

A Study of Haemoglobin Barts in Cord Blood

Pages with reference to book, From 285 To 287

Lala Rukh Khan (Present Address: Department of Pathology, Allama Iqbal Medical College, Lahore.) Abdul Hayee
(Post-Graduate Medical Institute, Lahore.)

Abstract

It is easier to diagnose alpha (oc)-thalass-aemia in neonates, by detecting the presence of haemoglobin (Hb) Bart's because the procedure involved i.,e, haemoglobin electrophoresis for haemoglobin Bart's is inexpensive, rapid and reliable^{1,2}. A study was carried out to find the incidence of Hb, Barts in this part of the world. For this a random collection of cord blood each sample. In addition, estimation of Hb, PCV, RBC count, MCV, MCH and MCHC was done on suitable samples. In the present series three cases of alpha thalassaemia were diagnosed, making an overall prevalence of 0.94% (JPMA; 36: 285, 1986).

INTRODUCTION

Alpha thalassaemia is a genetic disorder characterised by reduced production of the alpha-globin chains of haemoglobin. A reduced production of a chains leads to formation of Hb Barts in the foetus. At the neonatal period when gamma-chain production is switching over to B -chain production, there is a short time when bottry-abd -B chains are competing for available a-chains; since a-chains have preference for /3-chains, the 7-chains excess becomes exaggerated and easily detectable in the blood during this phase of development. One of the major difficulties in diagnosis of a thalassaemia trait is that it does not produce any easily demonstrable change in the Hb pattern in adults³ Therefore cord blood examination for the presence of Hb Bart's is the most accurate and practical method for studying the incidence of a-thalassaemia in a population⁴ Presence of a-thalassaemia has been reported from various parts of the world.⁵ The incidence varies in different population (Table -1).

TABLE -1
Incidence of Alpha Thalassaemia in various Races .

Races	Incidence of Alpha Thalassaemia
Maltese	0%
Youguslavs	0.2%
Italians	0.5%
Greeks	0.7%
Lebanese	0.8%
Egyptians	2.0%
Indians	2.0%
Spanish	2.7%
Cypriots	2.8%
Turkish	2.9%
Syrian	3.0%
Jamaican Negroes	7%
Thais	19-21%

There has been no report on the prevalence of a-thalassaemia in Pakistan. In addition to Hb Barts, low Hb levels and low red cell indices are also found in a-thalassaemic patients.⁶

MATERIAL AND METHODS

For this study, a random collection of cord blood samples from 320 full term infants born in the labour

rooms of various Lahore hospitals was carried out. Two to three ml of free flowing samples from three hundred and twenty full term infants was done and haemoglobin electrophoresis on cellulose acetate membrane as well as on starch-gel was carried out on blood from the maternal side of the severed umbilical cord was collected in clean, dry vials containing 4-5 mg of sodium salt of ethylene diamine tetraacetic acid. After mixing, the samples were refrigerated at 4°-8°C and the following tests were carried out within 24 hours.

1. Hb estimation, RBC count, PCV and the red cell indices i.e. MCV, MCH and MCHC on coulter counter model Z F6 system with MCV/Hct accessory, coulter haemoglobin and dual diluter III.

2. Hb electrophoresis of haemolysate prepared according to s Lehmann and Huntsman¹¹, on (a) Cellulose Acetate Membrane (CAM) using tris EDTA Borate Buffer PH 8.6-9.1⁷ and (b) Starch Gel using Iris EDTA-Borate buffer system Ph 6,0,0. 8M⁷

The specimens which revealed a fast moving haemoglobin band were subjected to confirmation by performing electrophoresis on

(a) CAM in phosphate buffer Ph 6.5⁷ and

(b) Starch-gel in Phosphate buffer Ph. 7.1, 0.0054.M⁷

The Hb Barts so identified was quantitated by elution⁸.

RESULTS

In a total of 320 newborns included in this study, Hb Barts was identified on CAM in two infants and in an additional infant on starch-gel electrophoresis. Hb Barts identified on CAM as well as on starch gel in the first two infants was also quantitated and found to be 63% and 3.03% of the total haemoglobin, respectively. The haematological statistics of the three infants with Hb Barts as compared to the mean values of infants with normal haemoglobin pattern on electrophoresis (which therefore formed a control group) is given in Table -II.

TABLE - II
Haematological Data of the Positive Cases and the Control Group.

Subject	Hb gm/ dl	RBC Count x10 ¹¹ /l	PCV gm/ dl	MCV fl	MCH pg	MCHC Gm/dl	Hb Barts % of total Hb
Control Group.	15.4 (S.D.2.0)	4.4 (S.D-0.59)	52 (S.D.-7.2)	118 (S.D.7.3)	35 (S.D.2.3)	29.7 (S.D. 2.5)	Nil
INFANT -I	11.7	4.08	41.8	102	28.7	27.9	6.3%
INFANT -II	13.4	4.68	46.5	99	28.6	28.5	3.03%
INFANT -III	12.1	4.1	42.0	102	29.5	29.0	Low

DISCUSSION

The incidence of alpha thalassaemia varies from 0% to 21% in various races^{5,9-12} In the present study, cord blood samples from 320 newborns were investigated for alpha thalassaemia. Three positive cases were identified giving a prevalence of 0.94%. The haematological indices which show a definite variation in the positive cases as compared to the control group are: haemoglobin levels, MCV and

MCH all three indices being low in the affected infants^{41,15,16,6}

Therefore babies with a low MCV associated with a low MCH at birth should be investigated further for alpha thalassaemia viz. Hb electrophoresis, to detect presence of Hb Barts.

REFERENCES

1. Pornpatkul, M., Wasi, P. and Na-Nakorn, S. Haemoglobin parameters in obligatory alphathalassaemia. *J. Med. Ass. Thail.*, 1969; 52: 801.
2. Todd, D., Lai, M.C.S., Braga, C.A. and Soo, H.N. Alpha-thalassaemia in Chinese: Cord blood studies. *Br. J. Haematol.*, 1969; 16: 551.
3. Hegde, U.M., White, J.M., Hait, G.H. and Marsh, G.W. Diagnosis of alpha thalassaemia triit from Coulter Counter 'S' indices. *J. Clin. Pathol*, 1977; 30 : 884.
4. Lie-Injo, L.E., Solai, A., Herrara, A.R., Nicolaisen, L., Khan, Y.W., Wan, W.P. and Hasan, K. Hb Barts level in cprd blood and deletions of alpha globin genes. *Blood*, 1982; 59 : 370.
5. Weatherall, D.J., Pressley, L., Clegg, J.B., Weatherail, D.J., Higgs, S., Carey, P. and Serjeant, G.R. Detection of alpha thalassaemia in Negro infants. *B.J. HaematoL*, 1980;46 : 39.
7. Weatherali, D.J., and Clegg, J.B. *The thalassaemia syndromes*. 3rd ed. Oxford, Black well, 1981.
8. Weatherali, D.J. and Clegg, J.B. *The thalassaemia syndromes*. 3rd ed. 'Oxford, Blackweli, 1981.
9. Smith, M.B. and Cauchi, M.N. Incidence of alpha thalassaemia in Australian population of mediterranean origin. *Med. J. Austr.*, 1978; 2:357.
10. Pootrakul, S.N., Wasi, P., Pornpatkul, M. and Nanakorn, S. Incidence of alpha- thalassaemia in Bangkok. *J. Med. Ass. Thai.*, 1970; 53: 250.
11. Higgs, D.R., Pressley, L., Clegg, J.B., Weatherall, D.J. and Serjeant, G.R. Alpha thalassaemia in black populations. *Johns Hopkins Med. J.*, 1980; 146: 300.
12. Chouhan, D.M., Sharma, R. S. and Parekh, J.G. Alpha-thalassaemia in India. *J. Indian Med. Assoc.*, 1970; 54: 364.