



## Review

# Prognostic role of haematological indices in sudden sensorineural hearing loss: Review and meta-analysis

Zaizai Cao<sup>a,b</sup>, Ziyue Li<sup>a,b</sup>, Haijie Xiang<sup>a,b</sup>, Saiyu Huang<sup>a,b</sup>, Jinjian Gao<sup>a,b</sup>, Xiang Zhan<sup>a,b</sup>,  
Xiuxiu Zheng<sup>a,b</sup>, Bangliang Li<sup>a,b</sup>, JianBin Wu<sup>a,b</sup>, Bobei Chen<sup>a,b,\*</sup>

<sup>a</sup> Department of Otolaryngology, The Second Affiliated Hospital and Yuying Children's Hospital of Wenzhou Medical University, Wenzhou, Zhejiang, China

<sup>b</sup> The Second School of Medicine, Wenzhou Medical University, Wenzhou, Zhejiang, China

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## ABSTRACT

**Background:** Complete blood count (CBC) is an important blood test in clinical practice, and it has been recently used to predict the prognosis of patients with sudden sensorineural hearing loss (SSNHL). Some haematological indices of the CBC test have been reported to be associated with the clinical outcome of SSNHL. However, the prognostic value of these haematological indices in SSNHL is currently under debate. Here, we performed a meta-analysis to investigate the association between haematological indices of the CBC test and clinical outcomes in patients with SSNHL.

**Methods:** We conducted a meta-analysis of studies that evaluated the association between haematological indices and prognoses in patients with sudden hearing loss. Subgroup and sensitivity analyses were also performed to explore potential sources of heterogeneity.

**Results:** Ten studies that included 972 individuals were identified. Pooled analysis showed neutrophil-to-lymphocyte ratio (NLR) (weighted mean difference [WMD] =  $-1.69$  and  $p < 0.001$ ), platelet-to-lymphocyte ratio (PLR) (WMD =  $-38.45$  and  $p < 0.001$ ), neutrophil count (WMD =  $-1.57 \times 10^9/L$  and  $p < 0.001$ ) and lymphocyte count (WMD =  $0.41 \times 10^9/L$  and  $p < 0.001$ ) to be the factors associated with the prognosis of SSNHL.

**Conclusions:** Our findings indicated that NLR, PLR, neutrophil count and lymphocyte count are strongly associated with the prognosis of SSNHL. These four indices could be recommended as inexpensive markers to report treatment outcomes.

## 1. Introduction

Sudden sensorineural hearing loss (SSNHL) is defined as the rapid hearing loss of at least 30 dB in 3 contiguous audiometric frequencies within 3 days [1,2]. The aetiology of SSNHL is thought to be multifactorial. Viral infections, chronic inflammation, immunological diseases and impairment of the vascular microcirculation have been suggested as possible reasons [3–6]. However, most cases of SSNHL have no identifiable cause [7]. A large number of studies were designed to investigate the prognostic factors of SSNHL, and a variety of factors are considered to affect recovery from SSNHL, including the type of audiogram, duration and severity of hearing loss, age, accompanying symptoms, genes and mental state [8–10].

Complete blood count (CBC) is an important blood test in clinical practice. Recently, the CBC test has been found to be associated with the recovery of patients with SSNHL, and some haematological indices

such as neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR) and red cell distribution width (RDW) have been found to be linked to prognosis of patients with SSNHL [11–13]. However, the data of these studies were largely inconclusive, and findings from other studies do not support the assertion that haematological indices can play a role as a prognostic factor for SSNHL [14]. Therefore, we performed a meta-analysis to review the medical literature evidence systematically to investigate the association between haematological indices of the CBC test and clinical outcomes of patients with SSNHL.

To our knowledge, this is the first meta-analysis to research the prognostic role of haematological indices in patients with SSNHL.

\* Corresponding author at: Department of Otolaryngology, The Second Affiliated Hospital and Yuying Children's Hospital of Wenzhou Medical University, College West Road no. 109, Wenzhou, Zhejiang 325027, China.

E-mail address: [wzbobei@outlook.com](mailto:wzbobei@outlook.com) (B. Chen).

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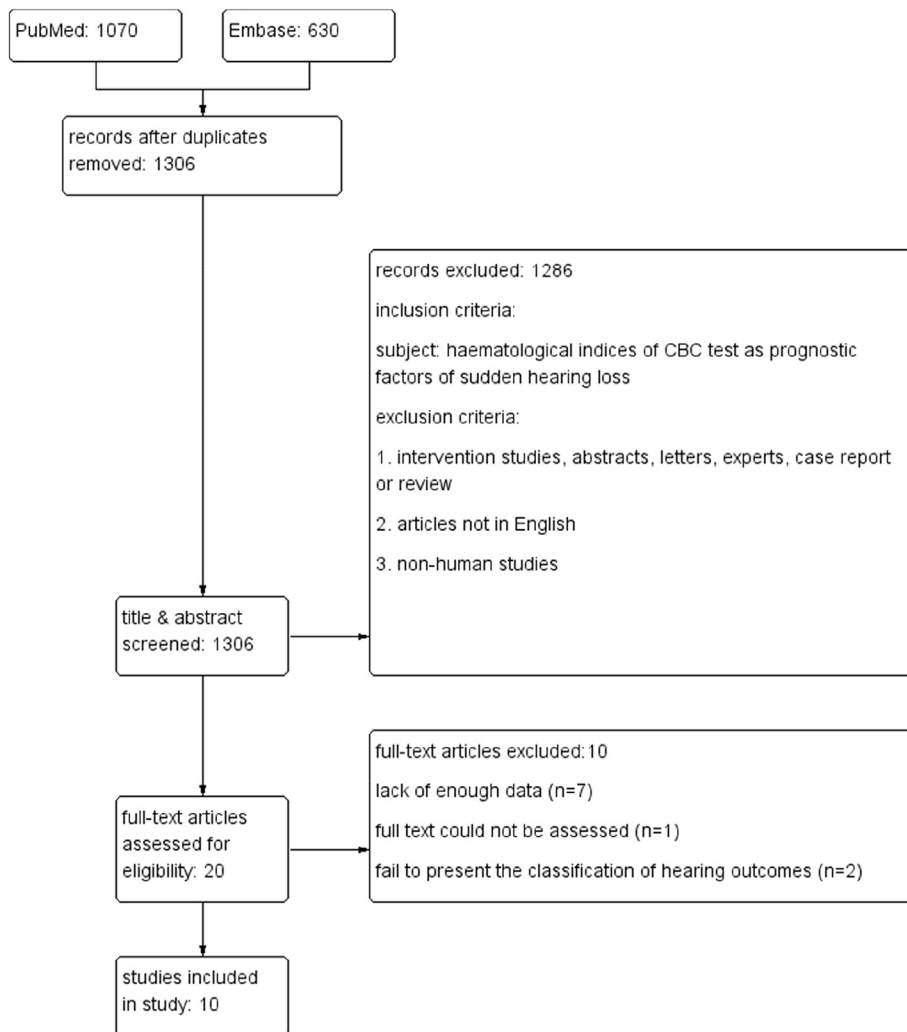
**Table 1**  
Systematic search for studies of prognostic factors of sudden sensorineural hearing loss (date of search: 28 January 2018).

Data base	Search	Hits
PubMed	(((((((((idiopathic sudden sensorineural hearing loss) OR sudden sensorineural deafness) OR sudden sensorineural hearing loss) OR sudden deafness[MeSH Terms]) OR sudden deafness) OR sudden hearing loss[MeSH Terms]) OR sudden hearing loss))) AND (((((((clinical outcome) OR recurrence) OR recurrence[MeSH Terms]) OR prognosis) OR prognosis [MeSH Terms]) OR prognostic factor) OR prognostic factor [MeSH Terms]))	1070
Embase	("idiopathic sudden sensorineural hearing loss"/exp. OR "idiopathic sudden sensorineural hearing loss" OR "sudden hearing loss"/exp. OR "sudden hearing loss" OR "sudden deafness"/exp. OR "sudden deafness" OR "sudden sensorineural hearing loss"/exp. OR "sudden sensorineural hearing loss" OR "sudden sensorineural deafness") AND ("clinical outcome"/exp. OR "clinical outcome" OR "recurrence"/exp. OR "recurrence" OR "prognosis"/exp. OR "prognosis" OR "prognostic factor"/exp. OR "prognostic factor")	630

**2. Materials and methods**

**2.1. Search strategy and search selection**

A systematic literature search was performed on the prognostic factors of sudden hearing loss in PubMed and Embase databases from the inception of the database to 28 January 2018. A complete overview of the search terms is shown in Table 1. Two reviewers screened the titles and abstracts independently. Conflicts between the two reviewers were resolved by consensus and discussion. All articles on haematological indices of the CBC test as prognostic factors of sudden hearing loss were selected. In addition, the references of all identified articles were screened to increase the yield of relevant articles. The full text of all eligible studies was screened for a more detailed selection. The studies had to meet all the following criteria: (1) The study compared the post-treatment hearing outcome of patients with sudden deafness in terms of haematological indices. (2) The article described a reasonable treatment prescription. (3) The study provided the criteria for the diagnosis of sudden hearing loss. (4) The article described the classification of hearing outcomes. (5) The article was an original article published in peer-reviewed scientific journals in English. The following types of publications were excluded: (1) those lacking accessibility to original articles and/or with incomplete data; (2) studies with fewer than 20 patients; (3) duplicate publications; and (4) intervention studies, case reports, reviews, letters and abstracts.



**Fig. 1.** Flow chart demonstrating the process of study selection.

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