

PREVALENCE OF THYROID DISORDERS AND THYROID ANTIBODIES AMONG COASTAL COMMUNITIES IN MALAYSIA (part of nationwide study of thyroid disorders in Malaysia)

Authors

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Introduction

This is the first study in Malaysia to look at the prevalence of thyroid disorders and thyroid antibodies nationwide. For the purpose of this study, Peninsular Malaysia is divided into 5 regions (Northern region, Central region, Southern region, West Coast and East Coast). We sample a population from each region to represent the Malaysian population. Up till today 2498 respondents has been screened. The current result is from two communities in the West Coast.

Objectives

To determine the prevalence of thyroid disorders and thyroid autoantibodies in the coastal communities of Malaysia. This study is part of a nationwide study looking into the prevalence of thyroid disorders.

Methods

A cross sectional study was performed in two coastal districts of rural Selangor. A village from each district was chosen where a participant from each household from the village was selected using KISH tables. Sociodemographic data, medical history, anthropometric measurement and thyroid examination were performed. The presence of goitre was recorded according to the World Health Organization (WHO) goitre grading system. Blood withdrawn was tested for thyroid function and thyroid autoantibodies. Thyroid antibodies analyses were done using Immulite 2000 system. Lowest detectable limit for anti-thyroperoxidase (antiTPO) and anti-thyroglobulin (antiTG) are 10 IU/mL and 20 IU/mL respectively. Low, moderate and high titre is defined 40 - 100 IU/mL, 101-1000 IU/mL and >1000 IU/mL respectively.

Results

A total of 418 subjects were recruited with a mean age of 54.1 ± 14.2 years. Majority were Malays (86.8%), followed by Indians (11.7%) and Chinese (1.4%) (Table 1). Among respondents, 2.9% had Grade 1 and 8.9% had Grade 2 goitre. A mere 3.4% had clinically palpable thyroid nodules (Figure 1). A total of 411 blood samples were available for thyroid level assessment, with 1.9% of respondents were found to have hypothyroidism while 85.6% had TSH in the range of 0.32-2.5 mIU/L. The prevalence of overt and subclinical hypothyroidism was 0.2% and 1.7% respectively. On the other hand, 3.4% of respondents were hyperthyroid (TSH < 0.32 mIU/L) with prevalence of overt and subclinical hyperthyroidism being 0.5% and 2.9% respectively (Figure 3).

Among 417 samples which were available for antiTPO analysis, 8.9% has detectable antiTPO titre (>40.0 IU/mL), with 4.3% had moderate and 2.4% had high antiTPO titres (Figure 4). One respondent (10%) from among those with high antiTPO titres was found to have T3 thyrotoxicosis. Forty percent of euthyroid respondents with high titre and 38.9% with moderate titre had high normal TSH, in the range of 2.51 – 5.00 mIU/L (p<0.001) (Table 2).

Among 417 samples which are available for antiTG analysis, 3.4% and 5.3% had low detectable and moderate antiTG titres respectively (Figure 4). Only 0.5% (2 respondents) had high antiTG titre (>1000 IU/mL) and found to be hypothyroid. Among those with moderately positive titre, 9.1% were hyperthyroid and majority (63.6%), although euthyroid, had TSH levels between 0.32 – 2.50 mIU/L (p<0.001) (Table 2).

Discussion

The low prevalence of thyroid disorders in this cohort is possibly due to the fact that coastal communities are generally iodine sufficient. In 2008, WM Wan Nazimoon et al, reported that the median urinary iodine level in the state of Selangor is 126 ug/L (designated as iodine sufficient area by WHO/ICCIDD/UNICEF criteria)*. Comparison made with other studies are as follows:

| Hyperthyroidism | | | | Hypothyroidism | | | |
|-----------------------|-----------------|----------------------------|---------------|------------------|-------------|------------------|---------------|
| Author | Location | Prevalence | Iodine Status | Author | Location | Prevalence | Iodine Status |
| Current study | Malaysia | 1.9% | *Sufficient | Current study | Malaysia | 3.4% | *Sufficient |
| Konno et al | Japan | 2.7/1000(M), 5.1/1000 (F) | Sufficient | Konno et al | Japan | 10.9/1000 | Sufficient |
| Usha Menon et al | India | 1.3% | Sufficient | Usha Menon et al | India | 3.9% | Sufficient |
| Aghini-Lombardi et al | Italy | 2% | Deficient | Sawin CT et al | Framingham | 13.6% (>60 yrs) | ? |
| Hollowell JG et al | US (NHANES III) | 0.2% (0.4-2.0% in elderly) | ? | Empson et al | Australia | 13.6% | ? |
| Bjoro et al | Netherlands | 2.5% (M), 0.9%(F) | ? | Bjoro et al | Netherlands | 4.8%(M), 0.9%(F) | ? |

Note that most studies with lower prevalence of hyperthyroidism and higher prevalence of hypothyroidism are generally older cohort.

Majority of respondent had TSH level between 0.32—2.50 uIU/mL. A possible explanation for this observation is that the mean age of respondent is relatively young. This also supports the notion about the controversies of what constitute a normal TSH. The 95th centile for TSH in this cohort is 3.30 uIU/mL.

The prevalence of antiTPO antibody and antiTG in the cohort was low. This is likely due to young population screened in this cohort. The NHANES III survey reported that the prevalence of thyroid antibodies increases with age and is 10-12% detectable in healthy population. In this cohort, although euthyroid, those with positive antiTG have low normal TSH level and those with positive antiTPO have high normal TSH level. The relationship between thyroid antibodies and risk of developing subclinical and overt thyroid disease has yet to be established in this cohort.

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Conclusion

The low prevalence of thyroid antibodies and thyroid disorders in coastal communities could be attributed to the iodine sufficient status in those areas. Euthyroid respondents with moderate and high antiTPO titres tend to have higher TSH levels, while those with moderate and high antiTG titres had lower TSH levels.

Abbreviation:

WHO/ICCIDD/UNICEF = World Health Organization/ International Council for Control of Iodine Deficiency Disorders/ United Nations International Children's Emergency Fund

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List of references: can be downloaded at <https://www.researchgate.net/publication/286019064>

| | | N = 418 |
|------------------------|---------|-------------|
| Age, mean ± SD (years) | | 54.1 ± 14.2 |
| Gender | Male | 143 (34.2%) |
| | Female | 275 (65.8%) |
| Ethnicity | Malay | 363 (86.8%) |
| | Chinese | 6 (1.4%) |
| | Indian | 49 (11.7%) |

Table 1: Demographic background of respondents

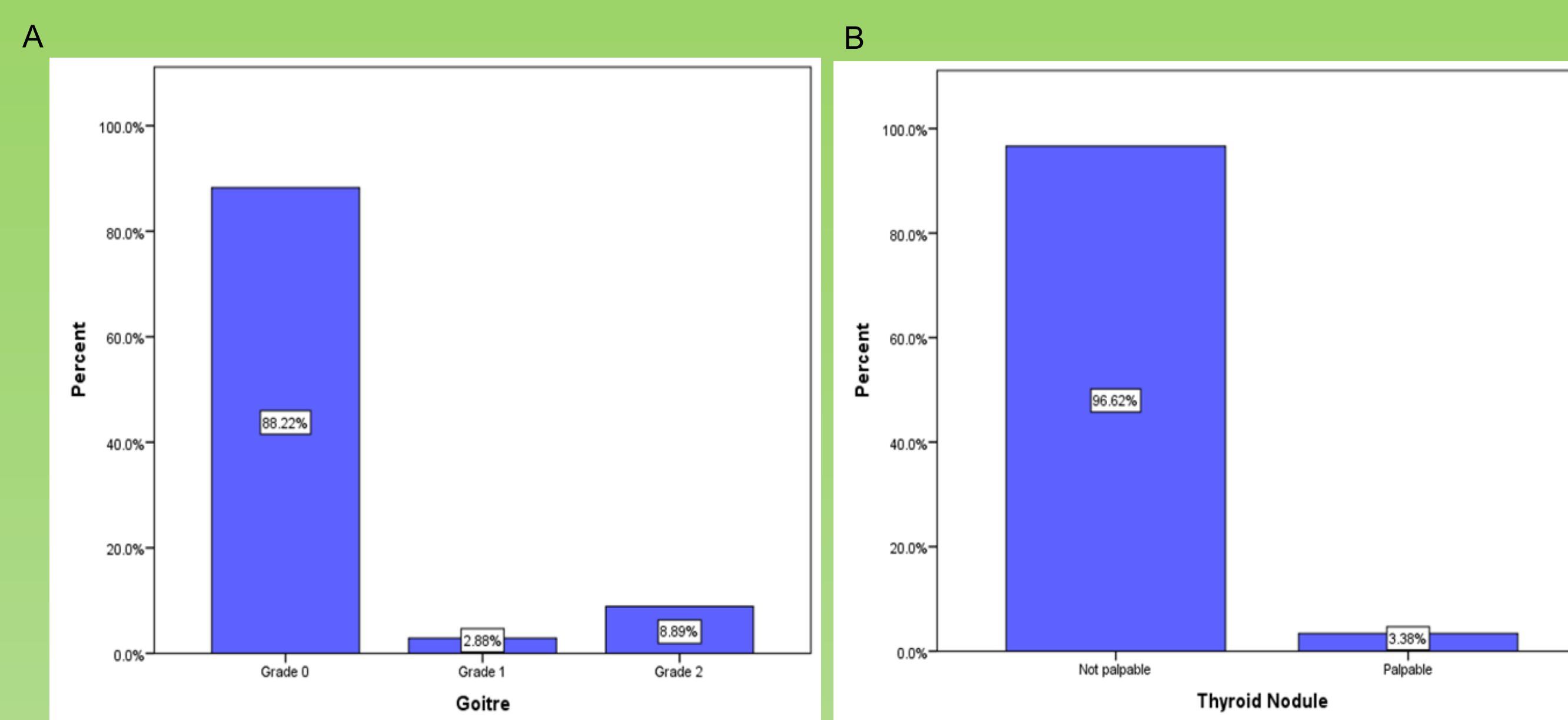


Figure 1: Prevalence of A. goitre and B. thyroid nodule among respondents

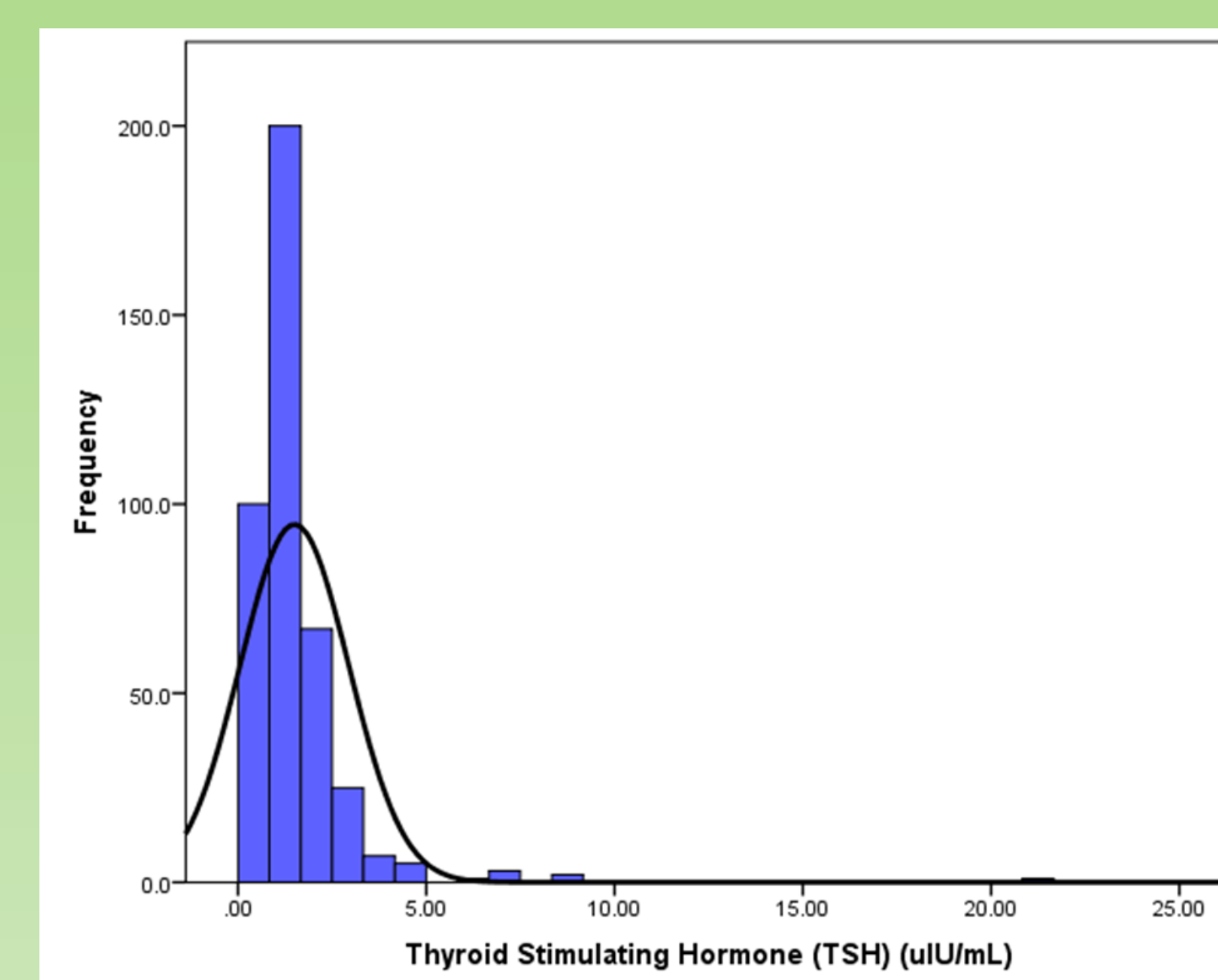
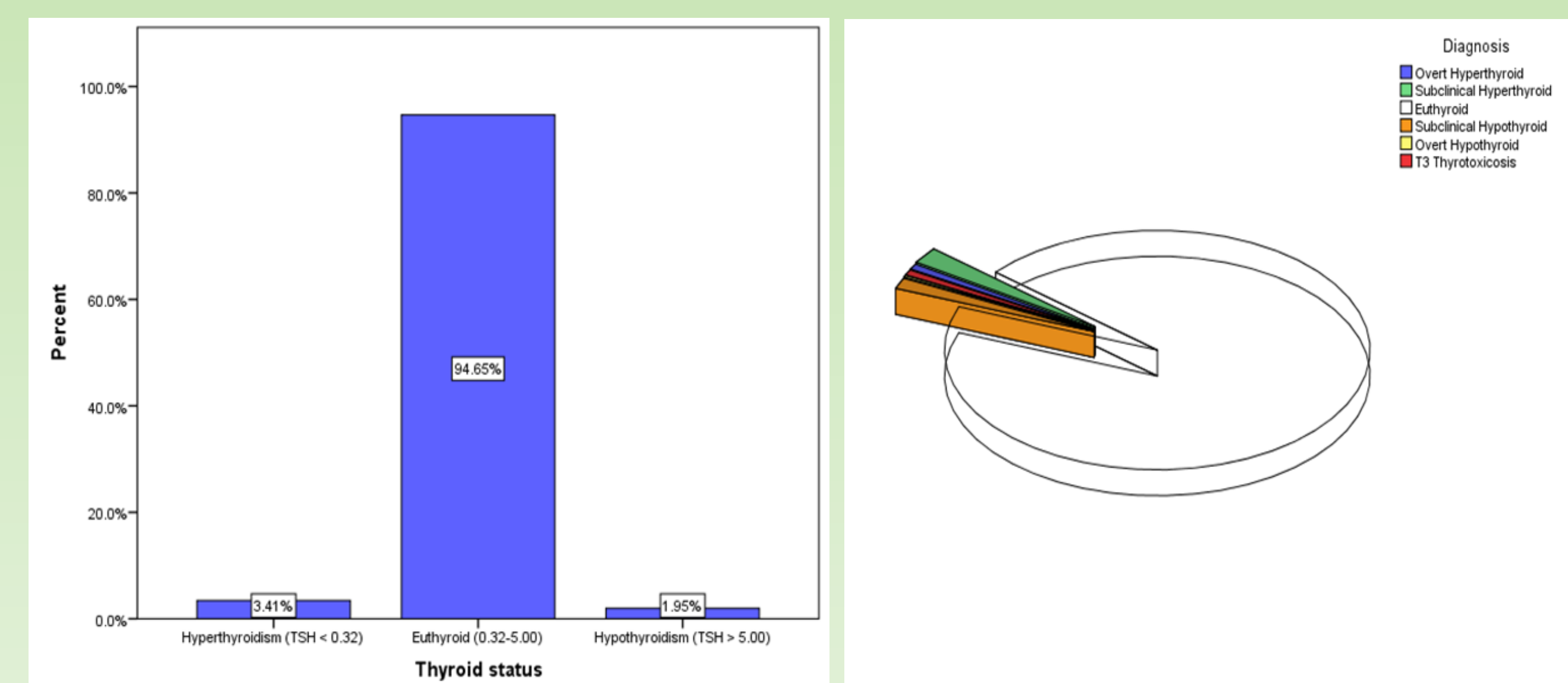


Figure 2: Thyroid stimulating hormone (TSH), Median = 1.18 (0.84, 1.77) mIU/L. Note that 85.6% had TSH in the range of 0.32-2.5 mIU/L. 95th centile for TSH in the study cohort was 3.30 mIU/L.



| Diagnosis | | | | | |
|-----------------------|-----------------------------|-------------|----------------------------|----------------------|-------------------|
| Overt Hyperthyroidism | Subclinical Hyperthyroidism | Euthyroid | Subclinical Hypothyroidism | Overt Hypothyroidism | T3 Thyrotoxicosis |
| 2 (0.5%) | 9 (2.2%) | 387 (94.6%) | 7 (1.7%) | 1 (0.2%) | 3 (0.7%) |

*n=409 [2 respondents uncategorized (TSH euthyroid range with T4 < 9.10 pmol/

Figure 4: Prevalence of abnormal thyroid function among respondents

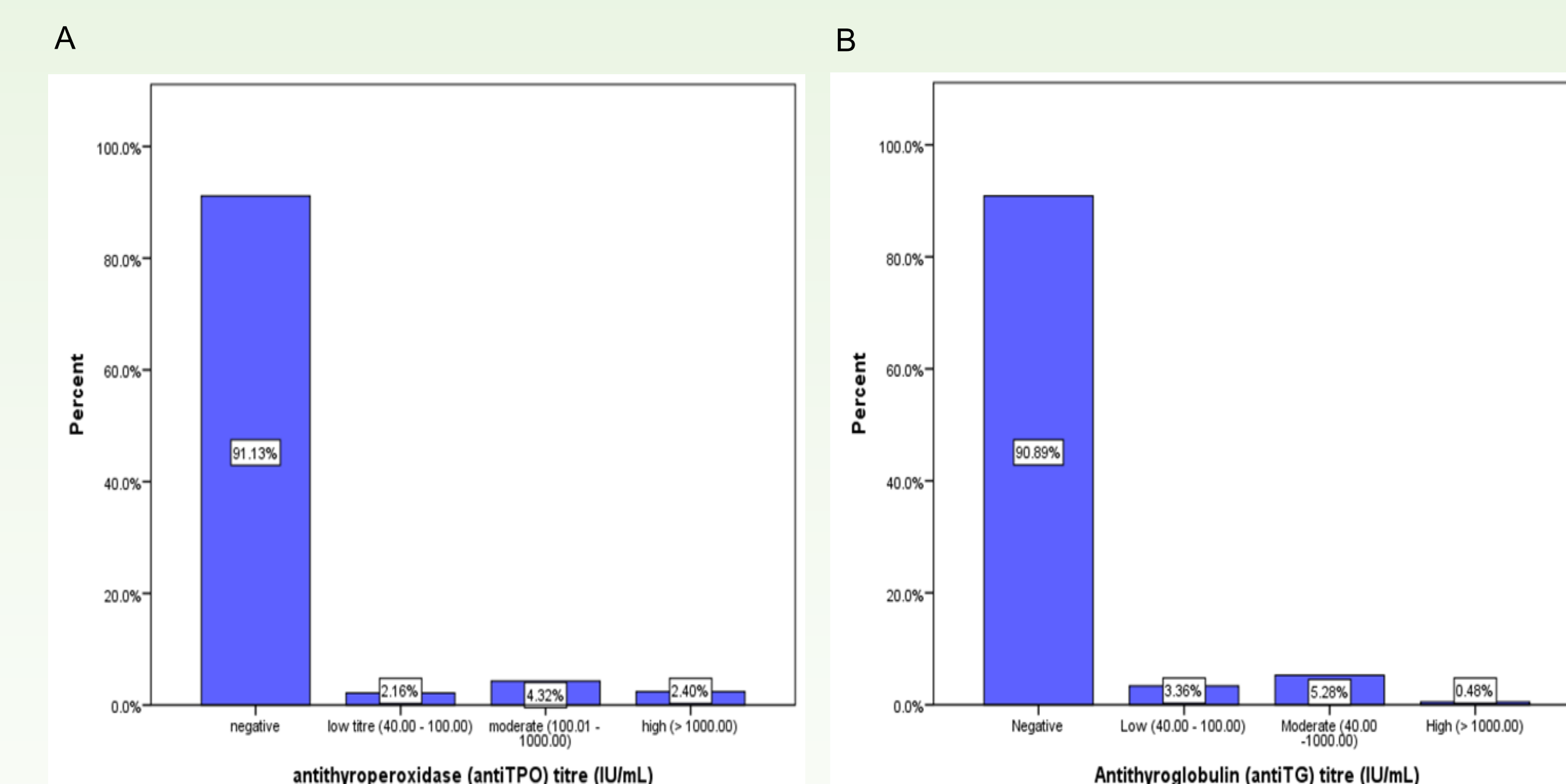


Figure 4: Prevalence of A. antithyroperoxidase (antiTPO) and B. antithyroglobulin (antiTG)

| TSH range (mIU/L) | Antithyroglobulin (antiTG) titre | | | | p-value |
|-------------------|----------------------------------|------------|------------|----------|---------|
| | Negative | Low | Moderate | High | |
| 0.32 – 2.50 | 324 (87.6%) | 11 (78.6%) | 11 (63.6%) | 0 (0.0%) | <0.001 |
| 2.51 – 5.00 | 29 (7.8%) | 2 (14.3%) | 6 (27.3%) | 0 (0.0%) | |

| TSH range (mIU/L) | Antithyroperoxidase (antiTPO) titre | | | | p-value |
|-------------------|-------------------------------------|-----------|-----------|-----------|---------|
| | Negative | Low | Moderate | High | |
| 0.32 – 2.50 | 332 (89.5%) | 7 (77.8%) | 5 (27.8%) | 5 (50.0%) | <0.001 |
| 2.51 – 5.00 | 25 (6.7%) | 1 (11.1%) | 7 (38.9%) | 4 (40.0%) | |

Table 2: Association between thyroid antibodies and thyroid stimulating hormone (TSH) level among euthyroid respondents. A. Antithyroglobulin (antiTG) B. Antithyroperoxidase (antiTPO).