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Exploring Multifaceted Factors in Chronic Kidney Disease Risk: A Comprehensive Analysis of Biochemistry, Lifestyle, and Inflammation in Elderly Chinese Individuals

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Abstract

This letter praises a recent article in the World Journal of Clinical Cases (Roles of biochemistry data, lifestyle, and inflammation in identifying abnormal renal function in old Chinese), examining factors affecting abnormal renal function in elderly Chinese using advanced machine learning. It highlights the importance of uric acid, age, hemoglobin, body mass index, sport hours, and systolic blood pressure. The study's holistic approach, integrating lifestyle and inflammation, offers a nuanced understanding of chronic kidney disease risk factors. The letter suggests exploring mechanistic pathways of hyperuricemia, the link between anemia and renal function, and the connection between body mass index and estimated glomerular filtration rate. It advocates investigating physical activity's impact on renal health and the independent effects of blood pressure. The study significantly contributes to chronic kidney disease understanding, proposing avenues for further exploration and interventions. Commendations are extended to the authors and the journal.

TO THE EDITOR

I am writing to convey my appreciation for the recent article entitled "Roles of Biochemistry Data, Lifestyle, and Inflammation in Identifying Abnormal Renal

Function in Elderly Chinese," which was recently published in the *World Journal of Clinical Cases* ^[1]. This study delves into the identification of factors associated with a low estimated glomerular filtration rate (L-eGFR) within a cohort of elderly Chinese individuals. The authors employed advanced machine learning techniques and their findings shed light on the significance of various risk factors, such as uric acid (UA),
¹ age, hemoglobin (Hb), body mass index (BMI), sport hours, and systolic blood pressure (SBP), in the identification of abnormal renal function.

The escalating incidence of chronic kidney disease (CKD) in recent years has raised considerable concerns, notably due to its substantial impact on patient mortality rates, rendering it a critical area of study. Given that the importance of UA has been highlighted for both diabetic ^[2] and non-diabetic patients ^[3], the article endeavors to offer a more comprehensive perspective on the risk factors for CKD. It extends beyond the traditional boundaries of research by incorporating lifestyle and inflammation markers into the analysis, and furthermore, employs cutting-edge machine learning methods, thereby presenting an innovative approach to identifying subjects with abnormal renal function.

One noteworthy aspect of the study is its inclusion of lifestyle and inflammation factors in addition to demographic and biochemistry data. This holistic approach provides a more comprehensive understanding of the intricate interplay of variables contributing to CKD. The utilization of machine learning techniques adds a layer of sophistication to the analysis, allowing for a more nuanced exploration of the data. This approach not only advances our understanding but also offers potential avenues for more personalized and effective interventions. These data both validate and advance previous results in this field, employing both linear and nonlinear relationships of risk factors for CKD in the elderly to develop a predictive model for early intervention in the health of the elderly ^[4].

The results presented in the article are indeed thought-provoking, particularly in accentuating the heightened significance of risk factors as we progress from Model 1 (incorporating demographic and biochemistry data) to Model 3 (including

inflammatory markers). The study underscores the importance of inflammation markers and lifestyle factors in identifying individuals with abnormal renal function. Furthermore, Model 3 identifies UA¹ as the most influential risk factor, followed by age, Hb, BMI, sport hours, and SBP.² These findings not only provide new insights into the multifaceted nature of CKD risk factors but also raise questions about the potential mechanistic pathways underpinning these associations.

Nonetheless, I would like to propose further avenues for exploration and discussion. First, in light of the significance of UA in identifying L-eGFR, it would be intriguing to delve deeper into the mechanistic pathways through which hyperuricemia impacts renal function, especially concerning vascular obstruction and renal hypoperfusion. An emerging interpretation could entail an exploration of the interplay between UA and inflammation. Given the established links between hyperuricemia and vascular obstruction, investigating whether targeting UA levels could positively impact renal health, particularly in the context of CKD, would be of interest. Additionally, this raises the potential for designing interventions that not only focus on individual risk factors but also address their interactions.

Moreover, the study spotlights the role of hemoglobin levels as a significant risk factor for abnormal eGFR, eliciting questions about the causal relationship between anemia and renal function. It may be beneficial to investigate whether the management of anemia in elderly individuals could potentially impede the progression of CKD and contribute to the preservation of renal health, thereby opening avenues for interventions that address both conditions concurrently.

The connection between BMI and eGFR is intriguing, and the study's findings emphasize the necessity for further longitudinal research to elucidate this association, particularly given the escalating prevalence of obesity-related comorbidities. Given that prior works have linked BMI to kidney function^[5] and UA to BMI^[6], it would be constructive to investigate how the trajectory of BMI over time impacts renal function. This could provide insights into the potential benefits of weight management and offer more tailored recommendations for individuals at risk of CKD.

The importance of sport hours as a risk factor for L-eGFR underscores the potential role of physical activity in renal health. Future research could explore specific exercise regimens or interventions tailored to elderly individuals, aimed at improving renal function.

Lastly, the independent effects of systolic blood pressure (SBP) and diastolic blood pressure (DBP) on eGFR warrant further investigation. Subsequent studies could help unveil the mechanisms underlying these effects and explore the potential for targeted interventions in blood pressure management.

As a constructive critique, the study appropriately underscores the significance of age, which has been substantiated by prior research on CKD. This may be because age is regarded as a static factor rather than a dynamic one. Gaining a deeper understanding of how age-related changes in renal function evolve over time could pave the way for interventions that are tailored to meet the specific needs of aging individuals.

In conclusion, the article makes a significant contribution to our comprehension of CKD risk factors in elderly Chinese individuals. It provides valuable insights into the intricate interplay of demographic, biochemistry, lifestyle, and inflammation factors in identifying individuals at risk of abnormal renal function. Its application of machine learning techniques and inclusion of a wide range of risk factors is commendable and enhances our understanding of CKD in the elderly Chinese population. To fully maximize the impact of these findings, future research could delve into the intricate interactions between risk factors, explore potential causal mechanisms, and design interventions that consider the evolving nature of these factors. Additionally, addressing the limitations and contemplating the potential for generalization to broader populations would further bolster the study's impact. I hope these suggested avenues for further research will contribute to the ongoing exploration of CKD risk factors and potential interventions.

I wish to extend my gratitude to the authors for their thought-provoking work and to your esteemed journal for publishing this crucial research.

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