ABSTRACT

Background: Thymus is a small, irregular shaped gland mainly concerned with immune function. Studies have shown that in different age groups and in genders, the morphology of thymus is variable. Hence this study was aimed to access the different shapes, size of thymus gland using Computed tomography scan.

Methods: The study was a descriptive cross-sectional study conducted in Department of Radiology and Imaging, College of Medical Sciences, Bharatpur, Nepal. This study was conducted for a period of three months among 104 patients. Computed tomography examination was conducted by the Toshiba 160 slice CT scanner with slice thickness of 1.5mm. Statistical analysis was done with Statistical Package for the Social Sciences (SPSS) version 16. Only descriptive statistics were employed and the results were presented in tabular format.

Results: In total 104 patients participated in this study. The frequency of male was 39 (37.5%) and female 65 (62.5%). The mean age of patients was 55±15.1 years. The mean anteroposterior diameter in the male was 17.62±5.98 mm and in female it was 16.02±5.78 mm, similarly the transverse diameter in male was 30.85±11.85 and in female it was 28.80±10.23 mm. Triangular morphology was most common among both male and female with frequency of 31(79.5%) and 34(52.3%) respectively.

Conclusions: Thymus gland is slightly larger in males than females. From this study we can conclude that triangular thymic shape was most frequently observed morphological shape in both male and female.
data. Both male and female patients who gave written consent participated in the study. All the patients included in this study were referred to the department for various chest pathology excluding chest pathology. Patients with history of thymus gland enlargements or hyperplasia, history of myasthenia gravis, systemic lupus erythematosus, rheumatoid arthritis, radiation therapy, burns and steroid treatments were excluded. All the patients with mediastinal involvement of the disease or thymus pathology itself were also excluded from the study.

The CT scan, measurement and interpretation was conducted by a single radiologist with several years of experience on this type of procedure. CT examination was conducted by the Toshiba 160 slice CT scanner with slice thickness of 1.5mm. Thymus gland was measured as explained by Araki et al. and Naik et al. However, in this study the authors did no focus on fatty replacement of the thymus. The different measurements such as anteroposterior and transverse diameters, length, thickness were calculated. Apart from this morphology of the thymus gland was also determined.

The data were entered in Microsoft excel and later transported to Statistical Package for the Social Sciences (SPSS) version 16 (SPSS, Inc., an IBM Company, Chicago, IL). Only descriptive statistics were employed and the results were presented in tabular format.

RESULTS

In this study 104 patients participated among them the frequency of male was 39 (37.5%) and female 65 (62.5%). The mean age of patients was 55±15.1 years (Table 1).

Table 1: Characteristics of patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (years) ± SD</td>
<td>55±15.1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>39 (37.5)</td>
</tr>
<tr>
<td>Female</td>
<td>65 (62.5)</td>
</tr>
</tbody>
</table>

The mean anteroposterior diameter in the male was 17.62±5.98 mm and in female it was 16.02±5.78 mm, similarly the transverse diameter in male was 30.85±11.85 and in female it was 28.80±10.23 mm. The length and thickness were more on the left side of both male and female (Table 2).

Table 2: Dimensions of thymus of male and female

<table>
<thead>
<tr>
<th>Variables</th>
<th>Male Mean±S.D.</th>
<th>Female Mean±S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anteroposterior diameter (mm)</td>
<td>17.63±5.98</td>
<td>16.02±5.79</td>
</tr>
<tr>
<td>Transverse diameter (mm)</td>
<td>30.86±11.85</td>
<td>28.8±10.24</td>
</tr>
<tr>
<td>Left length (mm)</td>
<td>24.53±10.66</td>
<td>21.47±8.54</td>
</tr>
<tr>
<td>Left thickness (mm)</td>
<td>12.25±6.64</td>
<td>11.62±3.98</td>
</tr>
<tr>
<td>Right length (mm)</td>
<td>20.95±8.74</td>
<td>19.45±7.47</td>
</tr>
<tr>
<td>Right thickness (mm)</td>
<td>10.83±4.74</td>
<td>10.26±3.53</td>
</tr>
</tbody>
</table>

Triangular morphology was most common among both male and female with frequency of 31(79.5%) and 34(52.3%) respectively (Table 3).

Table 3: Morphological shape of thymus in males and females

<table>
<thead>
<tr>
<th>Variables</th>
<th>Quadrilateral</th>
<th>Triangular</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>8 (20.5%)</td>
<td>31 (79.5%)</td>
<td>39 (100%)</td>
</tr>
<tr>
<td>Female</td>
<td>31 (47.7%)</td>
<td>34 (52.3%)</td>
<td>65 (100%)</td>
</tr>
</tbody>
</table>

DISCUSSION

Thymus gland is a bilobed structure primarily concerned with immune system. It plays a vital role in development of T-lymphocytes. Developmentally the major portion of thymus gland is contributed by the ventral aspect of third pharyngeal pouch, whereas, a small portion of the ventral aspect is contributed by the fourth pharyngeal pouch. The two lobes get connected in the midline, later at the 8th week of gestational life. During development, with the descent of heart and associated caudal movement of aortic sac, the thymus also moves caudally.

The present study conducted to delineate the morphology of thymus among study participants in Chitwan. Studies on thymus have been conducted among the fetus and in cadavers. Thymus imaging have also been a popular method. There are various modalities of the thymus imaging, among them CT and MRI are the two main modalities. CT scan has advantage of rapid scanning with short time taken to scan it so, artifact due to cardiac motion and large vessels pulsation is very low. It has very good soft tissue contrast and it can accurately depict the presence of fat and soft tissue densities. The main disadvantage of CT scan is ionization radiation exposure. Whereas MRI has superior soft tissue contrast and lacks radiation hazards but it takes long time to scan so, it has high chances of respiratory and cardiac motion artifact and pulsation artifacts. Many studies have been conducted using multidetector CT scan. In the present study too, authors used CT scan method.

As a matter of fact, thymus is observed in different shapes and sizes in different age groups. The size of thymus may also alter due to stress. Sometimes rebound hyperplasia is also observed in patients after chemotherapy, treatment of Cushing’s syndrome and stem cell transplantation.

The shape of thymus has been described as arrowhead, bilobed, quadrangular, triangular or C-shaped. The shapes also varies among same age groups and across genders. In the present study triangular morphology was the most common shape in both males and females. This result was in line with that reported by Colak et al. and Araki et al. In contrast to our findings, Naik et al in their study reported, arrowhead as the most common shape. Araki et al also suggested that the thymic morphology may play little role in defining normality, owing to the anatomic location and complexity of structures around it.

In this study, the authors observed overall measurement of thymus to be larger in males than females. This observation...
was in line with other studies conducted by Colak et al.\textsuperscript{22} and Araki et al.\textsuperscript{2} However, the thymus glands undergoes involution and measurements in the old age is not possible. There more chances of unclear contour of thymus in old age.\textsuperscript{3} In this study the authors did not focus on the different age groups. Most of the studies in relation to thymus have been covered on young age groups.\textsuperscript{2,22}

This study has a few limitations. The results interpreted in this study has to be taken with caution due to the small sample size and not covering all the age groups. Since this was a descriptive study design the authors focused in the baseline data with which it would pave way for future researches for Nepalese researchers. The data presented here are not a true representative of total population of Chitwan or Nepal so the results cannot be generalized. The study also had non-uniform participation of both genders. Taking scoring of thymus for attenuation would have added impact on the strength of study, however, this was not our objective in this preliminary study. The study also did not look into other factors such as age groups, BMI that would have impact on the thymus gland.

**CONCLUSION**

From this study we can conclude that triangular thymic shape was most frequently observed morphological shape in both male and female. The overall individual measurements of thymus were more in male than in female. In conclusion though this study provides baseline information data, additional study with larger sample size is required.

**CONFLICT OF INTEREST:** None

**FINANCIAL DISCLOSURE:** None

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1. Lagou MK, Karagiannis GS. Obesity-induced thymic involution and cancer risk. Semin Cancer Biol. 2023;93:3-19. \[DOI\]  
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