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Morphometric Parameters of the Human Pineal Gland by 3D (Spiral) CT scan

Manish Chaturvedi[1], Preeti[2], Vijay Chouhan[3], Manish Patil[4].
[1]*Demonstretor, Dept of Anatomy, Gajra Raja Medical College, Gwalior (MP) India.*
[2]*Post Graduate Student, Dept of Anatomy, Gajra Raja Medical College, Gwalior (MP) India.*
[3]*Post Graduate Student, Dept of Anatomy, R.D. Gardi Medical College, Ujjain (MP) India.*
[4]*Professor (HOD), Dept of Anatomy, R.D. Gardi Medical College, Ujjain (MP) India.*

Abstract: *The pineal gland is very important human endocrine gland and its location and size is very important for the neurologist and neurosurgeons and for the radiologist because in certain radiological investigations it is the guide of midline and its right or left shifting is highly suggestive of space occupying lesion in the brain. The aim of study was to find out the morphometric parameters of pineal gland and their variations in the different age groups. For this 100 cases were scaned by 3D CT Scan out of which 73 are males & 27 are females from mp region. All the measurements were taken in sagittal, coronal and axial view by CT scan & measurement done directly on computer on DICOM images using the DICOM viewer software. Statistical analysis was performed using SPSS 16.0 (SPSS Inc., Chicago, IL)& using statistical tools like mean, SD, t-test, diagrams, one way ANOVA analysis of variance for comparing different parameters. There was significant difference found in length ($p<0.01$) between different age groups. In males significant difference was found in the width between 41-50 and >50 age groups ($p<0.05$). In females significant difference was found for the parameter length with respect to age groups ($p<0.01$). We concluded that to study the morphometric parameters of pineal gland by 3D CT Scan and their variations may help in certain radiological investigations & to distinguish healthy tissue from various pineal tumors.*

Keywords: *Pineal gland. 3D CT scan, Cross sectional study. Sagittal view. Length*

I. Introduction

The pineal gland has inspired novel avenues of research due to its unique nature and its discrete association with the sympathetic nervous system. The human pineal gland, a part of the diencephalon, is a small neuroendocrine organ that has a function in the circadian rhythm by the secretion of melatonin neurohormone.[1] Scientific reports prove that there is significant relationship between the gland function and many systemic disorders. Obesity, hypertension and sudden infant death syndrome are examples of this. Structures like the adrenal cortex are also functionally connected with the pineal gland.[2] Pineal gland weight and volume vary greatly in respect of time, age, and physiological condition.[3] It has been stated that the pineal gland grows in size from birth until two years of age and then remains constant between 2 to 20 years of age.[4] The present study was conceived, to see the any kind of variation in the different parameters of pineal gland with regard to the age of the individual, because its size and volume is related with its physiological functions.

II. Material And Methods

2.1 Inclusion criteria

it was across sectional study.Study group consisted of 100 normal cases (diagnosed by radiologist) of mp region at age ranges: 21–79 yea in certain radiological investigations rs, average 39.69 SD 13.84 years Who had undergone cranial 3D CT scan. It included 27 females & 73 males. All images were obtained with a 3D CT Scan Machine 128 slice of Wipro G Company.

2.2 Exclusion criteria

Patients with history of pineal tumor, cyst, or dysfunction, any brain abnormality adjacent to the pineal gland , patients with any known endocrinologic disorder or malignant tumor as well as those who were undergoing radiation therapy or chemotherapy or if the required images were missing or destroyed.

2.3 The Materials

All images were obtained with a 3D CT Scan Machine 128 slice of Wipro G Company.all mesurement were done directly on computer on DICOM images using Electronic Caliper inbuilt in the DICOM viewer software.

2.4 Methodology

All images were obtained with a 3D CT Scan Machine 128 slice of Wipro G Company.
Size = 1mm × 1mm × 1 mm; slice thickness = 1mm without gap.
In this study, the pineal boundary was exactly identified on the sagittal sections taken in addition to coronal and axial views.Antero-posterior dimension was measured in the sagittal view and vertical and transverse dimensions were measured in coronal and axial views.

2.5 Statistical Analysis

Statistical analysis was performed using SPSS 16.0 (SPSS Inc., Chicago, IL). We use statistical tools like mean, SD, t-test, diagrams, one way analysis of variance for comparing different parameters of pineal gland with respect to sex and age groups.

III. Results & Observations

Statistical analysis was performed using SPSS 16.0 (SPSS Inc., Chicago, IL)

Table No. 1: Frequency distribution of male & female according to age groups.

Sex	Age group				Total
	<30	31-40	41-50	>50	
Female	9	6	8	4	27
Male	19	20	18	16	73
Total	**28**	**26**	**26**	**20**	**100**

Table No. 14: One way ANOVA for different parameters of male with respect to age groups.

Variable	Source	Sum of Squares	Df	Mean Square	F	Sig.
Length	Between Groups	0.265	3	0.088	1.316	0.276
	Within Groups	4.628	69	0.067		
	Total	**4.892**	**72**			
Width	Between Groups	0.758	3	0.253	2.164	0.100
	Within Groups	8.059	69	0.117		
	Total	**8.818**	**72**			

*** very significant; * significant; Ns – not significant

For comparing all age groups parameters in males we apply one way ANOVA technique. In the ANOVA table no significant difference was found in length, width and volume with respect to age groups (p>0.05).

Table No. 15: One way ANOVA for different parameters of female with respect to age groups.

Variable	Source	Sum of Squares	Df	Mean Square	F	Sig.
Length	Between Groups	1.778	3	0.593	9.396	0.000*
	Within Groups	1.451	23	0.063		
	Total	**3.229**	**26**			
Width	Between Groups	.307	3	0.102	1.387	0.272
	Within Groups	1.696	23	0.074		
	Total	2.003	26			

*** very significant; * significant; Ns – not significant

Comparing all age groups parameters in females we apply one way ANOVA technique. In the ANOVA table significant difference was found for the parameter length with respect to age groups (p<0.01). Nosignificant difference was found in width with respect to age groups (p>0.05).

Table No. 4: One way ANOVA for different parameters with respect to age groups.

Variables	Source	Sum of Squares	Df	Mean Square	F	Sig.
Length	Between Groups	1.081	3	0.360	4.911	0.003*
	Within Groups	7.044	96	0.073		
	Total	8.125	99			
Width	Between Groups	0.281	3	0.094	0.853	0.468
	Within Groups	10.547	96	0.110		
	Total	10.828	99			

*** very significant; * significant; Ns – not significant

For comparing all age groups parameters we apply one way ANOVA technique. In the ANOVA table significant difference was found for the parameter length with respect to age groups ($p<0.01$).

Table no. 17: Pineal gland length, width, thickness and volume mean values in age related groups.

Age group (in years)	N	LENGTH Mean	SD	WIDTH Mean	SD
<30	28	7.0325	0.1456	6.738	0.2772
31-40	26	7.1058[4]	0.2492	6.740	0.4745
41-50	26	7.1088[4]	0.2853	6.732	0.2415
>50	20	7.3285	0.3895	6.869	0.2696

1, 2, 3 & 4 represent different age groups of <30, 31-40, 41-50 & >50 respectively.

In above mentioned table, significant difference was found in the lengths between 31-40 and >50 age groups ($p<0.05$), significant difference was also found in the lengths between 41-50 and >50 age groups ($p<0.05$). No significant difference was found in the width among different age groups.

IV. Discussion

Present study evaluates the morphometric parameters on living subjects with the help of radio-imaging (3D CT scan) in mp India. One such study was conducted by Golan et al. in 2002 on the pineal glands which were dissected out from the cadavers. [5] They observed that the lowest average length of pineal gland was in the group of 41–50 years. The highest was found in the group of 31–40 years. The lowest mean width was observed in the group of 31–40 years. In the group of less than 30 years the mean was the highest. In my study, I observed the highest mean length in > 50 years and lowest in <30 years age group.The highest mean width in >50 years and lowest in 41-50 years age group. So, in present study, the highest and lowest mean values of all the parameters in age groups (Length, width) are not concordance with the study results done by Golan et al. on cadaveric pineal glands. It is difficult to explain the discrepancy in observations but it might be because of difference in the study method (CT scan & Cadaveric), difference in the race and difference in the age of puberty due to climatic conditions. [6] [7]

V. Conclusion

It is concluded that pineal gland's mean length gradually increased with age.The width of the gland is increased up to the 40 years then it slightly decreased with age. There was significant difference in length ($p<0.01$) between different age groups but no significant difference was found in width. In males significant difference was found in the width between 41-50 and >50 age groups ($p<0.05$). In females significant difference was found for the parameter length with respect to age groups ($p<0.01$). NO significant difference was found in width with respect to age groups. In the pineal region, where a variety of tumors occur, including germ cell tumors and pinealoma, knowledge of the normal size of the developing gland can help to distinguish healthy tissue from tumor. In addition, the lack of a blood-brain barrier in the normal pineal gland results in an inability to separate a normal gland from a neoplasm on the basis of enhancement characteristics. [8]

References

[1]. Turgut M, Kumar R., Pineal Gland and Melatonin: Recent Advances in Development, Imaging, Disease and Treatment, (New York, Nova Science 2011).
[2]. Reyes PF. Age related histologic changes in the human pineal gland. Prog Clin Biol Res.1992;253–61.
[3]. 3. Keller SS, Roberts N., Measurement of brain volume using MRI: software, techniques, choices and prerequisites, Journal of Anthropological Sciences, 2009;87:127–51.
[4]. Sumida M, James Barkovich A and Hans Newton T. "Development of the pineal gland: measurement with MR". American Journal of Neuroradiology. 1996;17:233–36.
[5]. Langman j., Medical Embryology 3rd ed.(Baltimore,Williams &Wilkins,1975) 175–78.
[6]. Janusz Golan, Kamil Torres, Grzegorz J. Staśkiewicz, Grzegorz Opielak, Ryszard Maciejewski. Morphometric parameters of the human pineal gland in relation to age, body weight and height. Folia Morphol. 2002; 61:111–13.
[7]. Wurtman RJ, Moskowitz MA. The pineal organ. N Engl. J Med. 1977; 296:1329–33.
[8]. Kitay JI. Pineal lesions and precocious puberty: a review. J Clin Endocrinol Metab. 1954;14: 622–25.