

Cost-of-Illness Trend of Thyroid Gland Disease in Korea

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The incidence of thyroid disease has been increasing in Korea. In particular, the incidence of thyroid cancer began to sharply rise, and it became the most prevalent malignancy in Korea. In 2013, the Korea Central Cancer Registry reported that the incidence of thyroid cancer in 2011 was 40,568, and that the prevalence was 215,178 [1]. The high incidence of thyroid cancer is mainly due to early detection, which has been enabled by the application of high-resolution ultrasonography to the diagnosis of thyroid cancer. However, the incidence of larger thyroid cancers has also been increasing; moreover, the incidence of childhood thyroid cancer in Korea has increased 2.5-fold during the past 10 years [1,2]. Due to these findings, it has been proposed that early detection alone is insufficient to explain the rapid increase in the incidence of thyroid cancer, and that alternative explanations are required [3]. This conclusion is partly related to the unique medical environment in Korea, where residents can easily visit any hospital and undergo ultrasonography at a relatively low cost of \$20 to \$50, compared to \$300 to \$1,000 in the United States. Recently, thyroid ultrasonography became an optional or obligatory examination for health promotion programs in most hospitals [2]. Many studies have reported that genetic factors make major contributions to the pathogenesis of thyroid cancer, and that the inhabitants of East Asia, including Korea, are genetically susceptible to thyroid cancer [4-6]. Extremely high iodine intake, increased exposure to medical radiation, and increasing rates of obesity may be also potential explanations for this phenomenon.

A recent study in Korea reported comprehensive nationwide data regarding the incidence and prevalence of thyroid dysfunction. Seo et al. [7] reported in 2013 that the annual incidence of hyperthyroidism was 0.72/1,000 (men 0.40, women 1.03) and the prevalence was 3.40/1,000 (men 2.09, women 4.70) in Korea. Seo et al. [7] also estimated that the annual incidence of hypothyroidism cases treated with levothyroxine was 2.26/1,000 (manuscript submitted). The overall incidence and prevalence of thyroid disease, including thyroid cancer, have both been increasing due to early detection, the development of innovative diagnostic and therapeutic tools, and longer survival times. In parallel, the disease-specific medical costs for thyroid disease have also been increasing. Brown et al. [8] suggested that medical costs were one issue on which both health care economics and health policy specialists had continuously focused. Yabroff et al. [9] and Woodward et al. [10] also emphasized that information regarding medical costs was not only helpful for allocating resources and financial planning, but also for calculating national health expenditures, thus allowing nations to evaluate the productivity of their health care delivery systems. Therefore, precise evaluation and analysis of the total costs of specific diseases is important for achieving efficient health insurance expenditures and for developing more effective health policies.

Hyun et al. [11] analyzed the cost-of-illness trend for thyroid disease over the past 10 years. For this analysis, the cost-of-illness consisted of both direct costs (medical costs) and indirect costs (loss of potential income and/or productivity). This

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study reported that the cost-of-illness for thyroid disease increased remarkably from 2002 to 2010 (2,242 hundred million won to 7,622 hundred million won, a 3.4-fold increase). Recent reports have also shown that the cumulative medical costs of endocrine, nutritional, and metabolic diseases increased 1.7-fold from 2003 to 2007 [12,13]. Therefore, the medical costs incurred by patients with thyroid disease have increased significantly more than those incurred by patients with other endocrine diseases. This study also reported that the medical costs of thyroid disease were 69.7% of all total costs, which was the highest percentage of all costs. Subsequently, the loss of productivity due to absence from work was 19.9%, the future income loss due to premature death 5%, and others 5.4%. In contrast, the medical costs of endocrine, nutritional, and metabolic diseases from 2003 to 2007 were 38.1% of all total costs, the loss of productivity 20.2%, the future income loss 36.4%, and others 5.3%. We found that the medical costs of thyroid disease were higher than those of other endocrine diseases; furthermore, the future income loss of thyroid disease was lower than that of other endocrine diseases. Thyroid disease usually occurred in patients aged 30 to 60 years old, who were part of an economically active generation. Therefore, this study suggested that the government should recognize the importance of thyroid disease and investigate effective strategies for its prevention and management. This was the first report that quantified and evaluated the socioeconomic impact of thyroid disease in Korea. In Korea, the National Health Insurance program covers almost all residents through a single insurance program. In addition, health insurance claims data were originally designed for medical cost reimbursement, and therefore included data from all pertinent health institutions. Therefore, Korean health insurance claims are highly reliable and confidential sources for medical cost data.

Shin et al. [14] reported the medical costs incurred during the 5 years after diagnosis of the six most prevalent cancers (stomach, liver, lung, breast, colon, and thyroid) in Korea. In this study, patients ($n=28,509$) were randomly selected from the Korea Central Cancer Registry, and the medical cost of each patient was obtained through their National Health Insurance claims. The medical cost per patient in the lung cancer group was highest (\$20,217), followed by liver cancer (\$19,059), breast cancer (\$18,242), colorectal cancer (\$17,928), stomach cancer (\$12,577), and thyroid cancer (\$5,647). Advanced stage cancer was associated with a 1.8- to 2.5-fold higher medical cost. Colorectal, breast, and thyroid cancers also exhibited higher costs for the distant metastasis stage compared with the

localized/regional stages. Notably, the average medical cost for a patient with localized thyroid cancer was \$4,936, whereas the average cost for a patient with thyroid cancer in the distant metastasis stage was 2.3-fold higher (\$11,409). Medical costs were also found to be highest during the first year, and then to decrease in the third or fourth year. These findings suggested that prevention, early detection, and efficient therapeutic modalities should be actively employed to reduce the medical costs of these diseases. Although the medical cost per patient with thyroid cancer was quite low, the high incidence and prevalence of this disease can potentially lead to significant economic implications. Since thyroid cancer is generally associated with low morbidity and mortality rates, discriminating low-risk patients from high-risk patients is important for preventing overtreatment. Moreover, improved therapeutic guidelines and risk stratification strategies should be developed. Brown et al. [15] emphasized that improved risk stratification strategies should include the identification of patients who are unlikely to benefit from radioactive iodine therapy after their initial surgery, in addition to the identification of patients with indolent and asymptomatic metastatic diseases who are unlikely to benefit from novel therapies. This study concluded that the exact health care costs associated with the increased diagnosis of thyroid cancer were difficult to define, but were worthy of further research.

The recognition of precise disease-specific medical costs is extremely important for the appropriate allocation of resources and for effective financial planning. To achieve efficient health insurance expenditure, the prevention of thyroid cancer, its early detection, and the development of effective therapeutic modalities against thyroid cancer are all necessary. Moreover, unnecessary diagnosis and excessive treatment should be avoided. However, if uniform regulations are applied only to reduce the economic burden and are in fact unreasonable, such regulations could potentially do more harm than good. Thus, therapeutic guidelines should be developed based on evidence-based medical decisions for the patients, and not on their economic efficacy.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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