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ORIGINAL ARTICLE

SONOGRAPHIC MEASUREMENT OF NORMAL RENAL SIZE AND CORRELATION WITH SOMATIC VARIABLES IN SUBSET OF KARACHI PEDIATRIC POPULATION

Naila Younus , Farheen Raza , Sanober Bhugio . Nosheen Zehra , Pashmina Gul , Waseem Mehmood Nizamani , Shumaila Younus

ABSTRACT

Background: Multiple renal pathogenesis manifested as unilateral or bilateral size changes, therefore there should be normative reference data for proper comparison. Our goal is to determine normal standard value ranges for renal dimensions in pediatric population in Karachi. Sonographically renal length in 150 children were measured and correlate with age, gender, body height, weight and BMI.

Objective: Sonographic Measurement of Normal Renal Size and Correlation with Somatic Variables in Subset of Karachi Pediatric Population.

Methods: A six month cross sectional hospital based assessment of kidney size (length, width) was evaluated with the help of sonography. XarioTM 200 Toshiba with convex 3.5 frequency transducer will be used. The mean renal dimensions with standard deviation (SD) were estimated for every group of age. The renal length and width were determined and corresponded with different somatic variables. Descriptive statistics with Regression analysis was done.

Results: The normal length and the width of kidneys and its ranges were obtained. Right kidney length moderately and significantly correlated with height and weight (r=0.651, r=0.654) and age (r=0.538) respectively. However, moderately insignificant with BMI (0.129). Lefts kidney moderately and significantly correlated with height and weight (r=0.665 r=0.705), negative insignificant with age (0.564) and moderately weak insignificant relationship with BMI (0.174).

Conclusion: The research presents the normal range parameters of renal size and measurements by sonography in healthy pediatric population in Karachi. Guideline measurements of kidneys represent a statistically important and comprehensive interaction with specifications of growth which allows us to easily calculate the renal size by derived regression analysis.

KEY WORDS: Renal Size, Sonography, Children, Chronic Renal Disease.

INTRODUCTION

Renal size and function determined the health status of the kidney[1]. Proper body developments and functions are directly related to organ growth rate. The growth rate of renal length will be evaluated with help of distinct measurements like weight, height and anthropometric parameters such as body mass index (BMI).[2] It can be helpful and facilitate us for follow up for the treatment of children with chronic pyelonephritis, obstructive uropathy , and chronic glomerulonephritis in early childhood.[3,4] Sonography helps in accessing and following the patients of urolithiasis, cystic kidney

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diseases, malignancies ,infections, vesicoureteric reflux and renal transplant in elders as well as in children.[5,6] The prevalence of Kidney failure diseases in Pakistani children is 10-12%.[7]
Sonography has now replaced standard radiography and becomes the ideal, safe and reliable method in establishing the normal reference values and diagnosing renal diseases because of easy accessibility, non-invasive and inexpensive nature without hazards of contrast or radiations in children.[8] It also provides good anatomic details, the variation in normal parameters of renal measurements and represents underlying pathology. Failure in normal renal growth could also be a manifestation of renal disease.[9] Sonography is real time, nondependent of organ function and respiratory stage. Previously the kidney size was measured on intravenous pyelography which has its own negative side effects .[10]

Only a few studies have been published on sonographic renal measurements in a pediatric age group in the western world. We are lacking normative data according to age, gender, and body size. In our study we have determined the renal sizes of children (1 month to 14 years) sonographically, Indivual variations associated with anthropometric parameters (age, gender, height and weight) with no known renal disease.

METHODOLOGY

This descriptive cross-sectional study was conducted in the Radiology Department of a private tertiary care hospital. Total 150 normal symptomless children of the age-group 1 month to 14 years were evaluated from January 2014 to June 2014. The sample size was calculated with the help of WHO criteria taking the prevalence of 12 % of Kidney failure diseases in Pakistani children7, desired precision 10%, the bond of error 0.6% and confidence level as 95%. Sample size calculation was 113 that was raised to 150 to avoid data wastage. On the basis of expected values the estimated sample size is 150 patients.

$$n = \frac{z^2\, p\,(1-p)}{d^2}$$

Where;
n = Sample size
Z= Z score (1.96 = 3.84)
p = Prevalance 12 % (p = 0.12)
d = Confidence interval (95%)

The sampling technique used was non probability purposive. Children suffering from any of a condition which could change the size of the kidneys like UTI, Tumors, Urolithiasis, Urinary tract abnormalities like hydronephrosis,

dysplastic kidney, or solitary kidney, a history of corticosteroid use, duplex collecting system, urologic surgeries, vesicouretetic reflux, malnutrition, were excluded from the study. Consent was taken from the parents. Detailed parental history was taken for any preexisting disease relevant to kidney diseases. There were 30 parental rejections for participation due to the shortage of time or unawareness. Criterion constitutes age, sex, height/length and weight, and documented for all the children in a structured format. The ages were recorded to the nearest completed month.

We used high-resolution real-time ultrasound machine XarioTM 200 Toshiba [Tokyo, Japan] with 3.5-MHz convex transducers. Participants had neither undergone preparation nor sedation during ultrasound examination. All measured organs had a normal position, shape and echo texture.

Data obtained from the measurements were classified into 8 age groups. Data was analyzed on SPSS version 20.0. All categorical variables were presented as percentage and frequency, and all numerical variables as mean and standard deviation. A Chi square, Independent t test, Anova and Logistic regression test were applied. P value <0.05 was taken as significant.

RESULT

One hundred and fifty children with age between1 month to 14 years were analyzed. The mean age of the subjects obtained in our study is 6.5 years with standard deviation of 3.8 years. Among studied children 84 (56%) were male and 66 (46%) female. The Ethnic background of children suggested 62 pathan(41.3%), sindhi 29(19.3 %), Punjabi 22 (14.7%), urdu speaking, 18(12.7%), balochi 10(6.7) and 9(6%) others. All the children were classified into eight subgroups as in table1. Sonographic measurements were assessed statistically. Longitudinal and antero-posterior dimensions are documented to effective variables such as gender, height, weight and age in Tables 2, 3 and 4.

Normal ranges of renal length and width were obtained. Length of the right kidney moderately and significantly correlated with height and weight (r=0.651, r=0.654) and age (r=0.538). However, moderately insignificant with BMI (0.129).The left kidney moderately and significantly correlated with height and weight (r=0.665 r=0.705), negative insignificant with age (0.564) and moderately weak insignificant relationship with BMI (0.174). Multiple regression analysis was done and taking as right kidney length as dependent variable showed that weight (β coefficient 0.067, SE 0.024, P= 0.005) had significant positive association with the right kidney length while, height (β coefficient 0.022, SE 0.0086, P= 0.008) had significant positive association and age (βcoefficient -0.052, SE 0.047, P= 0.277) also had negative but not significant association. With left Kidney length as dependent variable showed that weight (β coefficient 0.106, SE 0.024, P= 0.000) had significant positive association while, height (β coefficient 0.015, SE 0.008, P= 0.081) had not significant and positive association and the age (β coefficient -0.057, SE 0.049, P= 0.244) also had not significant but negative association.

DISCUSSION

In the present study, renal length was assessed in sagittal view, with normal children either in the supine or in the contralateral decubitus aspects. The prime rationale was to evaluate the maximum renal length in both planes. Sonography seems to be an optimal technique for estimating the renal parameters in children. In the current report, it was attempted to evaluate the mean renal length with various somatic variables through these

Table 1. Distribution and study pattern according to age groups and gender

Age Group	Male n (%)	Female n (%)	Total n (%)
1 - 12 months	9 (6.3)	8 (5.6)	17 (11.9)
1 - < 2 year	5 (3.6)	6 (4.2)	11 (7.7)
2 - < 4 year	8 (7)	16 (13.9)	24 (20.9)
4 - < 6 year	17 (14.8)	14 (12.2)	31 (27)
6 - < 8 year	11 (9.6)	9 (7.8)	20 (17.4)
8 - < 10 year	12 (10.4)	4 (3.5)	16 (13.9)
10 - < 12 year	16 (13.9)	8 (7)	24 (20.9)
12 - 14 year	6 (4)	1 (0.7)	7 (4.7)
Total (%)	84 (56)	66 (44)	150 (100)

N= 150
Mean Age= 6.5 + 3.8
Gender: Male= 84 (56%) Female= 66 (44%)

Table 2. Kidney Measurements (cms) according to gender

Organ Measurements	Male Mean (SD)	Female Mean (SD)	P- Value
RT kidney length	7.45 (1.14)	6.9 (1.9)	0.033
RT kidney width	3.2 (2.9)	3.0 (3.3)	0.70
Lt kidney Length	7.6 (1.3)	6.8 (1.9)	0.003
Lt kidney width	3.3 (0.8)	2.9 (0.9)	0.015

Table 3. Kidney Measurements according to age Groups

Age Group	Right Kidney Length Mean (SD)	Left Kidney Length Mean (SD)
1 to 12 months (n) 17	Mean =5.618 (1.2451 SD)	Mean =5.535 (1.2747 SD)
Male (9)	5.6 (0.9)	5.6 (0.9)
Female (8)	5.6 (1.6)	5.5 (1.6)
1 to < 2 year (n) 11	6.445 (1.0577 SD)	6.609 (0.9439 SD)
Male (5)	6.2 (1.2)	6.5 (0.8)
Female (6)	6.6 (1.0)	6.6 (1.1)
2 to < 4 year (n) 24	7.2 (0.5718 SD)	7.171 (0.7788 SD)
Male (8)	7.4 (.03)	7.4 (0.2)
Female (16)	7.0 (0.6)	7.1 (0.9)
4 to < 6 year (n) 31	6.481 (2.2115 SD)	6.584 (2.2733 SD)
Male (17)	7.2 (0.7)	7.4 (0.7)
Female (14)	7.6 (3.0)	7.6 (3.0)

P-value =0.0001

Table 3. Kidney Measurements according to age Groups (continued)

6 to < 8 year (n) 20	8.155 (0.5031SD)	8.045(0.8666 SD)
Male (11)	8.1 (0.6)	8.2 (0.6)
Female (9)	8.1 (0.4)	7.6 (0.9)
8 to < 10year (n) 16	7.638 (0.9999 SD)	7.45 (1.0379)
Male (12)	8.2 (1.0)	8.2 (1.0)
Female (4)	8.4 (0.4)	8.1 (0.8
10 to <12 year (n) 24	8.004 (0.6785 SD)	8.363 (0.8112 SD)
Male (16)	8.1 (0.6)	8.4 (0.9)
Female (8)	8.8 (0.8)	8.7 (0.4)
12 to 14 year (n) 7	9.343 (0.391 SD)	9.957(0.391 SD)
Male (6)	9.2 (0.10)	10.1 (0.1)
Female (10)	10.2 (0.0)	9.1 (0.0)

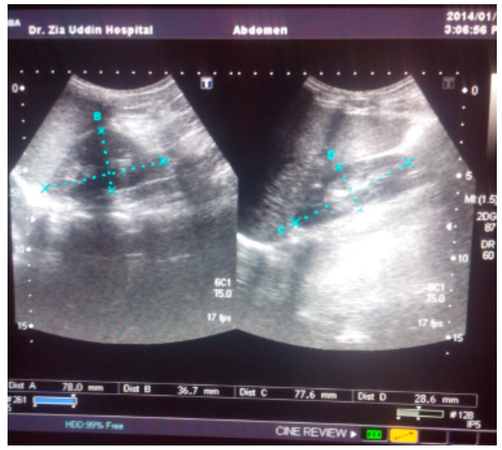
Table 4. Kidney length measurements according to height and weight

Parameter	Right Kidney Length mean (SD)	Left Kidney Length mean(SD)
Height (cm)		
50-80	5.87(0.6)	6.0(0.6)
81-100	6.97	6.95(0.6)
101-120	6.94(1.9)	6.92(2.02)
121-140	8.05(0.5)	8.29(0.7)
>140	8.5(0.8)	8.63(1.1)
Weight (kg)		
≤ 10	5.6(0.8)	5.56(0.8)
10.1-20	6.8	6.89(1.7)
20.1-30	8.06	8.08(0.7)
30.1-40	8.7(1.0)	9.62(0.35)
>40	9.2(0.1)	10.1(0.1)

Taking height /length as independent variables, regression analysis for the following variable are:

Dependent variable	R^2
RT kidney length	0.424
RT kidney width	0.014
Lt kidney Length	0.443
Lt kidney width	0.327

Figure 1. Sagittal Sonographic image of both kidneys with length and width measurements



variables do not represent direct functional correlation and depends basically on the total growth rate of the child. Knowledge of renal length can be critical to the management of children suffering from chronic pyelone-phritis, obstructive renal disease, and chronic glomerulo-nephritis with the early onset of their life. Multiple reports declared that renal length is greatly associated with a patient's height, weight and body mass index (BMI).[11,12] This study also evaluates the relationship between renal size and anthropometric parameters like height ,weight, age and BMI. Different data and literature, found that height being the significant correlation with renal size. In 2006 T Gavela et al [13] includes 474 children and reported height as most a sensitive indicator of kidney size which is undoubtedly related to our data. There were few variations in sizes between the left and the right kidney. In current study, the left kidney was not significantly larger than the right kidney, however, T Gavela, noted slightly the large left kidney than right .Christophe et Al [14] also found a slight difference between kidney lengths and considered it negligible. The best Correlation of renal size with weight was previously exhibit by SAFAK et al [15] which was also consistent with our study. Kim J et al.[16] documented that kidney length correlates positively with body length, and weight. We have not found a striking difference between gender and renal length, Soyupak.[17] also agreed with the same results. The body proportion and the rate of somatic variables are significantly distinct between boys and girls, their renal length sand did not manifests a remarkable difference. Mehta et al.[18] stated that their studies have also reported consonant observation.[19, 20] Ganesh et al.[21] also describe this correlation. Body mass index is one of the extensively measured criterion for checking obesity. Numerous academic researches considered the body surface area and lean body mass as important factors of renal size in children.[22, 23] However, some researches stated the conjunction between BMI and renal length. Pantoja Zuzuárregui et al.[11] stated that BMI is greatly interacted with renal length. Despite that, we got weak interactions between BMI and renal length as related to height and weight. This propose that BMI might not be a convincing confounder in recognizing the renal measurements. Renal development is rapid during fetal and early infant life, and the then growth rate progressively slows through the rest of the first year of life and becomes finally stable[24]. Miranda J.J et al. [25] showed that renal length is influenced of age. Min Jung Lee et al. reported that renal length increased with age.[26, 27] Normal values of the organ's weight, and size modify with time presumably under the effect of hereditary components and surroundings such as, routine diet, water intake and environmental variations between ethinicity.[28, 29].

CONCLUSION

We established the normal values of renal dimensions in pediatric population. We conclude that the outcome of this study can be taken as a practical, exten-sive and reference to specify the normal renal length values for every child, according to his/ her age and body. We formulated a gender and age specific normal values for adequate comparison in assessing renal diseases, and daily practice in clinical radiology.

LIMITATIONS

There were some limitations in our study. Due to lack of awareness and reluctance of parents, we had small sample size, and it is the hospital based research, so another study with the greater sample and inclusion of more population would be useful and advantageous. This study includes patients belongs to different ethnicity, therefore few results shows variation in growth pattern.

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ORIGINAL ARTICLE

MEDICAL STUDENTS' AND DOCTORS' KNOWLEDGE ABOUT INFLUENZA DISEASE AND ITS VACCINE

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ABSTRACT

Background: Influenza is a common disease affecting people of all age groups. Generally considered to be a mild disease, it can however, cause devastating effects in the very young, elderly and immunocompromised people.

Objective: To assess and compare the knowledge of influenza and its vaccine amongst medical students and practicing physicians.

Methods: A cross sectional survey was conducted on medical students and doctors at a tertiary care hospital. The participants were asked to fill out a structured questionnaire regarding knowledge and beliefs about influenza disease and its vaccine. Information thus obtained was tabulated and analysed and the two groups compared. Knowledge scores were calculated and the respondents were considered to have adequate knowledge if they scored> 60% on the knowledge part of the questionnaire.

Results: There were 179 participants in the study, of which 79 were medical students and 100 were practicing doctors. Majority of the respondents in both the groups knew the causative agent, mode of transmission and preventative measures of influenza. However, they lacked knowledge about complications of influenza. Respondents' knowledge was significantly deficient regarding many aspects of the influenza vaccine. Analysis of the knowledge scores revealed that only 49% of the physicians and 31.6% of the medical students had adequate knowledge about influenza disease and its vaccine.

Conclusion: Medical students and practicing physicians lack adequate knowledge about influenza and its vaccine. More emphasis needs to be placed on educating health care professionals about influenza and the importance of its vaccination program.

KEY WORDS: Influenza, Vaccination, Preventive Measures.

INTRODUCTION

Influenza is a viral disease affecting people of all age groups. Three types of the influenza virus, type A, B and C cause disease in humans, with the majority of cases occurring due to type A and to a lesser extent by type B. Symptoms include fever, cough, runny nose, sore throat, headache and malaise. In temperate climates, the disease peaks in the winter months. Generally a mild disease in healthy young adults, it can cause significant morbidity and mortality in the very young, elderly and those with underlying medical problems like asthma, diabetes and chronic renal failure. [1]

Influenza is a preventable disease and the most effective way of preventing it is by vaccination. The influenza vaccine has been available for many years. Influenza vaccine coverage rates for health care workers (HCWs) are generally low. In England, reported vaccination rate for HCWs for the 2012-2013 season was 45.6% and for doctors was 44.7%.[2] An Australian study reported influenza vaccination rate of 22% for HCWs and 26% for doctors.[3] This rate was much higher in USA, where 75.2% of HCWs and 92.2% of the physicians reported having received the influenza vaccine for the 2013-2014 season.[4] Limited information is available regarding this from the developing countries.

Myths prevail regarding influenza infection and influenza vaccine in HCWs as well as the general public and pose as barriers for influenza vaccination. This study was carried out to assess and compare the knowledge and beliefs of medical students and physicians regarding influenza infection and its vaccine.

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