

## Sehgal's index in screening of beta thalassemia trait in comparison with mentzer's index in paediatric age group

Shaista Choudhary<sup>1</sup>, Jaydeep G.L<sup>2\*</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Post Graduate, Dept. of Pathology, Dr. B. R Ambedkar Medical College, Bengaluru, Karnataka, India

\*Corresponding Author: Jaydeep G.L

Email: [jdeepgl@gmail.com](mailto:jdeepgl@gmail.com)

### Abstract

**Introduction:** Thalassemia is a worldwide Haemoglobin disorder, characterised by reduction or absence of one or more of the globin chains. The overall prevalence ranges between 0.3 to 25 per 1000 live births. In India alone every year 10% of total world thalasseemics are born with carrier rate varying from 3-5% in North India and 1-3% in south india. Among all the haemoglobinopathies beta thalassemia trait is under diagnosed and over looked because of the other health priorities.

**Aims and Objectives:** Comparison of Sehgal's index with Mentzer's index in screening of beta thalassemia trait. Both the indices were calculated in all Microcytic hypochromic anemia cases in age group <18 years, MCV <70fl and Hb <10g/dl.

**Materials and Methods:** This is a prospective observational study conducted in the department of pathology at our tertiary care center for the duration of 6 months 200 cases of microcytic hypochromic anemia were reported followed by screening for beta thalassemia trait by calculating sehgal's & mentzer's indices. Hemoglobin electrophoresis was done for the samples showing positive for the indices.

**Results:** Out of 200 cases, 40 cases showed positive sehgal's index & 34 cases showed positive for mentzer's index. In Our study Sehgal's index showed 96% sensitivity & 91% specificity. Mentzer's index showed 94% sensitivity & 92 % specificity, Thus sehgal's index being more sensitive and Mentzers being more specific in combination of both being more accurate in detecting beta thalassemia.

**Conclusion:** The study was done to promote screening method to detect Beta thalassemia trait using these two haematological indices which were found to be highly specific, sensitive and quite accurate in detecting Beta thalassemia trait before taking a call for haemoglobin electrophoresis and HPLC which is an economical burden.

**Keywords:** Beta thalassemia trait, Sehgal's index, Mentzer's index, Paediatric age group.

### Introduction

The most important cause for microcytic anemia are Iron deficiency anemia (IDA) and beta thalassemia trait (BTT), Hence there is a need to discriminate between the two.<sup>1</sup> In order to avoid unnecessary iron therapy which is may lead to complications and also it is contraindicated in beta thalassemia and in beta thalassemia major, genetic counseling plays an important role in prevention to pass it on to the further generations. By following these measures as much as 90% of birth rate of thalassemia major can be reduced by genetic counselling methods.<sup>2</sup>

Of all the thalasseemics, the most common of thalassemia is being Beta thalassemia minor.<sup>2</sup> The World wide statistics shows there are over 250 million carriers of thalassemia with higher prevalence in some parts of the world 3-15% noted in India, 8% in Mediterranean regions, 10% in Middle East and 9% in South East Asia which is being a very big public health issue.<sup>2</sup>

IDA and BTT can be discriminated by these expensive and laborious tests like Complete blood count (CBC), total iron binding capacity (TIBC) serum iron, free erythrocyte protoporphyrin, serum ferritin, bone marrow iron stores, HbA2 and zinc protoporphyrin levels.<sup>3</sup>

So utilizing blood cell analysers for Red blood cell counts and other complete blood count based indices which are not easy to calculate and not expensive.<sup>3</sup> The calculated CBC indices which can be used to differentiate between IDA and BTT are Mentzers Index, (G and K) Green and King index, (S and L) Shine and Lal index etc., have been published and evaluated for screening of BTT. Among which S and L index had high predictive values.<sup>3</sup>

For the above mentioned indices if the values below the cutoff which was followed up with HbA2 level analysis to substantiate the diagnosis.<sup>4</sup> In developing country like india use of these inexpensive red cell indices were utilised in screening of areas with high risk groups and young couples.<sup>4</sup>

To segregate high risk cases, camps are done based on the above following CBC indices which is later followed by confirmatory methods. A screening test should have high sensitivity. But some highly sensitive indices have a poor specificity like in india where IDA is very common therefore additional confirmatory analysis are required which are expensive.<sup>(4)</sup>

One of the way to confirm BTT is by High-performance liquid chromatography (HPLC) which also serves as a screening tool but with the draw back of being expensive, Though has a better sensitivity and specificity.<sup>5</sup> The aim of this study is Comparison of Sehgal's index with Mentzer's index in screening of beta thalassemia trait. Both the indices were calculated in all Microcytic hypochromic anemia cases in age group <18 years, MCV <70fl and Hb <10g/dl. Considering HPLC as a gold standard.<sup>6</sup>

### Material and Methods

1. This is a prospective observational study conducted in the department of pathology at our tertiary care center, for the duration of 6 months from july 2018 to December 2018.

- 200 cases of microcytic hypochromic anemia were reported followed by screening for beta thalassemia trait by calculating sehgal's & mentzer's index.
- Hemoglobin electrophoresis was done for the samples showing positive for the indices.
- Inclusion criteria: Age <18yrs, MCV<70fl, Hb<10g/dl.
- Exclusion criteria: Non EDTA Samples, clotted samples and samples exceeding the criteria of age, HB levels, MCV & RBC count.

## Results of the Study

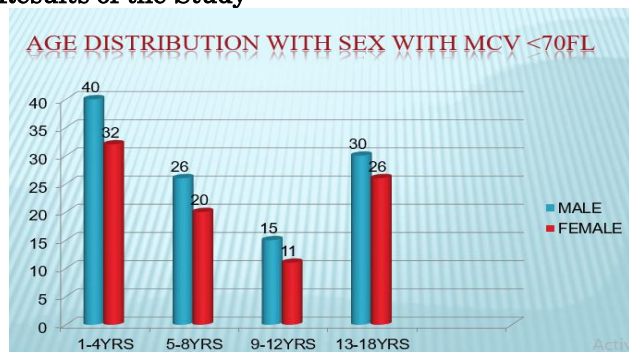


Fig. 1:

**Table 1:** Out of 200 cases, 47 cases showed positive sehgal's index & showed 96% sensitivity & 91% specificity.

	HB Electrophoresis Positive	HB Electrophoresis Negative
Sehgal's index positive	32	15
Sehgal's index negative	01	152

**Table 2:** Out of 200 cases, 44 cases showed positive for mentzer's index & showed 91% sensitivity & 93% specificity.

	HB Electrophoresis Positive	HB Electrophoresis Negative
Mentzer's index positive	34	10
Mentzer index negative	03	153

Thus sehgal's index being more sensitive and Mentzers being more specific. In combination of both being more accurate in detecting beta thalassemia.

## Discussion

In our present study out of 200 cases 34(17%) cases show positive for Beta Thalassemia Trait. Which is similar to study conducted by Chopra GS et al (2008) on 1032 patients for anemia investigation, found prevalence of BTT 17%.

## M/F Ratio

The present study included 200 cases of Microcytic Hypochromic Anaemia cases with MCV<70fl. Majority of patients in this study were Males (55%) and Females (45%),

is in concordance with studies conducted by Bolan Z, Enli Y et al in 2001, Dermir A et al and Yeo et al.<sup>8</sup>

In our present study sehgal index showed 96% sensitivity and 91% specificity by keeping the cut off value of 972. which had the same results as the study conducted by Trivedi DP et al<sup>6</sup>

Keeping Mentzers index <13 resulted in a sensitivity of 91% and specificity of 93% which had the same results as the study conducted by, Rathod DA et al,<sup>5</sup> Trivedi DP et al<sup>6</sup> and Madan et al.<sup>7</sup>

## Conclusion

The study was done to promote screening method to detect Beta thalassemia trait using these two haematological indices which were found to be highly specific, sensitive and quite accurate in detecting Beta thalassemia trait before taking a call for haemoglobin electrophoresis and HPLC which is an economical burden.

Sehgal index and Mentzers index showed the best combination of sensitivity and specificity in predicting BTT. The best indices or combination can be used as a "validated flag rule" in a hospital for identifying suspected cases of BTT.

**Conflict of Interest:** None.

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