International Journal of Medicine
pISSN 1468-3814 | eISSN 2667-7008
https://theinternationalmedicine.com/

Original Research Article *DOI: 10.61336/im/26-3-7*

A comparative study of Sehgal's index and Mentzer's index for diagnosis in patient with beta thalassemia trait at tertiary care hospital

Dr. Swati R.Tada[1]*, Dr. Bhavin R. Patel[2], Dr. Neelaba K. Mori [3], Dr. Nisha G. Raval[4]

[1]Resident, Department of Pathology, C. U. Shah Medical College and Hospital, Surendranagar, Gujarat, India
[2,3]Associate Professor, Department of Pathology, C. U. Shah Medical College and Hospital, Surendranagar, Gujarat, India
[4]Professor and Head, Department of Pathology, C. U. Shah Medical College and Hospital, Surendranagar, Gujarat, India

Correspondence:
Dr. Swati R. Tada

Received: **February 01, 2026**
Revised: **February 26, 2026**
Accepted: **March 08, 2026**
Published: **March 11, 2026**

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 thalassaemic 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. ***Materials and Methods:*** This is a data analysis carried at Department of Pathology of C.U.Shah medical college. Surendranagar. All cases included in this study were reports of diagnosed case of beta thalassemia trait at C.U.Shah medical, college Surendranagar. ***Results:*** Out of 80 beta thalassemia trait cases, 72 cases showed positive Mentzer's index and 75 cases showed positive for Sehgal's index. In Our study Sehgal's index showed 93.7% sensitivity & 81.8% specificity. Mentzer's index showed 90 % sensitivity & 86.4 % specificity, Thus sehgal's index being more sensitive and Mentzers being more specific . Sehgal's Index is better suited for screening due to its higher sensitivity, whereas Mentzer's Index is more specific and accurate, making it preferable for confirmatory purposes. ***Conclusion:*** Sehgal's Index is better suited for screening due to its higher sensitivity, whereas Mentzer's Index is more specific ad accurate, making it preferable for confirmatory purposes. A combination of both may yield optimal diagnostic outcomes. 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, Sehgals's index, Mentzer's index

INTRODUCTION

• Thalassemia is a worldwide Hemoglobin disorder, characterized 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 thalassemic 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.

• The most important cause for microcytic anemia is Iron deficiency anemia (IDA) and beta thalassemia trait (BTT), Hence there is a need to discriminate between the two. 1 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.2 Of all the thalassemic, the most common of thalassemia is being Beta thalassemia minor. 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.

• So utilizing blood cell analyzers for Red blood cell counts and other complete blood count-based indices which are easy to calculate and not expensive.3 The calculated CBC indices which can be used to differentiate between IDA and BTT are Mentzer index, Sehgal 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.

Aims and Objectives:

1. To determine Sehgal's Index in a patient with beta thalassemia trait.

2. To determine Mentzer's Index in a patient with beta thalassemia.
trait.
3. To compare both index with HPLC method.
4. To determine sensitivity and specificity of the index.

MATERIALS AND METHODS

• This is a data analysis carried at Department of Pathology of C.U.Shah medical college, Surendranagar.
• All cases included in this study were reports of diagnosed case of beta thalassemia trait at C.U.Shah medical, college Surendranagar.
• Following haematological parameters - Haemoglobin, MCV, RBC count were included in study.

RESULTS

- Out of 80 beta thalassemia trait cases, 72 cases showed positive Mentzer's index and 75 cases showed positive for Sehgal's index.
- In Our study Sehgal's index showed 93.7% sensitivity & 81.8% specificity. Mentzer's index showed 90 % sensitivity & 86.4 % specificity, Thus sehgal's index being more sensitive and Mentzer's being more specific.
- Sehgal's Index is better suited for screening due to its higher sensitivity, whereas Mentzer's Index is more specific and accurate, making it preferable for confirmatory purposes.

Table 1: Out of 300 cases, 80 cases showed positive for mentzer's index & showed sensitivity & specificity.

	HB Electrophoresis Postive	HB Electrophoresis Negative
Mentzer's index positive	72	30
Mentzer index negative	08	190

Table 2: Out of 300 cases, 75cases showed positive sehgal's index & showed sensitivity & specificity

	HB Electrophoresis Positive	HB Electrophoresis Negative
Sehgal's index positive	**75**	**40**
Sehgal's index negative	**05**	**180**

DISCUSSION

• In the present study, Hb electrophoresis was used as the gold standard for the detection of β-thalassemia trait among 300 individuals[1]. A total of 80 subjects were confirmed as β-thalassemia trait positive. The diagnostic performance of two commonly used discrimination indices—Mentzer Index and Sehgal Index—was compared.

• The Mentzer Index, first proposed by Mentzer in 1973[2], demonstrated a sensitivity of 90% and a specificity of 86.4%. This index has consistently shown good sensitivity in differentiating iron deficiency anemia from β-thalassemia trait in previous studies[2,3]. Although specificity varies in different populations, most studies report its usefulness as a reliable initial screening tool[3].

• The Sehgal Index has been evaluated mainly in Indian populations and is reported to perform well in identifying β-thalassemia trait[5]. In the present study, it showed higher sensitivity (93.7%) but lower specificity (81.8%) compared to the Mentzer Index. This pattern, where high sensitivity comes at the cost of lower specificity, has been noted earlier in studies proposing highly sensitive indices for β-thalassemia screening[5,6].

• Comparison between the two indices shows that the Sehgal Index is more sensitive, while the Mentzer Index offers better specificity. Such trade-offs are important in clinical decision-making: indices with higher sensitivity (like Sehgal) are preferred in large-scale screening programmes to reduce false negatives[5], while indices with higher specificity (like Mentzer) help reduce unnecessary confirmatory testing[2,3].

Both indices have demonstrated good diagnostic accuracy overall, similar to findings from other hematological screening indices such as those proposed by Shine & Lal[4] and Ehsani et al.[8]. However, none of these indices can replace confirmatory tests such as Hb electrophoresis or HPLC[9,10]. Variability in performance due to iron deficiency, age, or population-specific hematological factors has also been highlighted previously[9].

CONCLUSION

In this study, the diagnostic performances of the Mentzer and Sehgal indices were evaluated against Hb electrophoresis, the gold standard for β-thalassemia trait detection. The Mentzer Index showed higher specificity. The Sehgal Index demonstrated higher sensitivity similar to earlier Indian population–based studies. Highly sensitive indices such as the Sehgal Index are preferable for screening programmes aiming to minimize missed cases, whereas indices with higher specificity like the Mentzer Index may help reduce unnecessary confirmatory testing. A combination of both may yield optimal diagnostic outcomes. 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.

Funding: Nil
Conflict of interest: None
Ethical approval: The study was approved by the institutional Ethical Committee

REFERENCES

1. Mentzer WC. Differentiation of iron deficiency from thalassaemia trait. Lancet. 1973;1(7808):882–3.
2. England JM, Fraser PM. Differentiation of iron deficiency from thalassaemia trait by routine blood-count. Lancet. 1973;1(7801):449–52.
3. Srivastava PC, Bevington JM. Iron deficiency and β-thalassaemia trait: differentiation by simple hematological tests. J Clin Pathol. 1973;26(10):781–3.
4. Shine I, Lal S. A strategy to detect β-thalassaemia trait. Lancet. 1977;309(8013):692–4.
5. Sehgal K, et al. Evaluation of Sehgal Index in differentiating β-thalassemia trait from iron deficiency anemia. Indian J Pathol Microbiol. [Insert year; volume(issue):pages].
6. Rahim F, Keikhaei B. Better differential diagnosis of iron deficiency anemia from thalassemia trait. Turk J Hematol. 2009;26(3):138–45.
7. Bessman JD, Gilmer PR, Gardner FH. Improved classification of anemias by MCV and RDW. Am J Clin Pathol. 1983;80(3):322–6.
8. Ehsani MA, Shahgholi E, Rahiminejad MS, Seighali F, Rashidi A. A new index for discrimination between iron deficiency anemia and β-thalassemia minor: the Ehsani index. Pediatr Hematol Oncol. 2009;26(3):159–66.
9. Hoffbrand AV, Moss PAH. Essential Haematology. 7th ed. Oxford: Wiley-Blackwell; 2016.
10. Galanello R, Origa R. Beta-thalassemia. Orphanet J Rare Dis. 2010;5:11.