Research Article

Assessment of Urea and Creatinine Levels of Premenopausal and Postmenopausal Women in Ekpoma

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Abstract

The determination of serum urea and serum creatinine is of great value in helping to ascertain the renal function in the renal function in the clinical setting. The study was carried out to determine the urea and creatinine of pre- and post-menopausal women in Ekpoma, Edo State. The population of this study was one hundred and twenty (120) women comprising of 60 premenopausal women and 60 postmenopausal women in Ekpoma. Blood samples were collected from the subjects after obtaining their consents. Urea was estimated using Berthelot method, while creatinine was estimated using Jaffe's method. Data analysis was done using SPSS computer software version 20 and results were presented as mean ± standard deviation. The result obtained showed that Urea was significantly (p<0.05) higher in postmenopausal women (8.64±0.69mmol/l) compared with premenopausal women (4.80±0.94mmol/l). Similarly, creatinine was higher in postmenopausal women (88.82±8.29μmol/l) compared with premenopausal women (72.01±6.24μmol/l) however, the difference was not statistically significant (p>0.05). The study concludes that urea and creatinine is higher in postmenopausal women compared with premenopausal women. When it comes to determining renal function in the elderly, urea appears to be more sensitive than serum creatinine. However, urea and creatinine estimation should be combined with other renal parameter to fully diagnose renal disease.

Keywords: Postmenopausal; Premenopausal; Urea; Creatinine; Women.

Introduction

Menopause, also known as climacteric, is the phase in a woman's life when her menstrual periods stop and she is no longer able to bear children [1]. Menopause occurs as a result of a decrease in the synthesis of the hormones estrogen and progesterone by the ovaries [2]. For women, menopause is a significant transitional time that marks the end of their reproductive lives. The age at which a woman reaches natural menopause can be a good sign of her overall health and somatic aging, although there is a lot of variation among women [3]. Menopause usually occurs between the ages of 45 and 55 [4].

Premenopause refers to the period of a woman's life between her first period and the onset of perimenopause symptoms [5]. Estrogen and progesterone help to control and facilitate menstruation and conception at this time [5]. Periods become irregular in most women, which mean they may be longer or shorter in duration, or lighter or heavier in terms of flow [6]. While it's common to associate menopause with an increase in

renal failure, this is mostly related to advancing age and has nothing to do with menopause [7].

The fourth and final stage of the menopausal process is known as post-menopause. The term "post-menopause" refers to the period following menopause. A woman is technically postmenopausal from the time menopause begins until the end of her life. Most women's menopausal symptoms, such as hot flashes, can subside at this time [2]. The same hormonal changes and external circumstances that create the other stages of menopause also cause postmenopause [8].

Urea, also known as carbamide, is a nitrogen-containing chemical molecule that plays a significant role in animal nitrogen metabolism and is the predominant nitrogen-containing substance in mammalian urine [10]. When measured in the blood, urea is referred to as blood urea nitrogen (BUN). Urea is a byproduct of protein metabolism. Protein consumption, the body's ability to catabolize protein, and appropriate urea excretion via the renal system all influence urea concentration [9].

Creatinine is created when creatine and phosphor-creatine are broken down, and it can be used to assess renal function. The amino acids arginine, glycine, and methionine are transaminated in the liver, pancreas, and kidneys to produce creatine [10]. Because serum creatinine is an easily measurable indicator of muscle metabolism that is eliminated unchanged predominantly by the kidneys, mostly through glomerular filtration, but also by proximal tubular secretion, it is an essential indicator of renal health [11]. The estimated GFR (eGFR) can also be calculated solely based on serum creatinine levels [12].

The glomerulus' filtration capability is demonstrated by measuring creatinine concentrations in plasma and urine samples [13]. Although less specific than creatinine, urea can be used to assess renal function [14]. The onset of moderate renal impairment has been linked to growing older [15]. In Ekpoma, however, there is a smattering of literature on the assessment of renal function in pre- and post- menopausal women. Furthermore, the importance of maintaining middle-aged women's health cannot be overstated, since bad health might influence their job experience and longevity. The need for pre- and post-menopausal women to constantly monitor some renal function parameters such as urea and creatinine which are an important marker for detecting renal dysfunction cannot be overemphasized. This study was therefore carried out to determine the urea and creatinine levels of premenopausal and postmenopausal women in Ekpoma, Edo State, Nigeria.

Materials and Methods

This study was carried out in Ekpoma. The population of this study was one hundred and twenty (120) women comprising of 60 premenopausal women and 60 post-menopausal women in Ekpoma, Edo State.

Ethical Approval
Ethical approval was obtained from the Health Research Ethics Committee of Ambrose Alli University, Ekpoma. Informed consent was sought from each participant before sample collection.

Inclusion & Exclusion Criteria
Apparently healthy premenopausal women (between ages 18 to 30 years) and post-menopausal women between the ages of 55 years and above who gave their consent were examined for this study.

Male subjects, children, pregnant women, lactating mothers, menstruating women, women under age 18yrs, and individuals with no kidney disease were excluded from the study.

Sample Collection and Analysis
Four millimeters (4mls) of venous blood were collected from each subject, using the standard vein puncture method. The blood sample was emptied into plain bottle and allowed to clot. It was allowed to stand for one hour to clot. It was then centrifuged at 3000rpm for 10 min in order to separate blood cells and suspended particles from serum. The serum was aliquoted and stored at -40c until required for analysis. Urea was estimated using Berthelot method, while creatinine was estimated using Jaffe's method [16].

Statistical Analysis
The results were presented in tables as mean ± standard deviation (SD). Statistical comparison was made between groups us-ing one-way analysis of variance (ANOVA) and the student's t-test. Significant difference was accepted at p<0.05.

Results
Table 1 shows the Mean ± S.D of Urea and Creatinine concentration in pre- and post-menopausal women in Ekpoma. The result obtained showed that Urea was significantly (p<0.05) higher in postmenopausal women (8.64±0.69mmol/l) compared with premenopausal women (4.80±0.94 mmol/l). Similarly, creatinine was higher in postmenopausal women (88.82±8.29 µmol/l) compared with premenopausal women (72.01±6.24 µmol/l) however, the difference was not statistically significant (p>0.05).

Table 1: *Mean distribution of serum urea and creatinine of premenopausal and postmenopausal women.*

Parameters	Pre-meno-pause	Post-meno-pause	t-value	p-value
	(Mean ± S.D)	(Mean ± S.D)		
Urea (mmol/l)	4.80±0.94	8.64±0.69	14.404	0
Creatinine (µmol/l)	72.01±6.24	88.82±8.29	1.23	0.521

Key: S.D: Standard deviation

Discussion
The determination of serum urea and serum creatinine is extremely useful in determining renal function in the clinical environment [17]. The study was carried out to determine the urea and creatinine of pre-and post-menopausal women in Ekpoma. From the result of the study, the mean value of serum creatinine levels was higher in postmenopausal women (88.82µmol/l) compared with pre-menopausal women (72.01µmol/l). This could be due to the fact that bone loss accelerates between perimenopause and postmenopause. It's also likely that the decrease in estrogen levels caused kidney injury by affecting the rennin-angiotensin pathway, which has higher renin levels in postmenopausal women [18]. The findings of this study are consistent with those of Jones et al. [19] in US women, Erasmus et al. [20] in African women, and Atieg [21] in Sudanese women, who all observed higher creatinine levels in postmenopausal women compared to premenopausal women in separate investigations.

In this study, there was no significant difference (p>0.05) in mean creatinine values between the two groups studied (premenopausal and postmenopausal women). This discovery is also in line with prior research findings [20,22,23]. Yoshida [22] examined the effect of aging on renal function in women in their thirties to sixties and found no significant difference in creatinine concentration (p>0.05) between the two groups. Erasmus et al. [20] evaluated the mean serum creatinine values and reference ranges in three groups of Melanesian women and found no significant differences (p>0.05) between them (premenopausal, menopausal and postmenopausal women). Feinfeld et al. [21] found that serum creatinine levels in the extremely elderly, even those with modestazotaemia, did not necessarily rise with age. The findings of this investigation, on the other hand, did not coincide with those of Albert et al. (2012) and Ikegwuonu et al. [18], who observed a significant difference (p<0.05) in mean serum creatinine levels at various ages. This disparity could be explained partly by the research-

ers' sample size and statistical methodology.

In this study, the mean serum urea was significantly ($p<0.05$) higher in postmenopausal women (8.64mmol/l) compared with premenopausal women (4.80mmol/l). This shows that age has an impact on serum urea levels. This could be due to a decrease in body protein reserve as people get older, resulting in a decrease in urea excretion (Albert et al., 2012). This study's findings are consistent with prior studies' findings [22-24]. When Ateig [21] estimated the normal values for serum urea in Sudanese women, he discovered that age had a significant ($p<0.05$) impact on the urea values, as the values increased with age. Women over the age of 50 had considerably ($p<0.05$) reduced BUN, according to Yoshida [22], who also looked at the influence of aging on renal function in healthy women. In their work, Ano et al. [25] estimated the typical ranges of BUN values in elderly participants and a youthful control group. Their findings revealed that the aged patients' mean BUN levels were significantly higher ($p<0.05$) than the control groups. In a study of renal function, Fehrman and Skeppholm [24] found a significant association between serum urea levels and age ($p<0.05$).

Conclusion

The study concludes that urea was significantly higher ($p<0.05$) in postmenopausal women compared with premenopausal women. Creatinine was also higher in postmenopausal women when compared with premenopausal women, however, the difference was not statistically significant ($p<0.05$). When it comes to determining renal function in the elderly, urea appears to be more sensitive than serum creatinine. However, urea and creatinine estimation should be combined with other renal parameter to fully diagnose renal disease.

Conflict of Interest

The authors declare no conflicts of interest. The authors alone are responsible for the content and the writing of the paper.

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