JMSCR Vol||05||Issue||01||Page 15974-15975||January 2017

www.jmscr.igmpublication.org
Impact Factor 5.84
Index Copernicus Value: 83.27
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v5i1.119

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Beta Thalassaemia Carrier Detection by Nestroft - A Cost Effective Method

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Abstract
Thalassaemia, A Dreaded Disease Can be Prevented by an Uncumbersome and Inexpensive Nestroft Test by Detection of Thalassaemia Trait. Here we have Compared HPLC & Haemoglobin Electrophoresis with Low Cost Nestroft Test. Nestroft in Combination with MCV <80fl Proved 100% Sensitive. However Combination of Nestroft & MCV is not Cost Effective.
Conclusion- *Nestroft is a Single Cost Effective, Rapid, Reliable, Sensitive Screening Test.*
Keywords: *Nestroft, Thalassaemia Trait, Cost effective*

INTRODUCTION

The thalassaemia are a heterogenous group of disorder with a genetically determined reduction in the rate of synthesis of one or more type of normal haemoglobin, the inherited haemoglobin disorders are the most common single gene defect in man. The problem is of special importance in developing countries. The abnormality can be quantitative (thalassaemias) or qualitative (haemoglobimnopathy) of these, the thalassaemia, particularly beta thalassaemias and some alpha thalassaemia are the major cause of morbidity.

Around 7% of the population worldwide are carriers with more than 3,00,000 severely affected babies born every year. Estimated 7,500-12,000 beta thalassaemia major babies are born in india every year. In india nearly 30 million people are carriers of beta thalassaemia

As for treatment of thalassaemia major patient, till date, remains a source of misery, burden and mostly disappointing, prevention plays the key role. For thalassaemia major prevention is the only answer till date.

HPLC, haemoglobin electrophoresis, Hb A_2 estimation by elusion techniques are good screening tests, but they are very costly and time consuming. Costly instruments and consumables are needed for these tests. Trained professionals are also required for interpretation of the results. NESTROFT (naked eye single tube osmotic fragility test has been variably looked upon as a simple, cheap, rapid, objective test with se sensitivity as high as 94% in detection of thalassaemia trait

Here, we report an institution based study. To compare the results of NESTROFT with other tests eg. HPLC, CBC, A_2 elusion fraction, serum iron and TIBC

MATERIALS AND METHODS

When 20 micro litre of blood is put in 2 ml of 0.36% buffered saline solution, the cells which have normal discoid cell shape rupture and the solution become transparent. Abnormal cell fail to show this result as they have altered osmotic fragility, and they fail to rupture.

The cells remain suspended in the solution, so the solution is translucent to almost opaque

Those which show clear lines when the tube is held against the lines on the paper are referred to as NESTROFT NEGATIVE, while those in which the lines are not seen at all are NESTROFT POSITIVE, and those in which the partial blurring is encountered are said to be NESTROFT DOUBTFUL.

The study population included, anaemic patient, in paediatric OPD.

Sample size was 400 children. A detailed history was taken, after taking proper informed consent 5ml of venous blood was collected, 3 ml in EDTA tube and 2ml in plain tube. Two direct smear were made. The anticoagulated blood was used for NESTROFT, CBC, RETIC COUNT, HB ELECTROPHORESIS, HB. A_2, HPLC. A_2 level of$\geq$3.8% was used for diagnosing thalassaemia trait, while values between 3.4% to 3.7% were considered borderline, Serum was used for estimation of serum iron and TIBC

RESULTS

Table Showing Nestroft Result

NESTROFT results	Diagnosis	Diagnosis	Total
	Beta thal.trait	Not Beta thal. trait	
Positive	14 (true positive)	17	31
Negative	1(false negative)	368	369
Total	15	385	400

Sensitivity=14/15X100=93.33%
Specificity=368/385X=95.58%

A total of 400 OPD children were screened for haemoglobinopathies by using NESTROFT CBC, HPLC, RETIC COUNT, HB ELECTROPHO-RESIS SR. IRON &TIBC out of 15 cases of beta thalassaemia trait NESTROFT was positive in 14 cases . It showed 17 false positive and 1 false negative result. Thus for detection of beta thalassaemia trait among paediatric children the sensitivity of NESTROFT came to be 93.33% and specificity 95.58%. The overall HB A_2 3.9 % to 6.8 % . Though the levels were lower in cases of carriers with iron deficiency.

DISCUSSION

A total of 400 children underwent NESTROFT CBC AND HPLC. SR. IRON &TIBC .The purpose of the study is to validate the validity of NESTROFT in the detection of thalassaemia . 15 cases of beta thalassaemiea trait were identified. thus showing 3.75% prevalence of beta thalassaemia carrier . In our study NESTROFT was able to pickup 14 out of 15 thalassaemia carriers thus giving a sensitivity of 93.33%. The comparison of specificity and sensitivity, positive predictive value and negative predictive value of NESTROFT in our studywith some other previous studies also recommended NESROFT for screening of beta thalassemia trait, where there is high prevalence and constrained resources. Comparison of haematological parameters, among various haematological parameters among iron replete and iron deficient beta thalassemic carriers showed interesting results. The present study shows that the MCV and MCH levels were significantly lower in cases of beta thalassemia trait with coexistent iron deficiency than their iron– replete counterparts. Patient with beta thalassemia trait with co existent iron deficiency had haemoglobin level, MCV &MCH levels significantly lower than those of beta thalassaemia only.in our study the RBC counts and haematocrit were also lower in cases of beta thalassaemia with iron deficiency . the haemoglobin A_2 levels were also significantly lower in iron deficient carriers. However iron deficiency did not preclude a diagnosis of beta thalassaemia carriers as in these cases also the HB A_2 levels were significantly high

CONCLUSION

NESTROFT appears to be a valid test for beta thalassemia trait in this region, It is needed for larger community based screening strategies and to estimate the burden of beta thalassemia triat.