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Parity and Iodine Status are Predictive Factors for Goitre Prevalence in Females

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Abstract

Background: To evaluate the predictive factors of goitre prevalence in females.

Methods: In a questionnaire-based survey, data from 370 female employees aged between from 4 institutions in western part of Germany was collected between April 2001 and April 2002 and the association between parity and simple goitre was examined with respect to age, daily use of iodized salt, contraceptives, the history of goitre in the first degree relatives and smoking. Ultrasound of the neck was performed in all cases to determine the thyroid volume. Logistic regression analyses were performed to adjust for age, iodine status, parity, contraceptives, familial history of goitre and smoking.

Results: The overall prevalence of goitre was (80/370) 21.6%. Median thyroid volume Goitre was present in 44 out of 140 parous (31.4%) vs. 34/220 (15.5%) in nulliparous (odds ratio: 2.5; p<0.001). Indeed, the linear regression shows a positive association of the thyroid volume with increasing age (p=0.023), the number of cigarettes in a week (p=0.001) and its negative association with duration of contraceptive intake (p=0.005), no association with iodine intake or parity could be detected. However, the logistic regression analysis revealed significant association only between goitre prevalence and parity (p=0.004), and lack of daily iodized salt intake (p=0.01), whereas, age (p=0.18), contraceptive (p=0.82), the familial history of goitre (p=0.33) and smoking (p=0.09) did not affect the goitre prevalence.

Conclusions: Parity and iodine status are predictive factors of goitre prevalence in females.

Keywords: Thyroid; Goiter; Iodine; Smoking; Male

Introduction

Despite recent improvement of iodine supplementation since 1989 [1-6] the prevalence of goitre in Germany remains substantial [7-9]. The etiology of simple endemic or sporadic goitre depends on genetic and environmental factors. Indeed, the major factor remains iodine deficiency [9,10]. However, thyroid disorders occurs predominantly in females [11,12], suggesting that hormonal determinants are involved in pathogenesis of this disease.

An association between parity and the risk of goitre is reported in some, but not all studies [13-15]. In this prospective study, we investigated the predictive factors of simple goitre in females with respect to parity, age, daily use of iodized salt, contraceptives, the history of goitre in the first degree relatives and smoking in 370 healthy females.

Materials and Methods

Study DesignBetween April 2001 and April 2002, a total of 370 healthy female employees of 4 institutions in Essen (Bethesda Essen and Karstadt AG) and Muelheim (Siemens AG and Mannesmann AG) in western part of Germany aged between 18 and 68 years (range: 41.0±10.0 y) were examined by ultrasound of the neck to determine the thyroid volume.Ultrasound was performed by one experienced investigator (J.F.) with a Siemens Sonoline SI-400 using a 7.5 MHz linear scanner. The ultrasound was performed according to standardized criteria and the volume of thyroid was determined as the sum of /6 × length × width × depth of both lobes. Goitre was defined as a thyroid volume exceeding 18 ml.All subjects with present or former thyroid disorder were excluded from this analysis. Information on date of birth, date of screening, sex, daily use of iodized salt, history of previous diseases including benign diseases of thyroid, history of thyroid disorders in the first degree relatives, type and amount of smoking, contraceptives, and parity were assessed by standardized questionnaires.StatisticsThe general descriptive analyses were performed using PASW Statistics (Version 19.0).

Values for continuous variables are given as means SD. Statistical differences between groups and comparison of frequencies of goitre between groups were calculated with the *Chi-Square* test.Linear and logistic regression analyses were performed to adjust for age, smoking, iodine status, parity, use of contraceptives and familial history of goitre. Parameters were estimated using a least squares and a maximum-likelihood methods and the significance level was assessed using F- and Wald tests respectively. A p-value below 0.05 was considered to be statistically significant.

Results

The overall prevalence of goitre was (80/370) 21.6%. Median thyroid volume among parous (16.3±7.4 ml) was higher as compared to nulliparous females (14.2±6.0 ml). Goitre was present in 24 out of 62 (38.7%) bi-parus versus 20/78 (25.6%) uniparus females and versusvs. 34/219 (15.5%) in nulliparous (**Figure 1**). The risk of goitre in biparus females was 3.4 times higher as compared to nulliparus females and 1.9 fold than uniparus females.

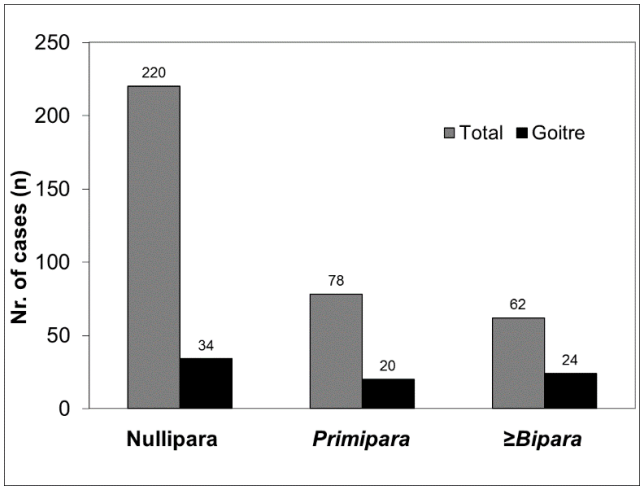

Figure 1 Goitre frequency (black column) among 360 (white column) nullipara, primipara and bipara females. The number of cases does not reach the total number of cases because of missing data.

Indeed, the linear regression shows a positive association of the thyroid volume with increasing age (p=0.023), the number of cigarettes in a week (p=0.001) and its negative association with duration of contraceptive intake (p=0.005), but no association with iodine intake or parity could be detected.However, the logistic regression analysis (**Table 1**) revealed significant association only between goitre prevalence and parity (p=0.004), and lack of daily iodized salt intake (p=0.01), whereas, age (p=0.18), contraceptive (p=0.82), the familial history of goitre (p=0.33) and smoking (p=0.09) did not affect the goitre prevalence.

Table 1 Association of age, smoking, daily use of iodized salt, parity, contraceptives and familial history of thyroid disorders with goitre prevalence assessed by logistic regression analysis in 370 healthy females.

	Number of cases n	Goitre n (%)	Adjusted odds ratio (95% CI**)	Wald Test p
Age			1.02 (0.99; 1.05)	0.18
Smoking				
+	149	38 (25.5%)	1.59 (0.93; 2.70)	0.09
-	221	42 (19.0%)		
Iodized salt				
+	204	38 (18.6%)	0.50 (0.29; 0.85)	0.01
-	165	42 (25.5%)		
Parity				
+	140	44 (31.4%)	2.39 (1.32; 4.31)	0.004
-	220	34 (15.5%)		
Contraceptives				
+	187	36 (19.3%)	0.94 (0.55; 1.60)	0.82
-	183	44 (24.0%)		
Family history				
+	133	30 (22.6%)	1.32 (0.76; 2.27)	0.33
-	237	50 (21.1%)		

*Number of cases does not reach the total number in all groups because of missing data.

**CI: confidence interval.

Discussion

Goitre is a major health problem in Germany and the annual costs for treatment of goitre and is estimated at 1 billion Euros [9]. Despite recent improvement of iodine supplementation since 1989 [1-6], the prevalence of goitre in Germany remains substantial [7-9]. The etiology of simple endemic or sporadic goitre depends on genetic and environmental factors. Indeed, the major factor remains iodine deficiency [9,10]. However, thyroid disorders occur predominantly in females [11,12], which are attributed to endogenous hormones during puberty and pregnancy.

Iodine supplementation during pregnancy can reduce the goitre prevalence among parous females [11]. In agreement, in our linear regression and logistic regression analyses lack of daily intake of iodized salt increase the prevalence of goitre, however, parity remained the major factor implicating the goitre prevalence. The risk of the developing goitre in

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multiparous women was more than 3 times higher as compared to nulliparous women.

In agreement with our finding, Rotondi et al. report on association between parity and thyroid volume in an area with moderate iodine deficiency [13]. In contrast, Gomez et al. found no association between thyroid volume and parity among 134 randomly selected healthy females [14].

Knudsen et al. report in a recent publication on association between increased thyroid volume only among smokers, more pronounced in iodine deficient area [15].

The association between smoking and goitre prevalence in females is discussed controversial [16-18]. However, we found in our analysis only an association linear regression analysis, but the effect of smoking on goitre prevalence in females could not be approved by logistic regression analysis. In contrast, Christensen et al. [17] evaluated the prevalence of goitre by palpation in 441 middle aged women and found higher goitre prevalence among smokers (14.8%) as compared to ex-smokers (3.8%) and non-smokers (9.4%). Ericsson et al. [18] reported a higher goitre prevalence among smoking females (14.2%) as compared to non-smokers (8.9%) and ex-smokers (7.0%) in an epidemiological study from Sweden including more than 4000 subjects. In contrast, Petersen et al. [19] found no increased prevalence of thyroid disease or goitre in 1154 middle-aged and older Swedish women with respect to smoking (14.3% smokers *vs*. 13.4% non-smokers).

Here it can be concluded from our research that the parity and iodine status are the major factors associating with the prevalence of goitre in females.

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