CASE REPORT

The Sage of Tea and the Inherited Metabolic Diseases

Xia Gao, MS; Ruijie Chang, MS; Echo Xu; Qiyang Ning; Jun Du, MS

ABSTRACT

Background • Lu Yu (733-804 AD, Tang Dynasty) was an orphan raised and educated in a monastery. His profound knowledge of tea earned him the title "the Sage of Tea." This paper explores the possibility that Lu Yu may have been a patient of inherited metabolic diseases (IMDs), particularly phenylketonuria (PKU), considering historical records and unique aspects of his life.

Case Presentation • Examining Lu Yu's orphaned upbringing, clinical manifestations noted in his autobiography, dietary preferences, and the significance of his name, this study postulates that he may have had IMDs, notably PKU. His life choices, such as abstaining from meat and fish and favoring a low-protein diet during his time in a monastery, align with practices recommended for managing IMDs. The linguistic associations of his name further reinforce this hypothesis.

Conclusions • This investigation sheds light on the intriguing possibility that Lu Yu may have been affected by IMDs, notably PKU. By considering historical context, clinical correlations, dietary choices, and name symbolism, we offer a unique historical perspective on this celebrated figure's health. Further research could provide valuable insights into both his life and the broader medical practices of the Tang Dynasty. (*Altern Ther Health Med.* [E-pub ahead of print.])

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INTRODUCTION

The Tang Dynasty (618-907 AD) stands as one of the most illustrious dynasties in Chinese feudal history. It is often regarded as the 'Golden Age' of China, holds a central place in history for its progressive policies, cultural advancements, and lasting influence on the nation's identity. It remains a symbol of China's embrace of diversity and the enduring legacy of its accomplishments. It presents the longest period of unification and the most formidable national power, leaving an indelible mark on Chinese history.[1-2]

During this era, China rose to global prominence, a testament to its remarkable achievements. This period, celebrated by the Chinese people, remains a source of pride and prosperity in their history. The Tang Dynasty embraced diverse nationalities and religions, fostering an inclusive and cosmopolitan culture. This dynasty witnessed unparalleled prosperity across economic, political, military, diplomatic, and cultural domains. In the realm of culture, the Tang era saw a remarkable flourishing of Tang poetry, tea culture, and wine culture, characterized by their diversity and outstanding achievements.[2]

Tea has its origins in China and its history is intricately linked with the Tang Dynasty. During this era, tea culture flourished, becoming an integral part of Chinese society. Tea's journey began as a medicinal herb and evolved into a beloved beverage, celebrated for its cultural and social significance. It was only in the first century BC that tea underwent a significant transformation into a luxury beverage primarily enjoyed within palace walls. By the 7th century, tea had evolved into a popular beverage cherished by people of all ethnic backgrounds in China.[3]

Today, tea is relished by individuals in over 100 countries and regions worldwide. The art of tea-making, practiced across the globe, owes its roots, directly or indirectly, to the rich traditions of China.[1-3] Lu Yu (733-804 AD, Tang Dynasty) spent his childhood as an orphan, raised and educated within a monastery in Tianmen City, Hubei Province, see in Figure

Figure 1. The statue of Lu Yu

1. His profound expertise in the realm of tea earned him the distinguished title of "*the Sage of Tea*".[1]

Inherited Metabolic Diseases (IMDs) constitute a diverse group of rare disorders, collectively affecting between 1 in 500 to 4000 live births, thereby presenting a significant public health challenge.[2-4] These conditions encompass clinical disorders originating from single gene defects that disrupt metabolic pathways, categorizing them as inherited metabolic diseases.[5] Examples include phenylketonuria (PKU), maple syrup urine disease (MSUD), and diabetes, the latter being a prominent type of metabolic disease.[5-7]

PKU is a rare inherited metabolic disorder characterized by the inability to metabolize phenylalanine, an essential amino acid. Diagnosing PKU typically involves a newborn blood screening test, which measures elevated levels of phenylalanine. Early signs of PKU may include developmental delays, intellectual disabilities, and a distinctive musty odor in the child's breath, urine, and sweat due to the buildup of phenylalanine.[6-8] We selected the case of Lu Yu, by examining his potential association with PKU, we aim to explore the intriguing intersection of medical history and the life of a celebrated figure.

CASE PRESENTATION

The historical records about Lu Yu's health, appearance, family, and medical history are intriguing. As an orphan, his family background remains a mystery. Lu Yu's appearance was noted for its unconventional aspects, including a distinct lack of physical beauty and a severe stutter. These unique traits, combined with his mysterious parentage, have led to the exploration of potential medical conditions, particularly IMDs, offering fresh perspectives on this enigmatic historical figure's life.

Family History

Lu Yu's family history remains shrouded in mystery, as he was raised as an orphan without knowledge of his biological parents. This lack of familial information has prompted speculation regarding his genetic background and the potential role of IMDs in his life. It was plausible that his parents had relinquished him, possibly due to the characteristic odor often linked with individuals afflicted by IMDs.[7]

Physical Characteristics and Clinical Traits

Lu Yu's physical appearance was notably marked by characteristics deemed unconventional for his time, including an absence of conventional beauty, a pronounced stutter, and his reputation for a challenging temperament and eccentric character. These unique traits have led to investigations into their potential clinical significance and their alignment with clinical manifestations often observed in IMDs.

Dietary Preferences and Potential Implications for Metabolic Health

Lu Yu's dietary choices during his life offer a distinct glimpse into his preferences. Notably, during his time in a Buddhist temple, he abstained from consuming meat and fish, instead favoring a diet primarily composed of vegetables and congee. These dietary inclinations align with practices recommended for managing metabolic disorders, such as PKU.[9-10]

Linguistic Significance of Lu Yu's Name in Medical History

Lu Yu's name carries intriguing symbolism in relation to disease. His second name, Ji (疾), and his third name, Ji Ci (疵), both contain Chinese characters associated with ailments. Specifically, 疾 translates to "disease," and 疵 signifies a disease related to specific dietary choices or consumption of certain foods. This linguistic connection adds an interesting element to our investigation into Lu Yu's possible health and the historical context.

DISCUSSION

In Traditional Chinese Medicine (TCM), historical records distinctly mention cases of diabetes, paralleling accounts related to individuals like Sima Xiangru (司马相如), Du Fu (杜甫), and Ouyang Xiu (欧阳修). PKU is an autosomal recessive genetic disorder rooted in a mutation within the phenylalanine hydroxylase gene. This mutation inhibits the body's ability to metabolize phenylalanine found in food, leading to an accumulation of phenylalanine and its associated metabolites. This build-up can induce toxic effects on the central nervous system, potentially resulting in neurological developmental defects and behavioral challenges. After diagnosis, it becomes imperative to initiate a low-phenylalanine diet for affected children promptly.[4-7]

IMDs have gained increasing significance within the field of medicine.[6] They are typically categorized into three primary groups: (1) Intoxication diseases: This category encompasses conditions such as aminoacidopathies, organic aciduria, fructose intolerance, galactosaemia, iron and copper overload, and porphyria.[7-9] (2) Diseases associated with energy deficiency: IMDs in this group include glycogenolysis disorders, mitochondrial diseases, disorders related to fatty acid oxidation and ketogenesis, and congenital

lactic acidosis.[10-11] (3) Diseases arising from complex molecule defects: This category encompasses conditions like lysosomal or peroxisomal diseases and congenital disorders of glycosylation.[12]

In recent years, there has been a significant advancement in the field of newborn screening (NBS) with the introduction of a program designed to identify presymptomatic newborns with IMDs. Tandem mass spectrometry (MS/MS) has emerged as a pivotal technological breakthrough within the NBS program, enabling the simultaneous detection of multiple metabolites.[13-14]

As physicians in Hubei province, drawing from historical records and diagnostic advancements, we arrive at the hypothesis that Lu Yu may have been afflicted by IMDs. We substantiate our hypothesis by considering various aspects of his life. Firstly, his origins: Lu Yu's status as an orphan, devoid of information about his biological parents, leads us to consider the possibility of IMDs. The notion that his parents abandoned him due to the distinctive odor associated with IMD patients[7] further supports our speculation.

Secondly, Lu Yu's autobiography[15] provides intriguing insights. It portrays him as possessing unconventional physical traits, marked by ugliness and a severe stutter, accompanied by a reputation for a challenging temperament and eccentric character. These characteristics mirror clinical manifestations often observed in IMDs.[16] Thirdly, during his time in a Buddhist temple, Lu Yu's dietary choices stood out. He abstained from consuming meat and fish, opting instead for a diet primarily comprised of vegetables and congee. This preference for a low-protein diet aligns with recommended dietary strategies for managing IMDs, such as phenylketonuria.[17]

Lastly, the symbolism embedded in Lu Yu's name adds another layer of intrigue. His second name, Ji (疾), and third name, Ji Ci (疵), both contain Chinese characters associated with disease. Specifically, 疾 translates to "disease," while 疵 signifies an illness related to specific dietary choices. These linguistic connections hint at a potential link between his name and a medical condition. Collectively, these factors lead us to postulate that Lu Yu might have been afflicted by IMDs, with a particular focus on phenylketonuria. Additionally, his awareness of the benefits of a low-protein diet and his engagement with traditional Chinese medicine highlight the complexity of his potential medical history.

Study Limitations

Several limitations warrant acknowledgment. First, the scarcity of historical records and the absence of conclusive medical evidence make it challenging to definitively establish the presence of IMDs in Lu Yu's life. Second, the interpretation of his physical traits and dietary choices is speculative, as multifaceted factors beyond medical conditions may influence them. Additionally, while his name carries symbolic significance, attributing it solely to a medical context is a hypothesis. Lastly, the absence of direct medical documentation from Lu Yu or his contemporaries poses inherent limitations in verifying our speculations. These limitations emphasize the need for cautious interpretation and further interdisciplinary research to explore this captivating historical-medical intersection.

CONCLUSION

In summary, this study exploring the life of Lu Yu, the renowned "Sage of Tea" during the Tang Dynasty, has brought to light a compelling hypothesis. We propose that Lu Yu may have been affected by inherited metabolic diseases, particularly phenylketonuria, based on historical evidence and medical considerations. His orphaned status, unconventional physical traits, dietary choices, and even the symbolism within his name collectively suggest a complex medical history. This exploration emphasizes the intriguing relationship between history and medicine, offering a fresh perspective on this esteemed historical figure and the prevalence of IMDs in the past.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Ethics Committee of Shiyan Renmin Hospital approved the research. All patient guardians gave informed consent to the study.

CONSENT FOR PUBLICATION

All patient guardians gave informed consent to the publication of this study.

AVAILABILITY OF DATA AND MATERIALS

Please contact the corresponding author for data requests.

CONFLICT OF INTEREST

The authors have no conflicts of interest relevant to this article.

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AUTHOR CONTRIBUTIONS

Xia Gao and Ruijie Chang contributed equally to this work.

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