A systematic review and meta-analysis on the accuracy of Enzyme-Linked Immunosorbent Assay (ELISA) for biomarker detection in the diagnosis of Autism Spectrum Disorder

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Poster

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INTRODUCTION

Autism spectrum disorder (ASD), a diverse group of neurodevelopmental conditions characterized by deficits in communication, social interaction, and repetitive behavior, is estimated to affect 1 in 36 children. Yet, given the wide variation of symptoms, diagnosis remains challenging and is often late.

OBJECTIVE

This study aims to map potential biomarkers for diagnosing ASD in children and adolescents (between 2 and 18 years, according to the World Health Organization definition).

METHOD

The systematic searches were performed in Pubmed, Embase and Web of Science (February-2024). Primary interventional or observational studies (with or without a comparator group) that assessed biological markers (e.g., enzymes, molecules, genes) found in body fluids for the diagnosis of ASD were eligible and had their main information extracted.Accuracy data on the methods used to measure biomarkers (including true positive, true negative, false positive, false negative results) were collected. Meta - analysis of sensitivity and specificity, as well as summary receiver operating characteristic (SROC) curves, were built using Metadisc2.0 (results reported with 95% confidence intervals - CI).

Protocol OSF

RESULTS

From the 86 articles included for evidence synthesis **(Figure 1)**, published between 1986-2023, 55% were from Asia, with 22% from China, encompassing a total sample size of 37,100.

Eight studies consistently assessed the use of Enzyme-Linked Immunosorbent Assay (ELISA). The meta-analysis revealed an overall sensitivity of 85% (95% CI 79-89%) and specificity of 80% (95% CI 57-92%) **(Figures 2 and 3).**

In addition, two studies reported a specificity of 99% for the thyroxine marker (hormone) and 98% sensitivity for c1q-tnf protein from the adipokines family. Other mentioned biomarkers were phosfoliapase A and interleucine-6 and 8.

Figure 1. PRISMA flowchart

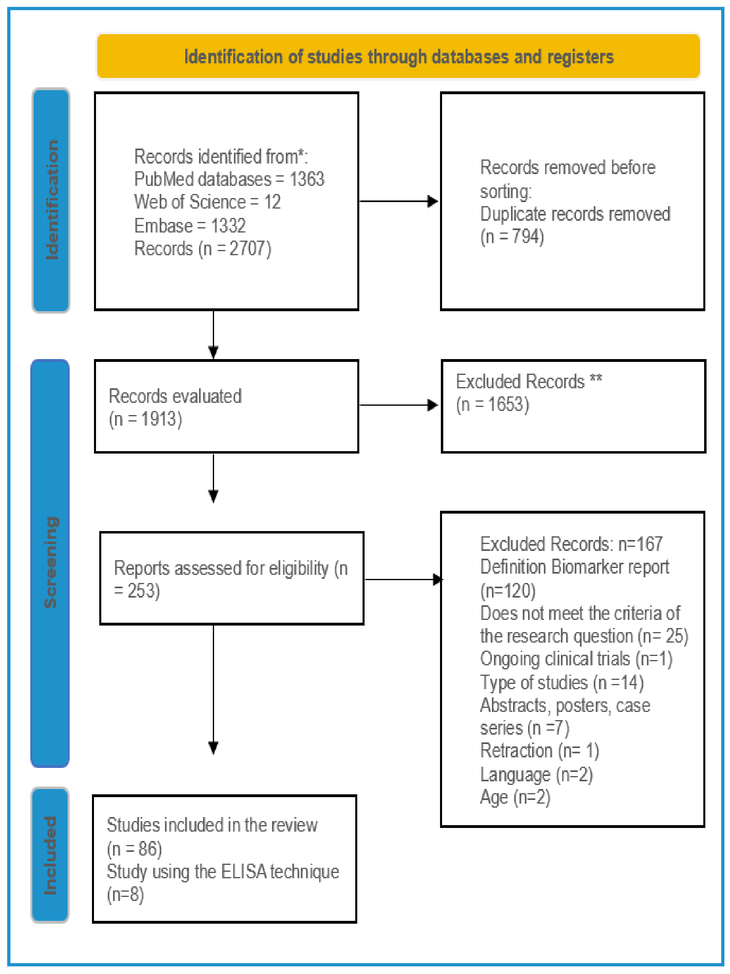


Figure 2. Sensitivity analysis of articles using HPLC method

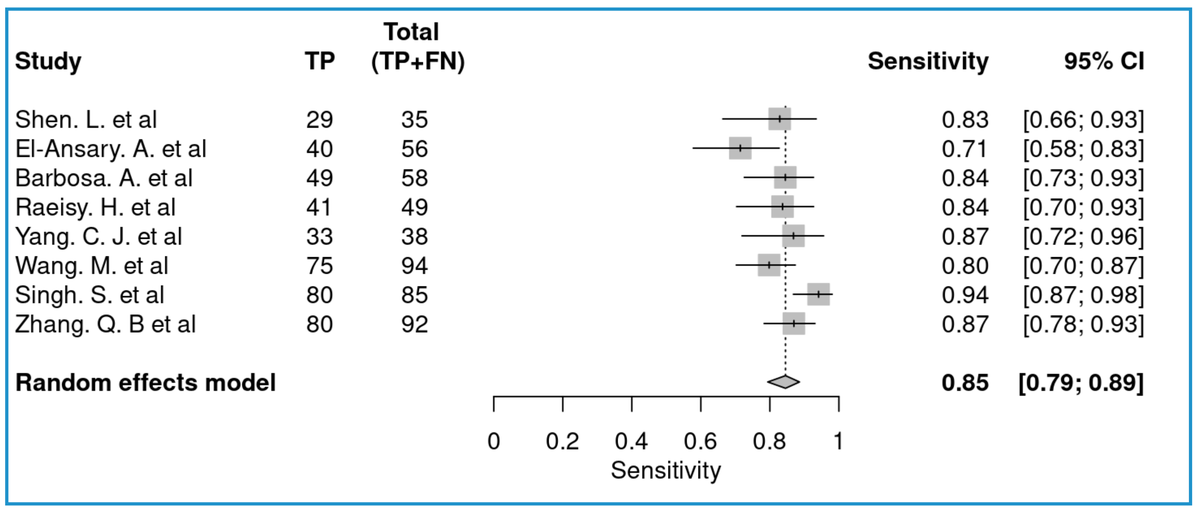
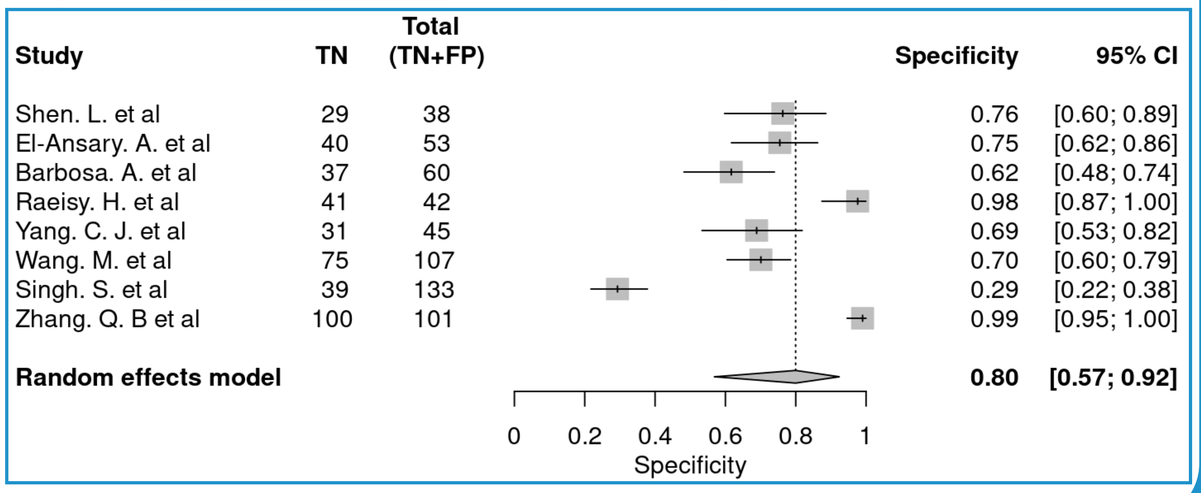


Figure 3. Specificity analysis of the articles using the HPLC method



CONCLUSIONS

The ELISA, a low-cost and easily implemented method, is a promising alternative for aiding in the diagnosis of ASD, especially when targeting serum thyroxine and C1q/TNF-related protein biomarkers, whose expression are elevated in this population. Further studies on the role of these molecules, including their impact on the severity of ASD, are warranted.

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REFERENCES

1. Shen, Liming et al. “A Combined Proteomics and Metabolomics Profiling to Investigate the Genetic Heterogeneity of Autistic Children.” Molecular neurobiology vol. 59,6 (2022): 3529-3545. doi:10.1007/s12035-022-02801-x.
2. Yang, C-J et al. “The combined role of serotonin and interleukin-6 as biomarker for autism.” Neuroscience vol. 284 (2015): 290-296. doi:10.1016/j.neuroscience.2014.10.011

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