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Current Perspective of Metabolomics in Pediatric Nephrotic Syndrome: A Systematic Review

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 January 2024 and was last updated on 14 January 2024.

INTRODUCTION

Review question / Objective To identify, summarize, and assess all relevant published research studies in the field of metabolomics related to pediatric nephrotic syndrome (NS).

Condition being studied Nephrotic syndrome in children is a clinical syndrome defined by the presence of nephrotic range proteinuria, hyperlipidemia, hypoalbuminemia, edema, and various complications. The diagnosis and management of NS in children focus on treating these symptoms and addressing the underlying cause, which may be idiopathic or secondary to other conditions. Treatment often involves medications like corticosteroids and diuretics, dietary changes, and careful monitoring of kidney function.
This review will focus on studies related to primary or idiopathic nephrotic syndrome (NS) in children, excluding secondary or congenital causes of NS (we will examine if the causes of NS have been identified in these studies).
(NS can be classified based on treatment response: Steroid-Sensitive NS (SSNS), Steroid-Resistant NS (SRNS); or based on renal histopathology).

METHODS

Participant or population Children with nephrotic syndrome (NS).

Intervention Not applicable. This review will explore the relationship between metabolomic signatures and Nephrotic Syndrome (NS), where either can be considered as the outcome or the exposure.

Comparator All studies will be considered for inclusion, irrespective of the comparator used.

Study designs to be included Any original research articles that do not meet the exclusion

criteria (review articles, secondary research, commentaries, studies conducted in vitro, and conference abstracts.)

Eligibility criteria The study will involve the investigation of metabolomic signatures (metabolites) in pediatric nephrotic syndrome, regardless of the types of samples used.

Information sources The literature search will be conducted in the PubMed (MEDLINE) and Scopus databases.

Main outcome(s) This review aims to provide a comprehensive overview of all previous studies in the field of metabolomics related to children with Nephrotic Syndrome (NS) and their results, thereby identifying areas or knowledge gaps for future research.

Additional outcome(s) The secondary outcome of this review is to summarize the analytical approaches used in the selected studies, including the use of technology-based metabolomics (such as NMR, LC-MS, GC-MS, etc.), and other relevant aspects (if any) such as machine learning techniques, additional omics data, repeated measures of metabolomic data, consideration of potential confounding factors, and whether attempts at replication or validation of findings have been made.

Quality assessment / Risk of bias analysis The bias risk in the selected studies will be evaluated using a modified Newcastle-Ottawa Scale, supplemented by information pertinent to metabolome coverage. Articles scoring above six stars will be regarded as high quality.

Strategy of data synthesis The systematic review will summarize and describe the findings from the included studies, dividing the descriptive summary into categories based on the study's objective (if any). Given the field's relative novelty and the diverse technologies used in metabolomics, the identified studies are likely to be too limited in number and too heterogeneous for meta-analysis. Therefore, this review will concentrate on highlighting promising areas for further metabolomic research and identifying gaps in the existing literature.

Subgroup analysis None.

Sensitivity analysis None.

Language restriction Only publications in English will be considered for inclusion.

Country(ies) involved Vietnam.

Other relevant information This systematic review conforms to the 2020 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.
The search strategy will be executed in the PubMed (MEDLINE) and Scopus databases. The results will be exported to Zotero, and duplicate results will be removed. Two authors will independently assess the eligibility of each study by screening the title and abstract, using the mentioned criteria. Any discrepancies between the authors will be identified and discussed, with input from a third author if necessary. For studies deemed potentially eligible, full texts will be independently screened by two authors. Any discrepancies will be resolved through discussion, with input from a third author if necessary.

Keywords nephrotic syndrome; metabolomics; children.

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