INTRODUCTION

Thyroid cancer is one of the most malignant endocrine tumors. The incidence in the world continues to increase over the last three decades. It is estimated that 1.0%–1.5% of all new cancer cases diagnosed in the United States is thyroid cancer [1]. The prevalence of thyroid cancer nationally has not been obtained yet. This cancer ranks 8th out of all malignancies that occur throughout the body based on the new cases that occurred in 2016. There are an estimated 64,300 new cases that occurred in 2016 (3.8% of all cancer incidents). The number of new cases of thyroid cancer is 13.9 per 100,000 every year. This cancer is most often diagnosed at the age of 45–54 years with an average age of 50 [2].

Thyroid cancer is also affected by race/ethnicity and gender. On the whole race, thyroid cancer is more common in women, which is about four times more than in men. In general, thyroid cancer is common in the east part of the world including Asia. The incidence of thyroid cancer in Asian women is 22.7 per 100,000 every year, while in Asian men 9.7 per 100,000 every year [2].

Various things can be a risk factor for thyroid cancer, such as obesity. Some studies reported that obesity is a risk factor for thyroid cancer; the percentage of thyroid cancer is higher in obese patients compared to non-obese patients (30% vs 22%) [4,5].

Thyroid cancer is classified into four types based on histopathological features, which are papillary thyroid carcinoma, follicular thyroid carcinoma, medullary...
thyroid carcinoma, and anaplastic thyroid carcinoma. Approximately 85% of all thyroid cancers are papillary thyroid carcinoma followed by follicular (11%), medullary (3–5%), and anaplastic (2–5%) [6].

There is no data on the characteristics of thyroid cancer in Haji Adam Malik General Hospital until now, especially in the distribution of body mass index (BMI) and thyroid nodules. Thus, this study was conducted to describe the characteristics of thyroid cancer in the Haji Adam Malik General Hospital from 2013 to 2015. The study could present the specific characteristics of Asian thyroid cancer patients, especially BMI and thyroid nodules. Further studies can be done to analyze the association of BMI and thyroid nodules with thyroid cancer.

METHODS

A cross-sectional study was carried out among 97 patients with thyroid cancer at Haji Adam Malik General Hospital from 2013 to 2015. Secondary data with consecutive sampling techniques were used in this study using medical records from Haji Adam Malik General Hospital. The inclusion criteria are all patients diagnosed with thyroid cancer based on the histopathological analysis.

Age was classified into several groups as follows: <20 years until >84 years. Sex information was classified as male and female. Histopathological features of thyroid cancer were based on National Cancer Institute such as: papillary, follicular, medullary, and anaplastic. The staging of thyroid cancer was divided into four (I-IV) based on AJCC (2010). Body mass index (BMI) was classified into several categories based on the Asia Pacific BMI classification. Thyroid nodule size was divide into four groups, 1.0 cm until >4.0 cm. Data were analyzed descriptively using the Statistical Package of Social Service (SPSS) version 23.0 in percentage.

This research had received permission from the Health Research Ethical Committee of the Medical Faculty of Universitas Sumatera Utara/H. Adam Malik General Hospital, with letter number 39/080816/KEPK FK USU-RSUP HAM/2016.

RESULTS

There were 97 eligible samples enrolled in this study from 2013 to 2015 at Haji Adam Malik General Hospital. Table 1 shows the frequency distribution based on the patient’s clinical characteristics as follows.

| Age          | Female | N (%) | Male | N (%) |
|--------------|--------|-------|------|-------|
| <20 years   | 1      | 1.4   | 0    | 0.0   |
| 20–34 years | 12     | 16.9  | 2    | 7.7   |
| 35–44 years | 12     | 16.9  | 2    | 7.7   |
| 45–54 years | 18     | 25.4  | 9    | 34.6  |
| 55–64 years | 22     | 31.0  | 9    | 34.6  |
| 65–74 years | 5      | 7.0   | 3    | 11.6  |
| 75–84 years | 1      | 1.4   | 1    | 3.8   |

| Clinical stage | Female | N (%) | Male | N (%) |
|----------------|--------|-------|------|-------|
| Stage I        | 19     | 27.6  | 4    | 14.3  |
| Stage II       | 9      | 13.0  | 3    | 10.7  |
| Stage III      | 16     | 23.2  | 8    | 28.6  |
| Stage IV       | 25     | 36.2  | 13   | 46.4  |

| Histopathological description | Female | N (%) | Male | N (%) |
|-------------------------------|--------|-------|------|-------|
| Papillary                    | 29     | 42.0  | 16   | 57.1  |
| Follicular                   | 32     | 46.4  | 6    | 21.4  |
| Medullary                    | 2      | 2.9   | 1    | 3.6   |
| Anaplastic                   | 6      | 8.7   | 5    | 17.9  |

| Years of diagnose | Female | N (%) | Male | N (%) |
|-------------------|--------|-------|------|-------|
| 2013              | 20     | 28.2  | 6    | 23.1  |
| 2014              | 23     | 32.4  | 8    | 30.7  |
| 2015              | 28     | 39.4  | 12   | 46.2  |

| Body mass index               | Female | N (%) | Male | N (%) |
|-------------------------------|--------|-------|------|-------|
| Underweight                   | 7      | 10.2  | 2    | 7.1   |
| Normal                        | 23     | 33.3  | 13   | 46.4  |
| Pre-obese                     | 20     | 29.0  | 3    | 10.7  |
| Obesity grade I               | 15     | 21.7  | 6    | 21.5  |
| Obesity grade II              | 4      | 5.8   | 4    | 14.3  |

| Nodule size | Female | N (%) | Male | N (%) |
|-------------|--------|-------|------|-------|
| 1.0–1.9 cm  | 12     | 17.7  | 3    | 10.3  |
| 2.0–2.9 cm  | 10     | 14.7  | 6    | 20.7  |
| 3.0–3.9 cm  | 13     | 19.1  | 7    | 24.1  |
| >3.9 cm     | 33     | 48.5  | 13   | 44.9  |

Based on Table 1, it can be concluded that the highest number of people affected by thyroid carcinoma in female was found in the age group of 55–64 years (31.0%) followed by the age group of 45–54 years.
(25.4%) and male in the age group of 45–54 years (34.6%). Both males and females are most diagnosed at stage IV about 46.4% and 36.2%. Based on the histological features of thyroid cancer in female, we found that follicular thyroid carcinoma was more common than other types (about 46.4%) followed by papillary thyroid carcinoma (42.0%), anaplastic thyroid carcinoma (8.7%), and medullary thyroid carcinoma (2.9%) while in male, papillary thyroid carcinoma was more common than other types (about 57.1%) followed by follicular thyroid carcinoma (21.4%), anaplastic thyroid carcinoma (17.9%), and medullary thyroid carcinoma (1.0%). Medullary thyroid carcinoma is the rarest type found in both genders.

From 2013 until 2015, we can see an increase in thyroid cancer cases both in males and females each year. The highest prevalence of thyroid cancer was found in normo-weight patients both in female (33.3%) and male (46.4%) followed by pre-obese patients in female (29.0%) and obesity grade I in male (21.5%). The same as the prevalence in thyroid cancer was found in patients with the nodule size of >3.9 cm both in male (44.4%) and female (48.5%) followed by patients with the nodule size of 3.0–3.9 cm both in female (19.1%) and male (24.1%).

**DISCUSSION**

The highest prevalence of thyroid cancer was found in the age groups of 55–64 years (32%) and 45–54 years (27.8%). A study conducted by Lukas et al. [6] found that the highest number of people affected by thyroid carcinoma was found in the age group of 55-59 years (12.2%). The second highest case was found in the age group of 60–64 years old (12.0%) with an average of 53 years. Something similar was also reported by Goyal et al. [7] that most thyroid carcinoma cases were diagnosed at the age of 65 years on average. This statement is based on the finding in thyroid cancer prevalence that is higher in elders in line with malignant cells aggressiveness and the metastasis risk which are also found higher [8].

Based on this study, it can be concluded that females are 2.5 times more affected than males. Some studies found that thyroid cancer affected females 8–10 times higher than males due to the difference of their estrogen levels. National Cancer Institute also explained that thyroid cancer in the Asian race is mostly found in women, about 22.7 per 100,000 women every year compared to men, 9.7 per 100,000. Besides, in the American Indian race, there are 14.5 per 100,000 women every year compared to men 3.9 per 100,000 every year [9].

Histology types of thyroid cancer are classified into four types, papillary thyroid carcinoma, follicular thyroid carcinoma, medullary thyroid carcinoma, and anaplastic thyroid carcinoma. Based on this study, we conclude that the most common type of thyroid cancer found in the sample is papillary (about 46.4%) followed by follicular (39.2%), anaplastic (11.3%), and medullary (3.1%). Something similar was reported by Pacini et al. [10] that the most common type of thyroid cancer was papillary with an incidence rate of about 5.7 per 100,000 every year, followed by follicular about 0.82 per 100,000 every year. Meanwhile, medullary and anaplastic types have the lowest incidence rates about 0.11 and 0.21 per 100,000 every year.

The most common type of thyroid cancer is papillary followed by follicular both types are derived from follicular cells that are dominating the thyroid gland. Meanwhile, medullary types are derived from parafollicular cells, and anaplastic types occur from other types of thyroid cancer which are treated properly [8]. A study conducted by Davies et al. [11] assumes that this is due to the increased number of accidental findings of thyroid cancer in small nodule size (<1 cm) while doing an early detection, which is an early stage of papillary microcarcinomas.

In general, thyroid cancer is mostly diagnosed at the late stage. This is due to asymptomatic clinical manifestation in thyroid cancer, which tends to reveal the diagnosis unpurposely while doing physical examination or radiology examination at the late stage [12]. From this study, we found a high number of thyroid cancers in stage IV (about 39.2%) followed by stage III (24.7%) while the early stage is only 36.1% consisting of stage I (23.7%) and stage II (12.4%). This data shows a high number of advanced cases because the samples were taken in Haji Adam Malik General Hospital as Sumatera’s referral center. A study conducted by Yoo et al. [13] found that most of the thyroid cancers were diagnosed unpurposely at the late stage (54.8%) compared with purposely (13.5%) [13]. A similar result has been found by a study conducted by Ganasan at Haji Adam Malik General Hospital Medan in 2013 that most of the thyroid cancers were diagnosed at stage IV (42.6%) [14].

A significant increase in the number of thyroid cancers is influenced by several risk factors such as obesity. The incidence of thyroid cancer has been steadily growing with the increasing obesity in the world. Our study found different results of prevalence that the majority of thyroid cancers happen to non-obese patients with normal BMI (37.1%) followed by obese patients (29.8%) consisting of obesity I (21%) and obesity II (8.2%).

A study conducted by Kitahara et al. [15] found that BMI was correlated with thyroid cancer both in men and women, which is similar to this study. They found that the prevalence of thyroid cancer in women with normal BMI was at 39% followed by obese patients (30%), pre-obese (28%), and underweight (3%). Different results from the study conducted by Renehan et al. [16] in a meta-analysis found that a greater BMI was
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found with thyroid nodules where the nodule size is associated with thyroid cancer risk [15,20].

studies showed little or no association of physical activity levels with a higher risk of developing thyroid cancer. Low levels of physical activity have been linked with a higher risk of thyroid cancer [20].

risk with obesity was only in women. The minimum number of samples made in this study cannot represent all of the characteristics of thyroid cancer, and because this is a cross-sectional study, we still cannot interpret the correlation between BMI and nodule size with thyroid study. Further studies are needed to analyze the association of BMI and thyroid nodules with thyroid cancer.

CONCLUSIONS

The highest prevalence of people affected by thyroid carcinoma was found in the age group of 55-64 years (32%), where females are 2.5 times more affected by thyroid cancer than males. Most thyroid cancer histopathological features found in the sample were papillary thyroid carcinoma (46.4%), and the highest number of thyroid cancer was found in stage IV about 38 cases (39.2%) in both genders. The highest number of people affected by thyroid carcinoma was found in patients with normal BMI (37.1%) followed by obese patients (29.8%), and the most common thyroid nodules size in the sample was ≥4 cm (39.2%).

DECLARATIONS

Competing of Interest
The authors declare no competing interest in this study

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