

Variation of Renal Length with Advancing Age in South-Eastern Nigeria.

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ABSTRACT

Background: Sonographic measurement of renal size is an important parameter in the clinical evaluation of renal pathologies. No information yet exists on renal size and its relationship to age and sex in the middle aged and elderly (>50yrs) in Enugu, South East Nigeria. The aim of this study is to determine variations in renal size and its relationship to age and sex in the aging population using absolute renal length as a parameter.

Method: This is a retrospective study where a cross section of 200 subjects between the ages of 50 and 89 years were scanned between the years 2008 and 2010. These had no history of renal disease and showed normal renal features on ultrasonography. Absolute renal length was measured using real-time ultrasonography and a 3.75MHz probe.

Results: 200 adults (122 males and 78 females) between 50 and 89 years (64.7 ± 9.71 years) were evaluated. Kidney length was significantly longer in males than in females ($P < 0.01$). Kidney length showed a decrease length with increasing age, the rate of decrease accelerates above 60 years. No significant difference was seen between the left and right kidney length (104 ± 11.0 mm left kidney vs 103 ± 10.8 mm right kidney; $P > 0.05$)

Conclusion: This study shows the effect of age on renal length in subjects above 50 years in Enugu.

Keywords: Renal length, normal value, ultrasonography.

INTRODUCTION

Knowledge of renal size is a very important criterion for the diagnosis, prognosis and treatment of renal diseases.

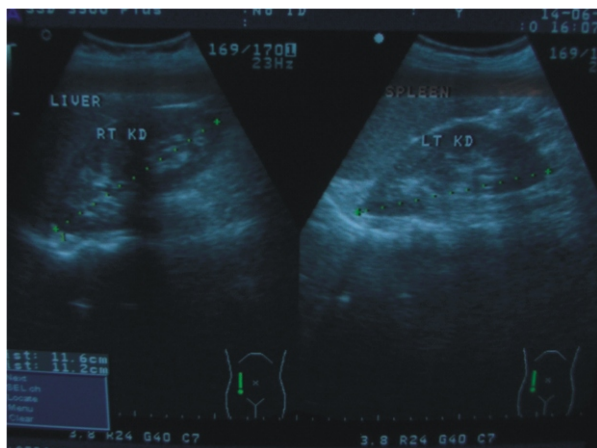
Variations in renal size are an important indicator of a renal pathology. Renal size can be evaluated by renal length (absolute and relative) and renal volume, although renal volume, measured by MRI, is the most accurate and precise method of assessing renal size¹. Estimation of renal volume by ultrasonography is not appropriate for accurate and reproducible calculation of renal size due to high inter-observer variation^{1,2}. Absolute renal length is a simple and easily reproducible measurement of renal size and is associated with less inter-observer variation. Renal length measurement shows the best reproducibility, hence its use for this study³. This study measured absolute bipolar renal lengths in healthy adults (over 50 years) and analyzed its relationship to age and sex.

MATERIALS AND METHODS

200 adult subjects (between 50 and 89 years) with no history of a renal pathology were randomly selected for this study between August 2008 and August 2010. Subjects with cortical or parapelvic cysts greater than 2cm, those with reduced corticomedullary differentiation and those who had multicystic or any other kidney disease were excluded.

Subjects were scanned in supine position. Where necessary, further scanning was done in lateral and prone positions to obtain the longest possible renal lengths. A Siemens sonoline SI-250 with a 3.75MHz_z sector probe was used. Two independent sonologists scanned these different subjects.

Fig1. The figure above shows method measuring the bipolar absolute renal length for the right and left kidneys.



The longest longitudinal diameter (bipolar diameter) of the right and left kidneys were measured in millimeters (mm), recorded in tabular form, and presented as mean $\pm$ standard deviation (SD). Primary data collection was done using Excel software (Microsoft USA). Bivariate correlations were tested using Pearson's correlation analysis and paired data (for left and right kidneys) were compared using SPSS 10 software. Value of $P < 0.05$ was considered to be significant.

RESULT

Of the 200 adult subjects aged between 50 and 89 years (64.67 ± 9.7 years) evaluated, 122 were males and 78 were females.

Both kidneys were significantly larger in males than in females. (right kidney: 105 ± 10.3 mm in males vs 101 ± 10.0 mm in females; left kidney: 106 ± 9.8 mm in males vs 101 ± 11.3 mm in females; $P < 0.01$).

The difference in absolute renal length between right and left kidneys for both males and females were not significant, (for males: 106 ± 9.81 mm left kidney vs 105 ± 10.3 mm for right; $P > 0.05$; for females: 101 ± 11.3 mm for left vs 101 ± 10.0 mm for right kidney; $P > 0.05$).

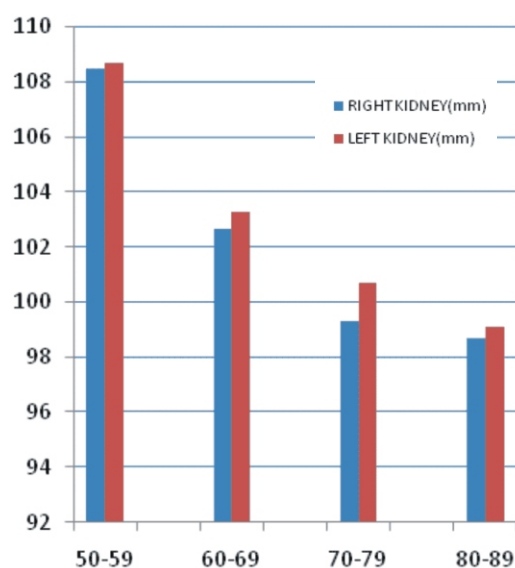
Table 1: The table above shows the difference in absolute renal length between the left and right kidney length for both males and females.

A significant negative correlation between absolute renal length and age was observed (right kidney, $r = -0.64$, $P < 0.01$ and $r = -0.63$, $P < 0.01$).

All groups show no significant variation between right and left kidney lengths ($P > 0.005$).

Table 2: The above table shows average absolute renal length for right and left kidneys as seen in the age groups.

Fig 2. The chart shows the average absolute lengths of the right and left kidneys within the age groups.



DISCUSSION

Renal pathologies can alter renal sizes. This alteration may be explained by changes in the normal structure of the organs. Studies have shown that ultrasonography tends to underestimate kidney size⁴. It is still of importance in establishing diagnosis and has the advantages of being non-invasive, safe, simple, practical and easily reproducible⁵.

Relative renal length is claimed to be a better method for the estimation and comparison of kidney size in different subject. It eliminates variations related to subject's height and sex. The difference in absolute and relative lengths between the left and right kidneys does not change significantly at any age⁵.

Studies have also shown that interobserver and intraobserver variations are similar in magnitude when measurements are made by either single or different workers, and are also similar for right and left renal length measurements, suggesting that sonographic bipolar measurements in normal adult kidneys are reasonably reliable^{4,5}. However, in disease states interobserver and intraobserver variations may be significantly higher⁶.

This study has shown that absolute renal lengths in males are significantly greater than in females. This confirms previous studies that showed a significant sex difference in renal length^{5,6}.

The study also shows that there is no significant difference between the length of the left and right kidneys of the same patient for both males and females in this age group in Enugu South East Nigeria. This is in variance with studies done elsewhere^{5,6}. In these studies the right kidney was smaller than the left. However the variation in size is not very significant. The explanation is that the left kidney has more space since the adjacent spleen is smaller than the liver.

The study also shows an inverse relationship between renal lengths and advancing age. Renal length is shown to decrease with advancing age, a decrease which accelerates between the ages of

60 69 and continues above 70 years. This is similar to the findings of Hekmatnia A. et al⁵ and Justo Ovuela-Carrasco et al⁶.

CONCLUSION

Both left and right absolute renal lengths are longer in males than in females in Enugu. A decrease in renal length was observed with increasing age, especially above 60 years. No significant difference was observed between the left and right kidneys for both males and females in these age range.

REFERENCES

1. Jeannette B., Macro O., Robert K., Eduard E. de Lange., Karel G.M.M., Jaap J. B., Frederik J.A.B., Renal Volume Measurement: Accuracy and Repeatability of US Compared with that of MR Imaging 1999;1.
2. Ablett M.J, Coulthard. A, Lee R.E.J, Richardson D.L., Bellas T., Owen J.P., Keri J., T.J Bufler. How reliable are ultrasound measurement of renal length in adults? The British Journal of Radiology 1995;68:814.
3. Emamian S.A, Nielsen M.B, Pedersen J.F. Intraobserver and intraobserver variations in sonographic measurement of the kidney size in adults volunteers. Acta Radiologica 1995;36:399-401.
4. Kew-Yong K., Young J.L., Soon C.P., Chul W.Y., Yong-Soo K., In S.M. Yong B.K., Byung K.B., Bum S.C. A comparative study of methods of estimating kidney length in kidney transplantation donors.
5. Hekmatnia A., Varaghi M. Sonographic Measurement of Absolute and Relative Renal Length in Healthy Isfahani Adults. Journal of Research in Medical Sciences 2004
6. Justo Oyuela-Carrasco, Francisco Rodriques-Castellanos, Erick K., Rosa Elena D., Juna P.Herrera-Felix., Renal Length by ultrasound in Mexican adults. Nefrologia 2009; 29,.