

Comparation Body Weight, Body Length, Kidney Weight and Liver Weight between Indonesian Adult and Thailand Adult in Autopsy Cases in Sardjito Hospital June 2011 to June 2012

Perbandingan Berat Badan, Panjang Badan, Berat Ginjal dan Berat Liver antara Manusia Dewasa Indonesia dan Thailand dalam Kasus Otopsi RS Sardjito Juni 2011 hingga Juni 2012

Wikan Basworo¹, Idha Arfianti Wira Agni^{1*}

¹ Department of Forensic and Medicolegal, Faculty of Medicine, Sardjito Hospital, Gadjah Mada University, Yogyakarta, Indonesia.

*Email: idha_arfianti@yahoo.com

Abstract

This research aims to retrospectively review forensic autopsy cases of a Indonesian people to see the description of liver weight, kidney weight, body weight and length. The present study included 8 cases autopsies from Sardjito Hospital from June 2011 to June 2012. The subjects were from unnatural death following criteria. The weighed organs included liver and kidneys. We compared the result with Thailand population with independent sample t-test, to see the differences between them. The ages ranged from 16 to 69 years and there were 2 males and 6 females. The Mean were represented by; 55,1; 153,1; 1094,5; 103,6 in body weight, body length, liver weight, and kidneys weight respectively. There were no significant differences between Indonesian dan Thailand people in age, body weight, and body height. There were differences between Indonesian dan Thailand people in liver weight and kidney weight, but significancy can not be analyzed because lack of comparison data. There were no significant differences in body weight, body length, liver weight, and kidneys weight between autopsy cases from Sardjito Hospital from June 2011 to June 2012 with Thailand publication paper.

Keywords: body length, body weight, liver weight, kidney weight

Abstrak

Tujuan penulisan makalah ini adalah untuk retrospektif meninjau kasus otopsi forensik dari masyarakat Indonesia untuk melihat deskripsi berat hati, berat ginjal, berat badan, dan panjang. Penelitian ini termasuk 8 kasus otopsi dari Rumah Sakit Sardjito dari Juni 2011 hingga Juni 2012. Subyek penelitian adalah dari kriteria berikut kematian yang tidak wajar. Organ ditimbang termasuk hati dan kidneys. We dibandingkan hasilnya dengan penduduk Thailand dengan independent sample t-test, untuk melihat perbedaan antara mereka. Hasil penelitian menunjukkan bahwa usia berkisar antara 16 sampai 69 tahun dan ada 2 laki-laki dan 6 perempuan. Rata-rata diwakili oleh, 55,1, 153,1, 1094,5, 103,6 berat badan, tinggi badan, berat hati dan ginjal Bobot masing-masing. Tidak ada perbedaan yang signifikan antara Thailand Dan masyarakat Indonesia usia, berat badan, dan tinggi badan. Ada perbedaan antara Thailand Dan masyarakat Indonesia berat hati dan berat ginjal, namun signifikansi tidak dapat dianalisis karena kurangnya data perbandingan. Disimpulkan bahwa tidak ada perbedaan signifikan dalam berat badan, panjang badan, berat hati, dan ginjal bobot antara kasus otopsi dari Rumah Sakit Sardjito dari Juni 2011 hingga Juni 2012 dengan penduduk Thailand kertas publikasi.

Kata kunci: panjang tubuh, berat badan, berat hati, berat ginjal

BACKGROUND

At an autopsy, the pathologist examined the organs and considered whether they showed pathological changes or not. The organ weight is one of regular criteria by the pathologist during an autopsy to detect what is abnormal. The findings were compared to what is normal for a specific organ. The determination of abdominal organs in particular has significant potential clinical value. For example, liver volumes are important not only in determining disease states and disease progression but in estimating segmental liver volumes for transplant donors and planning the extent of hepatectomy in cancer patients.¹ Kidney size bears a relation to the degree of renal diseases. There are several standard textbooks that show the normal internal organs weight such as that of Ludwing (1979),² and Sunderman and Borner (1949).³ All of these are always referenced; however, most indicators are from the populations of Caucasoid and there are very few from the populations of Asian, most of whom are from Japan, China, Korea and India. In the past, Indonesia normally used references from American or European textbooks and publication papers. The problem is that the differences of these factors make the indicators different: race, body structure, genetic, environment, living condition, life style and food. Therefore, we to find out the description of body length, body weight, liver weight and kidney weight in autopsy cases.⁴ We compared the result with Thailand people, which have the same race. However, the 8 subjects that were used as the sample is quite small. The

researchers thought it should be increased, as it would make the data more qualitative and reliable for referencing.

This research aims to retrospectively review forensic autopsy cases of a Indonesian people to see the description of liver weight, kidney weight, body weight and length.

MATERIAL AND METHODS

Data were collected from June 2011 to June 2012, from 8 forensic autopsies in Sardjito Hospital Yogyakarta. All of the subjects were adult Indonesian people, excluding the subjects of fire related death, asphyxia related death and decomposition were deleted, because, they would affect internal organs weight and body weight. Therefore, most of the subjects in the present study were from accidents, suicide and homicide manner of death. The weight and the height of the body were measured by forensic pathologist responsible for the autopsy. The body length measured was the head to heel length. All the bodies were weighed with the same weighing machine. All of them were not refrigerated and at the same room temperature. As the delay between death and autopsy might alter organ weights, all autopsies were performed by forensic pathologists within 24 hours after death. The weighed organs included liver and kidney. The data would be collected. They were divided into gender: male/female with weight, height, liver weight and kidney weight for analyzing mean, standard deviation maximum and minimum. We compared the result with Thailand population with independent sample T-Test, to see the differences between them.

Table 1. Mean, Standar Deviation, Minimum and Maximum of Age (Year), Body Weight and Body Height

	Mean±SD	Min-Max
Age (y)	33,25±18,3	16-69
Body weight (kg)	55,13±12,17	31,5-71
Body height (cm)	153,13±9,69	141-171

Table 2. Mechanism of Death

	Percent (%)	N
Vital organ damage	25	2
Hemorrhage	50	4
Cranial fracture	12,5	1
Metastatic tumor	12,5	1

RESULTS

The eight subjects were divided into two groups: two males and six females. The parameters including age, weight and height are shown in Table 1. Mechanism of death are shown in Table 2. internal organs weight (liver and kidneys) are shown with the mean, the standard deviation and the range of the internal organs weight at studied population in Table 3.

The ages ranged from 16 to 69 years and there were two males and six females. The Mean were represented by; 55,13±12,17; 153,13±9,69; 1094.5±281,1; 103,6±23,15 in body weight, body length, liver weight and kidneys weight respectively. There were various mechanism of death such as vital organ damage (25%), hemorrhage (50%), cranial fracture (12,5%) and metastatic tumor (12,5%). The data would be compared with Thailand people that have the same race with Indonesian people (Table 4).

Table 3. Internal Organ Weight

	Mean±SD	Min-Max
Liver (gram)	1094.5±281,1	812-1480
Kidney (gram)	103,6±23,15	86-140

There were no significant differences between Indonesian dan Thailand people in age, body weight and body height. There were differences between Indonesian dan Thailand people in liver weight and kidney weight, but significancy can not be analyzed because lack of comparison data .

DISCUSSION

Trying to find out the normal internal organs weight is still going on by two methods, radiology such as ultrasound or computer tomography and weighing the organs from autopsy.⁴ However, there are both positive and negative effect for each method. Researcher is interested in the weighing method, directly from autopsies according to the criteria because it is part of the routine work. Subjects that are selected are cases of unnatural death because there is more variety of morbid anatomical lesions or disease than the cases of natural death. In the past, there were studies showing causes of death that had an effect on the internal organs weight,^{5,6} such as hypovolemic shock which makes it decrease;⁶ however, the results from other studies are in disagreement with the point of spleen weight.⁷ Pearl and Bacon (1924),⁸ underlined the limitation of hospital

Table 4. Comparison between Indonesian People and Thailand People

	Indonesian people		Thailand people		Significancy
	Mean±SD	Min-Max	Mean±SD	Min-Max	
Age (y)	33,25±18,3	16-69	36±15,5	15-89	NS
Body weight (kg)	55,13±12,17	31,5-71	55,9±10,62	30-115	NS
Body height (cm)	153,13±9,69	141-171	151,55±6,29	142-188	NS
Liver (gram)	1094.5±281,1	812-1480	1256,03±276,4		
Kidney (gram)	103,6±23,15	86-140	237,63±48,96		

autopsy records as a suitable source of material for establishing tables of organ weight. They also stated that the ideal subjects for establishing anatomical standards would be in those dying in violent accidents. One study has found that the weight of male's brain weight was $1330.62 + 127.45$ gm and that of the females $1208.71 + 131.44$ gm.⁴ These findings are similar to those of Chirachariyavej et al. (2006),⁹ and others, except the weight from the present study was quite less than the weight of the studies from Europe and United States.¹⁰⁻¹⁶

From the studies of Chrzanowska and Krechowicki (1975),¹⁴ or Koha et al. (2005),¹⁷ it was found that there is a significant correlation in body length in male but not in female participants. Furthermore, when the authors distributed the weight according to the range of age, the brain weight was reduced as the age increases. This is because under-nutrition in the elderly has a relative effect on brain weight, probably because the brain contains only small amounts of glycogen and neutral fat.¹⁸

The heart weight is almost constant or even increased with increasing age. This phenomenon is also observed during middle age and has attracted the attention of researchers.^{19,20} Undiagnosed systolic hypertension is frequently seen in the middle-aged and elderly, mainly accounting for the increase in heart weight. Liver weight is positive by correlation to body weight in both males and females, and positive by correlation to body length in only males, according to the research of Chirachariyavej et al. (2006).⁹ That is because of vital activity or persistent circulatory disturbance

before death. According to other researchers, it was found that spleen weight will reduce in older age. Spleen of females is lighter than males⁶ and Sprogoe-Jakobsen (1997),²¹ found that there is positive correlation with body weight and body length in males, but not in females.

The research shows internal organs weight that can be used for Forensic and Non-Forensic pathologists when making an autopsy in a Indonesian population. This is because reference from Americans or European populations may not be suitable for Asian population. The organ weight will remain a good diagnostic criteria of autopsy only if normality is accurately and regularly defined. This includes three variable equations used to calculate each internal organ weight validly and reliably. Because of the lack number of sample, there should still be more study done as more subjects will gives more qualitative results. It will be better if the subjects of females and males in the same number size.

CONCLUSION

There were no significant differences in body weight, body length, liver weight, and kidneys weight between autopsy cases in Sardjito Hospital from June 2011 to June 2012 with Thailand publication paper.

REFERENCES

1. Schiano TD, Bodian C, Schwartz ME, Glajchen N, Min AD. Accuracy and Significance of Computed Tomographic Scan Assessment of Hepatic Volume in Patients Undergoing Liver Transplantation. *Transplantation*, 2000; 69 (4): 545-50.

2. Ludwig J. *Current Methods of Autopsy Practice*. Second edition. Philadelphia: Saunders; 1979. p.647-89.
3. Sunderman WF, Boerner F. *Normal Values in Clinical Medicine*. Philadelphia: Saunders. 1949.
4. Mathuramon P, Chirachariyavej T, Peonim V, Rochanawutanon M. Correlation of Internal Organ Weight with Body Weight and Body Length in Normal Thai Adults. *J Med Assoc Thai*, 2009; 92 (2): 250-8.
5. Moar JJ, Reinach SG. Renal Weights in the Southern African Black Population. *Am J Phys Anthropol* 1988; 76 (1): 105-10.
6. Boyd E. Normal Variability in Weight of the Adult Human Liver and Spleen. *Arch Pathol*, 1933; 16 (1): 350-72.
7. Myers J, Segal RJ. Weight of the Spleen. I. Range of Normal in a Nonhospital Population. *Arch Pathol*, 1974; 98 (1): 33-5.
8. Pearl R, Bacon AL. Biometrical Studies in Pathology. *Johns Hopkins Hosp Rep*, 1924; 21 (1): 351.
9. Chirachariyavej T, Ouyswat K, Sanggarnjanavanich S, Tiensuwan M, Peonim V, Sirikulchayanonta V. Normal Internal Organ Weight of Thai Adults Correlated to Body Length and Body Weight. *J Med Assoc Thai*, 2006; 89 (10): 1702-12.
10. Blinkov SM, Glezer II. *The Human Brain in Figures and Tables: A Quantitative Handbook*. New York: Plenum Press. 1968.
11. Dekaban AS. Changes in Brain Weights during the Span of Human Life: Relation of Brain Weights to Body Heights and Body Weights. *Ann Neurol*, 1978; 4 (4): 345-56.
12. Lindboe CF. Brain weight: what does it mean?. *Clin Neuropathol* 2003; 22 (6): 263-5.
13. Hartmann P, Ramseier A, Gudat F, Mihatsch MJ, Polasek W. Normal Weight of the Brain in Adults in Relation to Age, Sex, Body Height and Weight. *Pathologe*, 1994; 15 (3): 165-70.
14. Chrzanowska G, Krechowicki A. Does the Weight of the Brain Depend on the Body Height?. *Gegenbaurs Morphol Jahrb*, 1975; 121 (2): 192-208.
15. Ho KC, Roessmann U, Straumfjord JV, Monroe G. Analysis of Brain Weight. I. Adult Brain Weight in Relation to Sex, Race and Age. *Arch Pathol Lab Med*, 1980; 104 (12): 635-9.
16. Hamilton SJ, McMahon RF. Sudden Death and Suicide: a Comparison of Brain Weight. *Br J Psychiatry*, 2002; 181 (1): 72-5.
17. Koh I, Lee MS, Lee NJ, Park KW, Kim KH, Kim H, et al. Body Size Effect on Brain Volume in Korean Youth. *Neuroreport*, 2005; 16 (18): 2029-32.
18. Sawabe M, Saito M, Naka M, Kasahara I, Saito Y, Arai T, et al. Standard Organ Weights among Elderly Japanese who Died in Hospital, Including 50 Centenarians. *Pathol Int*, 2006; 56 (6): 315-23.
19. Inoue T, Otsu S. Statistical Analysis of the Organ Weights in 1,000 Autopsy Cases of Japanese Aged Over 60 Years. *Acta Pathol Jpn*, 1987; 37 (3): 343-59.
20. Adebo OA, Lun KC, Lee CN, Chao TC. Agerelated Changes in Normal Chinese Hearts. *Chin Med J (Engl)*, 1994; 107 (2): 88-94.
21. Sprogøe-Jakobsen S, Sprogøe-Jakobsen U. The Weight of the Normal Spleen. *Forensic Sci Int*, 1997; 88 (3): 215-23.