Proptosis in Normal Thai Samples and Thyroid Patients

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Objective: *Find normal values of proptosis in Thai population and study proptosis in Graves' disease and Hashimoto's thyroiditis.*
Material and Method: *Measurement of proptosis was made with Luedde exophthalmometer by one examiner in 277 normal Thai subjects and 591 thyroid patients.*
Results: *The mean proptosis of 168 normal Thai female patients was 11.44 mm. The mean proptosis of 109 normal Thai male patients was 11.84 mm. The value of standard deviation in both groups was 2 mm. The 99% confidence limit for exophthalmoses in Thai males was 16.5 mm and 16.1 mm in Thai females. The maximum value was 17 mm in males and 16 mm in females and the minimum value was 8 mm in males and 7 mm in females. The difference between both eyes was not greater than 2 mm.*
Conclusion: *The mean proptosis of normal Thai female is 11.44 mm while the mean proptosis of normal Thai male is 11.84 mm. The distribution in proptosis in Graves' disease patients was greater than the normal population by about 2 mm while in Hashimoto's thyroiditis patients was not different from the normal population.*

Keywords: *Exophthalmoses, Thyroid patients*

J Med Assoc Thai 2007; 90 (4): 679-83
Full text. e-Journal: *http://www.medassocthai.org/journal*

A previous study about exophthalmoses in different races found that normal blacks might have greater values for proptosis than the white population[1]. Normal value for proptosis in whites are 18-21 mm and normal values for proptosis in blacks are 23-24 mm. There are no studies about proptosis in a Thai population.

In some thyroid diseases such as Graves' disease and Hashimoto's thyroiditis, eye sign abnormalities may be found. A previous study found exophthalmopathy in 20-40% of patients with Graves' disease[2] and in 5% of patients with Hashimoto's thyroiditis. These groups might be called endocrine ophthalmopathy. Male patients and elderly patients have more severe exophthalmopathy[3].

The present study reported the incidence of proptosis in a sample of a normal Thai population in comparison to patients with thyroid diseases.

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Objective

The aims of this study were to find normal values of proptosis in sample of normal Thai population from medical personnel in Chulalongkorn Hospital and to study proptosis in Graves' disease and Hashimoto's thyroiditis.

Material and Method

This was a cross sectional study in the incidence of proptosis. In the normal sample group, the examiner would measure the depth of eyes in medical personnel in Chulalongkorn Hospital. Thyroid disease was excluded by history and physical examination. Patients with thyroid disease were recruited from the endocrine clinic at Chulalongkorn Hospital. The measurement in both groups was performed by one examiner with the Luedde exophthalmometer. The Luedde exophthalmometer is a bar of see thru plastic that has a scale on both sides. Each eye was measured by putting the distal end to the orbital ridge and reading the scale when the scale on both sides is in the same position.

Table 1. Patients characteristic

Disease	Male n = 25 (%)	Female n = 566 (%)	Total (n = 591) n (%)
Graves' disease	15 (60)	193 (34.1)	208 (35.2)
Hashimoto's thyroiditis	0	50 (8.8)	50 (8.5)
Euthyroid goiter	3 (12)	101 (17.8%)	104 (17.6)
Thyroid nodule	6 (24)	163 (28.8%)	169 (28.6)
Others (MNG, toxic MNG, thyroiditis)	1 (4)	59 (10.4)	60 (10.2)

Table 2. Mean and standard deviation of eyes's depth in normal Thai samples

Sex	Total (n = 277)	Mean (mm)	SD	99% CL* (mm)
Male	109	11.84	2.0	16.5
Female	168	11.44	2.0	16.1

* CL = confidence limits

This exophthalmometer is often preferred because it is small and relatively inexpensive [4]. Eight hundred and sixty-eight subjects were enrolled in the present study. Two hundred and seventy-seven were normal subjects (168 female and 109 male). Five hundred and ninety-one patients with thyroid disease were examined (566 female and 25 male). Frequencies and percentage, mean, standard deviation (SD), and range were described. Student t-test and Chi-square test were used to compare between the two groups. A p-value of less than 0.05 was considered significant difference. Details of the thyroid patients group are presented in Table 1.

Results

In the normal group, the values of mean and standard deviation are shown in Table 2. There was no significant difference in the prevalence of proptosis between males and females (p = 0.1). Maximal value and minimal value in the normal female subjects were 16 mm and 7 mm. Maximal value and minimal value in normal male samples were 17 mm and 8 mm. Difference between each eye was not more than 2 mm (not shown in the Table). From the normal patients, 99% confidence limits for exophthalmoses were 16.5 mm in male samples and 16.1 mm in female samples. The values of proptosis according to sex and age group are shown in Table 3 and Table 4.

There was no significant difference in age in both sexes (p = 0.1). In the normal female group, the age of the patients ranged from14-72 years old, with a mean age of 38.4 years. In the normal male group, the mean age was 33.7 years with a range of 13-70 years.

Table 3. Mean and standard deviation of proptosis in normal females according to age

Age	Total (n = 168) n (%)	Mean (mm)	SD
≤ 20	17 (10.1)	11.70	1.62
21-29	27 (16.1)	11.45	1.53
30-39	56 (33.3)	11.64	2.09
40-49	32 (19.0)	11.22	2.07
50-59	22 (13.1)	11.23	2.16
≥ 60	14 (8.3)	10.77	1.95
Mean age	38.4		
Range	14-72		

Table 4. Mean and standard deviation of proptosis in normal males according to age

Age	Total (n = 108) n (%)	Mean (mm)	SD
≤ 20	7 (6.5)	11.46	2.63
21-29	49 (45.4)	11.98	1.78
30-39	26 (24.1)	11.73	2.22
40-49	11 (10.2)	11.50	2.07
50-59	9 (8.3)	11.77	1.92
≥ 60	7 (6.5)	12.15	1.50
Mean	33.7		
Range	13-70		

Table 5. Mean and standard deviation in thyroid patients

Disease	Male		Female	
	$\bar{X} \pm SD$	Total	$\bar{X} \pm SD$	Total
Graves' disease	14.4 ± 2	15	13.30 ± 2.34	193
Hashimoto's	0	0	11.43 ± 1.62	50
Euthyroid goiter	9.3 ± 1.53	3	11.65 ± 2.04	101
Thyroid nodule	11.9 ± 1.75	6	11.38 ± 1.91	163
Others	13.0 ± 0	1	11.38 ± 2.12	59

In Graves' disease group, the age between 14-72 years old, the mean age was 35.5 years. There were no difference in age between normal and Graves' disease patients ($p > 0.05$). In thyroid patients the mean and standard deviation of proptosis are shown in Table 5.

Patients in Graves' disease had significantly more proptosis than the normal group ($p < 0.001$). In patients with other thyroid diseases (including Hashimoto's thyroiditis), there was no significant difference from the normal group ($p > 0.5$). Distribution of proptosis in normal female subjects, Graves' disease patients are shown in Fig. 1 and Hashimoto's thyroiditis is shown in Fig. 2.

In Fig. 1, the distribution pattern of protrusion in Graves' disease is similar to normal subjects, although the histogram was significantly displaced as a whole to a higher position. On the other hand the degree and distribution in patients with Hashimoto's thyroiditis were the same as those in normal subjects according to Fig. 2.

Discussion

The measurement of proptosis in normal and thyroid patients by Luedde exophthalmometer in the present study have four limitations. First, there was no blinding technique in the group of normal and thyroid patients. Second, intra and inter-observer variations were not done. Third, the normal Thai samples were Chulalongkorn Hospital workers who may not be representative of a normal Thai population. Fourth, in the present study, most of the thyroid patients were females, very few males were included so the authors could not compare the difference in the male group.

The results of the present study were in line with a previous study[5] that proptosis in normal females was lower than in Graves' disease and that there was no difference with age. However, in contrast with the previous study, there was no difference of proptosis with the sexes.

Exophthalmometry has been described in whites, blacks[6], Indians[7], Koreans[8], Mexican adults[9], and Saudi Arabian[10]. The mean exophthalmometry reading in blacks is higher than in Caucasians, and in Caucasians is

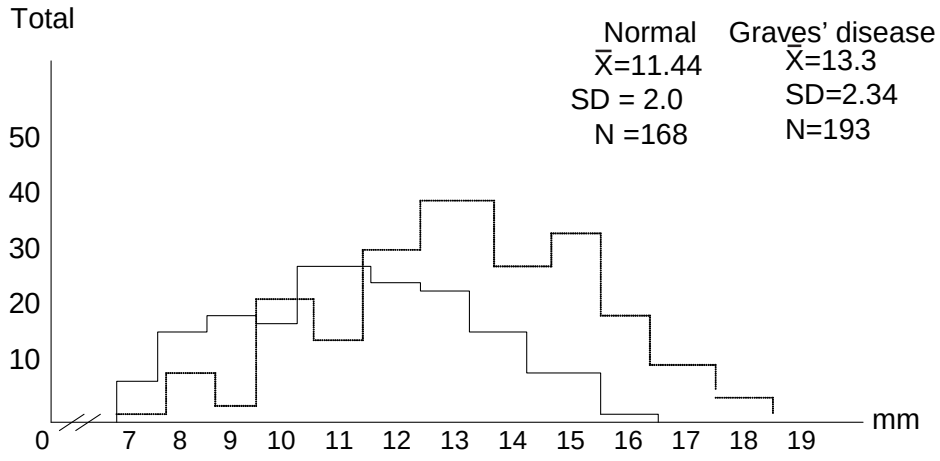

Fig. 1 Distribution of female's eye depth of normal (——) and Grave's disease (·····)

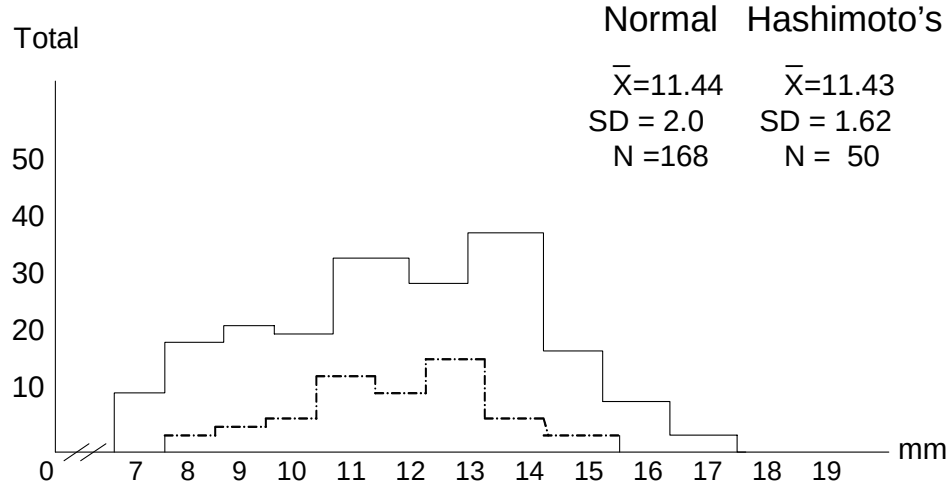

Fig. 2 Distribution of eye depth in normal (——) and Hashimoto's thyroidtis (----)

higher than in Asians. In the present study, the value of 99% confidence limits of exophthalmos in normal male samples was 16.5 mm and in normal female was 16.1 mm.

The figure of distribution in females between normal and Graves' disease patients was similar but there was a 2 mm higher shift in Graves' disease patients. It is likely that most patients with Graves' disease probably had eyes involvement. This is consistent with the finding of Werner et al[11] that ultrasonographic orbital abnormality is present in almost all patients examined with Graves' disease.

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ค่าปกติของขนาดตาในคนไทยและขนาดตาในผู้ป่วยโรคไทรอยด์

วีระศักดิ์ ศรินนภากร, วิทยา ศรีดามา, ทองคำ สุนทรเทพวรากุล

การวัดขนาดตาโดยใช้เครื่องมือ Luedde exophthalmometer โดยผู้วัดคนเดียวซึ่งทำในคนไทยปกติ 277 รายและผู้ป่วยโรคไทรอยด์ 591 รายได้ค่าเฉลี่ยของตาหญิงไทย 168 รายคือ 11.44 มม. ค่าเฉลี่ยของตาชายไทยปกติ 109 รายคือ 11.84 มม. โดยที่มีค่าเบี่ยงเบนมาตรฐานทั้ง 2 กลุ่มอยู่ที่ 2 มม. ค่าความเชื่อมั่น 99% ของค่าปกติในกลุ่มตัวอย่างเพศชายคือ 16.5 มม. และในเพศหญิงคือ 16.1 มม. ค่าขนาดตาสูงสุดในเพศชายอยู่ที่ 17 มม. และเพศหญิงอยู่ที่ 16 มม. ค่าขนาดตาต่ำสุดในเพศชายอยู่ที่ 8 มม. และ 7 มม. ในเพศหญิง ความแตกต่างของตาทั้ง 2 ข้างไม่เกิน 2 มม. เมื่อดูถึงการกระจายของตาโปนในผู้ป่วย Graves' disease จะมีการกระจายที่มากกว่าคนปกติ 2 มม. ซึ่งอาจเป็นไปได้ว่าผู้ป่วย Graves' disease ส่วนใหญ่จะมีความผิดปกติของตาร่วมด้วยแต่การกระจายของผู้ป่วย Hashimoto's thyroiditis ไม่แตกต่างจากกลุ่มปกติ