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Original Research Article

Investigating Health Metrics: An Assessment of Renal Function Indices in Male Medical Doctors in Aba, Abia State, Nigeria

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Abstract

This study investigates the renal function indices, specifically urea concentration, creatinine concentration, and the urea to creatinine ratio, among male medical doctors in Aba, Abia State, Nigeria. The largest proportion of the participants exhibited urea levels within the range of 3.0-3.9 mg/dL (45.76%) and creatinine concentrations between 90-99 Umol/L (22.03%). Most participants also demonstrated a urea:creatinine ratio within the 0.030-0.039 range (35.59%). Findings indicate that the majority of the study participants displayed renal function indices within acceptable parameters. However, several exhibited urea and creatinine concentrations, as well as urea:creatinine ratio, that fell outside the optimal ranges, necessitating further investigations into potential factors such as work stress, dietary habits, and other lifestyle attributes. This study contributes to the body of knowledge on the health metrics of medical professionals and may have implications for their self-care and the healthcare industry's employee wellbeing initiatives. Future research could focus on identifying any correlations between these indices and other health or lifestyle variables or extend the investigation to other geographical regions and demographic groups within the healthcare sector.

Keywords: Creatinine, Health metrics, Medical Doctors, Urea

INTRODUCTION

Renal function plays an essential role in maintaining homeostasis in the human body (Levey and Coresh, 2012). The kidneys not only help to eliminate waste products from the body but also regulate blood volume and pressure, control levels of electrolytes and metabolites, and regulate blood pH. Abnormalities in renal function can lead to dire consequences, including end-stage renal disease, cardiovascular disease, and death (Ene-Iordache *et al*., 2016).

In recent years, there has been an increasing body of research on the prevalence and predictors of chronic kidney disease (CKD) in low and middle-income countries (Airaodion *et al*., 2020a). A significant portion of this research has focused on Nigeria due to the high prevalence of risk factors like hypertension and diabetes in this population (Stanifer *et al*., 2015). The World Health Organization (WHO) reports that non-communicable diseases (NCDs), including CKD, are on the rise in Nigeria, contributing to an increasing burden on health-care systems (WHO, 2018).

Research has demonstrated that certain professions may carry a higher risk for renal diseases, and healthcare workers are not exempted. Medical doctors, in particular, may be at greater risk due to long work hours, high-stress levels, unhealthy dietary habits, and exposure to certain environmental and occupational risk factors (Al-Rubeaan *et al*., 2018; Klein *et al*., 2021).

In the Abia state of Nigeria, there is a high population

of medical doctors. Aba, the state's commercial hub, has a large number of hospitals and healthcare centres. However, studies investigating the renal function of these doctors are lacking. This is a significant gap in research, especially considering the escalating prevalence of CKD in the country (Ojogwu *et al*., 2020). It is also important to investigate health metrics among healthcare providers as they directly impact the quality of patient care (Linzer *et al*., 2022).

Given the situation, our study aims to investigate renal function indices in male medical doctors in Aba, Abia State, Nigeria. This research will provide valuable insights into the state of kidney health in this specific professional group, potentially influencing policies, preventive strategies, and health guidelines for medical doctors in the region and across Nigeria.

METHODOLOGY

This study employed a cross-sectional survey design, an effective method for observing large populations at a single point in time, or over a short period, collecting data on all variables at once (Ekeleme *et al*., 2023). There are about 300 practicing doctors (constituting both the young and the old) in Aba, Abia State. However, the respondents were forty years and above. Aba has a Teaching hospital, a cottage hospital, two mission hospitals, and many private hospitals.

The research was carried out during the zonal meeting of the Nigerian Medical Association (NMA) Aba zone together with official clinic consultation. A convenient sampling method was used and only those who gave their consent were included in this study. The selection of male doctors was a strategic decision, influenced by the desire to understand the health status of this particular population. A total of 59 participants were recruited for the study.

Blood samples were taken following standard venepuncture techniques and were analysed for urea and creatinine concentrations using an automatic biochemical analyser.

Ethical Consideration

This study adhered strictly to the ethical guidelines for human research, including voluntary participation, informed consent, and the right to withdraw at any time. The study received ethical approval from the ethical review board of the hospitals involved.

RESULTS

The results of this study (Figure 1) showed the concentration of urea in the blood. Most doctors (45.76%) had a urea concentration between 3.0 - 3.9 mg/dL, while the least (1.69%) had concentrations below 2.0 mg/dL and between 6.0 - 6.9 mg/dL. Figure 2 provides similar information but for creatinine concentration. Here, the largest group of doctors (22.03%) had a creatinine concentration between 90 - 99, umol/L while the least number of doctors (1.69%) had creatinine concentrations below 50 mg/dL. Figure 3 shows the urea-to-creatinine ratio. This ratio can be used as an indicator of renal health. Here, most doctors (35.59%) had a ratio between 0.030 - 0.039, while the least number (3.38%) had a ratio between 0.001 - 0.019.

DISCUSSION

This present study is a critical investigation focused on examining the renal function indices of male medical doctors. Given the nature of the medical profession that often involves long hours, high stress, and potential neglect of personal health, it is paramount to understand the status of this population's renal health. This study is specifically essential for Nigeria, where previous studies suggest that the burden of kidney disease is high and growing (Abali *et al*., 2022; Ene-Iordache *et al*., 2020).

In this study, most participants (78%) had urea concentrations within the 3.0 - 4.9 mg/dL range, generally considered to be within the normal range in adult males (Bhattacharjee, 2019). The relatively high proportion of subjects in this range is reassuring and suggests a general pattern of good renal health in this population. These results align with previous studies indicating that healthcare professionals typically have better health indicators than the general population due to better access to healthcare services and higher health literacy (Azodo *et al*., 2020).

The 8 subjects (13.6%) who fell within the 5.0 - 5.9 mg/dL range might be considered for further evaluation. Elevated urea levels could reflect a variety of conditions, including high protein intake, dehydration, stress, or early signs of kidney dysfunction (Airaodion *et al*., 2020b; Papazafiropoulou *et al*., 2019). Given the demanding nature of the medical profession, these factors are not unexpected and warrant closer attention to hydration and stress management strategies.

The single participant with a urea level below 2.0 mg/dL and another with a level in the 6.0 - 6.9 mg/dL range, accounting for 1.7% of the sample in each case, are of special interest. Both low and high levels of urea can be indicative of kidney problems or other health issues (Airaodion *et al*., 2020c; Vanholder *et al*., 2018).

This study highlights the importance of regular health checks among healthcare professionals, who often neglect their health due to workload and stress. Early detection and management of elevated or low urea levels can prevent future complications, improve overall health,

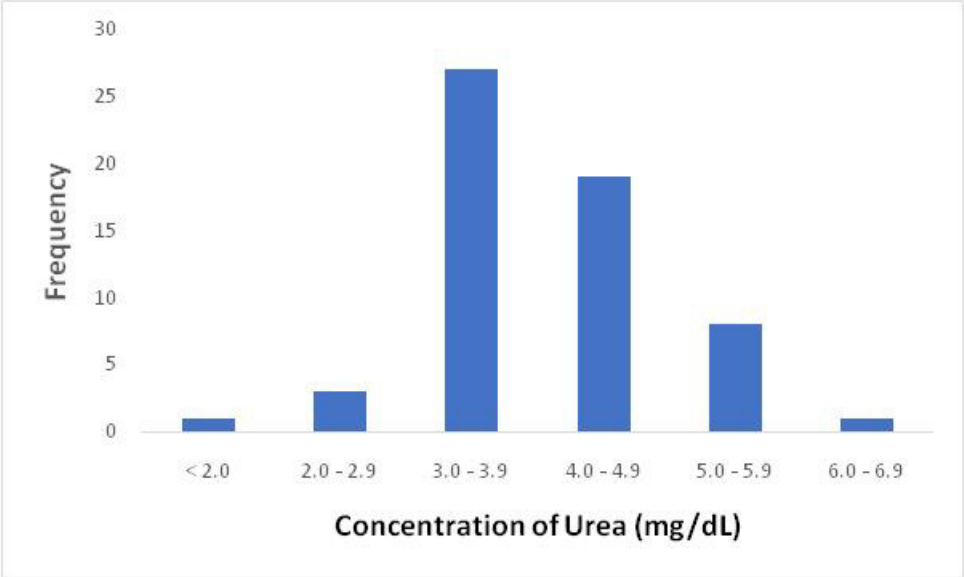

Figure 1. Urea Concentration of Male Medical Doctors

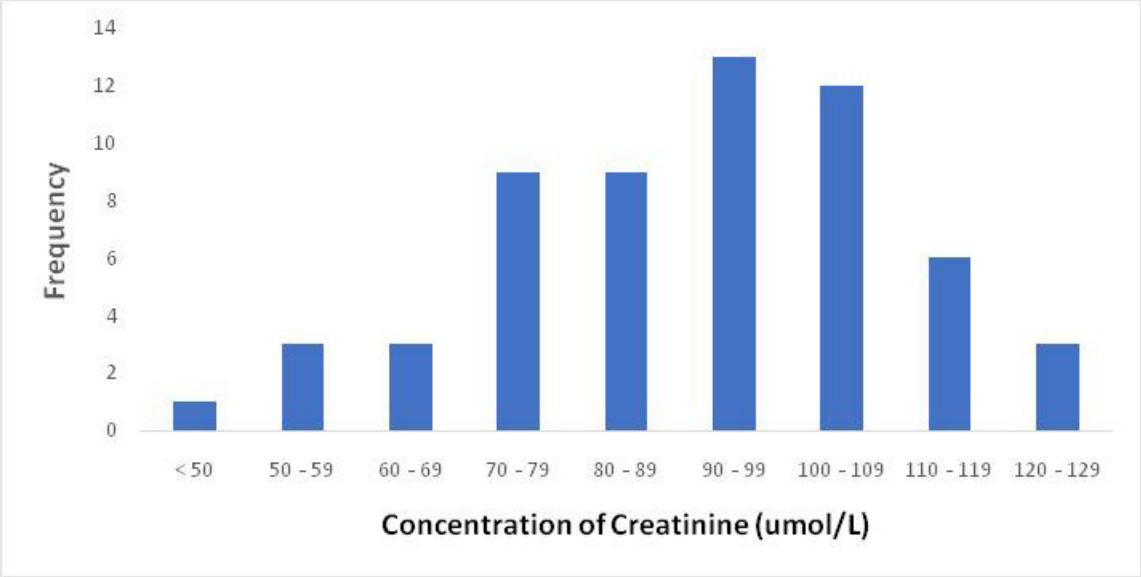

Figure 2. Creatinine Concentration of Male Medical Doctors

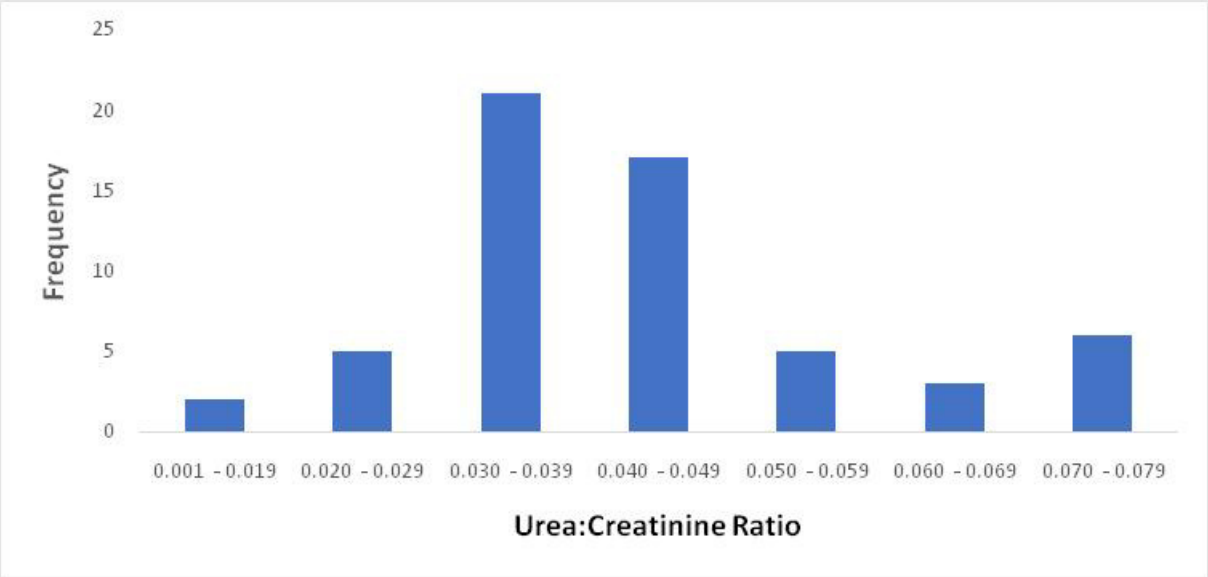

Figure 3: Urea:Creatinine Ratio of Male Medical Doctors

and serve as an example for patients (Patterson *et al*., 2022).

Creatinine concentration was also a focus of this study, as it is a vital indicator of kidney function (Airaodion *et al*., 2020d; Devgan *et al*., 2021). In this study, the creatinine levels ranged from less than 50 umol/L to 129 umol/L (Figure 2). As the renal function and overall health of medical practitioners could reflect on their professional performance, understanding these metrics is critical (Khalsa and Maisonneuve, 2022).

In this sample, a relatively low number of participants, 1.69%, had creatinine concentrations less than 50umol/L. Creatinine levels below normal could be attributed to conditions like muscle wasting or malnutrition, which could potentially be of concern if found in a healthcare professional (Airaodion *et al*., 2019; Adebisi *et al*., 2021). However, given the low number of participants with this level of creatinine, these conditions might not be prevalent in the examined population.

Creatinine levels ranging from 50 to 89 mg/dL, considered to be within the normal range for adult males (Stevens and Levin, 2023), were observed in approximately 36% of the participants. These individuals likely have proper kidney function and are not at a high risk of developing kidney diseases.

A significant proportion, 42.37% of the participants, had creatinine concentrations ranging from 90 to 109 mg/dL. While these figures still lie within the broad normal range, they are towards the upper end, indicating a slightly reduced kidney function. These individuals may be at a higher risk of kidney diseases, especially if there are other risk factors such as hypertension or diabetes (Spanaus and Kollerits, 2021).

The remaining 20% of the participants had creatinine levels exceeding 110 mg/dL, which is considered high and indicative of impaired kidney function. These individuals are at a substantially increased risk of chronic kidney disease (CKD) and need to be closely monitored (Ogbuagu *et al*., 2021; Vyas *et al*., 2022). Notably, this group of participants with elevated creatinine levels is sizable, raising concerns about their overall renal health. Substantial stress and irregular work routines, factors known to impact health negatively. This study's results underscore the necessity for regular health check-ups, particularly for medical doctors, who are often under (Scheepers *et al*., 2022). The significant proportion of participants with creatinine levels at the higher end of normal, and those exceeding normal ranges, suggests a potential health issue that needs immediate attention (Sung and Choi, 2023).

This study also uses the Urea-to-Creatinine (U:C) ratio, which is an important indicator of renal health. A higher U:C ratio indicates impaired kidney function since healthy kidneys should filter both urea and creatinine out of the blood efficiently. If the kidneys are not functioning optimally, the levels of these waste products increase, thus increasing the U:C ratio (Perazella and Coca, 2012).

Looking at the results of this study, we find a distribution of U:C ratios among the sampled medical doctors. The most common U:C ratio falls within the range of 0.030 to 0.039, comprising 35.59% of the population. The second most common range is 0.040 to 0.049, comprising 28.81%. Interestingly, there is a non-negligible portion of the population with a higher U:C ratio, as indicated by the 10.17% in the range of 0.070 to 0.079.

Based on established medical knowledge, a U:C ratio within the range of 0.020 to 0.040 is considered healthy (Kee, 2017). In this study, it appears that the majority (about 64.40%) of the participants had U:C ratios within this normal range. This finding is a bit reassuring and shows that despite the challenges associated with the profession, a significant portion of the medical doctors maintained reasonable renal health.

However, it's noteworthy to highlight the substantial percentage of participants who had U:C ratios above the normal range, suggesting a degree of renal impairment. Specifically, 28.81% had U:C ratios ranging from 0.040 to 0.049, while 10.17% had ratios from 0.070 to 0.079. Although these ranges do not necessarily indicate severe kidney disease, they can be a sign of mild to moderate kidney impairment or other physiological abnormalities that might lead to kidney problems in the future (Levey and Coresh, 2012). It's also worth noting that low ratios, as indicated by the 3.39% with ratios from 0.001 to 0.019, can be indicative of liver disease or malnutrition (Lim, 2017).

These findings suggest that a notable percentage of male medical doctors in Aba, Abia State, Nigeria may be at risk for kidney disease, highlighting the need for enhanced focus on their health and well-being. Given the demanding nature of their profession, it is essential to raise awareness about maintaining a healthy lifestyle and regularly monitoring renal and overall health. Future research can also be focused on investigating the reasons behind the increased U:C ratios observed in this population.

Overall, this research provides a valuable contribution to the existing literature on the health of medical professionals in Nigeria, highlighting the importance of constant health monitoring and self-care in this population. It also underscores the need for further investigation to discern the factors contributing to these trends and design effective interventions to curb them.

CONCLUSION

The study on renal function indices in male medical doctors in Aba, Abia State, Nigeria unveiled informative trends in health metrics. The majority of the participants had urea concentrations within the ranges of 3.0-3.9 mg/dL (45.76%) and 4.0-4.9 mg/dL (32.20%). This pattern signifies that most subjects were within the normal urea range, highlighting relatively good renal health. With respect to creatinine levels, the most frequent ranges were found to be 90-99umol/L (22.03%) and 100-109 umol/L (20.33%). Some participants had creatinine levels higher than the commonly accepted normal range (50-110 umol/L), indicating the possible presence of renal dysfunction among these doctors. Finally, the urea:creatinine ratio, another vital kidney health indicator, showed the majority of the participants with ratios between 0.030 - 0.049. This range is typically associated with normal kidney function.

RECOMMENDATIONS

a. **Regular Health Checks**: This study stresses the importance of regular health check-ups, even among medical professionals who might be presumed to have better health due to increased medical knowledge and access to health care.

b. **Expanded Research**: It would be beneficial to extend this research to include other healthcare professionals and even the general population to provide a more holistic view of kidney health in the region.

c. **Lifestyle and Diet Counselling**: Given the significant role of lifestyle factors in kidney health, doctors with high creatinine levels could benefit from personalized lifestyle and diet counselling to maintain or improve their kidney function.

d. **Early Detection and Intervention**: Regular testing of kidney function indices such as urea and creatinine levels can facilitate early detection of any potential renal issues. Timely intervention could then be initiated, potentially preventing the progression of kidney disease.

e. **Education and Awareness**: There is a need to increase awareness about the importance of regular screening for kidney disease, especially among high-risk groups. Despite their medical background, the findings suggest that even medical doctors may be at risk of kidney disease.

f. **Longitudinal Studies**: This research provides a cross-sectional snapshot of the kidney health status among the study population. Future studies could consider longitudinal designs to better understand trends and causality.

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