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Visceral Weight in Bengali Population Correlated With Age, Sex and Body Length-An Autopsy Based Study

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Original Research Article

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Abstract: The organ weight is one important indicator to differentiate normal condition from abnormal in forensic pathology as well as in clinical medicine. This study includes organ weights of Bengali population, which can be fundamental sources to be analysed comparatively with other ethnic groups. A total 716 cases of which 256 were females and 460 were males are studied for organ weights. Six organs; brain, heart, lungs, spleen, liver and kidneys were studied during autopsy examination. The mean weight of all organs is more in males than in females. The weight of the heart and both lungs are found to be positively correlated with age and the weight of brain, liver, spleen and the kidneys are noted to be negatively correlated with age. The weight of all the organs is noted to be positively correlated with body length.
Keywords: Autopsy, organ weight, age, sex, body length, correlation.

INTRODUCTION

Weighing of organs at autopsy is not merely an exercise but has great medico-legal importance. Any deviation in weight from the normal range suggests some pathological change in the organ and thus helps in interpreting the opinion regarding the cause of death in various pathological conditions. The reason for this is the variation in the dietary habits, climatic conditions, daily water intake, customs and genetic predisposition of different population groups.

Hence the normal organ weights of a particular region may not be accurate enough for another. Organomegaly can be a sign of disease and pathologic abnormality, although standard tables defining organomegaly have yet to be established and universally accepted. This study was designed to address the issue and to determine a normal weight range for the visceral organs in Bengali population of both sexes and different age groups and also to correlate the visceral weights with variables such as age, sex and body length.

AIM AND OBJECTIVES

- To prepare a standard table of average weights of visceral organs for Bengali population through an autopsy based observation.
- To examine the relationship between the visceral organ weight with age, sex and body length.

MATERIALAND METHODS

Study design

Retrospective cross sectional study.

Study period

Approximately 7 years

Study population

Medicolegal autopsy cases belonging to Bengali population and coming to Kolkata Police Morgue

Inclusion criteria

Individuals of both genders among Bengali population

Exclusion criteria

Cases were excluded:

- If there was a history of medical or surgical illness involving any one or more organs under study that may affect the organ weight.
- If body length and visceral weight could not be accurately assessed.
- Individual organs were excluded if there was significant injury to the organ, which could have affected the weight.
- Decomposed dead bodies.

Study tool and technique

716 cases were selected (of which 256 were females and 460 were males) depending upon the exclusion and inclusion criteria. Visceral weights were taken in digital viscera weighing machine after their removal employing standard dissection and evisceration techniques. The stature (length) of the dead bodies was measured employing standard autopsy technique. The collected data was examined statistically.

Review of literature

The increase or decrease of visceral weight compared to the age, sex and body length are well recognized in many diseases [1, 2]. The normal adult visceral weight has been studied in the United States, Western Europe, Japan and some other countries [1-14]. Only a few studies that covered continental Asia were reported from Japan [1-11].

Some textbooks by Indian authors [15-19] mentioned the visceral weights, among them only Mathiharan & Kannan[15] quoted the Indian population visceral weights with its reference. Parikh [16] mentioned the visceral weight of Indian population but did not mention any reference. Remaining authors [7-9] did not clarify whether visceral weights belong to Indian or western population.

However no study regarding visceral weights of Bengali population is available in the literature.

Table-1

Male (n=460)					Female (n=256)				
Organ	Min. weight in grams	Max. weight in grams	Mean weight in grams	SD	Organ	Min. weight in grams	Max. weight in grams	Mean weight in grams	SD
Brain	900	1709	1209.25	129.37	Brain	770	1479	1125.16	107.16
Heart	48	711	292.27	87.56	Heart	100	650	272.01	76.79
Right Lung	71	1376	549.95	187.54	Right Lung	143	902	438.04	125.80
Left Lung	47	1140	476.10	168.60	Left Lung	158	914	382.56	104.80
Liver	352	4100	1246	357.59	Liver	502	2086	1175.83	300.82
Spleen	21	1269	142.47	107.37	Spleen	10	381	123.75	64.17
Right Kidney	38	415	133.86	50.73	Right Kidney	10	343	124.94	45.99
Left Kidney	32	399	126.26	49.47	Left Kidney	50	343	119.07	45.44

Table -2a: Correlation between age and different visceral weight for the whole group.

Different viscera	Correlation co-efficient between age and visceral weight
Brain	-0.20
Heart	0.36
Rt lung	0.12
Lt lung	0.11
Liver	-0.12
Spleen	-0.09
Rt kidney	-0.04
Lt kidney	-0.06

Table -2b: Correlation between age and different visceral weight for male

Different viscera	Correlation co-efficient
Brain	-0.18818
Heart	0.356988
Rt lung	0.213724
Lt lung	0.196484
Liver	-0.09038
Spleen	-0.0758
Rt kidney	0.033974
Lt kidney	0.022238

Table- 2c: Correlation between age and different visceral weight for female.

Different viscera	Correlation coefficient
Brain	-0.31
Heart	0.382475
Rt lung	-0.08652
Lt lung	-0.08104
Liver	-0.18294
Spleen	-0.15415
Rt kidney	-0.17476
Lt kidney	-0.21231

Table -3a: Correlation between body length and different visceral weight for the whole group.

Different viscera	Correlation co-efficient
Brain	0.25368889
Heart	0.31701231
Rt lung	0.3764163
Lt lung	0.34337991
Liver	0.35457792
Spleen	0.15932666
Rt kidney	0.27144126
Lt kidney	0.26115993

Table- 3b: Correlation between body length and different visceral weight for male.

Different viscera	Correlation co-efficient
Brain	0.13
Heart	0.35
Rt lung	0.33
Lt lung	0.29
Liver	0.36
Spleen	0.14
Rt kidney	0.30
Lt kidney	0.30

Table-3c: Correlation between body length and different visceral weight for female.

Different viscera	Correlation coefficient
Brain	0.120343
Heart	0.182093
Rt lung	0.191187
Lt lung	0.171873
Liver	0.317891
Spleen	0.127412
Rt kidney	0.181872
Lt kidney	0.170165

CONCLUSION

The average weight of brain, heart, right lung, left lung, liver, spleen, right kidney and left kidney was found to be 1209.25, 292.27, 549.95, 476.10, 1246, 142.47, 133.86 and 126.26 grams respectively in male; and 1125.16, 272.01, 438.04, 382.56, 1175.83, 123.75, 124.94 and 119.07 grams respectively in female. So all the organ weights are found to be more in males than females. The weight of the heart and both lungs are found to be positively correlated with age and the weight of brain, liver, spleen and the kidneys are noted to be negatively correlated with age. That signifies that the weights of heart and both lungs increases with age and that of brain, liver, spleen and kidneys decreases with age but the correlation is of minor degree and not significant enough. The weight of all the organs are noted to be positively correlated with body length, which means that as the body length increases the weight of all the organs under study increases but here again the correlation is of minor degree and not significant enough.

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Ethical clearance

Ethical clearance and approval taken from the Institutional Ethics Committee of Medical College, Kolkata.

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