Association of Body Mass Index and Thyroid Stimulating Hormone Levels with Thyroid Cancer Among Genders in MU-TNED (MU-Thyroid Nodule Electronic Database)

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Objective:

To analyze the relationship between body mass index (BMI), thyroid stimulating hormone levels (TSH), and the development of thyroid cancer among genders, males and female, in MU-TNED (MU-Thyroid Nodule Electronic Database) that includes patients with nodular disease.

Introduction:

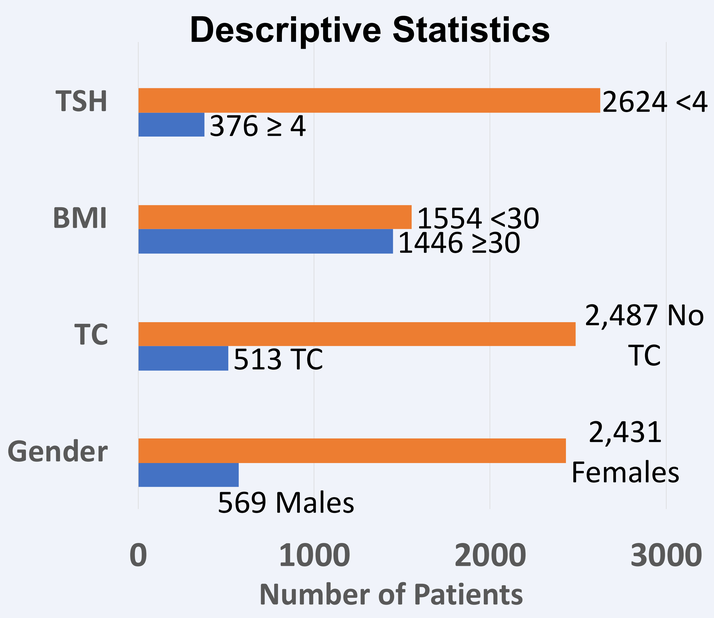
Thyroid cancer is increasing in the US, making it the sixth most common cancer especially in women according to SEER data[2]. The National Cancer Institute has identified thirteen cancers associated with obesity[1]. The types of cancer include:

- Meningioma, Multiple myeloma
- Adenocarcinoma of the esophagus
- Kidneys, Uterus, Ovaries
- Thyroid, Breast, Liver
- Gallbladder, Upper stomach
- Colon and Rectum, Pancreas

Higher BMI (specifically, a 5-unit increase in BMI) is associated with a slight (10%) increase in the risk of thyroid cancer[3].
Thyroid stimulating hormone (TSH) is a hormone produced by the pituitary gland to regulate thyroid function, which affects the way the body uses its energy, affecting a person's weight and BMI. If TSH levels are high, this may indicate a low thyroid hormone level, a condition called hypothyroidism[4].

Methodology:

A retrospective chart review of MU-TNED and the electronic medical record system used by the University of Missouri Healthcare, called Powerchart, was used to evaluate the extracted patient history of patients from 2014-2019.
This included 3000 patients, 2431 females and 569 males. Patients were divided into groups of higher BMI (≥30) and lower BMI (<30), patients with malignant disease (thyroid cancer) and patients with no malignancy. Descriptive statistics were used to assess the data. A logistic regression was used adjusting for BMI and TSH assessing the association of thyroid cancer with BMI, TSH, and gender.



Results:

A total of 3,000 patients were evaluated from MU-TNED (MU-Thyroid Nodule Electronic Database). BMI showed a p-value that was statistically significant (<0.05). TSH also had a p-value that was statistically significant (p<0.05). Results of our data show that BMI and TSH are related to an increased likelihood of thyroid cancer. The results show that the odds increased for males and females with higher BMI (≥30) compared to patients with <30. The results also show an increased odds when TSH levels are ≥4 in patients with nodular disease than <4.

Table 1. P-Value of Independent Variables, BMI and TSH

	P-Value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.003939239	0.023136574	0.121279457	0.023136574	0.121279457
BMI	0.000217882	0.001365994	0.0044426647	0.001365994	0.004442647
TSH	1.3960E-08	0.00159917	0.003280962	0.00159917	0.003280962

- BMI and TSH P-Values statistically significant p<0.05

Table 2. Odd Ratios for BMI and TSH

	Odds Ratio for BMI	
Effect	ODDS Ratio Females	ODDS Ratio Males
BMI ≥ 30	1.22	1.24

- Odds of females for TC is 1.21 times higher for BMI ≥30 than for females with BMI <30.
- Odds of males for TC is 1.24 times higher when BMI ≥30 than <30.

	Odds Ratio for TSH	
Effect	OR Females	OR Males
TSH ≥ 4	1.59	1.33

- Odds of females for TC is 1.59 times higher when TSH ≥4 than <4.
- Odds of males for TC is 1.33 times higher when TSH ≥4than <4.

Conclusion: We confirmed that BMI and TSH are statistically significant in regard to the likelihood of Thyroid cancer. High BMI and TSH levels are associated with a higher risk of Thyroid cancer. Among genders, male and female, have a close odds of getting Thyroid cancer.

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Thank you for your time