Research Article

Can Age, Weight, Tobacco Exposure and Habitation affect Thyroid Function in the Northeast of Algeria?

Nesrine Adjabi[1*], Samira Bensoltane[2,4], Fatiha Yassi[2], Ali Tahar[3], Saoussen Chernine[4]

[1] Animal Eco physiology and Environment laboratory, Department of Biology, [2] Faculty of Medicine, [3]Vegetal Biology and Environment Laboratory, Department of Biology, [4]Cell toxicology Laboratory, Department of Biology, Faculty of Sciences, Badji-Mokhtar University, Annaba, Algeria.

***Corresponding author's E-mail:** adjabi-nesrine@hotmail.fr

Received: 18-10-2016; **Revised:** 05-11-2016; **Accepted:** 20-11-2016.

ABSTRACT

Thyroid disease has been in the increase these last decades for that many studies were carried out to determine the risk factors of it cause. This work aim is to examine some factors that can alter thyroid function that may lead to hypothyroidism and hyperthyroidism. The study was conducted on 246 subjects with hypothyroidism and hyperthyroidism to investigate the influence of habitat, age, Body Mass Index (BMI) and exposure to tobacco smoke on both diseases. The subjects were asked to fill in a questionnaire covers different parts. For 246 subjects, 31.70% of patients were ≥45 years. More than fifty-two percent of patients lived at coastal city Annaba. The age at diagnosis reported to have a dependent influence on hyperthyroidism and hypothyroidism ($P<0.05$). It has been noted a significant association between the habitat and both pathologies ($P<0.001$). There was no association of BMI and the exposure of subject to tobacco smoke with both diseases.

Keywords: Hypothyroidism, hyperthyroidism, environment factors, thyroid.

INTRODUCTION

Millions of people are suffering from thyroid pathology such as goiter, nodules wither are benign or malign, hyperthyroidism, and hypothyroidism[1] and its prevalence has reached 15% in adult females[2]. Hypothyroidism is rather common in adult population[3] also; the prevalence of hyperthyroidism is 0.02 to 2.5% after 60 years[4]. The thyroid is a sensitive organ that can be influenced by different endogenous and environmental factors. Many Researchers are interested in the influence of age [5-4], Body weight and smoke exposure[6] on thyroid function. The prevalence of thyroid diseases increases with aging including hypothyroidism and hyperthyroidism[4]. Further, tobacco is considered as an independent risk factor Graves' orbitopathy and multi-nodular goiter in iodine-deficient area [7-8]. Exposure to cigarette smoke can alter thyroid function by increase or decrease of thyroxin (T4) and triiodothyronine (T3) concentrations in serum[9-10] .There is at least 200 endocrine disrupters in cigarette smoke[11].Therefore; smokers have height risk to develop autoimmune thyroid diseases[5]. In addition, it is noted that regions play a role in the manifestation of thyroid pathologies, for regions with iodine deficiency or excessive iodine intake[12], polluted environment by toxicants and different agents also can alter thyroid function[13]. There is little population database studies to show the association between those factors and thyroid disorder.

The aim of this paper is to examine the association of the age, habitat (living area), Body Mass Index, cigarette exposure with Hyperthyroidism and Hypothyroidism.

SUBJECTS AND METHODS

Study population

The study was conducted at private clinics of endocrinology at Annaba province. The subjects consisted on 246 volunteered patients who have been diagnosed with two of thyroid pathology: hyperthyroidism, hypothyroidism.

The aim of this study is to assess the relationship between the risk factors such as age, Body Mass Index, and cigarettes exposure with thyroid pathologies. For that purpose, we prepared a structured questionnaire that covered: personnel information, body parameters as: weigh, high, body mass index (BMI), as well as a hormonal and reproductive factors, medical history, family history with thyroid pathology, medical X-ray exposure, professional exposure. The interview was done in person during medical checkup at the clinic.

Statistical analyze

The data was collected using EpiData version 3.1 and Minitab (version 16). Chi-Square Test (Two-Way Table in Work Sheet) was used to determine the dependence of the Hyperthyroidism and Hypothyroidism on the Age, Body Mass Index, living area and tobacco.

RESULTS

Out of 246 patients, 52 were diagnosed with Hypothyroidism and 195 diagnosed with Hyperthyroidism. The peak age at diagnosis in both subjects were in the fourth group (≥45 years) as it is shown in the figure1 with percentage of 31.70% (28% are Hypothyroidism vs 3% Hyperthyroidism).

Table 1: Body Mass Index (BMI) classification (kg/m²)[15]

Classification	BMI
Underweight	<18.50
Normal range	18.50 - 24.99
Overweight	≥25-29.99
Obese class I	30.00 - 34.99
Obese class II	35.00 - 39.99
Obese class III	≥40.00

The median age was younger for the subjects with Hyperthyroidism 40 years (inter quartile range <IQR>45-30) compared to subjects with Hypothyroidism 45 years (IQR 45-35). Almost 24% of patients are ranged in the group between (36-45 years). Following the group (26-35 years) with 24.39%, 16.26% for the group (16-25) and lastly 3.65% presenting the group (0-15). It appears that thyroid disease depends on the age (P=0.044).

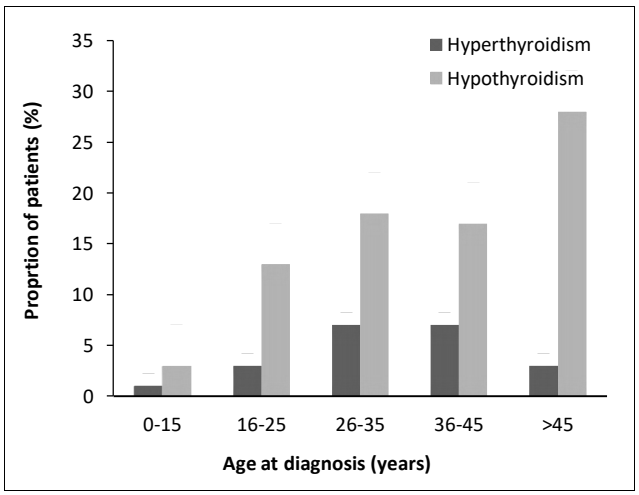

Figure 1: Age at diagnosis (years) of patients with Hyperthyroidism and patients with hypothyroidism.

It is shown in the figure 2 that the group of patients with Body Mass Index (BMI) between (≥25-29.9 Kg/m²) represents the highest proportion with 38.21% (IQR 25.47- 28.16) that is considered an overweight. A rate of 34.14% (IQR 22.56- 24.61) represents the group of patients between (18.5-24.9/m²) which is classified a normal range (OMS), 23.98% (IQR 30.67-36) of patients have BMI ≤30 Kg/m² that is ranged as a class of obesity. It is noted that the disease depends not on the weight (P=0,296).

We recorded (in figure 3) 25.20% of patients with thyroid disease were exposed to cigarette smoke (4.87% Hyperthyroidism patients *vs* 20.32% Hypothyroidism patients), while 74.79% were not exposed to cigarette smoke (15.85% *vs* 58.94%). It was observed that both pathologies do not depend on cigarette smoke exposure (P=0.757).

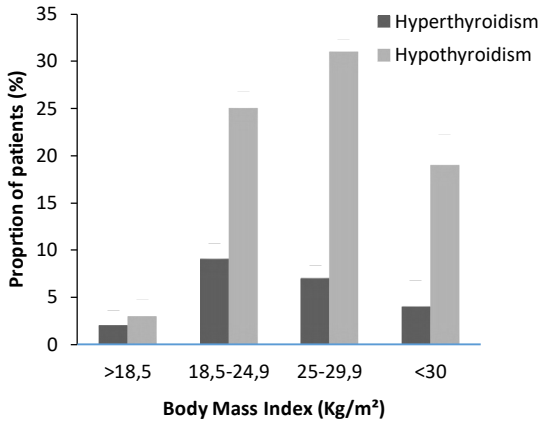

Figure 2: Body Mass Index of patients with Hyperthyroidism and patients with hypothyroidism.

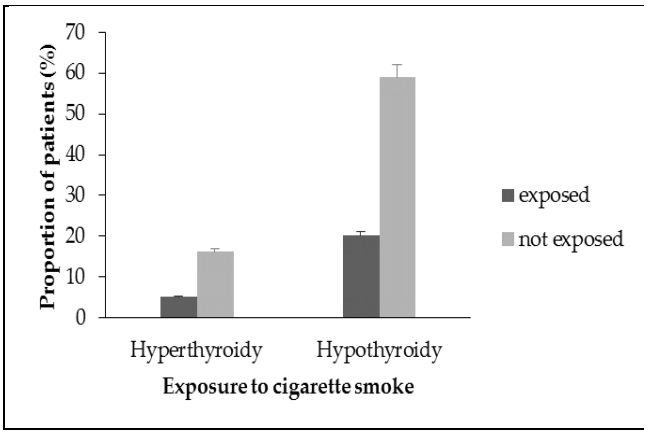

Figure 3: Proportion of patients with Hyperthyroidism (n=12 exposed to cigarette smoke, n=39 not exposed to cigarette smoke) and Hypothyroidism (n=50 exposed to cigarette smoke, n=145 not exposed to cigarette smoke).

More than 51% of subjects lived at Annaba (38.61% were Hypothyroidism patients vs 12.6% that were Hyperthyroidism patients as it is shown in the figure 4), 13.4% were from Souk ahras while Guelma had an approximated rate (12.49%). Followed by 12.18% of patients from El taref and 7.31% that lived at Skikda. It is observed that both pathologies Hypothyroidism and Hyperthyroidism depend on living area (P<0.001).

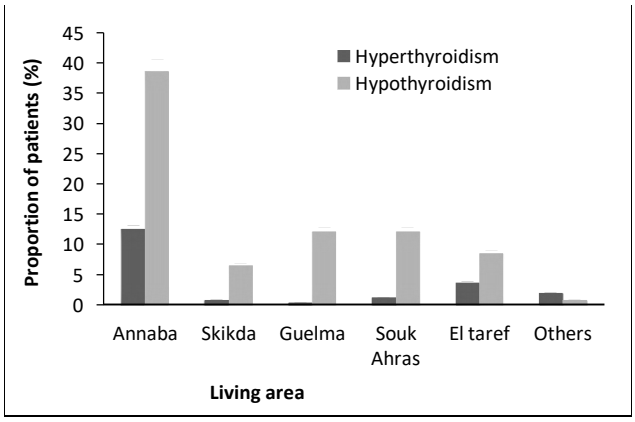

Figure 4: Proportion of patients with Hyperthyroidism and Hypothyroidism living in different areas.

DISCUSSION

This study is a cohort of 246 subjects with defined hyperthyroid and hypothyroid diseases to determine the dependence or not on some environment and daily life quotidian factors. There was no similar population database study on the northeast Algerian regions.

it has been shown that the median age was higher in subjects with hyperthyroidism then in subjects with hyperthyroidism and that the higher rate of group age for both pathologies was in the group (36-45 years). Chi Square Test demonstrated that both diseases depend on the age. This finding agree with similarly study of 2805 subjects in which has been marked an association of age and thyroid autoimmune disease[5] as well a French study on elderly subjects[4]. It was found that the higher proportion of subjects suffer an overweight but there was no dependent effect of both Hyperthyroid and Hypothyroid diseases on weight (BMI) and thus disagree with a large-scale Chinese study on women in whom where a positive relationship of BMI and thyroid disease[14]. In one study, it was reported that abdominal obesity was associated with thyroid disease[16].

The influence of exposure to cigarette smoke was examined and it was found that the higher proportions are of subjects with hypothyroid disease then hyperthyroid disease. However, there was no association marked of active cigarette smoke exposure and hyperthyroidism and hypothyroidism, in contrast with American study in which they have proven a low risk association between subject exposed to tobacco smoke and thyroid abnormalities (hypothyroidism in the general)[17].

the subjects were arranged depending on the area they live in (more than a year).the results has shown that the highest proportion are for subjects that lived at Annaba with high rate of hypothyroidism that is a coastal region, known for its polluted environment due to the different chemical and metallic industries. Comparable Canadian study on 41 communities has reported the rise of hypothyroidism on the western and southern coastal polluted areas[13]. Souk ahras and Guelma, which are inland cities, had significant equal rate. It is worth noting that those two regions had history of iodine deficiency. It was shown that there is association between the living area of subjects and thyroid diseases. Some report of countries [18-19] that had deficiency in iodine intake suffer from thyroid disorder. Another Japanese report in iodine deficient regions, prolonged stimulation by TSH causes multinodular autonomous development and function, leading to hyperthyroidism in middle-aged and elderly subjects[20].

CONCLUSION

In conclusion, we marked association between the age and the habitation areas of the concerned subjects and hyperthyroidism and hypothyroidism, while Body Mass Index and exposure to tobacco smoke exerted no influence on both diseases. We encourage expanding the study on nationwide territory of Algeria which would be interesting to have large significant screening of thyroid diseases and.

Acknowledgements: First, we are grateful to the patients who participated in this survey. Also to the doctors and nurses who helped us in our research study that we conducted at their clinics: Dr. Amraoui, Dr. Mesbah, and Dr. Sedrati.

REFERENCES

1. Thyroid foundation of Canada. Available from: http://www.thyroid.ca/fr/thyroid_disease.php (accessed on 05- 01-2016)
2. Coceani M, Heart disease in patients with thyroid dysfunction: hyperthyroidism, hypothyroidism and beyond, The Anatolian Journal of Cardiology, **13**, 2013, 62-66.
3. Estaquio C, Castetbon K, Valeix P, Maladies thyroïdiennes dans la cohorte SU.VI.MAX. Estimation de leur incidence et des facteurs de risque associés, 1994-2002. Saint-Maurice (Fra) : Institut de veille sanitaire et Université Paris 13, Août 2009, pp58.
4. Retornaza F, Castinetti C, Molinesa C Olivera. La thyroïde de la personne âgée (Partie 1). La Revue de médecine interne, 34, 2013, 623–627.
5. Manji N, Carr-Smith JD, Boelaert K, Allahabadia A, Armitage M, Chatterjee VK, Lazarus J, Pearce SH, Vaidya B, Gough SC, Franklyn JA, Influences of age, gender, smoking, and family history on autoimmune thyroid disease phenotype, J Clin Endocrinol Metab, 91, 2006, 4873–4880.
6. Offie PS, Bethany EG, Sappho ZG, Helain JL, Soldin SJ, Thyroid Hormone Levels Associated with Active and Passive Cigarette Smoking, Thyroid, 19, 2009, 817-823.
7. Prummel MF, Wiersinga WM, Smoking and risk of Graves' disease, JAMA, 269, 1993, 479–482.
8. Vestergaard P, Rejnmark L Weeke J, Hoeck HC, Nielsen HK, Rungby J, Laurberg P, Mosekilde L, Smoking as a risk factor for Graves' disease, toxic nodular goiter, and autoimmune hypothyroidism, *Thyroid, 12,* 2002,69–75.
9. Burguet A, Kaminski M, Truffert P, Menget A, Marpeau L, Voyer M, Roze JC, Escande B, Cambonie G, Hascoet JM, Grandjean H, Breart G, Larroque B, Does smoking in pregnancy modify the impact of antenatal steroids on neonatal respiratory distress syndrome? Results of the Epipage study, *Arch Dis Child Fetal Neonatal*, 90, 2005, 41–F45.
10. Pontikides N, Krassas G, Influence of cigarette smoking on thyroid function, goiter formation and autoimmune thyroid disorders, *Hormones (Athens), 1,* 2002, 91–98.
11. Pieraccini G, Furlanetto S, Orlandini S, Bartolucci, G, Giannini I, Pinzauti S, Moneti G, Identification and determination of mainstream and sidestream smoke components in different brands and types of cigarettes by means of solidphase microextraction-gas chromatography-mass spectrometry, *J Chromatogr A,* 1180**,** 2008, 138–150.
12. Vanderpump M J, The epidemiology of thyroid disease, British Medical Bulletin, 99, 2011, 39–51.

13. Sarkar A, Knight JC, Babichuk NA, Mulay S, Skewed distribution of hypothyroidism in the coastal communities of Newfoundland, Canada, *Environ Int, 83,* 2015, 171-175.

14. Lei Z, Wenhua Y, Yue K, Ping L, Yiming M, An Epidemiological Study of Risk Factors of Thyroid Nodule and Goiter in Chinese Women*, Int J Environ Res Public Health*, 12, 2015, 11608–11620.

15. World Health Organization, BMI classification 2004.. Available from: http://www.who.int/bmi/index.jsp?introPage=intro_3.html (accessed on 25-01-2016).

16. Tamer G, Mert M, Tamer I, Mesci B, Kilic D, Arik S, Effects of thyroid autoimmunity on abdominal obesity and hyper lipidaemia, *Endokrynol. Pol*, 62, 2011, 421–428.

17. Ruth MB, Brad CA, Neil RP, Paul WL, Smoke Exposure Is Associated with a Lower Prevalence of Serum Thyroid Auto antibodies and Thyrotropin Concentration Elevation and a Higher Prevalence of Mild Thyrotropin Concentration Suppression in the Third National Health and Nutrition Examination Survey (NHANES III*), The Journal of Clinical Endocrinology & Metabolism,* 89, 2014, 6077–6086.

18. Gaberšček S, Zaletel K. Epidemiological trends of iodine-related thyroid disorders: an example from Slovenia, *Arh Hig Rada* Toksikol, 67, 2016, 93-98.

19. Gärtner R. Recent data on iodine intake in Germany and Europe. *J Trace Elem Med Biol*, 37, 2016, 85-89.

20. Kasagi K, Epidemiology of thyroid tumors: effect of environmental iodine intake, *Nihon Rinsho*, 65, 2007, 1953-1958.

Source of Support: Nil, **Conflict of Interest:** None.