



## HAEMATOLOGICAL PARAMETERS OF ALPHA THALASSEMIA OF BAIGA POPULATION OF ANUPPUR DISTRICT

Mamta Saha<sup>1</sup> and Gopal Gond<sup>2</sup>

<sup>1,2</sup>Guru Nanak College Of Science, Ballarpur, Maharashtra, India.

Corresponding Email: [mamtasaha14@gmail.com](mailto:mamtasaha14@gmail.com)

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### ABSTRACT:

Madhya Pradesh and Chhattisgarh fall in the central India and both of the state having largest tribal population in any India. This is about ¼ of total tribal population of India.

District Anuppur is situated in South Eastern part of Madhya Pradesh. Anuppur district has been formed from the district of Shahdol. The Baiga population is one of the crowd tribal population of Madhya Pradesh and Chhattisgarh.

Alpha Thalassemias associated with improved hematological indices and lower consultations rate in this group of patients. Red Blood Cell (RBC) are the part of Complete Blood Count (CBC) test. It is used to help diagnose the cause of anemia, a condition to show all about blood cell in present body. Hematological parameters indices include the Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC). These all shows the average amount of hemoglobin, based on the volume of RBC's and all about the present in individuals RBC's.

**Keywords :-** Alpha Thalassemia, Haemoglobin, RBC's, Baiga tribe Madhya Pradesh.

### INTRODUCTION :

Haemoglobin is a negatively charged protein at alkaline pH and migrates toward the anode (+) in an electric field. During electrophoresis, haemoglobin variants separate at different rates due to differences in their surface electrical charge as determined by their amino acid structure (Chanarin, 1989). Electrophoresis Power supply capable of delivering a constant current (0-100 mA and up to 500 Volts) and a horizontal electrophoresis tank (migration chamber), Cellulose acetate membranes (CellasGel, Cleaver Scientific Ltd., UK), Whatman No.3 filter paper (GE Healthcare UK Limited), sample applicator is required for this test.

### MATERIALS AND METHOD:

#### Sample Collection:

Venous blood is preferred for most haematological examinations. About 3 ml of venous blood is collected in sterile vials

containing Ethylene Diamine Tetra Acetic acid (EDTA) acid as anticoagulant.



### Basic Laboratory investigations:

#### Complete Blood Count CBC:

The complete blood count including total haemoglobin percentage (Hb%) total red blood cell count (TRBC) and red cell indices such as mean cell volume (MCV), mean cell haemoglobin (MCH), mean cell Haemoglobin concentration (MCHC) were measured using an automated blood cell counter (Cellenium 19, China). Complete Blood cell Counts (CBC's) are used during diagnosis, treatment, and follow-up to determine the health of the patient. It was done

with the help of CBC Counter, an automatic blood cell counter. Many parameters have been taken into consideration. Those parameters and their normal values are as followed-

**WBC [White Blood Cell Count]: 4000 to 10800 cells/ $\mu$ l**

**Haemoglobin %:**

Men: 13 (or 14) to 18 gms/dl

Women: 12 to 16 gms/dl

Children: 11 to 13 gms/dl

**Hematocrit [Packed Cell Volume (PCV)]:**

Men: 0.42 – 0.52 [42% - 52%]

Women: 0.37 – 0.47 [37% - 47%]

Children: 0.36 – 0.40 [36% - 40%]

**RBC [Red Blood Cell Count]:**

Men: 4.5 – 6.2 million cells/ $\mu$ l

Women: 4.2 – 5.4 million cells/ $\mu$ l

Children: 4.6 – 4.8 million cells/ $\mu$ l

**MCV [Mean Corpuscular Volume]:**

Adult: 86  $\pm$  10 fl

Infants: 106 fl

Children (3 months): 95 fl

Children (1 year): 78  $\pm$  8 fl

Children (3-6 years): 81  $\pm$  8 fl

Children (10-12 years): 84  $\pm$  7 fl

**MCH [Mean Corpuscular Haemoglobin]**

Adult: 29.5  $\pm$  2.5 pg

Children (3 months): 29  $\pm$  5 pg

Children (1 year): 27  $\pm$  4 pg

Children (3-6 years): 27  $\pm$  3 pg

**MCHC [Mean Corpuscular Haemoglobin Concentration]:** 32-36 gms/dl

**Lymphocytes:** 1.3 - 4.00  $\times 10^3$  /  $\mu$ l

**Monocytes & Eosinophils Granulocytes [MID]:** 0.15-0.70  $\times 10^3$ / $\mu$ l

**Granulocytes:** 2.5 – 7.50  $\times 10^3$  /  $\mu$ l

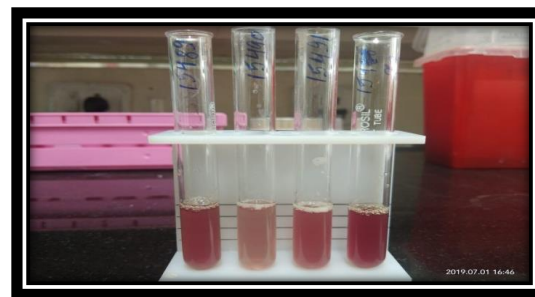
**Hematocrit (HCT):** 36.0 – 48.0 percent

**Platelet (PLT):** 150 – 400  $\times 10^3$  /  $\mu$ l (or  $10^9$  / l)

**Mean Platelet volume (MPV):** 8.0 – 15.0 fl

**Sickle Solubility Test:**

This test was performed to check the presence of Sickling in the sample.



**Turbidity shows positive results**

#### RESULT AND DISCUSSION :

The mean haematological parameters of normal for alpha gene deletion and alpha thalassemia type-2 individuals are given in Table -1. The mean haemoglobin level of normal individuals is 11.5 $\pm$ 1.7g/dl. The mean haemoglobin levels of individuals those who are homozygous for  $-\alpha^{3.7}$  deletion ( $-\alpha^{3.7}/-\alpha^{3.7}$ ) is observed as 11.8 $\pm$ 1.2 g/dl in heterozygous for  $-\alpha^{3.7}$  deletion ( $-\alpha^{3.7}/\alpha\alpha$ ) and heterozygous for  $-\alpha^{4.2}$  deletion ( $\alpha\alpha/-\alpha^{4.2}$ ) individuals. The low mean levels for MCV and MCH were observed in all three categories. The mean red cell indices of homozygous for  $-\alpha^{3.7}$  deletion ( $-\alpha^{3.7}/-\alpha^{3.7}$ ) individuals are relatively lower than that of normal and heterozygous individuals. Mean Hb A<sub>2</sub>, Hb F levels are same in all three categories and within normal limits. (Balkaran B.1992)

Mean haematological parameters of anaemic population in shown in Table -2 Results shown that anaemic population has lower values for MCH in all the three groups. This is the indicative of microcytosis and iron deficiency. Identification of Iron deficiency is not done in the studied population. The mean haemoglobin level for the adult male is 11.5 $\pm$ 2.0 g/dl. It is 10.4 $\pm$ 1.2 g/dl for female and 11.2 $\pm$ 0.6 g/dl for the children. Children have relatively low indices. The mean haematological parameters of sickle cell and sickle cell disease individuals are given in Table-3. Only 13% of the individuals were found as sickle cell trait and 1% as sickle cell disease. The mean haemoglobin level of sickle cell trait is 12.5 $\pm$ 2.2g/dl. The mean values for MCV and MCH are 70.0 $\pm$ 7.3 pg and 25.1 $\pm$ 2.2 pg

respectively. Normal mean levels for Hb F% (1.2±0.6) and Hb A<sub>2</sub>% (3.2±0.3) are observed. The mean WBC levels for sickle cell trait individual is observed as 8.7±2.6X10<sup>3</sup>/μl. (Adams RJ1994) The mean haemoglobin level of sickle cell disease is 6.2g/dl. The mean values for MCV and MCH are 73.4 pg and 25.8 pg respectively. Normal mean levels for Hb F% (17.0) and Hb A<sub>2</sub>% (3.4) are observed. The mean WBC levels for sickle cell trait individuals is observed as 5.2X10<sup>3</sup>/μl. Only 2 individuals were found as β-thalassemia trait. The mean haemoglobin level of β- thalassemia trait is 12.2±0.2 g/dl. The mean values for MCV and MCH are 66.2±4.7 pg and 23.6±2.5 pg respectively. Normal mean levels for Hb F% (0.8±0.7) and Hb A<sub>2</sub>% (4.4±0.6) are observed. The mean WBC levels for β- thalassemia trait individuals are observed as 11.9±0.8 X10<sup>3</sup>/μl. 58 individuals were found as normal the mean haemoglobin level of normal individual is 11.9±1.5 g/dl. The mean values for MCV and MCH are 71.2±6.9 pg and 25.2±2.9 pg respectively. Normal mean levels for Hb F% (0.6±0.3) and Hb A<sub>2</sub>% (2.6±0.5) are observed. The mean WBC levels for β- thalassemia trait individuals are observed as 7.1±2.0X10<sup>3</sup>/μl.

The CBC profile of the Gond population of Shandol district is given in Table-4. The mean haemoglobin was 12.4±1.8 g/dl, 11.5±1.0 and 11.4±1.3 g/dl for adult male, female and children group respectively. Mean values for MCV is 72.1±7.0 fl for adult males, 70.3±7.4 fl is for females and 66.1±5.0 fl is for children. Low mean values of MCH in both groups indicate the microcytosis. The mean value for MCHC is in normal range for all male (35.5.0±1.1 pg), female (35.5±1.2pg) and children (35.9±0.8). The mean values for WBC is 7.3±2.3X10<sup>3</sup>/μl among male, it is 7.2±2.1 X10<sup>3</sup>/μl for female and it is 8.6±2.6 X10<sup>3</sup>/μl for children. The mean HbA<sub>2</sub> level in all male (2.8±0.4), female (2.6±0.7) and children (2.7±0.6) is in normal range. The mean Hb F levels are observed as 1.4±3.2 in males, 0.6±0.3

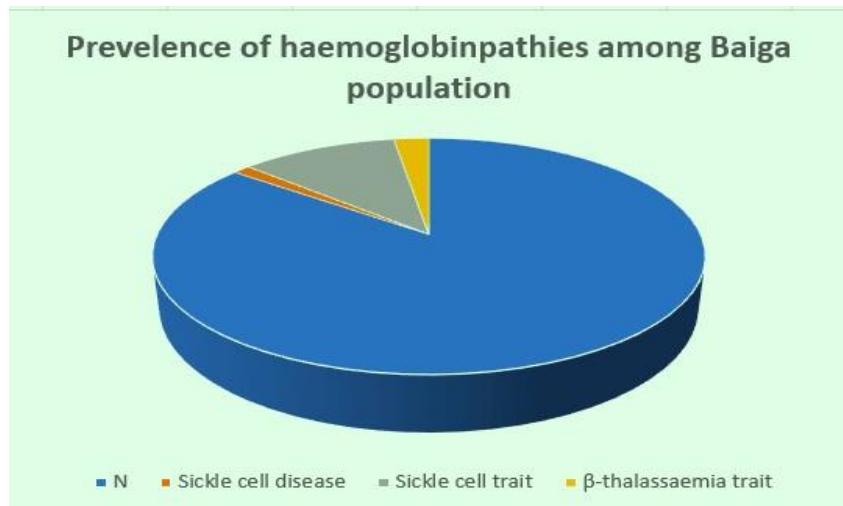
in female and 0.8±0.4 among children group. (Camasehella C 1997).

#### REFERENCES:

- Alsultan A, Aleem A, Ghabbour H et al., (2012)• Sickle cell disease subphenotypes in patients from southwestern Province of Saudi Arabia. *Journal of pediatric hematology/oncology*. 34(2): 79-84.
- Balkaran B. Char G. Morris JS, Thomas PW, Serjeant GR (1992). Stroke in a cohort of patients with homozygous sickle cell disease. *Journal of Pediatrics* 120(3): 360-366.
- Aguilar C, Vichinsky E, Neumayr L (2005). Bone and joint disease in sickle cell disease. *Hematol. Oncol. Clin North Am*. 19(5):929-941.
- Carter D, Chakalova L, Osborne CS, Dai YF, Fraser P (2002). Long-range chromatin regulatory interactions in vivo. *Nat Genet*. 32(4): 623-626.
- Barrett-Connor E (1971). Bacterial infection and sickle cell anemia. An analysis of 250 infections in 166 patients and a review of the literature. *Medicine (Baltimore)* 50(2): 97-112.
- Chanarin I (1989). *Laboratory Haematology: An account of Laboratory techniques*. 1st edition Pub. by Churchill Livingstone, London.

**TABLE NO.1 Prevalance of Haemoglobinopathies among Baiga population of Anupur District**

Population	N	Sickle cell disease	Sickle Cell trait	β- thalassaemia trait
Baiga	70(1%)	1(13%)	9(13%)	2 (3%)

**TABLE NO. 2: Percent prevalence of anaemia among Baiga population of Anuppur District.**

Group	N	Type of anaemia			Total Anaemia
		Mild	Moderate	Severe	
					15 (58%)
Male	26	13 (50%)	1 (4%)	1 (4%)	20 (59%)
Female	34	11 (32%)	9 (28%)	0	6 (60%)
Children	10	5 (50%)	1 (10%)	0	41 (59%)
<b>Total</b>	<b>70</b>	<b>29 (41%)</b>	<b>11 (16%)</b>	<b>1 (4%)</b>	

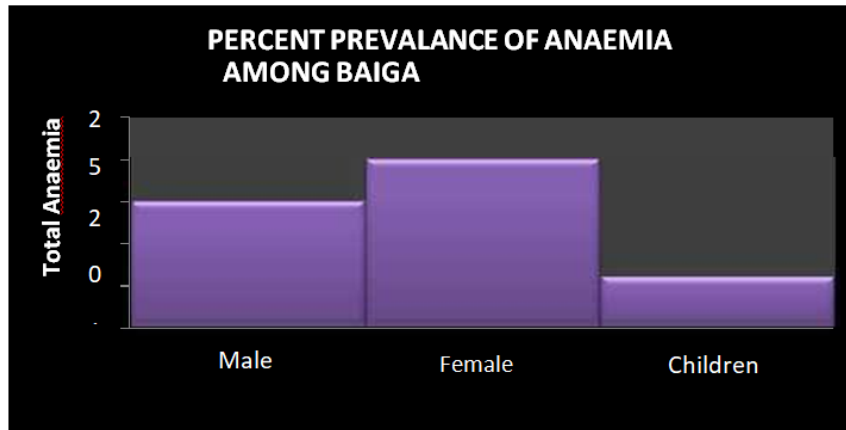
**TABLE NO. 3 HAEMATOLOGICAL PARAMETERS OF ALPHA THALASSEMIA OF BAIGA POPULATION OF DISTRICT ANUPPUR**

Group	N	Hb (g/dl)	Hct (%)	TRBC ( $\times 10^6/\mu\text{I}$ )	MCV (fl)	MCH (pg)	MCHC (g/dl)	HbF (%)	HbF <sub>2</sub> (%)	WBC ( $\times 10^3/\mu\text{I}$ )	PLT ( $\times 10^3/\mu\text{I}$ )
Male	15	11.5 $\pm 2.0$	33.8 $\pm 4.8$	4.6 $\pm 0.9$	72.6 $\pm 6.3$	25.4 $\pm 2.1$	35.1 $\pm 0.9$	1.7 $\pm 4.2$	2.9 $\pm 0.5$	6.9 $\pm 1.8$	209.3 $\pm 54.1$
Female	20	10.4 $\pm 1.2$	29.4 $\pm 2.9$	4.3 $\pm 0.5$	68.6 $\pm 7.1$	24.1 $\pm 2.9$	35.2 $\pm 1.3$	0.7 $\pm 0.3$	2.4 $\pm 0.5$	6.5 $\pm 2.0$	168.7 $\pm 41.2$
Children	6	11.2 $\pm 0.6$	31.2 $\pm 1.6$	4.8 $\pm 0.4$	68.2 $\pm 7.5$	23.3 $\pm 2.6$	35.9 $\pm 0.8$	0.8 $\pm 0.5$	2.7 $\pm 0.6$	7.6 $\pm 2.4$	186.5 $\pm 36.1$

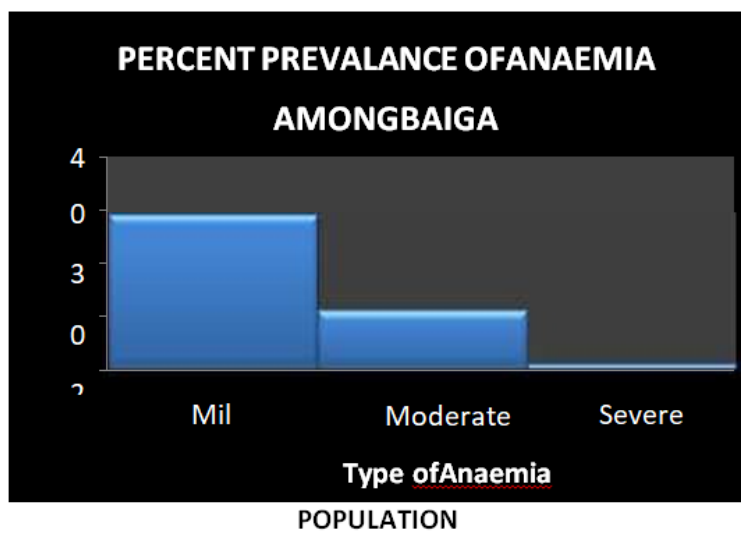
**TABLE NO.4 CBC PROFILE OF BAIGA POPULATION OF ANUPPUR DISTRICT**

Group	N	Hb (g/dl)	Hct (%)	TRBC ( $\times 10^6/\mu\text{I}$ )	MCV (fl)	MCH (pg)	MCHC (g/dl)	HbF (%)	HbA <sub>2</sub> (%)	WBC ( $\times 10^3/\mu\text{I}$ )	PLT ( $\times 10^3/\mu\text{I}$ )
Male	26	12.6 $\pm 2.0$	36.1 $\pm 4.6$	4.9 $\pm 0.9$	72.5 $\pm 6.7$	25.7 $\pm 2.6$	35.5 $\pm 1.1$	1.4 $\pm 3.2$	2.8 $\pm 0.4$	7.73 $\pm 2.3$	205.6 $\pm 56.8$
Female	34	11.3 $\pm 1.5$	31.8 $\pm 3.7$	4.6 $\pm 0.5$	70 $\pm 6.6$	24.9 $\pm 2.8$	35.5 $\pm 1.2$	0.6 $\pm 0.3$	2.6 $\pm 0.7$	7.2 $\pm 2.1$	182.7 $\pm 50.2$
Children	10	11.8 $\pm 0.9$	32.9 $\pm 2.6$	4.8 $\pm 0.4$	69.1 $\pm 8.2$	24.7 $\pm 3.1$	35.9 $\pm 0.8$	0.8 $\pm 0.4$	2.7 $\pm 0.4$	8.6 $\pm 2.6$	216.8 $\pm 56.7$

**Graph 2.1 PERCENT PREVALANCE OF ANAEMIA AMONG BAIGA POPULATION**



**Graph 2.2 PERCENT PREVALANCE OF ANAEMIA**



**Graph 2.3: Percent prevalence of anaemia among Baiga population.**

