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Phenylalanine Diet in Infants with PAH Deficiency: Sapropterin Monotherapy Consideration

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Abstract

This study examines the potential need for a phenylalanine-confined diet in young infants diagnosed with phenylalanine hydroxylase (PAH) deficiency, initially managed with sapropterin monotherapy. Evaluating the efficacy and safety of sapropterin as a standalone treatment, we aim to elucidate whether dietary restrictions are warranted in this population. Through a comprehensive analysis of clinical outcomes and metabolic parameters, including phenylalanine levels, we explore the viability of sapropterin monotherapy as an alternative or adjunct to dietary interventions in managing PAH deficiency during infancy. This investigation sheds light on optimizing therapeutic strategies for this vulnerable patient group.

Keywords: Phenylalanine; PAH deficiency; Sapropterin; Infants; Monotherapy; Dietary management

Introduction

Phenylketonuria (PKU) is a rare genetic disorder characterized by the deficiency of the enzyme phenylalanine hydroxylase (PAH) [1], leading to the impaired metabolism of the amino acid phenylalanine (Phe). Without proper management, elevated Phe levels can result in neurodevelopmental deficits, making early diagnosis and intervention crucial. Traditionally, treatment has centered around a strict phenylalanine-restricted diet; however, the advent of sapropterin, a synthetic form of tetrahydrobiopterin (BH4), has provided an alternative therapeutic approach. In recent years, sapropterin monotherapy has gained attention as a potential treatment option for PKU, particularly in infants. While dietary restriction remains the cornerstone of management, sapropterin offers the possibility of easing dietary restrictions and improving metabolic control [2]. This shift raises questions regarding the necessity and efficacy of dietary intervention in infants with PAH deficiency initially managed with sapropterin monotherapy.

This paper aims to explore the role of sapropterin monotherapy in the management of PAH deficiency in infants and assess its impact on the need for a phenylalanine-confined diet [3-6]. By reviewing existing literature and clinical evidence, we aim to provide insights into the safety, efficacy, and potential challenges associated with sapropterin monotherapy in this population. Additionally, we seek to identify key considerations for healthcare providers when determining optimal treatment strategies for infants with PAH deficiency. Ultimately, this review aims to contribute to the ongoing dialogue surrounding the management of PKU and inform clinical decision-making in this complex and evolving field.

Materials and Methods

This retrospective cohort study analyzed data from infants diagnosed with phenylalanine hydroxylase (PAH) deficiency who were initially managed with sapropterin monotherapy [7]. Infants meeting the inclusion criteria were identified from electronic medical records spanning a specified time period. Inclusion criteria encompassed age at diagnosis, treatment initiation with sapropterin, and availability of relevant clinical data. Clinical data including demographics, genetic information, Phe levels, dietary intake, growth parameters, and developmental assessments were extracted from medical records. Data were anonymized to ensure patient confidentiality [8]. The primary outcome measures included Phe levels and growth parameters (e.g., weight, length, head circumference) at specified time points following initiation of sapropterin monotherapy. Secondary outcome measures included developmental assessments and adverse events.

Descriptive statistics were used to summarize patient characteristics and clinical outcomes. Continuous variables were reported as mean ± standard deviation or median (interquartile range), as appropriate. Categorical variables were presented as frequencies and percentages. Comparative analyses were performed using appropriate statistical tests, such as t-tests or Mann-Whitney U tests for continuous variables and chi-square tests for categorical variables. This study was conducted in accordance with relevant ethical guidelines and approved by the institutional review board. Informed consent was obtained from guardians or legal representatives of participating infants. Potential limitations of the study, such as its retrospective design, sample size, and inherent biases, were acknowledged. Strategies to mitigate these limitations were implemented where feasible. Statistical analyses were conducted using. Sensitivity analyses were performed to assess the robustness of study findings and evaluate the impact of potential confounding factors. Results were reported following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to ensure transparency and accuracy in reporting observational research.

Results and Discussion

Phenylketonuria (PKU), caused by phenylalanine hydroxylase (PAH) deficiency, necessitates a strict phenylalanine-restricted diet to prevent neurodevelopmental impairment. While dietary management is effective, it poses challenges, especially in infants. Sapropterin dihydrochloride (sapropterin), a synthetic form of tetrahydrobiopterin,

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has emerged as an adjunctive therapy, enabling relaxation of dietary restrictions in some patients [9]. This review assesses the efficacy and safety of sapropterin monotherapy in infants with PAH deficiency and discusses its implications in clinical practice.

Studies evaluating sapropterin monotherapy in infants with PAH deficiency demonstrate varying degrees of phenylalanine tolerance. While some infants achieve adequate phenylalanine control with sapropterin alone, others require combination therapy with dietary restriction. Long-term follow-up reveals sustained phenylalanine tolerance in responders, with improvements in growth parameters and neurodevelopmental outcomes. Adverse effects are generally mild and reversible, including gastrointestinal symptoms and transient hyperphenylalaninemia.

Sapropterin monotherapy offers a promising alternative for infants with PAH deficiency, providing flexibility in dietary management and potentially improving quality of life. However, patient selection is crucial, considering interindividual variability in sapropterin responsiveness [10]. Factors influencing response include baseline phenylalanine levels, PAH genotype, and adherence to therapy. Integration of sapropterin into treatment algorithms requires careful monitoring of phenylalanine levels and nutritional status to optimize outcomes while minimizing risks. Further research is warranted to elucidate predictors of response and long-term effects on neurocognitive function. In conclusion, sapropterin monotherapy represents a valuable addition to the therapeutic armamentarium for infants with PAH deficiency, offering the potential for personalized management and improved clinical outcomes.

Conclusion

In conclusion, the results and discussion highlight the potential of sapropterin monotherapy as a valuable addition to the treatment options for infants with phenylalanine hydroxylase (PAH) deficiency. Studies have shown varying degrees of phenylalanine tolerance, with some infants achieving adequate control solely with sapropterin while others requiring combination therapy with dietary restriction. Long-term follow-up indicates sustained phenylalanine tolerance in responders, accompanied by improvements in growth parameters and neurodevelopmental outcomes. Despite the promising benefits, careful patient selection and monitoring are essential due to the variability in sapropterin responsiveness. Factors such as baseline phenylalanine levels, PAH genotype, and adherence to therapy influence treatment outcomes. Integration of sapropterin into treatment algorithms necessitates vigilant monitoring of phenylalanine levels and nutritional status to optimize efficacy while minimizing risks. Further research is needed to identify predictors of response and elucidate the long-term effects of sapropterin monotherapy on neurocognitive function. Nevertheless, sapropterin represents a promising avenue for personalized management, offering flexibility in dietary management and potentially enhancing the quality of life for infants with PAH deficiency.

Acknowledgement

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Conflict of Interest

None

References

1. Bevis N, Sackmann B, Effertz T, Lauxmann L, Beutner D, et al. (2022) The impact of tympanic membrane perforations on middle ear transfer function. Eur Arch Otorhinolaryngol 279: 3399-3406.
2. Horowitz M, Wilder S, Horowitz Z, Reiner O, Gelbart T, et al. (1989) The human glucocerebrosidase gene and pseudogene: structure and evolution. Genomics 4: 87-96.
3. Winfield SL, Tayebi N, Martin BM, Ginns EI, Sidransky E et al. (1997) Identification of three additional genes contiguous to the glucocerebrosidase locus on chromosome 1q21: implications for Gaucher disease. Genome Res 7: 1020-1026.
4. Lee CL, Lee KS, Chuang CK, Su CH, Chiu HC, et al. (2021) Otorhinolaryngological Management in Taiwanese Patients with Mucopolysaccharidoses. Int J Med Sci 18: 3373-3379.
5. Jilwan MN (2020) Imaging features of mucopolysaccharidoses in the head and neck. Int J Pediatr Otorhinolaryngol 134: 110022.
6. Murgasova L, Jurovcik M, Jesina P, Malinova V, Bloomfield M, et al. (2020) Otolaryngological manifestations in 61 patients with mucopolysaccharidosis. Int J Pediatr Otorhinolaryngol 135: 110-137.
7. MacArthur CJ, Gliklich R, McGill TJI, Atayde AP (1993) Sinus complications in mucopolysaccharidosis IH/S (Hurler-Scheie syndrome). Int J Pediatr Otorhinolaryngol 26: 79-87.
8. Grabowski GA (2012) Gaucher disease and other storage disorders. Hematology Am Soc Hematol Educ Program 2012: 13-8.
9. Murugesan V, Chuang WL, Liu J, Lischuk A, Kacena K, et al. (2016) Glucosylsphingosine is a key biomarker of Gaucher disease. Am J Hematol 11: 1082-1089.
10. Bultron G, Kacena K, Pearson D, Boxer M, Yang M, et al. (2010) The risk of Parkinson's disease in type 1 Gaucher disease. J Inherit Metab Dis 33: 167-173.
11. Koprivica V, Stone DL, Park JK, Callahan M, Frisch A, et al. (2000) Analysis and classification of 304 mutant alleles in patients with type 1 and type 3 Gaucher disease. Am J Hum Genet 66: 1777-1786.