The Effects of Lifestyle on Thyroid Nodules in Women

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Abstract. From the perspective of the influence of lifestyle on thyroid nodules in women, this study analyzed the causes of multiple thyroid nodules in women. Based on the fact that female thyroid cancer has become the eighth most common tumor in women, this study first conducted an extensive search and collation of relevant theories, and then used literature research methods, case study methods, survey methods, empirical methods, and other research methods to study the problems of lifestyle and the disease, intraoperative, and prognosis of thyroid nodules in women. Large changes in estrogen levels, large mood swings, and easy malnutrition are the three major factors that women are prone to disease. Lifestyle changes do not directly cure thyroid nodules, but can help improve overall health and may help slow the development of nodules or the effects of associated symptoms. A healthy diet, psychological adjustment, and routine can help patients maintain or restore a normal quality of life after surgery. We need to work together at different levels to reduce the prevalence of thyroid nodules in women and improve the treatment outcomes.

Keywords: Thyroid nodule; estrogen level; mood swings, malnutrition.

1. Introduction

The thyroid gland is an important endocrine gland in the shape of an H or butterfly, and the brain comprises two lateral lobes, the left and right, which are linked by a thin isthmus in the center. It is located in front of the lower larynx and upper trache, and is surrounded by the trachea, esophagus, and larynx. The main function of the thyroid gland is to synthesize, store, and secrete thyroid hormones including triiodothyronine (T3) and tetraiodothyronine (T4). These hormones play a vital role in metabolism, growth, development, and body temperature regulation.

Blood supply to the thyroid gland is more abundant. Approximately 150 mL of blood passes through the thyroid gland every minute, and the nerves innervating the thyroid gland are divided into sympathetic and parasympathetic nerves. The thyroid gland can promote and maintain the growth, development, and metabolism of the human body, especially in the bones and nervous system, and secretes calcitonin to regulate the balance of calcium in the body, so it plays an extremely important role.

Thyroid nodules are common and discrete lesions within the thyroid gland caused by abnormal, localized growth of thyroid cells and are particularly common in older and female populations [1]. This disease is not uncommon in daily life, and we have real cases of thyroid disease all around us.

At present, the standard thyroid ultrasound examination standard in China divides thyroid nodules into six grades. Grade 1–3 thyroid nodules are usually benign. Grade 4 is divided into 4A, 4B, and 4C, and the probabilities of malignancy are 2%-10%, 10%-50%, and 50%-90%, respectively. Grade 5 indicates a greater than 90% chance of malignancy. Grade 6 thyroid nodules have been diagnosed as malignant nodules.

Most of the time, people with thyroid nodules don't have any symptoms, but some experience pain around the nodules, a foreign body sensation in the throat, and a feeling of pressure. Some patients with advanced disease develop symptoms of neck edema. When the nodule compresses the surrounding tissues, symptoms such as hoarseness, foreign body sensation in the throat, dyspnea, shortness of breath, and difficulty in swallowing may occur. In patients with hyperthyroidism, palpitations, sweating, hand tremors, and weight loss occur, accompanied by hypothyroidism, symptoms of cold intolerance, and general fatigue.

The prevalence of thyroid nodules is generally 3percent–7 percent based on postpalpation [2]. According to clinical statistics, 5–15% of thyroid nodules develop into thyroid cancer, accounting for

2.59% of the systemic cancer incidence [3]. The global incidence of thyroid cancer is 3.3 per 100,000 women and 1.3 per 100,000 men [4]. In 2005, it was reported that the incidence of thyroid cancer worldwide increased by 4% per year, and it has increased to the eighth most common cancer in women. From the above data, it is clear that the number of women with this disease is significantly greater than that of men [5,6]. It is not difficult to find that women have the following three characteristics compared with men: estrogen levels change greatly, mood swings are large, and they are prone to malnutrition.

Given the dearth of comprehensive investigations, this study seeks to provide a comprehensive analysis of Lifestyle effects on thyroid nodules in women.

2. Lifestyle effects on thyroid health in women

In today's society, excessive pressure on women's lives and work affects the endocrine system, leading to hormone secretion disorders in the body, and large changes in estrogen levels have become an important reason for women to be susceptible to thyroid nodules. Compared with men, women are more likely to be affected by emotions and are often dominated by excessive emotions, which leads to abnormal thyroid immune regulation and the development of thyroid nodules in women. Excessive iodine intake in women due to dietary preferences results in thyroid nodules [7,8,9]. The impact of thyroid nodules on women is multifaceted, from physical to psychological to social relationships and economic conditions.

2.1. Dietary habits

In order to pursue a slim figure, many women eat irregularly and consume a diet to lose weight; however, this unhealthy weight loss method will lead to malnutrition in the body, and long-term malnutrition can lead to abnormal thyroid function, which in turn promotes thyroid lesions and induces thyroid nodules [10].

The mechanism by which malnutrition affects thyroid function is not directly genetic but indirectly by affecting the supply of nutrients needed for thyroid hormone synthesis and by affecting the overall metabolic state.

Iodine deficiency: Iodine is one of the important components in the synthesis of thyroid hormones. If dietary iodine intake is insufficient, the thyroid gland will not be able to produce enough thyroid hormones. Long-term iodine deficiency can lead to an enlarged thyroid gland (endemic goiter) and may lower thyroid hormone levels, leading to hypothyroidism [11].

Proteins and amino acids: Proteins and amino acids form the basis of thyroid hormone synthesis. Inadequate protein intake owing to malnutrition may affect thyroid hormone synthesis and transport [12]. For example, tyrosine is one of the basic building blocks of thyroid hormones and its deficiency may affect thyroid hormone synthesis.

Epigenetics: Malnutrition may also affect gene expression via epigenetic mechanisms. Nutrient deficiencies may alter the state of DNA methylation and histone modification, which can affect the expression of thyroid-related genes. For example, malnutrition may affect thyroid function by affecting the expression of genes involved in thyroid hormone synthesis.

2.2. Levels of hormonal changes are associated

Estrogen may affect thyroid gland function by regulating the expression of genes related to thyroid function [13]. For example, estrogen may affect the expression of genes involved in thyroid hormone synthesis and release [14,15], such as thyroid peroxidase (TPO) or thyroglobulin (TG).

The rationale for the influence of estrogen on thyroid peroxidase (TPO) or thyroglobulin (TG) expression involves hormone receptor-mediated gene transcriptional regulation.

Transcriptional regulation of genes:

Direct Regulation: The hormone-receptor complex can bind to the ER in the promoter region of the TPO gene and directly regulate its transcriptional activity of the TPO gene. If the ER binds to an

enhancer sequence, it may promote the expression of the TPO gene; if it binds to a repressor sequence, it may inhibit the expression of the TPO gene.

Indirect regulation: Estrogen may also indirectly regulate the expression of TPO genes by affecting the expression or activity of other transcription factors. For example, it may upregulate or downregulate the expression of certain transcription factors that regulate the transcription of TPO genes.

Influencing Mechanism: Thyroid hormones play a regulatory role in the development of the testes and ovaries; abnormal levels of sex hormones can also affect thyroid function; estrogen can participate in the occurrence of β and development of hyperthyroidism through estrogen receptors, and can also promote the proliferation of thyroid stem cells, which can further proliferate to form nodules.

2.3. Stress and mood on thyroid nodules

Compared to men, women are more likely to be affected by emotions, and women are naturally more sensitive. If the pressure of life and work is too great, and they are unable to regulate their emotions, or are subject to serious mental stimulation, it is easy to cause emotional instability in the long run, such as frequent anger and excessive excitability, which can lead to abnormal thyroid immune regulation, which can lead to excessive or excessive thyroid hormone secretion, and too much or too little thyroid hormone secretion can easily lead to thyroid nodules in women [16].

The genetic principle that mood swings affect thyroid function is not directly causal but indirectly affects the thyroid gland through a complex set of physiological and biochemical pathways.

The role of transmitters: Mood swings can alter the balance of neurotransmitters in the brain, including norepinephrine, dopamine, and serotonin. Changes in these neurotransmitters may affect the hypothalamic activity, which in turn affects the function of the HPT axis. For example, changes in serotonin levels have been associated with thyroid function.

Gene expression regulation: Mood swings may affect the expression of thyroid-related genes via epigenetic mechanisms. For example, stress may alter gene expression patterns through DNA methylation and histone modification. Long-term stress may cause changes in the expression levels of thyroid-related genes, which in turn can affect thyroid gland function.

3. The importance of lifestyle in the treatment process

3.1. The impact of unhealthy lifestyle on treatment efficacy

Dietary habits such as high-calorie and high-fat diets can lead to obesity, which is associated with multiple endocrine disorders that may indirectly affect thyroid health. Lack of adequate physical activity can lead to a decrease in the metabolic rate, which in turn can affect overall health, including thyroid function.

Interventions

Adjust your iodine intake as recommended by your doctor or dietitian. Increase your intake of vegetables, fruits, and whole grains and reduce the intake of processed foods, sugar, and fatty foods. Engage in moderate-intensity physical activity on a regular basis, such as brisk walking, swimming, or cycling. Stress management involves relaxation techniques, such as meditation, yoga, and deep breathing exercises. Maintaining good sleep habits. Quit smoking and seeking professional help increased the success rate.

3.2. The importance of lifestyle modification during treatment

A thyroid nodule is defined as one or more areas of abnormal growth that occur within the thyroid gland. Although most thyroid nodules are benign, they can be malignant.Although lifestyle changes cannot directly cure thyroid nodules, they can be supportive in the treatment process, help improve overall health, and slow the progression of nodules or the effects of associated symptoms.

Nutrition and diet: (1) healthy eating habits can improve the overall metabolic state of the body, thereby supporting thyroid function. For example, moderate iodine intake is essential for preventing goiter and nodule formation. However, excessive iodine intake may be detrimental in patients with pre-existing nodules [17]. (2) Antioxidant-rich foods such as blueberries, green leafy vegetables, and nuts can help reduce oxidative stress and inflammation, which may benefit thyroid health.

Weight management: Maintaining a healthy weight can help reduce the risk of cardiovascular diseases and other health problems that can affect thyroid function. Obesity is associated with thyroid dysfunction; therefore, weight control may be beneficial.

Exercise regularly: Moderate physical activity can improve circulation, boost the immune system and metabolism, and help maintain a healthy weight. These factors are beneficial for thyroid health.

Stress management: Long-term stress can increase cortisol levels, which can negatively affect the thyroid function. Managing stress through meditation, yoga, and breathing exercises can help to improve overall health.

Quitting smoking: Smoking has been shown to adversely affect thyroid function, and smoking cessation can improve overall health and reduce potential damage to the thyroid gland.

Avoiding environmental toxins: Certain environmental pollutants, such as heavy metals and certain chemicals, can interfere with thyroid function. Reducing exposure to these substances can help protect thyroid health.

Regular surveillance: Regular ultrasonography and blood tests for known thyroid nodules can help track changes in the nodules and identify conditions that require further evaluation.

Mental health: The presence of thyroid nodules may cause anxiety or depressed mood, and active mental health management and support networks are important for coping with these emotions.

While lifestyle changes cannot eliminate thyroid nodules, they can complement traditional medical treatments, such as medications, surgery, or radioactive iodine therapy, by improving overall health. In addition, a healthy lifestyle can improve a patient's quality of life and help slow disease progression. It is important to work with the care team to develop personalized treatment plans that include appropriate lifestyle modifications.

4. The role of lifestyle in surgical prognosis

4.1. Healthy diet with thyroid nodules

Healthy diet after thyroid nodule surgery plays an important role in patient recovery. The right diet not only promotes wound healing but also helps maintain or restore a normal quality of life.

Proteins are one of the key nutrients for wound healing and help repair damaged tissues. After surgery, you should increase the intake of foods rich in high-quality protein, such as eggs, milk, chicken, and fish. Nutrients, such as vitamin C, vitamin E, and zinc, help boost the immune system and improve the body's ability to fight infections. Moderate carbohydrate intake is necessary to maintain the energy levels.Choose complex carbohydrate sources, such as whole-grain bread, brown rice, and oats, which help provide sustained energy release. Maintaining healthy weight is essential for overall health. After surgery, it may be necessary to adjust their diet to avoid weight gain, and spicy, greasy, excessively hot, or cold foods may need to be avoided in the early stages of surgery, as these foods may irritate the throat and surgical area, affecting the healing process.

In summary, a balanced diet plan is essential for patients after thyroid nodule surgery. Not only does it speed up the body's healing process, but it also helps patients better cope with the challenges of surgery.

4.2. Psychological regulation with thyroid nodules

Psychological adjustment not only affects the quality of life of patients, but may also indirectly affect the management of the disease and its prognosis [18,19].

The moment a patient with thyroid nodules learns that they have the disease, great psychological stress ensues. Effective psychological conditioning techniques, such as deep breathing, meditation,

mindfulness exercises, etc., can help patients relax and reduce anxiety. Psychological adjustment can enhance the resilience of individuals in the face of illness and help them face the diagnosis, treatment process, and subsequent life changes. During this process, patients learn to accept their condition and develop problem-solving skills.Stress and anxiety in patients often lead to sleep disorders, and good night's sleep is essential for recovery and health. Improving sleep through psychological regulation can help improve overall quality of life and physical health. Mental health is closely associated with physical health. Through psychological regulation, patients can better manage their emotions, which can improve well-being and social functioning in daily life. Long-term stress and anxiety can negatively impact the body and may exacerbate existing health problems or trigger new ones. Reducing these negative emotions through psychological regulation can help reduce the risk of complications [20]. Psychological adjustment can help people build and strengthen their social support networks. This support is very important for coping with emotional demands during illness.

For better psychological adjustment, patients may consider participating in counseling, joining support groups, or adopting other methods of self-regulation. It is important that patients become aware of the importance of psychological adjustment and seek help to better cope with the challenges posed by thyroid nodules. At the same time, the support of family and friends is also a force to be reckoned with.

4.3. Regularity of life with thyroid nodules

Routines help maintain the stability of the body's internal environment and maintain normal hormone secretion patterns, including thyroid hormones. An irregular lifestyle may interfere with this natural rhythm, which in turn can affect the function of the thyroid gland. A regular routine helps reduce stress in daily life. Chronic stress increases levels of stress hormones such as cortisol, which may indirectly affect the function of the thyroid gland. By maintaining a regular rhythm of life, such as a regular schedule, unnecessary stress can be reduced. Adequate and high-quality sleep is essential for overall health.Irregular sleep schedules can lead to poor sleep quality, which in turn affects multiple physiological processes such as the immune system, metabolic rate, and ultimately thyroid health.

Living with a regular routine makes it easier for people to maintain healthy eating habits. Eating a regular and measured diet can help maintain stable blood sugar levels and reduce the burden on the body caused by irregular diets. Routines also help patients better monitor their symptoms and physical reactions and detect any changes in their condition in a timely manner, which is important for the timely adjustment of treatment regimens. With regular lifestyle habits, the immune system can be strengthened, which is important for preventing infections and other health problems.A good immune system helps fight off diseases, including thyroid-related problems. A regular lifestyle can help to maintain mental health. The reduction of psychological stress and emotional stability contribute to the overall quality of life of patients, which is beneficial for both the management and prognosis of thyroid disease.

In conclusion, routine is an indispensable part of the health management of patients with thyroid nodules. By maintaining a regular routine, diet, and exercise routine, patients can better manage their illness and improve their quality of life.

5. Discussion

Thyroid nodules are very common, and due to changes in estrogen levels, mood swings, malnutrition, and other factors, there are more women than men with thyroid nodules. Therefore, the influence of lifestyle on thyroid nodules in women has been extensively studied.

Estrogen may affect thyroid function by influencing the expression of thyroid peroxidase (TPO) and thyroglobulin (TG), which are genes used to synthesize and release thyroid hormones. Mood swings affect transmitter action and gene expression profiles affect the thyroid gland. Women lose weight in pursuit of a slim figure, which in turn affects their thyroid function.

In the process of in-depth research, we learned that age, overweight, hypertension, diabetes, and other underlying diseases are important factors in the development of thyroid nodules.

In this study,postoperative maintenance of patients with thyroid nodules was also crucial, and a balanced diet plan can not only speed up the recovery process of the patient but also help the patient better cope with the challenges of surgery. We cannot ignore the role of support, psychological suggestions, and psychological adjustment of family and friends. Maintaining regular routines, diet, and exercise habits can help patients to better control their diseases and improve their quality of life, which is an indispensable part of the health management of patients with thyroid nodules.

Reducing the prevalence of thyroid nodules in women remains a multifaceted challenge.Raise public awareness of thyroid health at the public health policy level, especially among women. Popularize knowledge about thyroid diseases through the media, community activities, etc. Include adequate iodine supplementation programs in public health programs to ensure that people have access to adequate iodine intake. Implement routine thyroid health screening programs, especially for high-risk groups such as those with a family history, for early detection and treatment.Promote a healthy lifestyle at the level of personal health management, such as a balanced diet, regular exercise, adequate sleep, and stress reduction. Women are encouraged to self-monitor for changes in their thyroid glands and seek medical attention if they notice a lump or abnormality in their neck. Reduces exposure to radioactive materials and avoids exposure to environmental contaminants that can affect thyroid health.Social support: Build support networks and support groups to provide emotional support and practical information to women with thyroid nodules. Mental health services are available to help women with thyroid diseases cope with their emotional distress.

Based on the above measures, the incidence of thyroid nodules in women has been significantly higher in recent years, and the etiological mechanisms are complex and diverse. Therefore, we need to work together at different levels to reduce the prevalence of thyroid nodules in women and improve the treatment effect. However, it is important to note that the success of any public health strategy requires close collaboration among governments, healthcare institutions, and individuals.

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