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# Thyroid Disorders

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## Abstract

Thyroid disorders are highly prevalent worldwide. In order to obtain a better understanding of these disorders research was done by analyzing current data and scholarly literature. Questions answered by this research comprise different aspects of thyroid disorders and their affects. What types of thyroid disorders exist? How do they affect the body and how detrimental are they when left untreated? How do these disorders affect the daily living of the individuals affected? And how are third world populations affected by these disorders? Research suggests that over 750 million people worldwide suffer from a thyroid disorder. These disorders have detrimental effects on the body's functions and metabolism. When the human thyroid is interrupted a host of symptoms can occur. These symptoms make activities of daily living a challenge. Several treatments are available, the most common being supplementation of synthetic thyroid hormone. Research shows that countries in Africa suffer from a high prevalence of iodine deficiencies. Many of these deficiencies are left untreated and lead to premature death. The most cost effective treatment is supplementation of iodine in the daily diet of the populations through iodized salt. This supplementation could decrease the prevalence of these deficiencies if implemented. This thesis will investigate the causes, distribution and treatment of thyroid disorders.

# Thyroid Disorders

Many people are unaware of the small gland in their neck called a thyroid. This organ plays a vital role in the health and wellness of our bodies. The thyroid is located in the front of the neck and has lobes. The middle portion of the gland is called the thyroid and the two lobes to each side of the thyroid are the parathyroid. The thyroid gland regulates many functions of the body and is responsible for its growth. It does this by releasing thyroid stimulating hormones into the bloodstream where they will travel to different organs and areas of the body stimulating certain functions such as heartrate, internal body temperature, metabolism, and mental capabilities. (Brunner & Suddarth 2010)

When something goes wrong with the thyroid it is extremely devastating to the body. Many things can affect this organ and cause hormone imbalances in the body. Some disorders cause the thyroid to produce too little hormone while others cause the thyroid to produce too much hormone. This causes vital organs to function incorrectly, they body's systems to deregulate, and the person to feel a plethora of symptoms.

The World Health Organization WHO recently estimated that over 750 million people worldwide suffer from a thyroid disorder. (Gharib, 2014) They also postulated that these disorders may be more prevalent than diabetes, another endocrine disorder. (Gharib, 2014) According to the American Thyroid Association 12% of Americans will develop a thyroid disorder in their lifetime. (American Thyroid Association, 2015) They also stated that about 20 million Americans currently have a thyroid disorder. Women are 5 times more likely than men to have thyroid conditions and 1 in 8 women worldwide suffer from one. (American Thyroid

Association, 2015) The most common thyroid disorders are hypothyroidism, hyperthyroidism, Grave's Disease, Hashimoto's Disease, and iodine deficiencies.

The most common thyroid disorder worldwide is an iodine deficiency. Over one third of the world's population lives in areas where this deficiency is highly prevalent. (Vanderpump, 2011) Iodine deficiencies can cause a multitude of problems with the thyroid gland. Enlargement of a thyroid or a goiter is one sign of an iodine deficiency. In many cases individuals with a goiter have hypothyroidism meaning their thyroid is not producing enough hormone to meet their metabolic needs. Countries in Africa have large populations with these manifestations. (Kalk, 1998) Due to the lack of money and medical resources many individuals go without treatment causing devastating effects to their body including death.

I personally was diagnosed with hyperthyroidism and Grave's Disease at the age of 18. Thyroid disorders are prevalent on my mother's side of the family affecting her, both her parents, and one of her parents siblings. What led me to making my initial appointment with my general practitioner was the presence of a goiter. I also had extreme symptoms of fatigue, hair loss, heart palpitations, and anxiety or agitation. I had two radiation treatments that specifically targeted my thyroid to "kill" some cells which in turn would lower hormone production. It was a month after treatment when my endocrinologist realized that too much of my thyroid had been destroyed by the radiation. I now have hypothyroidism and will take replacement hormones for the rest of my life. I didn't realize how bad I felt prior to treatment until I felt good again. I still have trace amounts of radiation in my body that will gradually go away, but more of my thyroid is being destroyed and my replacement hormone doses continue to increase. I now face the symptoms of hypothyroidism which are just as overwhelming as the symptoms of hyperthyroidism. I look forward to being completely regulated with minimal symptoms.

Thyroid disorders may go underdiagnosed due to their symptoms being misinterpreted by the individual they affect. The symptoms may be shrugged off as just being tired from a long day or manifestations of life's daily stresses. Without a request for a blood test targeting thyroid hormone levels an older adult may think they are just experiencing the aging process. A parent of a child may not think to test their children just because they have a disorder or may think a child is too young to have a thyroid disorder. It is unknown why people don't recognize the symptoms of thyroid conditions, but is known is how devastating untreated thyroid disorders can be on the health and lives of the individuals who have them.

If more people were educated on the thyroid and its many disorders there may be less cases go undiagnosed. Although it is known that thyroid disorders can affect hormone production the significance of damage to the body as a whole is varied. I intend to seek the answers to several questions by compiling data from previous and current research and literature reviews. What thyroid disorders have been identified and how do they each individually affect the body? How do these disorders affect the daily living of the person that has them? What are the most common treatments? If left untreated how detrimental are these disorders to the body? And lastly, how are populations in third world countries affected by these disorders? By looking at existing research I intend to develop a better understanding of the thyroid and what happens to the body when it isn't working correctly. I also want to understand what populations are affected and how these individuals present as this will help me in my role as a nurse in the future when treating and caring for patients with these disorders.

## Disorders

### Hypothyroidism

Hypothyroidism is a condition of the thyroid where the thyroid gland is underactive and does not produce enough hormone. (Brunner & Suddarth, 2010) This has many effects on the body because it is not getting the hormones it needs to function correctly. They thyroid controls metabolism and when too little hormone is produced metabolism is slowed down. Every system in your body starts to slow down affecting temperature, appetite, heart rate, overall energy levels. According to the National Institutes of Health around 4.6% of the U.S. population suffers from hypothyroidism. This only includes individuals 12 years of age and older. (National Institutes of Health, 2015) The University of Maryland Medical Center stated, "People who have hypothyroidism may be at increased risk for other chronic conditions including heart disease, arthritis, age-related macular degeneration, and cognitive impairment." (Ehrlich, 2015)

Hypothyroidism mainly affects middle aged women however, anyone can develop this disorder. (American Thyroid Association, 2015) It is seen in infants, children, teens, men and women. Researchers at the American Thyroid Association concluded that pregnant women that go undiagnosed or inadequately treated are at an increased risk for a miscarriage, preterm delivery, and severe developmental problems in their children. (American Thyroid Association, 2015) During pregnancy a woman with hypothyroidism may have to take up to triple the amount of their daily replacement hormones to ensure their baby is developing adequately and that all her body functions are functioning correctly while supporting another life. Congenital hypothyroidism affects about one newborn in 3,500 to 4,000 births and is the most treatable cause of mental retardation. (British Medical Bulletin, 2011)

Individuals with this disorder face a plethora of symptoms that can make each day a struggle. The first symptoms an individual may notice when developing this disorder are unexplained weight gain, extreme fatigue, and hair loss. Hormone imbalances in the body case

these symptoms to occur. (American Thyroid Association, 2015) These symptoms affect the individual in a physical way that they can see and the fatigue will affect their daily living to a point that they can't ignore it. Other symptoms that make daily tasks a little harder than normal include muscle weakness, stiffness, and aches, joint pain, swelling, and stiffness, and increased sensitivity to cold. Women with hypothyroidism may also have irregular and sometimes heavier than normal menstrual cycles. Hypothyroidism can affect a person psychologically. They may experience depression and impaired memory skills or memory retention. Other symptoms of this disorder are bradycardia or a slow heart rate and elevated cholesterol levels. (Mayo Clinic, 2015)

Myxedema is the advanced form of hypothyroidism and occurs when the condition is left untreated. This is very severe and can be fatal. There are several signs to look out for that include hypotension or low blood pressure, bradypnea or decreased breathing rate, low body temperature, unresponsiveness, and coma.

**Hyperthyroidism**

Hyperthyroidism is a condition of the thyroid where the thyroid gland is overactive and produces too much thyroid hormone. (Brunner & Suddarth, 2010) This affects an individual's metabolism and causes organs and other functions to be excited. It affects heart rate, body temperature, weight, and sleep patterns. There are several things that can cause hyperthyroidism to develop. Things like eating an excess of foods that contain iodine, thyroiditis or the inflammation of the thyroid caused by infections, Grave's Disease, taking too synthetic thyroid hormone, some tumors on the testes or ovaries, and noncancerous growths on the pituitary gland or they thyroid gland. (National Library of Medicine, 2015) According to the National Institutes of Health around 1 percent of the United States' population has hyperthyroidism. (National Institutes of Health, 2015)

An individual with hyperthyroidism had too many thyroid hormones circulating in their bloodstream causing body processes to speed up. The symptoms of this disorder can be very taxing. One of the first signs and individual may notice is unexplained weight loss. They may not have changed their exercise habits or their diet and they continue to lose weight. They may also see swelling in their neck or a knot sticking out of their lower throat. This is a goiter or an enlargement of the thyroid. It can make things like breathing and swallowing more difficult. Other symptoms that may be more noticeable than others are hand tremors and frequent bowel movements and diarrhea. Hand tremors make tasks such as cooking, folding laundry, sewing, and even using the television remote exasperating and frustrating. As an individual's body starts to speed up, they may experience tachycardia or a fast heart rate. Sometimes they can hear this in their ears. They may also be intolerant of the heat and constantly feel like they need to cool off. Some symptoms that can affect daily living and relationships challenging are nervousness, irritability, insomnia and restlessness, and mood swings. Muscle weakness and fatigue can be the most challenging symptoms due to the individual just wanting to stay in bed all day or relax preventing them from getting other things done. (National Institutes of Health, 2015)

When left untreated hyperthyroidism could turn into a thyroid storm. A thyroid storm can also develop when hyperthyroidism is poorly treated or the individual is noncompliant with treatment. Thyroid storm is an accelerated amount of thyroid hormone entering the bloodstream. It causes the individual to experience a racing and irregular heart rate, vomiting, diarrhea, fever, profuse sweating, seizures, delirium, extreme weakness, and severe hypotension or low blood pressure. These symptoms require immediate attention and emergency care. (Mayo Clinic, 2015)

**Hashimoto's Disease**

Hashimoto's Disease is an autoimmune disorder where the body's immune system attacks itself. (National Institutes of Health, 2015) In this case antibodies attack and damage the thyroid gland. This causes inflammation and interferes with hormone production. (National Institutes of Health, 2015) The thyroid may enlarge and become visible when looking at the throat. This is a goiter and may be the only sign or symptom an individual will experience for months or years prior to diagnosis. According to the Office of Women's Health in the Department of Health and Human Services Hashimoto's Disease is 7 times more common in women than in men. They also found that individuals that suffer with this disease had a higher percentage of having other autoimmune disorders. (National Institutes of Health, 2015) This disease can be hereditary and is more common in individuals where thyroid disorders run in their family. Individuals that consume foods or medications high in iodine have a higher risk of developing an onset of this disease.

Signs and symptoms of Hashimoto's Disease are very similar to hypothyroidism because the antibodies are causing to the thyroid to reduce hormone production. The causes the body's processes and systems to slow down. An individual with Hashimoto's will experience fatigue and weight gain. Their hair will start to drier and eventually thin out. They will also experience bradycardia or a slow heart rate. A temperature intolerance to cold is common and heavy and irregular menstrual cycles will contribute to this. Difficulty getting pregnant is common among these individuals. When looking at an individual with Hashimoto's Disease you will notice that they have a pale complexion and swollen face or puffy face. Other symptoms of this disease include depression, muscle and joint pain, and constipation. (Office of Women's Health, 2015)

**Graves' Disease**

Graves' disease is an autoimmune disorder where the body produces antibodies that attack the thyroid gland causing an overproduction of thyroid hormone. (Brunner & Suddarth, 2010) This overproduction of hormone causes the body's systems to speed up. This affects things such heart rate, metabolism, and mood. According to the National Institutes of Health Graves' disease is the most common cause of hyperthyroidism. It is mostly seen in women over the age of 20, but anyone of at any age can develop this disorder. (National Institutes of Health, 2015)

There are a host of symptoms that accompany Graves' disease. The majority of these symptoms are the symptoms experienced with hyperthyroidism because that is what this disease causes to occur. These symptoms include enlargement of the thyroid or a goiter, frequent bowel movements, irregular menstrual cycles, irregular sleep patterns, difficulty sleeping, thinning and loss of hair, weight loss, fatigue, difficulty getting pregnant, muscle and joint pain and weakness, tachycardia or fast heart rate, nervousness, anxiety, irritability, heat intolerance, profuse sweating, and hand tremors. There are a few symptoms unique to Graves' disease. An individual may experience changes in their vision and eye health. Graves' disease can cause tissue behind the eye to become inflamed and swollen. The eyes will begin to bulge out of the eye socket and look noticeably larger. This symptom usually resolves on its own as treatment progresses. Another symptom that accompanies Graves' disease is reddening and thickening of the skin. This can occur on the tops of the feet and shins and is usually painless. (Office of Women's Health, 2015)

When left untreated Graves' disease will cause extreme hyperthyroidism. This can develop into a thyroid storm or a large amount of thyroid hormone entering the bloodstream. If not treated immediately it can be fatal.

**Iodine Deficiencies**

Iodine is used in the production of thyroid hormone and is vital to its functioning. Iodine is not made in the body so it is essential that foods with iodine are prevalent in one's diet. When too little iodine is consumed the thyroid does not produce enough hormone to support the body's function. It will begin to enlarge and a goiter will develop due to the inflammation caused in the gland. Approximately 40% of the world's population are in areas where iodine is not plentiful in the diet. These populations are at greater risk for developing an iodine deficiency. Iodine is found in many foods; the main being iodized salt. Examples of these foods are cheese, eggs, saltwater fish, yogurt, and cow's milk. It can also be found in sea water and the soil. Countries where these foods are not plentiful have high rates of iodine deficiencies. (American Thyroid Association, 2015)

Like other thyroid disorders, iodine deficiency has a wide range of symptoms. Most of these symptoms correlate to hypothyroidism due to the lack of thyroid hormone being produced. Iodine deficiency has many effects on pregnant women and their unborn child. According to the American Thyroid Association it can cause miscarriages, stillbirths, preterm labor, and congenital abnormalities. (American Thyroid Association, 2015) Mental retardation can occur in these children which will give them lifelong challenges. Their growth and development are delayed and they can face a plethora of other health problems as they age. When an iodine deficiency is left untreated it can be extremely detrimental to one's body and eventually lead to death.

In some cases individuals with a diagnosed iodine deficiency can consume too much iodine while trying to treat their disorder. This in turn will cause the thyroid to be overactive and

lead to hyperthyroidism if iodine in high levels continues to be congested. With frequent blood tests in the beginning of treatment correct amounts of iodine intake can be determined.

## Daily Living

Thyroid hormones regulate the function of the majority of the body's systems. When there is an imbalance in thyroid hormone symptoms can occur and are wide ranging. The symptoms of any thyroid disorder can be daunting to a newly diagnosed individual. Not one disorder is easy to live with and they present new challenges every day. Activities of daily living can go from enjoyable to tiring and overwhelming. Some symptoms can be more difficult to deal with than others, but when they are all added together life can feel unbearable. Treatments can prevent and lessen symptoms, but some symptoms will be lifelong and require some adjusting to manage. (Mayo Clinic, 2015)

One symptom that is present in any thyroid disorder is fatigue. Fatigue makes anything and everything challenging. In hyperthyroidism insomnia is widely experienced and causes individuals to get only a few hours of quality sleep a night. In hypothyroidism fatigue is always present regardless of the quantity or quality of sleep received each night. Work days become much harder to get through. Focusing on school work or tasks at work become difficult. Driving under extreme fatigue is very dangerous for individuals and may require someone to take them where they need to go. Individuals may choose to leave the house less because just thinking about how much energy it will take can cause individuals to tire. Tasks like laundry, grocery shopping, preparing a meal, and cleaning require more time and sometimes assistance from others to accomplish. Along with fatigue muscle and joint weakness and pain can play into making daily tasks harder and more time consuming. Individuals may have less motivation to get out of bed in the morning.

An individual's self-esteem can be greatly affected as their body changes in undesirable ways. Unexplained weight gain is one of the first outwardly signs of hypothyroidism. Weight gain can occur quickly requiring individuals to change their wardrobe, diet, and exercise routines. Rapid unexplained weight loss can occur in hyperthyroidism and weight fluctuation may occur causing stretch marks. This may also play a role in a decreased self-esteem.

With many challenging symptoms comes psychological changes. Stress is highly prevalent among individuals with thyroid disorders. Changing routines, appearance, and sleep patterns can lead to depression. Individuals may find it hard to face their illness and the struggles they encounter each day. They may question if their life is worth living. These feelings are heightened in individuals that have less support from family and friends or those who have other people that are dependent on them. They may feel inadequate as a spouse, caregiver, friend, or child. Depression can become serious and may need attention by a general practitioner or therapist. Marian, Nica, Ionescu, and Ghinea (2009) conducted a case study on a woman that had hyperthyroidism. Their goal was to confirm depression and psychosis in individuals with this disorder. They preluded their study stating, "Psychiatric symptoms have been reported quite frequently in certain thyroid diseases, but more frequently in association with hypothyroidism. Thyrotoxicosis can be associated with various psychiatric symptoms, such as emotional lability, anxiety, restlessness and rarely frank psychosis." (Marian, et al., 2009) They found that this individual experienced heightened levels of agitation and depression prior to treatment and during the initial months of treatment when correct dosages of synthetic hormone replacement were being determined.

## Treatments

There are a variety of treatments available for thyroid disorders. The goal of thyroid treatments are to maintain a healthy level of thyroid hormone in the body to support its functions. Some treatments will require lifelong adherence. There are four main treatments for thyroid disorders. The most common treatment is hormone replacement which can be required in all forms of thyroid disorders.

Hypothyroidism, Hashimoto's disease, and iodine deficiencies are disorders where the thyroid produces too little hormone. Hormone replacement is needed to sustain the body's functions and metabolism. Levothyroxine is the synthetic form of thyroid hormone. The generic brand is called Synthroid and is the most widely used among individuals with thyroid disorders. There are constantly new brands of levothyroxine being developed. One of the newest brands is called Tirosint. Individuals on synthetic hormone replacement must take these hormones in a pill form every day. The pill is generally taken in the morning at the same time each day. Taking other supplements, vitamins, and certain medications at the same time of day is discouraged. This treatment is lifelong. If an individual stops taking their levothyroxine they risk developing severe hypothyroidism and myxedema which can lead to death.

Decreased levels of thyroid hormones slow down the body's metabolism. This has many repercussions on the health of the individual affected. One of these repercussions is an altered lipid metabolism. Disorders such as hypercholesterolemia and high circulating triglycerides, both risk factors for nonischemic cardiomyopathy. Overall this cases a higher lipid load which is a cause for cardiac dysfunction. Scherer and colleagues (2014) designed and implemented a study to determine the effects of levothyroxine treatment on lipid metabolism and overall cardiac health in individuals with decreased thyroid hormone levels. The found that levothyroxine treatment improves cardiac function by reducing lipid accumulation in the heart. Their results

stated, “Here we show that levothyroxine treatment reduces lipid accumulation in the heart and increases cardiac output in overtly hypothyroid patients. These results could in part explain the increased risk of death and heart failure in hypothyroid patients.” (Scherer, Wolf, Winhofer, Duan, Einwallner, Gessl, Luger, Trattnig, Hoffmann, Niessner, Baumgartner-Parzer, Krssak, & Krebs, 2014)

Negro and Stagnaro-Green (2014) conducted a study on pregnant women with hypothyroidism and their synthetic hormone needs during pregnancy. They stated “…the prevalence of undiagnosed subclinical hypothyroidism in pregnant women ranges from 3% to 15%. Subclinical hypothyroidism is associated with multiple adverse outcomes in the mother and fetus, including spontaneous abortion, pre-eclampsia, gestational hypertension, gestational diabetes, preterm delivery, and decreased IQ in the offspring.” (Negro & Stagnaro-Green, 2014) What they found was that pregnant women on average require 50% more thyroid hormone production during production and concluded their study saying, “Consequently, most women on levothyroxine therapy before pregnancy require an increase in dose when pregnant to maintain euthyroidism. Ongoing prospective trials that are evaluating the impact of levothyroxine therapy on adverse outcomes in the mother and fetus in women with subclinical hypothyroidism will provide crucial data on the role of thyroid hormone replacement in pregnancy.” (Negro & Stagnaro-Green, 2014)

Low thyroid levels have been linked to increased risk of depression. Researchers Chakraborty, Garda, Gowda, Goswami, and Vishnoi conducted a study to determine what effect levothyroxine treatment had on levels of depression. The determined that increasing hormone levels with levothyroxine in patients with SDH or subclinical hypothyroidism had a positive impact on the incidence of depression in participants. They measured levels of depression using

HAM-D criteria. Their conclusion states "SCH is associated with low mood and there is a positive correlation between serum TSH levels and HAM-D scores. The administration of Levothyroxine therapy is associated with significant improvement in HAM-D scores. This underlines the importance of thyroid screening in cases of low mood and also asserts the role of Levothyroxine therapy." (Chakraborty, Garda, Gowda, Goswami, & Vishnoi, 2013)

Hyperthyroidism and Graves' disease require a more detailed treatment plan. In these disorders the thyroid is producing an excess of thyroid hormone causing the body's functions to be sped up. The goal of treatment in these disorders is to reduce the amount of hormone being produced. Unfortunately, many treatments leave the thyroid producing too little thyroid hormone causing hypothyroidism. Synthetic hormone supplementation is needed in these cases. The main treatment options are radioactive iodine treatment, thyroidectomy or the surgical removal of thyroid and or it lobes, and medication that inhibits the production of thyroid hormone.

The thyroid is the only organ in the body that takes in iodine. Radioactive iodine is administered by pill and the radiation is taken up by the thyroid. Thyroid cells are destroyed causing the thyroid to shrink and in turn thyroid hormone production is decreased. This treatment has been used for over 60 years and is seen as a safe treatment option for hyperthyroidism. (Mayo Clinic, 2015) In some cases too much of thyroid is destroyed and individuals have to take synthetic hormones for the rest of their lives. In the majority of cases patients treated with radioactive iodine do not need further treatment to reduce thyroid hormone production. Danish researchers looked at a group of 873 patients with goiters and evaluated their treatment outcomes after administration of radioactive iodine. The goal of the study was to determine how many patients required a thyroidectomy secondary to treatment with radioactive

iodine. The concluded stating, "The effect of RI therapy sufficiently solved the problem (hyperthyroidism or goitre) and surgery was hence avoided in 848 of 873 (97%) patients. However, within the group of patients with nontoxic goitre, a subgroup of patients with large goitres seems to be resistant to RI treatment and does not achieve sufficient effect under the current RI therapy regime." (Villadsen, Sorensen, Godballe, & Nygaard, 2011) Overall radioactive iodine treatment was successful and a permanent treatment for overactive thyroid in individuals with a goiter.

Anti-thyroid medications are also a popular form of treatment for overactive thyroid caused by Graves' disease. These medications reduce the amount of hormone produced over time. Treatment typically lasts 12 weeks, but can continue for many months. Some individuals may need one course of treatment to permanently reduce their hormone levels where others may need several treatments to obtain safe hormone levels. There are some adverse effects from these medications and for that reason they are not as popular as other treatment options. These medications are known to cause liver damage. In some cases the damage was severe and lead to death. (Mayo Clinic, 2015)

The final treatment option for overactive thyroid is a thyroidectomy or surgical removal. This can be removal of the thyroid, the parathyroid lobes, or both. After surgery hormone replacement is started immediately. (American Thyroid Association, 2015) Compared to other treatments surgery has some advantages. One of these advantages is less weight gain directly after treatment. Schneider, Nookala, Jaraczewski, Chen, Solorzano, and Sippel conducted a research study comparing weight gain amongst patients that were treated with radioactive iodine and a thyroidectomy. They found that patients with a thyroidectomy gained less weight after treatment and concluded saying, "Compared with patients initially treated with RAI, patients

with hyperthyroidism who underwent surgery as the first treatment were less likely to become overweight or obese postoperatively." (Schneider, Nookala, Jaraczewski, Chen, Solorzano, & Sippel, 2014)

## Deficiencies in Africa

Iodine deficiencies are a large problem in third world countries. Many countries in Africa lack a diet rich in iodine. (Kalk, 1998) Imported resources can be hard to come by for a large portion of the population. Lack of government funding puts a strain on medical availability for these populations. Research is mainly done in larger more economically stable countries. The majority of the population's families cannot afford medical treatment and are not exposed to education on thyroid disorders. Goiters are highly prevalent among these individuals. Large portions of the affected population are left untreated and eventually die due to complications from their disorder. The most cost effective treatment to treat large populations with an iodine deficiency is introducing iodized salt into the common diet and making it more readily available. With the lack of education and financial resources many individuals will never know that they have a disorder that could end their life and they won't seek treatment. According to W. J. Kalk and the South African Medical Journal (1998) this was recognized and a major problem in the South African population. In an attempt to reduce the prevalence of iodine deficiencies the made changes to their salt production. Kalk wrote, "Since the December 1995 legislation, all salt manufactured in South Africa must contain potassium iodate. Such supplementation is likely to cause a small increase in auto-immune thyroid disorders. This negative effect is slight in comparison with the potential benefit to millions." (Kalk, 1998) Since this report iodine deficiencies continue to be highly prevalent in other African countries.

## Conclusion

Thyroid disorders are highly prevalent worldwide and affect millions of individuals. Whether it be too little hormone in disorder such as hypothyroidism, Hashimoto's disease, and iodine deficiencies or too much hormone in disorders such as hyperthyroidism and Graves' disease they cause detrimental effects to the body and can be fatal when left untreated. In the clinical setting thyroid disorders can be expected to be seen more often in elderly patients. The reason for this is stated as, "The higher prevalence of hypothyroidism among elderly people may be related to alterations in immune function with age and complicated by multiple comorbidities." (Brunner & Suddarth, 2010) The symptoms of these disorders can be unbearable and may lead to psychological changes and depression. Life can become a struggle and assistance may be needed for individuals to accomplish activities of daily living. With the correct dosing of synthetic hormone replacement individuals can live fairly normal lives. Adherence to this treatment is lifelong and crucial to body functions such as metabolism, body temperature, and heartrate. Symptoms of these disorders may not permanently cease with treatment, but they will diminish and be manageable. Third world populations continue to suffer from untreated thyroid disorders mainly caused by iodine deficiencies. This problem has potential to decrease if iodine supplementation is implemented in the daily diets of these populations by the manufacturing of iodized salt.

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