds to the normal values in the basic pediatric manuals and could be used in the evaluation of the health state of the children at the respective age. Horacio et.al. (2005) studied the children with short bowel syndrome of 3-12 years old, who had not received parenteral nutrition for at least two years. Anthropometric, hemoglobin values and indicators of minerals and vitamin were analyzed. The study reveals that many biological and growth deficiencies are frequently seen in patients with short bowel syndrome (SBS), even children adapted to external feeding. Beall and Brittenham (1998) made a comparative analysis of hemoglobin concentration of Tibetans and Bolivian Aymara females. They have attributed the state of health to genetic factors mainly.

Keeping above reviews in mind the present study was carried out to study the prevalence of anemia and estimation of hemoglobin level among the Angamis of Nagaland.

Materials and Method

Study area

The present study was conducted in Jotsoma village, Kohima district of Nagaland state. Nagaland is situated in the North-Eastern region and it represents the richest ethnic region of the world. Kohima, situated in the south at an altitude of 1444 m above sea level, occupies pride of place as the capital city of Nagaland. The district with great hills ranges inhabited by the Angamis, a major chunk of the Naga tribes of Nagaland. Village Jotsoma is one among others having a larger concentration of Angamis. The village is situated 3 km south-west of Kohima and 2 km

south of National Highway-39, at an altitude of 1445m and is bounded by Mt. Puliebadze and Mt. Japfo in the South. The population is around 4000. The people usually follow Jhum and Wet type of cultivation. The village authority is usually controlled by the males. The people are usually non-vegetarians and about 99% of people follow Christianity. The village is divided into four Khels viz. The Krunoma, Khwiima, Tsieyama and Tholoma. Agriculture is the main occupation. They are usually non-vegetarians. Tenyidie is the most common language spoken, though some other languages like Nagamese (a pidgin language) and English spoken people are also found. The family is usually of patrilineal type. Nuclear family is predominant and joint families are also found.

Sample Collection

A total of 100 blood samples was collected from the children of various houses in different areas of the Jostoma village, Kohima district, Nagaland. A cross-sectional survey was used to select the children aged 6-10 years (61 males and 39 females) and males and females were selected through random sampling technique. The blood sample was collected by choosing a child from each household through finger prick method.

Experimental Procedures

Test of Hb level

Anaemia is defined as a reduction in the hemoglobin (Hb) level in the blood circulation. It is an important tool in diagnosing anaemia. Nutritional anaemia is a disease syndrome caused by malnutrition in its widest sense (WHO, 1982). In the present study the blood samples were collected for estimating the hemoglobin level by ICSH recommended Cyanmethemoglobin Method (Gopaldas and Seshadri, 1987).

Principle

When blood is mixed with a solution containing Potassium Ferricyanide and Potassium Cyanide, the Potassium Ferricyanide oxidizes iron to form Methemoglobin. The Potassium cyanide then combines with Methomoglobin to form Cyanmethemoglobin, which is a stable colour pigment read photo metrically at a wavelength of 530 nm or green filter.

Reagent

Cyanmethemoglobin Reagent (Drabkin's solution): Dissolve 200mg Potassium Ferricyanide [K3 Fe (CN) 6], 50 mg of Potassium Cyanide [KCN], 140 mg of Potassium Phosphate Monobasic [KH2 PO4) and add 0-5ml of Sterox SE (surface active reagent) in 100 ml of distilled water.

Apparatus

It includes 12x75 test tubes, 2µl micro pipettes, Cyanmethemoglobin reagent (Drabkin's solution) disposable blood lancets, disposable micropipette tips, clean and sterile glassware, rectified spirit, surgical cotton, freezer, thermos flask, glass marking pencils, ruler, cello tape, filter paper, beakers, test tube rack, Hb standard, measuring cylinder, test solution bottles, labeling sheet, and hand gloves.

Technique

The little finger of the subjects was sterilized with rectified spirit just before taking the blood. Then a prick was given on the little finger of the left hand on the subject with the help of disposable blood lancet. A thick smear of blood drop was collected in a brown test bottle containing Drabkin's solution (5 ml) by micro pipette (20µl). The blood test solution bottles were brought later in a thermos flask to the department laboratory and tested.

Procedure

Measure two test tubes in each 5 ml of hemoglobin reaction reagent (Cyanmethemoglobin reagent) one for blank and another adding with 0.02 ml (20µl) of blood for sample. After keeping for 5 minutes, place test tube type blank into the photoelectric colorimeter instrument and set in at 100% to obtain results from calibrated instrument digital display. Calculate the test result by the standard solutions test standard to get the accurate hemoglobin content in the blood sample. Plot absorbance Hemoglobin concentration in grams' percent. Different grades of anemia were diagnosed when Hb concentration was less than 11.5 grams per deciliter (g/dL) for children (WHO, 1989). According to World Health Organization (WHO, 2001) standards, if the hemoglobin concentration above 10 g/dL but below 11.5 g/dL is mild anemia, when the concentration between 7 and 10 g/dL is moderate anemia and when it below 7 g/dL is severe anemia.

Classification of Hemoglobin Concentration (g/dL)	
Normal	>11.5
Anaemia	<11.5
Mild	10.0 –11.5
Moderate	7.0 –10.0
Severe	<7

Results and Discussion

Distribution and total number children according to their age group are shown in table 1. The estimation of Hemoglobin level can be inferred that out of the 100 individual samples collected, 77% individuals were normal, 23% individuals were affected with various grades of anemia (Table 2). Out of 77% individuals, 73.77% boys and 82.05% of girls were normal in their hemoglobin level. However, 26.23% of boys and 17.95% of girls were grouped under anemic (23.00%) (Table 2).

Table 1. Total number and percentage of the Angami children

Age group	Gender	No. of Subject	Percentage (%)
6	Boys	13	21.31
	Girls	8	20.51
7	Boys	10	16.39
	Girls	9	23.08
8	Boys	11	10.03
	Girls	6	15.38
9	Boys	7	11.48
	Girls	6	15.38
10	Boys	20	32.79
	Girls	10	25.64
Total	Boys	61	61.00
	Girls	39	39.00

Table 2: Gender wise distribution of anemia among the children of Angamis

Gender	Normal	Anemic	Total
Boys	45 (73.78)	16 (26.22)	61
Girls	32 (82.06)	07 (17.94)	39
Total	77 (77.00)	23 (23.00)	100

Figures in parenthesis are percentage.

Table 3: Distribution of anemia among the children of Angamis.

Age	Sample size	Anemic	Normal
6	21	03 (14.29)	18 (85.71)
7	19	06 (31.58)	13 (68.42)
8	17	08 (47.06)	09 (52.94)
9	13	03 (23.08)	10 (76.92)
10	30	03 (10.00)	27 (90.00)
Total	100	23 (23.00)	77 (77.00)

Figures in parenthesis are percentage.

Table 4: Distribution of various grades of anemia among the children of Angamis.

Hb level (g/dL)	Grades of Anemia	Boys	Girls	Total
>11.5	Normal	45 (58.44)	32 (41.56)	77
<11.5	Anaemia	16 (69.56)	07 (30.44)	23
10.0 –11.5	Mild	14 (70.00)	06 (30.00)	20
7.0 –10.0	Moderate	02 (66.67)	01 (33.33)	3
<7	Severe	00 (00.00)	00 (00.00)	0

Figures in parenthesis are percentage.

It can be inferred that more number of anemic children were found to be in the age group of 8 years, followed by 7, 9, 6 years and so on (Table 3). In this present study, it was observed that out of 100 individuals, there were 23% individuals whose hemoglobin levels were below 11.50 g/dL. Though it was below the normal hemoglobin level, it was again observed that 20% of individuals were in the

Table 5: Prevalence of different grades of anaemia among the Angami children.

Age group	Gender	Normal		Anemic		Mild		Moderate	
		No.	%	No.	%	No.	%	No.	%
6	Boys	10	16.39	3	30.00	2	66.67	1	33.33
	Girls	8	20.51	–	–	–	–	–	–
7	Boys	7	11.48	3	30.00	3	100.00	–	–
	Girls	6	15.38	3	50.00	2	66.67	1	33.33
8	Boys	6	9.84	5	47.00	5	100.00	–	–
	Girls	3	7.69	3	–	3	100.00		–
9	Boys	5	8.20	2	23.00	2	100.00	–	–
	Girls	5	12.82	1	20.00	–	-	1	100.00
10	Boys	17	27.87	3	23.00	3	10.00	–	–
	Girls	10	25.64	–	–	–	–	–	–
Total	61 Boys	45	73.77	16	26.23	14	22.95	2	3.280
	39 Girls	32	82.05	7	17.95	6	15.38	1	2.560

mild category (below 10.00-11.50 g/dL and 3% of individuals were in the moderate category (between 7.00-10.0 g/dL). But none of the individuals were in the severe category (below 7.00) and so no severe anemic child found. Furthermore, boys were found to be anemic than girls (Table 4).

Table 5 shows majority of 6 years' boys and 7 and 9 years aged girls fall under the moderate category of hemoglobin concentration. Whereas 20% individuals were in the mild category of which 22.95% were boys and 15.38% were girls. 3% individuals were of moderate category in which 3.28%were boys and 2.56 were girls. The children of low hemoglobin levels show more in boys (26.23%) than in girls (17.95%). Though no severe cases of anemia found, there were some individuals who fall under the mild category (22.95%) and 15.38% were moderate category. These children need further nutritional care to sustain the hemoglobin level and improve health condition.

The present study revealed that the boys and girls of Angami children of Kohima district, Nagaland can equally have grouped into the same state of hemoglobin concentration. However, no single girl found to be anemic in the age group of 6 and 10 years.

Conclusion

A person is said to be suffering from anaemia when there is a reduction in the hemoglobin level in blood circulation and this result due to malnutrition. An individual is known to be anemic when the hemoglobin level is below the normal hemoglobin level, i.e., below 11.5 g/dL. The test of Hemoglobin level among the Angamis of Jotsoma village, Kohima District, Nagaland, was undertaken to diagnose the prevalence of anemia. From the results it can be concluded that none of the individuals were found to be severely anemic and some percentage of children fall under the category of moderate and mild category. However, more number of boys were anemic than girls. To maintain normal health condition, proper care should be taken by consuming sufficient amount of nutrients containing rich iron in their food. Otherwise more number of Angami children may slip to be anemic. Awareness level should be improved to understanding the importance of certain essential nutrients.

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