



ASSESSMENT OF NORMAL ADRENAL GLAND THICKNESS BY USING MDCT IN WESTERN UP POPULATION, INDIA

Shubham Sharma^{1*}, Mamta Verma², Raushan Kumar³, Shivam Kumar⁴,
Rajul Rastogi⁵, Navreet Boora⁶

Abstract

Aim- Assessment of normal adrenal gland thickness by using MDCT in western up population.

Materials and Method- This was a prospective study involving 100 patients furthermore, each participant's gender, age were documented. Patients were excluded from the study who had Patients with malignant and benign tumours. Scans were performed using Philips ingenuity core 128 slice CT scan.

Result- Participants in the study had age ranging from 20 to 80 years old, with a mean age of 45.6 to 45.7 years. The study included a total of 65 males and 35 females. Table 1 summarises the standard deviation and mean for all the adrenal glands' measures taken during the CT scan. The right adrenal glands maximal thickness overall was 11.1 2.1mm. Right adrenal gland body, medial and lateral limb, and coronal length mean maximum thicknesses were 5.4 1.3 mm, 2.9 0.8 mm, and 2.8 0.7 mm, respectively. The left adrenal's maximal thickness was 12.0 2.6mm. The mean maximum thickness of the medial, lateral, and coronal lengths of the left adrenal gland was 5.5 1.4 mm, 3.1 0.9 mm, and 3.5 0.8 mm, accordingly.

Conclusion- Hence our data be used as a helpful baseline range of references for the population and as a guidance for radiologists to follow when they come across ambiguous "bulky" or "diffuse smoothly expanded" AG.

Keywords- Adrenal gland thickness; Adrenal gland size; multidetector computed tomography; bulky adrenal

^{1*}Department of Radiological imaging techniques, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India, E-mail- sh946645@gmail.com

²Department of Radiological imaging techniques, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India, E-mail- mamtav.paramedical@tmu.ac.in

³Department of Radiological Imaging Techniques, Teerthanker Mahaveer University, Email - raushank.paramedical@tmu.ac.in

⁴Department of Radiological imaging techniques, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India, E-mail- radiosshiv2021@gmail.com

⁵Department of Radio-diagnosis, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, Uttar Pradesh, India, E-mail -rajul.rst@yahoo.co.in

⁶Department of Radio-imaging Technology, Faculty of Allied Health Sciences Shree Guru Gobind Singh Tricentenary University, Gurugram, Haryana, India, Email- Navreet999@gmail.com

***Corresponding author:** Shubham Sharma

*Department of Radiological imaging techniques, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India, Contact no. 9466456883 E-mail- sh946645@gmail.com

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Introduction

The adrenal glands are crucial to the body's endocrine and physiological processes.^[1] The modest adrenal gland size belies its crucial significance in medicine, and it plays a crucial role in the identification and characterisation of adrenal dysfunction.^[2] The CT scan is a superior radiologic screening and frequently conclusive tool for evaluating the adrenal gland.^[3] The greatest the adrenal glands' breadth or thickness was measured by Montagne et al. and Karstaedt et al. at a right angle to the gland's or one of its limb's longitudinal plane.^[4,5] The gland's maximal breadth often happens at the intersection of the lateral limbs and medial due to its structural design.^[6-7] The study's goals were to measure the typical adrenal gland thickness in the adult population and assess how thickness relates to age and sex.

Materials & Methods

All adult patients who underwent standard upper abdominal CT for Clinical signs other than those related to the adrenals were included in this care facility bridge investigation. To validate consistency in slice thickness and picture quality across all research cases, regular abdominals were used. Patients with a history of chronic steroid usage and those who had clinical, biochemical, or radiological signs of adrenal illness were also eliminated from the trial. The study was carried out between March 20th, 2022, and March 21st, 2023. In Teerthanker Mahaveer Hospital & Research Centre, 05 to 10 routine abdominal CT scans of the upper abdomen are performed daily on occasion. Following the study's study protocol, 100 scans performed over the course of a year were included. In cases when the slice thickness was less than 2.5 mm, thin slice axial CT pictures were included. Figure 1 states the Kidney and adrenal gland anatomy and Figure 2 shows the Normal Adrenal Glands Axial Image.

In both adrenal glands, at a right angle to their long axes, the body's maximum thickness and the lateral limbs and medial were measured. These measurements were made using a commonly specified procedure in abdomen soft tissue window setup on a CT scan using an axial picture (window level 40–60, 400–pixel window width).^[8] The measurements were made in millimetres (mm), with one decimal place between each value. The measurements were done on axial image as shown in figure 3 (A) CT image axial (B) The measurement technique of adrenal gland: 1- Body thickness, 2 lateral and 3 medial limbs thickness.

All of the data are gathered and compiled in a Microsoft Excel work sheet, and the results are then analysed using the SPSS 26.0 edition.

Result

To compare, the Independent Sample "t" Test was utilised the standard thickness of the left adrenal gland according to gender and for each age group. There was a distinction ($p < 0.05$) in coronal length of the left adrenal gland between males and females and. There was a difference ($p < 0.05$) in the BMI between males and females for the age group 51 to 60 years. It was compared using the Independent sample "t" test the coronal length according to gender for each age group. There was a difference ($p < 0.05$) in the coronal length between males and females for the age groups: 31-40 and 71-80 years. The Paired "t" test was utilised to evaluate normal thickness of the adrenal gland among left and right sides and according to gender and according to age groups. There was a difference ($p < 0.05$) in max lateral limbs, max medial limbs, and total gland between right and left sides for both the gender. Among males a difference ($p < 0.05$) in normal thickness (total) as well as coronal length was found between right & left sides. There was a variation ($p < 0.05$) in max lateral limbs of the adrenal gland between left and right sides for the age groups: 20-30, 31-40, 41-50, and 51-60 years.

Table 1 shows the various measurements of the adrenal glands made using CT in all research participants ($n=100$). There was a difference in max medial limbs of the adrenal between the right and left sides for the age ranges of 20 to 30 and 61 to 70. The Paired "t" test was implemented for comparison normal thickness of the adrenal gland between right and left sides according to age groups. For the age range of 31 to 40 years, there was a variation in the normal thickness of the adrenal gland between the right and left sides ($p < 0.05$). The Paired "t" test was employed to compare coronal length of the adrenal gland between right and left sides according to age groups. There was a difference in coronal length of the adrenal gland between both sides for the age groups: 31-40 years. The Pearson correlation coefficient, "r" was used to find the relation between age BMI and normal thickness (right and left side) of the adrenal gland. Max thickness was positively correlated ($p < 0.05$) with max lateral limbs, max medial limbs, and the total. Also, max lateral limb was positively correlated ($p < 0.05$) with max medial limbs and the total. Max medial limbs and the total of the left side was correlated.

Table 2 states the measurements of adrenal gland in males(n=65) and females (n=35).

The word "thick and heavy adrenals," which is unclear but frequently used in CT results, leaves both the presenting doctor and the radiologist unsure of what this finding signifies for the subject. While using phrase lacks impartiality in addition. In order to effectively and checking' spatient's suspected of having an adrenal pathology in their regular practise, radiologists must be familiar with the typical thickness of the adrenal glands. Therefore, we think that a study of this kind will have a significant impact on determining a patient's adrenal gland size or atrophic status objectively.

Discussion

The word "thick and heavy adrenals," which is unclear but frequently used in CT results, leaves both the presenting doctor and the radiologist unsure of what this finding signifies for the subject. Therefore, we think that a study of this kind will have a significant impact on determining a patient's adrenal gland size or atrophic status objectively.

Le-le Li, et al. conducted a study in which they conclude that a common radiology result, incidental adrenal enlargement is associated with a variety of clinical variables that necessitate adequate diagnostic assessment and care. Nodular adrenal hypertrophy was discovered to be a separate risk factor during operational assessment. But in our study the average height adrenal gland cumulative measures in both men and women were $11.0 \pm 2.0\text{mm}$ and $11.2 \pm 2.2 \text{ mm}$, and the average cumulative left adrenal gland size in men and women, respectively were 12.0 ± 3.1 respectively.^[10]

Enes Gurun, et al. conducted a study in which they conclude increasing BMI, which is the why the BMI correlation must be taken aspect while AG. But in our study the average cumulative right adrenal gland measures in both men and women were $11.0 \pm 2.0\text{mm}$ and $11.2 \pm 2.2 \text{ mm}$, Men and women had similar mean cumulative left adrenal gland sizes. 12.0 ± 3.1 respectively.^[11]

Dr. Shilpa Devakaret al. conducted a study in which they in which she found that there was a difference in measurement of left and right AG the left was being larger than right simllilarey in our study the left AG was larger than right . But in our study, the average cumulative right adrenal gland measures in both men and women were $11.0 \pm$

2.0mm and $11.2 \pm 2.2 \text{ mm}$, the average size of the left adrenal gland with time in men and women was, respectively 12.0 ± 3.1 .^[12]

Li et al. evaluated the functional status of unintentionally enlarged adrenal glands and found that only 3 of the 39 patients had preclinical metabolic problems, whereas 35 of the 39 subject' ssmooth enlargement of the adrenal glands had normal metabolic effectiveness. This demonstrates the patient population with incidentally discovered smoothly enlarged adrenal glands has a rather low incidence of subclinical biochemical abnormalities. It's debatable if we can link ethnicity to the high rate of unintentionally enlarged adrenal glands. For a minimum, it might be essential to employ various reference norms for numerous groups of people. We suggest that radiologists use our information serves as a valuable range for a baseline for the adult Asian-Indian community and as a manual for their daily work. Demonstrating a slight to medium positive connection between the participant's age and different measures of the adrenal glands. John et al. investigation of the CT adrenal size in reported in the Indian Journal of Radiology and imaging, they use the phrase "diffuse smoothly expanded" or "bulky" to describe an uncertain adrenal gland. Because this study was retrospective in nature, patient height and weight were not provided, so we were unable to compare the size of the adrenal glands to these factors. We also emphasise the need for sizable population-based multiethnicre search to create a criterion that is recognised globally.

Conclusion

This study's findings lead us to suggest that our data be used as a helpful baseline reference range for the population in the west and as a guidance for radiologists to follow when they encounter ambiguous "bulky" or "diffuse smoothly expanded" AG.

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Thickness of adrenal gland	Right AG		Left AG		P value
	Mean thickness in mm	Standard deviation	Mean thickness In mm	Standard deviation	
Males					
Body	5.3	1.3	5.4	1.3	<0.001
Medial limb	2.9	0.8	3.1	0.8	
Lateral limb	2.9	0.7	3.5	0.8	
Total	11.0	2.0	12.0	2.3	
Coronal length	1.8	0.4	1.7	0.3	
Females					
Body	5.6	1.2	7.83	1.81	<0.001
Medial limb	2.8	0.7	3.2	1.0	
Lateral limb	2.8	0.8	3.5	0.9	
Total	11.2	2.2	12.2	3.1	
Coronal length	1.8	0.4	2.1	1.3	

Table1:The various measurements of the adrenal glands made using CT in all research participants (n=100).

Thickness Of AG	Right AG		Left AG		P value
	Mean thickness in mm	Standard deviation	Mean Thickness in mm	Standard deviation	
Body	5.4	1.3	5.5	1.4	<0.001
Medial limb	2.9	0.8	3.1	0.9	
Lateral limb	2.8	0.7	3.5	0.8	
Total	11.1	2.1	12.0	2.6	
Coronal length	1.8	0.4	1.8	0.8	

Table 2:The measurements of adrenal gland in males(n=65) and females (n=35)

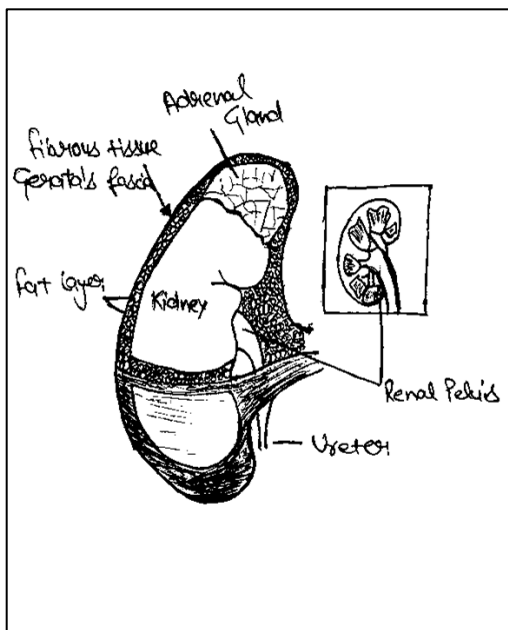


Figure 1: Kidney and adrenal gland anatomy



Figure 2: Normal Adrenal Glands Axial Image

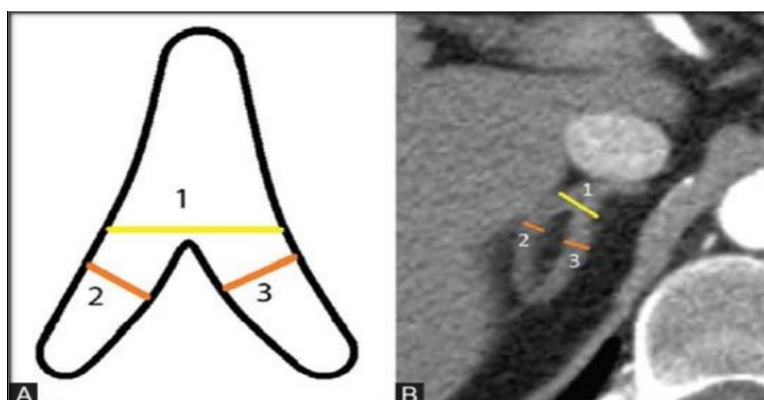


Figure 3: Diagram (A) CT image axial (B) The measurement technique of adrenal gland: 1- Body thickness, 2 lateral and 3 medial limbs thickness.