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Morphological Study of the Kidney in Relation to Age

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Abstract

Objective: *The study was done to standardize the morphological data of kidney in relation to the age of person.*

Materials and methods: *The study was done on kidneys collected from 50 postmortem cases, age from 11 years to 80 years, during the period of July 2005 to December 2005 in the department of Anatomy, M.A.G. Osmani Medical College, Sylhet. Kidneys were collected with legal permissions from the authority in charge of the morgue of Forensic Medicine department of M.A.G. Osmani Medical College, Sylhet. Among the cases 32 were male and 18 female. The kidneys were fixed in 10% formosaline. The weight, length, breadth and thickness were recorded.*

Result: *Data were collected in 3 groups, lower age (11- 25 years), middle age (26-40 years) and higher age (41-80 years) groups.*

The mean weights of the kidney in 3 groups were found as 88.53 gm, 95.25 gm and 91.62 gm respectively. Similarly the mean lengths were recorded as 8.12 cm, 9.12 cm and 8.73 cm. the mean breadth were 4.46 cm, 4.31 cm and 3.58 cm. the mean thickness in these three groups were 1.72 cm, 2.19 cm and 1.48 cm respectively.

Conclusion: *It can be concluded that the gross values of different dimensions of the kidney, except the breadth, increases up to the age of 40 years. With further advance of age they are gradually decreased. The breadth was found greater in lower age group.*

Key words: *Morphology of kidney, age*

Introduction

Normal kidney measures about 12 cm in length, 6 cm in breadth, 3 cm in thickness and weighs about 130 gm [1]. Kidney loses its functioning cells with age that do not have the ability to divide[2]. From 4th decade up to 8th decade of life the human kidneys lose approximately a fifth of their weight[3]. Kidneys with length less than 8 cm are regarded as contraindication for intervention of renal arterial disease[4]. It is found from the available publications that human kidneys have been extensively studied by various investigators but very few research works have been performed in Bangladeshi people. We depend on the data published in textbooks and literatures, which come from the subjects of different races and from the individuals under different geographic and climatic conditions. So research on kidney of Bangladeshi population to understand its morphological as well as structural basis is very important.

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Materials and methods

The present study was carried out on 50 human kidneys of Bangladeshi people aged from 11 years to 80 years. Among them 32 were male and 18 were female.

The kidneys were collected from apparently fresh dead bodies that underwent medicolegal examination from July 2005 to December 2005 in the morgue of the department of Forensic Medicine, M.A.G. Osmani Medical College, Sylhet. Written permission was obtained from the ethical committee of the college to collect the specimen for study. Each specimen was tagged with an identification

number. Age of bodies was recorded in a separate register book. For measurement of different parameters, left kidneys were chosen randomly, because it was found that there was no gross morphometric difference between right and left kidneys. The specimens were divided into 3 groups; a) lower age group A (11-25 years), b) middle age group B (26-40 years) and c) higher age group C (41-80 years) (table-I). The specimens were washed thoroughly with tap water and gently squeezed to remove the blood clots from the Lumina of blood vessels. Specimens were then kept in 10% formosaline for fixation and preservation.

Formalin fixed specimens were kept in tap water overnight to wash out excess formalin to minimize the irritation of eyes and nasal mucosa. Specimens were than taken in a tray and associated fat, fascia, nerves and other unwanted tissues were removed. Then the weight of the kidney was measured by means of a dietetic balance and results were recorded in gm. The length was measured from upper pole to lower pole. The breadth was measured at the level of the hilum. The thickness was measured at the region of maximum antero-posterior diameter. Length, breadth and thickness were measured with the help of slide calipers graduated in mm. Photographs were taken as needed.

Observation and Results

Results are summarized in tabulated form (table-II). The weight of kidneys of all these 3 groups ranged from 60 to 125 gm and the mean weight was 92.08 gm. The range of length was 7 to 11.5 cm and the mean was 8.99 cm. the range of breadth was 3 to 6.5 cm and the mean was 4.08 cm. The range of thickness was 1.14 to 2.87 cm and the mean was 1.78 cm.

Discussion

In this study the mean weight of the kidney was found maximum in group B (95.25 gm) and minimum in group A (88.53 gm). The difference is minimum between group A and group C. These findings indicate that the weight of the kidney increases its maximum level in and around 40 years of age. Thereafter it decreases slightly with increasing of age. Alam[5] observed the weight of kidneys increase with the increase of age particularly up to 40 years. Anderson and Brenner[3] reported that renal mass increases from about 60 gm at birth to more than 400 gm during 3rd and 4th decades. By the 9th decade it declines to less than 300 gm. Basmajian[6] stated that, in adult, the kidney weighs about 130 to 150 gm. Mullick[7] worked on 21 pairs of human kidney in Bangladeshi population and found the average weight of the kidneys was 113 gm. It is evident from the present study that the mean weight of the kidneys (92.08 gm) in Bangladeshi people is considerably lower in comparison to that of western people. This might be because of their higher body weight as well as greater body surface area in western population.

Sinnatamby[1] found the normal kidney measures more than 12X6X3 cm. Mullick[7] observed the average measurements of Bangladeshi human kidney are 9.9 cm in length, 4.6 cm in breadth and 3.7 cm in thickness. But in the present study the values are 8.99 cm (7-11.5 cm), 4.08 cm (3-6.5 cm) and 1.78 cm (1.14-2.87 cm) respectively (figs. 1,2,3). This lower value in present study might be due to formalin fixation. The mean length and thickness are maximum in group B but the breadth is maximum in group A. Observed findings, except the breadth, gradually increase or decrease in measurement in proportionate to the weight of the kidney. It is also obviously clear that the kidneys of Bangladeshi people are shorter, narrower and thinner in comparison with those of western people.

Table-I

Grouping of the samples in relation to age of the persons

Group	Range of age in year	Number of specimen
A	11 - 25	15
B	26 - 40	16
C	41 - 80	19
Total	11 - 80	50

Table-II
Values of different morphological parameters in respect of age groups

Parameters	Groups	Range of values	Mean value
Weight (gm)	A (n=15)	60 - 120	88.53
	B (n=16)	60 - 125	95.25
	C (n=19)	60 - 120	91.62
Length (cm)	A (n=15)	7.6 - 10	8.12
	B (n=16)	7.8 – 11.5	9.12
	C (n=19)	7 - 10	8.73
Breadth (cm)	A (n=15)	3.5 – 6.5	4.46
	B (n=16)	3.2 – 5.3	4.31
	C (n=19)	3 - 4	3.58
Thickness (cm)	A (n=15)	1.2 – 2.2	1.72
	B (n=16)	1.2 – 2.87	2.19
	C (n=19)	1.14 – 1.97	1.48

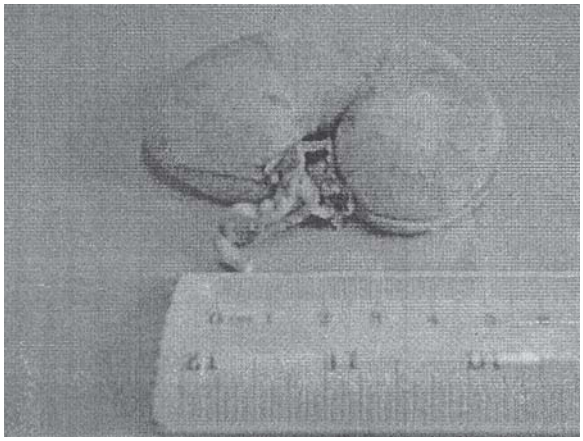

Fig.-1: *Photogrtaph of the kidney collected from the youngest person in the study*

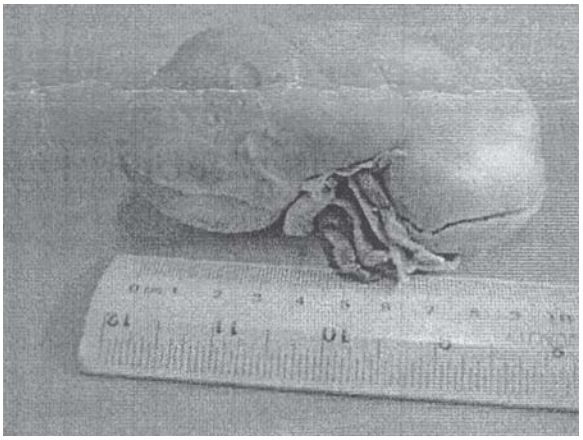

Fig.-2: *Photograph of the kidney having highest weight in the study. This kidney is from group B.*

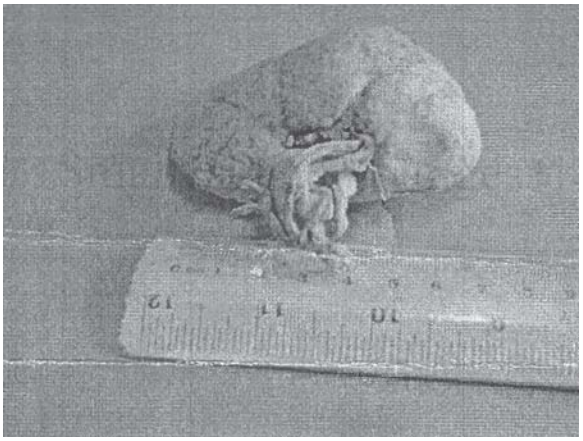

Fig.-3: *Photograph of kidney collected from the oldest person in the study*

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