

Original Articles

A Case Report for One Case of Thyrotoxic Periodic Paralysis Patient

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Objective : The thyrotoxic periodic paralysis mainly appears in case of hyperthyroidism and the amyotonia is the characteristic main symptom. Through the deteriorated case and treatment by oriental medicine, the purpose of this research is to study the change of symptoms and the treatment effect for one case of a thyrotoxic periodic paralysis patient.

Methods and Results : The treatment was carried out with oriental medicine as a main treatment and by the oriental medicinally deteriorated case, acupuncture treatment, moxibustion treatment and herbal medicine treatment were used as the main treatment methods. Also based on the symptoms which could appear with hyperthyroidism, the changes of symptoms were evaluated once a day with 4 levels of subjective scales that the patient was feeling, by dividing with 4 aspects of totalis symptoms, cardiovascular symptoms, musculoskeletal symptoms and other symptoms. In addition, it was shown that through the continuous hematologic test, the subjective and objective symptoms were mostly decreased during the treatment periods by comparing with the objective thyroid hormone (T3, T4, TSH) levels and the electrolyte levels.

Conclusion : With this result, it was considered that oriental medicinal treatment was very effective for the thyrotoxic periodic paralysis through the oriental medicinally deteriorated case.

Key Words: Hyperthyroidism, Thyrotoxic periodic paralysis, Thyroid Hormone

Introduction

The thyrotoxicosis is the state of hypersecretion of the thyroid hormone inside the peripheral blood and tissue and it usually occurs in case of hyperthyroidism like Graves's disease. The thyrotoxicosis usually shows

symptoms like lycorexia, weight loss, fatigue, heat intolerance, hyperhidrosis, tachycardia, palpitation, etc. and others are shown like hypotonia, fatigue, and hyposthenia as the musculoskeletal symptoms of thyrotoxicosis¹⁾.

The thyrotoxic periodic paralysis which usually appears among Asian males between 20s and 40s among the thyrotoxicosis symptoms mainly occurs after severe exercise, high carbohydrate diet, or while resting after heavy drinking and it occurs as the diplegia of the lower limbs, which spontaneously recovered after continuing for several hours or several days. This thyrotoxic periodic paralysis usually disappears with the improvement of the disease which causes the

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thyrotoxicosis such as hyperthyroidism²⁾.

In oriental medicine, the symptoms of thyrotoxicosis are considered as the symptoms of “Deficiency of Origin and Excess of Superficiality,” and they are treated as the Yin Deficiency as the origin and the excessive fire as the superficiality. Thus, the symptoms of thyrotoxic periodic paralysis can be treated as a deteriorated case which the “Flaring-up of Deficiency Fire” and the flaccidity of lower limb by the Deficiency of Kidney-in occur³⁾.

The author had a significant result by observing one patient who was treated in this hospital between May 28th, 2004 and June 15th, 2004 with both leg hypotonia, both leg pain, chest discomfort, weight loss, etc. as chief complaints and thus the author is reporting this case.

Materials and Methods

1. The study subject

- The subject was one patient who visited Dongshin

University Oriental Medicine Hospital on May 28th, 2004 with both leg hypotonia, both leg pain, and chest discomfort as chief complaints and received admission treatment until June 15th, 2004.

2. The evaluation method for symptom changes

- The evaluation for symptom changes was assessed based on the subjective feelings of the patient and measurement of exercise statues, and the symptoms were evaluated as 4 respects of totalis symptom, cardiovascular symptom, musculoskeletal symptom and other symptoms based on the symptoms of hyperthyroidism (Table 1).

3. Treatment Methods

1) Oriental Medicine Treatment

(1) Herb Medicine treatment (Table 2,3)

(2) Assistant medicine

① May 29th : Jichul-hwan (Zhizhu-wan) 1p

② May 31st : Sanjoin-san (Suanzaoren-san) 1p

Table 1. The Classification of Symptom Evaluation

Totalis symptom	weight change fatigue
Cardiovascular symptom	palpitation chest discomfort
Musculoskeletal symptom	hypotonia Myalgia
Other symptoms	dysorexia diaphoresis

Table 2. Herb medicine Treatment

date	Herb Medicine
5/28-5/31	Sibyimijhwang-tang (Shierweidihuang-tang)
5/31-6/2	Anjeonbakho-tang (Anquanbaihu-tang)
6/2-6/4	Sibyimijhwang-tang (Shierweidihuang-tang) increased Scrophulariae Radix to 12g, added Gypsum fibrosum and Anemarrhenae Rhizoma all 4g
6/4-6/5	former medicine added Epimedii herba 8g
6/5-6/8	former medicine changed Prepared Rehmannia Root 16g to Rehmannia Root 20g and added Psoraleae fructus, Trionycis carapax, Clematidis Radix, Achyranthis bidentatae Radix all 4g
6/8-6/11	former medicine increased Trionycis carapax to 8g
6/11-6/12	former medicine removed Epimedii herba and added Codonopsis pilosulae Radix 6g
6/12-6/15	former medicine changed Rehmannia Root to Prepared Rehmannia Root

Table 3. Prescription of Sibyimijhwang-tang and Anjeonbakhho-tang

Sibyimijhwang-tang		Anjeonbakhho-tang	
Scientific name of Herb	dose	Scientific name of Herb	dose
Prepared Rehmannia Root	16g	Puerariae Radix	20g
Corni fructus	8g	Scutellariae Radix	8g
Alismatis Rhizoma	6g	Cypsum fibrosum	4g
White part of Poria cocos	6g	Angelicae Dahuricae Radix	4g
Ledebouriellae Radix	4g	Cimicifugae Rhizoma	4g
Schizonepetae Herba	4g	Ligustici Rhizoma	4g
Plantaginis Semen	4g	Platycodi Radix	4g
Rubi fructus	4g	Glycyrrhizae Radix	4g
Lycii fructus	4g	Scrophulariae Radix	4g
Lycii Radicis cortex	4g	Moutan cortex	4g

(3) Acupuncture treatment

- With 0.30 × 40mm Stainless steel filiform needle (made from Dongbang Acupuncture, INC), the needle insertion was performed with the method of “Uniform Reinforcing-reducing technique” to the points of Yangnungchon, Umnungchun, Taegye, Puryu, Hapkok, Taechung once a day, and the retaining time of needle was 20 minutes.

(4) Moxibustion Treatment : Two of Moxa-stick Moxibustion were performed to Shinsu-hyul daily.

2) The western medical treatment

(1) June 5th : KCL 40 + N/S 1000ml I.V.

(2) June 11th : H/S 1000ml I.V.

Case

1. Name : Kim, ○ ○

2. Sex/Age : Male / 36

3. The chief complaints

1) Both leg hypotonia

2) Both leg pain

3) Chest discomfort

4) Palpitation

5) Weight loss (20kg/3month)

4. Date of onset : Occurred on December, 2003 → recurrence on April 24th, 2004

5. Past History : No specific history

6. Family History : No specific history

7. Drinking and Smoking History : No specific history for Drinking, Smoking (1pack/2days)

8. Present Illness

This patient had the above symptoms on December, 2003, but the symptoms disappeared spontaneously without receiving any specific treatment, and on February 2004, the above symptoms reoccurred but disappeared spontaneously without any specific treatment. On April 24th, 2004, the symptoms reoccurred and were treated in this hospital as an outpatient. While receiving treatment from this hospital, the above symptoms occurred occasionally (1time/4-5

Table 4. Four Methods of Diagnosis

Inspection	Both leg hypotonia, Bright red complexion, Reddened tongue with little fur, diaphoresis
Auscultation and Olfaction	High and powerful voice
Interrogation	chest discomfort, palpitation, both leg hypotonia, both leg pain, lycorexia, poll pain, tinnitus (int)
Pulse feeling and palpation	Slippery and powerful pulse

Table 5. The Change of Electrolyte and Thyroid Hormone >

	5/28	6/5	6/8	6/15	8/17	Normal Limit
Na	143	145	141	140	145	137.0~145.0
K	3.7	2.1	3.4	3.9	4.8	3.6~5.0
Cl	106	105		102	108	98.0~107.0
T3	2.33	0.953		0.798	1.10	0.84~2.02
T4	12.10	6.32		5.90	8.05	5.13~14.06
TSH	0.009	0.016		0.48	1.30	0.27~4.2

Table 6. The Change of Symptoms During 5/28 - 6/6

	5/28	5/29	5/30	5/31	6/1	6/2	6/3	6/4	6/5	6/6
weight change		77.8	78.8	78.2	75.8	77.15	77.1	77.9	78.4	78.7
fatigue	++	++	+	-	++	++	+	+	+	-
palpitation	+	-	-	-	-	-	-	-	+	-
chest discomfort	++	++	-	+	+	+	-	+	+	+
hypotonia	++	+	+	-	+++	+++	++	+	+++	-
myalgia	++	+	+	+	++	+	+	+	+	-
dysorexia	hyper	same	same	same	same	same	same	same	same	same
diaphoresis	+++	++	++	+	+	+	++	++	++	+

Table 7. The Change of Symptoms During 6/7 - 6/15

	6/7	6/8	6/9	6/10	6/11	6/12	6/13	6/14	6/15
weight change	78.0	76.75	78.9	78.0	78.7	78.4		77.7	77.9
fatigue	-	+	-	-	-	-		-	-
palpitation	+	-	-	-	-	-		-	-
chest discomfort	-	+	-	-	-	-		-	-
hypotonia	-	+	+	++	-	-		-	-
myalgia	-	+	-	-	-	-		-	-
dysorexia	same	same	same	same	same	same		same	same
diaphoresis	+	+	-	-	-	-		-	-

* The degree of symptom changes was indicated as (-) for normal, and this was measured as (+) for mild, (++) for moderate, and (+++) for severe.

** The degree of hypotonia among the musculoskeletal symptoms were measured,

- : normal

+ : a slight hypotonia was present but walking was possible.

++ : the lower limb exercise was possible as lying on the bed but walking was not possible.

+++ : the lower limb exercise against the gravity was impossible or the lower limb exercise was completely impossible.

days, duration: 4-12 hours/1time). Thus, he received admission treatment from May 28th, 2004 to June 15th, 2004 and was discharged due to personal reasons.

9. Four methods of diagnosis in Oriental medicine (Table 4.)

10. Test Findings

- 1) Vital sign when he was admitted: Blood pressure 110/70mmHg, Temperature 36.0°C, Pulse rate: 74times/min, Respiratory rate 20times/min
- 2) EKG finding : Normal
- 3) X-ray finding : Chest PA - No Pathological finding
- 4) Electrolyte and Thyroid Hormone study (Table 5.)

11. Diagnosis

- 1) The oriental medicine diagnosis : Deficiency of Kidney-yin, Flaring-up of Deficiency Fire
- 2) The western medicine diagnosis : Thyrotoxic periodic paralysis

12. Change of symptoms

- Table 6,7

Discussion

The thyrotoxicosis is defined as the state of hypersecretion of thyroid hormone. This meaning is not the same as hyperthyroidism which the thyroid function is excessively increased but most causes of thyrotoxicosis occur by hyperthyroidism such as Graves' disease or Toxic multinodular goiter¹⁾. When the secretion of thyroid hormone is promoted by Graves' disease, goiter, thyroid cancer, or thyroiditis, due to the excessive action of thyroid hormone, the clinical symptoms are manifested by the action of

excessive amounts of thyroid hormone inside the peripheral blood and tissue as well as heat intolerance, and thus it is called thyrotoxicosis⁵⁾.

The clinical symptoms of thyrotoxicosis are shown variously according to the severity of the thyrotoxicosis, illness period, age of patient, and the individual sensitivity of thyroid hormone. And in case of aging patients, the characteristics of thyrotoxicosis are not shown well and instead mainly fatigue or weight loss is shown. The thyrotoxicosis causes unaccountable weight loss in spite of increased appetite, hyperactivity, nervousness, quick temper, and the sense of fatigue and the neurologic symptoms like the excessive reflex, muscle consumption, proximal muscle illness without accompanying contraction, and rarely chorea are manifested. The most common cardiovascular symptoms caused by the thyrotoxicosis are the sinus tachycardia, including palpitation and also the increased blood pressure caused by increasing cardiac output and the trigger of aortic systolic murmur are shown. The skin is warm and damp, and also can be shown by heat intolerance and the diffuse of purpura. As for the musculoskeletal symptoms caused by thyrotoxicosis, the sense of fatigue or weakness mostly due to the attenuation of muscular force by the atrophy of appendicular muscle is complained about⁶⁾.

The thyrotoxic periodic paralysis generally appears in Latin American or Asian Males between 20s and 40s, and clinically it is manifested after severe exercise, a high carbohydrate diet, or while resting after heavy drinking. Even though the sense is normal, the similar symptoms with hypokalemic occurs and also the decline of blood kalium concentration can be accompanied. However, the characteristics of thyrotoxic periodic paralysis are that the muscular paralysis rarely invades the upper limb, the paralysis of respiratory muscle is extremely rare, after several hours or several days, it is recovered spontaneously, and there is no

sequele. While the thyrotoxic periodic paralysis is recovered spontaneously when the condition of thyroid hormone is returned to normal after the treatment of thyroid disease²⁾, the hypokalemia which is defined as the concentration of blood kalium is lower than 3.5 meq/L is different from the thyrotoxic periodic paralysis in respect that when the blood kalium concentration is 1.5-2.0meq/L without any treatment for the cause of kalium concentration decline or without infusion of kalium, the general muscular paralysis including the respiratory muscle occurs⁷⁾.

With the western medicinal treatment, the thyrotoxicosis is treated with antithyroids or with the treatment of the subtotal thyroidectomy or radioiodine, which decreases the synthesis of thyroid hormone by reducing the thyroid tissue. Currently, in Korea, Europe, or Japan, using antithyroids such as propylthiouracil, carbimazole, and methimazole is the main treatment method, but even though the remission rate of hyperthyroidism is usually gained after 18-24 months, all the patients should be concerned with the recurrence within one year of treatment, and continuous observation is necessary afterward⁸⁾. If the treatment with antithyroids is difficult, the radioiodine method which destroys the thyroid tissues using radioiodine or the operative treatment like the subtotal thyroidectomy is used, and in case of the radioiodine method or the operative method, it is known that the permanent hypothyroidism is occurred over the next 10 years to the patients of at least 10-30% and up to 50%⁹⁾.

The thyrotoxicosis is mostly caused by the hyperthyroidism and the hyperthyroidism is including the thyroid swelling. Thus in oriental medicine the hyperthyroidism is placed under the category of "Goiter and Tumor" and by each symptom it can be placed under the category of "Diabetes," "Severe Palpitation," "Palpitation due to fright," and "Fidgetiness." However, these symptoms are mostly the ones from the

"Deficiency of Origin and Excess of Superficiality." Considering the Yin Deficiency is the origin and the Excessive fire is the Superficiality, the "Excessive fire by Yin Deficiency" and "Flaring-up of Deficiency Fire" are the main clinical changes. In addition, they can be used as deteriorated case by dividing "Stagnation of Liver-qi," "Hyperactivity of Liver-yang," "Insufficiency and Impairment of Liver-Kidney Essence," "Heart-yin deficiency," "Breakdown of Normal Physiological Coordination between Heart and Kidney," "Kidney-yin deficiency," "Qi and blood stagnation," and "Damp Phlegm stagnation" according to the causes⁹⁾. The hyperthyroidism is treated with the method of "Clear Liver and Regulating Qi flow" for the "Stagnation of Liver-qi" and the "Danchisoyo-san (Danzhixiaoyao-san)" is applied. To the "Flaring-up of Liver Fire," it is treated with "Clear Liver and Purging fire" method and the "Yongdansagan-tang (Longdanxiegan-tang)" and "Chijachonggan-tang (Zhiziqinggan-tang)" are applied. The "Insufficiency and Impairment of Qi and blood" is treated with the "Replenishing Qi and blood" method and "Insamyangwi-tang hap Yukmijihwang-tang (Renshenyangwei-tang ge Liuweidihuang-tang)" are applied. The "Damp Phlegm stagnation" is treated with "Removing Dampness and Resolving Phlegm" method and "Haejookdae-tang (Haichaoyudai-tang)" is applied¹⁰⁾. From recent opinions, among the hyperthyroidism symptoms the heat intolerance is caused by the occurrence of the "Difficult Heat" because the energy of "wood Qi" is not exuberant enough, and seeing from the symptoms of fever, hyperhidrosis, and no chill sign, by deciding the "Yangming Channel Disease" as the deteriorated case which the main symptom is the heat on body surface among "Yangming Diseases," there is an opinion that it should be treated by using "Galgunhaegi-tang (Gegenhaeqi-tang)"⁹⁾.

For this case, the lower limb hypotonia appeared once

in December, 2003 and in February, 2004 respectively, and from February to May in 2004, with the continuous weight loss, the patient lost 20kg. Before April 26th, 2004 until the patient visited the hospital, he did not receive any treatment and from April 26th, 2004 to May 17th, 2004 he was treated as an outpatient receiving the acupuncture treatment, the moxibustion treatment and herbal medicine treatment. Then from May 28th, 2004 to June 15th, 2004 he received the admission treatment at this hospital.

At the time when he was admitted to the hospital, the patient was at the state of having difficulty with self-walking by the both leg hypotonia, and he complained the symptoms like chest discomfort, palpitation, hyperhidrosis. On the day he was admitted, his K⁺ level from the hematologic test was tend to be slightly low, but it was under the normal range. Also since T3 level, the thyroid hormone, was slightly higher than the normal level and TSH level, the thyroid stimulating hormone, showed a very declined level compared to the normal level, it was thought to be a light case of hyperthyroidism. However, the exact cause of sudden occurrence for hyperthyroidism could not be understood considering his past history or present illness state.

If this case is examined, both leg hypotonia which was the chief complaint was gradually decreased from the evening of the admitted date on May 28th, and the symptoms of palpitation, chest discomfort and hyperhidrosis were continued. By administering the "Sibiyimijihwang-tang (Shierweidihuang-tang)" from May 28th to May 31st, both leg hypotonia which was the chief symptom was gradually reduced from 28th of May and both leg pain was also decreased. Besides, the chest discomfort was still continued and hyperhidrosis was gradually reduced, but the general fatigue was complained. On 20th of May, the patient complained the chest discomfort greatly, thus one dose of "Jichul-hwan (Zhizhu-wan)" was administered. From May 31st to

June 2nd, to treat the "Symptoms by Deficiency heat" of upper part which was the main complaint at the time, the drug was administered by changing into "Anjeonbakho-tang (Anquanbaihu-tang)," and the palpitation symptom was disappeared after that and the chest discomfort was decreased. However, from the morning of 1st of June, the symptom of both leg hypotonia became worse again and both leg pain also became severe. To reduce the leg hypotonia symptom, from 2nd to 4th of June the drug was again changed into "Sibiyimijihwang-tang (Shierweidihuang-tang)" and administered. At the same time, to treat the upper part of "Symptoms by Deficiency Heat" the amount of "Scrophulariae Radix" was increased and the "Gypsum fibrosum" and "Anemarrhenae Rhizoma" were added. On 2nd of June, the leg hypotonia symptom was reduced and on 4th of June, the leg hypotonia was remained slightly. The light degree of chest discomfort and both leg pain were continued. On 4th of June, to treat the both leg hypotonia by stimulating the "Yang-Qi" of "Lower-energizer part," the "Epimedii Herba" was added. On 5th of June, the both leg hypotonia was once again worse. From the result of lab follow up, the thyroid hormone, T3, was the normal level and TSH was increased compared to the one on May 28th, thus the hyperthyroidism was shown the gradual improvement. However, K⁺ level among the electrolyte was greatly decreased, therefore, KCl was injected by mixing with N/S through I.V. For the herbal medicine treatment, "Prepared Rehmannia Root" was replaced with "Rehmannia Root" in "Sibiyimijihwang-tang (Shierweidihuang-tang)", the amount of "Epimedii herba" was increased, and the "Psoraleae fructus" was added. In addition, "Trionycis Carapax" was added for "Nourishing Yin", and to draw the drug effect to the "Lower-energizer part," "Achyranthis Bidentatae Radix" and "Clematidis Radix" were added. From June 6th to June 7th, both leg hypotonia, fatigue and both leg

pain were disappeared and the chest discomfort and hyperhidrosis were slightly remained. From 8th of June the mild both leg hypotonia was started to reappear, and from the electrolyte test, K⁺ level was 3.4 which showed the slightly decreased level compared to the normal level of 3.5. On 10th of June, even though the leg exercise was possible, the hypotonia was manifested again to the degree of impossible to walk. On the other hand, the chest discomfort only appeared once and other symptoms were decreased. The herbal medicine treatment was administered by increasing the amount of "Trionycis Carapax." From 11th of June to 15th of June, all the symptoms were not manifested. The "Codonopsis Pilosulae Radix" was added to the herbal medicine treatment for "Replenishing Qi" on 11th of June, and from 12th of June the drug was administered by replacing "Rehmannia Root" with "Prepared Rehmannia Root" again. On 15th of June, after testing the electrolyte and thyroid hormone the patient was discharged from the hospital due to the personal reason. At the time of discharge, the electrolyte level was normal and T4 and TSH levels in the thyroid hormone were normal but T3 level was rather decreased as 0.798 compared to the normal which rather had a tendency of hypothyroidism. However, by the time the patient was retested on August 17th, 2004, none of previous symptoms were reoccurred and according to the Lab. follow up, all of Na⁺, K⁺ and thyroid hormone levels appeared as normal. Nevertheless, the patient had no care during from June 15th to August 17th after he discharged from hospital. Therefore, it is suggested that the treatment by the oriental medicinal deteriorated case for the thyrotoxic periodic paralysis can be effective.

From this case, it was found that when it was diagnosed as the hyperthyroidism, if the main symptoms were the symptoms by Excessive fire such as palpitation and heat intolerance, then the treatment methods of the drugs like "bakho-tang (baihu-tang)"

and the acupuncture for removing the Excessive fire were effective, but if the both leg hypotonia caused by the thyrotoxicosis was shown as the main symptom, then the treatment method using the drugs and acupuncture treatment mainly based on "Nourishing Kidney-Yin" were effective.

However, it is thought that the lack of subject patients which was only one patient in this case and the lack of continuous observation and study about the phenomenon which the hyperthyroidism symptom showed the tendency to change into the hypothyroidism at the last period of this case are needed to be improved and it is considered that the continuous oriental medicinal study and examination for the thyrotoxic periodic paralysis should be continued further.

Conclusion

In this case, the patient who was admitted to the hospital with the chief complaints of both leg hypotonia, both leg pain, chest discomfort and palpitation, was diagnosed as the thyrotoxic periodic paralysis by the western medicine with respect to the increase of thyroid hormone concentration from the pathological test and other various symptoms (weight loss, lycorexia, fatigue, etc.) and also he was diagnosed as the "Kidney-yin deficiency" caused by "Excessive fire by Yin Deficiency" and both leg hypotonia by the oriental medicine. After treating with the "Sibiyimijih-wang-tang (Shierweidihuang-tang)" as the main treatment drug, it was observed that the symptoms were improved and the increased thyroid hormone level from the clinical pathological test was decreased and the decreased thyroid stimulating hormone were recovered to the normal level, so the author is reporting this case.

Based on this, more studies about the oriental medicinal treatment for the hyperthyroidism should be published so that they can be referred to for clinical

applications, and it is considered that further research is necessary for the decrease of thyroid hormone under the normal level or the mechanism of sudden decline of kalium, which appeared during observation of this case.

References

1. E. Braunwald etc. HARRISON'S PRINCIPLES of Internal Medicine 13th Edn.. Seoul: Jungdam Publisher Co.. 2003:(2125-2140)
2. Min HK etc. Endocrinology. Seoul: Medical Publishing Co. Ltd.. 1994:(290-292)
3. Doo HK. The Kidney System in Oriental Medicine. Seoul: The Oriental Medicine Institute. 1993:(1050-1058)
4. Ahn SY. The Collected Papers on 2nd Korean Society for Oriental Internal Medicine Seminar. The Korean Society for Oriental Internal Medicine. 2003:(59-65)
5. Ahn SY. The Thyroid Clinic. Seoul: Sungbo publishing Co.. 2004:(90-131)
6. Song YG etc. The Study of Thyroid Gland 2nd Edition. Seoul: Korea Medical Book Publisher Co.. 1995:(131-188)
7. Judith E. Tintinalli. Emergency Medicine. Seoul: Han Wori Publishing Co.. 2001:(170-171)
8. Min HK. Clinical Endocrinology Second Edition. Seoul: Korea publishing Co.. 1999:(215-242)
9. Doo HK. The study of Kidney System. Seoul: The Oriental Medicine Institute. 1993:(1050-1058)
10. Kim CJ. The consideration of literatures about Hyperthyroidism. The Collected Papers published by Taejeon University. 1998;7(1):(807-816)