

WEIGHTS OF HUMAN ORGANS AT AUTOPSY IN CHANDIGARH ZONE OF NORTH-WEST INDIA

Dr. Dalbir Singh, Additional Professor & Head,

Dr. Y.S.Bansal, Assistant Professor,

Dr. Sreenivas M., Senior Resident,

Mr. Avadh Naresh Pandey, Research Fellow

Mrs. Seema Tyagi, Junior Technician,

Department of Forensic Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh

ABSTRACT

Mean organ weights in 2025 subjects who died and autopsied at Postgraduate Institute of Medical Education and Research, Chandigarh revealed that they in general were heavier than reported from other parts of India. Various organs continued to attain their maximum weight up to 40-50 years of age.

KEY WORDS: Medico-legal deaths, organ weights, autopsy

INTRODUCTION

Human body organs play a significant role in almost all the ancestral branches of medical sciences including forensic sciences, as 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 and also in finding out the relationship between trauma and disease [1-3]. Organ weights also play a significant role in estimation of body height and weight of an individual [1-2]. Human organ weights besides race, age, gender etc. were also reported to be dependent on environmental and socio-economic conditions [1-10] which are quite different in various parts of India. Hence, the organ weights reported from other parts of India are definitely not applicable directly to the population of Chandigarh zone of India. As literature available on the subject for the population of north-west India in general and Chandigarh zone in particular is scanty, hence the present study is an attempt to provide such information.

MATERIALS AND METHODS

The present study was carried out on 2025 (1449 males and 576 females) subjects who were admitted and died between 1st April, 1996 and 31st March, 2004 at Postgraduate Institute of Medical Education and Research, Chandigarh for various medico-legal causes and on whom postmortem examination was conducted by the

department of Forensic Medicine within 6 hours of death.

In the present study, only those subjects were included who belonged to Chandigarh zone of north-west India i.e. states of Punjab, Haryana, Himachal Pradesh and U.T. of Chandigarh (old combined Punjab) and in those who complete demographic profile was known. Subjects with septicemia or with gross organ pathology were not included in the present study. Standard autopsy protocol and procedure (as described in Current methods of Autopsy Practice by J Ludwig, 2nd edition, W.B.Saunders Company) were employed for removal of various organs. After removing the extraneous tissues and draining of the blood, each organ was weighed on electronic weighing machine having the accuracy of ± 0.1 gram. To see the role of age on various organ weights, the subjects were divided into seven age groups i.e. <10, 11-20, 21-30, 31-40, 41-50, 51-60, >60 years.

OBSERVATIONS AND DISCUSSION

Mean organ weights as observed in the present study in general were more (table 1 & 2) than those reported from other parts of India. [2-10] They are more in concordance with the western population, possibly because the population of this zone in general is taller and heavier than rest of the population of the country and is more akin to western population so are their organ weights [1].

In a study from Nagpur, region [3] weights of brain and liver were reported to be maximum at

Table-1 - Organ weight (grams) in various age- groups in males

Age (yrs)	subjects	variables	Brain	Rt lung	Lt lung	heart	Rt Kidney	Lt Kidney	liver	spleen	pancreas	Rt suprarenal	Lt suprarenal	Rt testes	Lt testis	prostate
<11	34	Mean	1098.24	149.52	143.42	88.17	52.92	56	619.73	57.97	45.50	4.02	4.32	6.83	7.11	15.22
		S.D.	219.53	46.48	44.62	34.91	21.28	22.14	222.42	28.81	29.94	1.42	1.24	1.42	1.49	3.31
		Range	510-1340	70-210	50-190	30-170	10-105	20-110	311-880	21-90	130.05	106.27	6.55	8	5-9	5-10
11-20	172	Mean	1315.13	444.92	411.51	247.93	114.20	123.52	1420.62	130.05	106.27	6.55	8	23.72	25.16	39.94
		S.D.	133.14	99.22	103.64	61.97	23.53	24.71	175.49	29.95	13.50	1.68	1.78	7.48	7.66	16.12
		Range	870-1500	195-530	172-510	90-420	50-145	55-160	909-1645	70-180	80-127	5-10	7-13	9-20	20-35	12-48
21-30	457	Mean	1340.38	579.75	531.92	289.59	128.77	138.88	1493.79	162.45	131.15	7.55	8.57	28.24	29.37	62.18
		S.D.	113.162	151.51	146.31	55.26	22.40	23.11	168.78	43.02	33.12	2.15	2.02	6.01	6.01	14.77
		Range	1040-1620	210-580	180-545	140-440	56-180	65-190	835-1816	76-270	80-144	8-19	9-20	21-45	20-37	34-87
31-40	372	Mean	1336.85	608.92	547.78	301.68	136.71	146.12	1544.67	164.37	131.91	9.54	10.12	29	30	64.12
		S.D.	109.97	163.05	155.95	57.61	31.74	30.71	361.47	62.56	19.39	2.34	1.91	2.51	4.19	8.87
		Range	1080-1640	210-835	205-810	180-465	78-265	75-295	903-1890	89-316	71-165	8-18	9-20	20-49	18-48	35-80
41-50	212	Mean	1333.53	621.36	555.29	314.65	132.67	141.44	1591.48	168.52	133.52	10.80	11.57	30.52	31.85	65.23
		S.D.	120.58	162.15	160.17	67.55	30.27	34.85	268.88	69.55	21.57	2.71	3.51	6.16	6.142	5.28
		Range	1030-1550	260-755	235-730	120-480	60-260	70-280	1120-2032	110-330	112-190	10-21	10-21	13.55	29.41	19-48
51-60	116	Mean	1309.1	607.22	540.65	319.05	130.87	141.58	1486.16	145.57	130.46	12.74	12.74	29.41	29.10	65.90
		S.D.	118.09	171.02	183.21	81.21	32.19	30.25	108.90	28.33	10.40	4.72	4.24	3.91	1.56	3.08
		Range	1000-1590	230-760	210-745	130-490	80-290	100-260	830-1588	102-310	115-145	8-20	9-21	24-36	24-42	60-90
>60	86	Mean	1288.09	602.96	528.82	325.31	125.86	135.70	1480.78	144	114.88	9.77	10.77	27	27.77	66.33
		S.D.	122.84	178.42	163.20	84.61	31.57	32.75	369.95	27.02	15.07	1.09	1.20	9.30	8.88	3.39
		Range	1040-1570	240-780	220-880	130-490	90-220	100-235	848-1995	108-300	84-135	10-21	10-21	18-40	18-40	62-88
Total	1449	Mean	1324.05	568.85	516.62	291.87	128.15	137.74	1426.62	155.17	124.73	7.67	8.62	27.38	28.46	59.82
		S.D.	126.06	174.85	165.45	72.21	30.40	31.29	278.47	54.19	36.85	2.67	2.63	7.46	7.35	16.95
		Range	510-1650	70-835	50-880	30-490	10-290	20-295	311-2032	21-330	12-190	2-20	3-21	5-49	5-48	12-88

Table-2 - Organ weight (grams) in various age groups in Females

Age (yrs)	subjects	variables	Brain	Rt lung	Lt lung	heart	Rt Kidney	Lt Kidney	liver	spleen	pancreas	Rt suprarenal	Lt suprarenal	uterus	Rt ovary	Lt ovary
<11	27	Mean	1044.59	148.63	137.96	92.03	58.66	67.70	498	51.75	59.25	2.75	3.5	18.5	7	7.75
		S.D.	154.76	52.25	48.31	29.53	21.40	23.26	76.36	7.93	7.36	2.06	1.91	4.50	1.41	1.258306
		Range	500-1218	60-200	55-190	30-150	20-110	114.99	122.51	1282.86	129.35	101.28	6.92	8.03	15-25	5-8
11-20	123	Mean	1206.46	388.87	370.04	214.71	114.99	122.51	1282.86	129.35	101.28	6.92	8.03	57.28	8.14	8.57
		S.D.	109.25	90.38	111.93	47.12	26.94	27.35	222.48	18.81	15.65	1.68	1.62	11.23	2.14	2.20
		Range	890-1550	150-470	140-455	90-380	40-140	50-155	825-1519	70-150	72-124	5-10	46-72	6-10	3-12	15.47
21-30	204	Mean	1210.21	435.07	403.43	241.27	124.43	133.84	1302.29	131.94	111.76	8.12	8.88	75.11	14.47	15.47
		S.D.	109.94	67.95	72.99	50.50	23.49	25.65	199.80	33.33	28.33	2.11	2.23	10.01	7.60	8.00
		Range	940-1610	210-890	200-860	135-385	70-165	74-170	846-1580	72-210	83-151	5-12	5-13	65-96	8-30	9-32
31-40	112	Mean	1208.06	440.61	405.75	251.98	125.04	134.11	1341.57	137	121.57	10.14	10.71	94.71	15.1	16
		S.D.	122.96	88.41	82.68	49.17	33.76	33.32	313.70	8.86	14.32	2.47	3.19	15.30	4.46	5.28
		Range	1010-1550	220-810	200-800	140-390	75-230	80-240	801-1720	80-252	110-127	5-11	4-14	75-114	12-25	12-28
41-50	54	Mean	1192.54	480.05	450.59	265.68	115.96	123.66	1381.93	139.06	122.86	9.7	11.3	91.06	16.2	17.46
		S.D.	101.84	112.92	141.38	45.11	26.27	28.08	244.28	29.03	5.81	1.53	2.10	23.92	4.05	4.68
		Range	930-1530	260-800	250-690	160-370	70-200	80-205	1090-1700	107-280	96-118	7-11	8-13	70-123	11-22	11-24
51-60	35	Mean	1174	471.88	449.08	286.68	114.77	123.02	1381.58	133.57	104.21	8.26	9.78	88.26	13.89	14.05
		S.D.	72.15	110.38	111.14	55.48	19.22	20.03	170.78	20.43	7.99	2.02	2.27	9.75	1.24	1.22
		Range	960-1450	200-705	195-775	180-400	90-170	100-180	970-1660	110-195	60-120	7-12	9-14	65-97	12-16	13-14
>60	21	Mean	1165.24	468.76	440.95	288.66	113.38	119.04	1355.73	126.90	106.45	8.63	9.45	76.72	13.36	13.63
		S.D.	82.30	89.52	93.57	38.26	31.11	31.84	154.19	13.64	9.37	1.62	1.80	9.68	1.361	0.80
		Range	1070-1580	240-750	290-810	140-380	90-190	100-210	1212-1620	110-150	98-123	7-12	7-13	68-80	12-15	13-15
Total	576	Mean	1195.73	421.2	392.87	235.69	117.95	125.90	1292.9	132.17	107.95	8.08	9.19	75.01	12.58	13.21
		S.D.	116.47	108.23	112.54	61.53	30.12	31.10	272.03	32.40	22.90	2.62	2.69	21.77	5.14	5.56
		Range	500-1610	60-890	55-860	30-400	20-230	30-240	410-1720	41-280	50-124	1-12	1-14	15-123	5-30	6-28

the age 20 and 40 years respectively, whereas in the present study in both the genders, the weight of the brain increased up to 30 years. Lung, liver, spleen, pancreas, suprarenal attained their peak weights at 40-50 years and the kidney at 30-40 years. It may be attributed to the difference in dietary habits and socioeconomic conditions of both the regions. After attaining the peak, all organ weights declined with the advancing age with the exception of the heart, possible reasons being the deposition of fat and higher incidence of cardiomyopathies in the population under study.

Comparing the weights of liver and brain, it was seen that except in children, the mean weight of the liver was more than the mean weight of the brain in both the genders. This is in concordance with the findings of the studies on European and Japanese population [10-15], and contrary to the studies from other regions of India. [2, 9]

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