Historical Overviews of Thyroidology in Georgia

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Abstract

Background: Thyroid gland diseases are a topical medical and social problem of modern society. Thyroid gland disorders are the second most prevalent disease among endocrine abnormalities after diabetes mellitus globally. Development of thyroidology was influenced by different civilizations. The description of thyroid gland diseases in historical sources is an illustration of the tight connection between basic and clinical sciences. Thyroidology is one of the very crucial fields of modern endocrinology and it is also well-developed in Georgia.

Aim: to study the history of the development of thyroidology in Georgia.

Methods: Desk research is conducted to review the empirical evidence on the development of thyroidology in Georgia, to identify the main drivers and key actors of the process and analyze their roles in the development of thyroidology in Georgia. The search for relevant publications with the above-mentioned keywords is conducted in the following databases: PubMed, ScienceDirect, Medline, Cochrane Database of Systematic Reviews, and Google Scholar. Literature is searched in January-September 2022. The language of publications is limited to English, Georgian, and Russian.

Results: Evidence-based publications about the development of thyroidology in Georgia were /.,m

Conclusions: Georgia is situated in cross broader of many countries. The development of medicine in Georgia was influenced by the different cultures and civilizations. At the same time, the development of thyroidology in Georgia is also affected by the local factors and health needs of the local population. **TCM-GMJ March 2023; 8 (1):P17-P21)**

Keywords: Thyroid gland, Georgia, Thyroidology, goiter, Qiqvi, Iodized salt,

Introduction

Thyroidology, the study of the thyroid gland, is a relatively important field of endocrinology. However, the thyroid gland has been known for several centuries. It was described back to ancient Chinese, Indian, and Egyptian writings (1, 2, 3). Galen, a renowned Greek physician, first described the anatomy of the thyroid gland in the first century AD (4). Also, early depictions of goiters can be found in holy Byzantine paintings from the ninth century AD (5) as well as sculptures from the Gandhara culture in what is now northern Pakistan from as early as the second century AD (6). Vesalius provided a detailed description of the organ in 1543; he thought it was made up of two distinct sections (7). The thyroid was given its name in 1656 by Londoner Thomas Wharton (1617–73), from the Greek word thyreos, which means "oblong shield“ (8). Since the invention of the microscope, the thyroid's histology has been researched. It was discovered that it was made of cubical cells and colloid-containing vesicles. The concept that the vesicles were interacting with one another was disproved in 1841 by German scientist Heinrich Bardeleben (1817–1955) (4).

The description of thyroid diseases in the historical sources is an illustration of the tight connection between basic and clinical sciences. The anatomy of the thyroid could be depicted as dissection became more accessible, and Leonardo da Vinci created the first in-depth pictures (9, 10). After the Middle Ages, goiters were frequently shown in sacred and secular art (11,12). The location of the thyroid contributed to the belief that the function was either as a protector of the larynx or an esthetic filler to make the neck more beautiful (13, 14, 15)

The achievements of the earlier scientists shouldn't be overlooked, even though the majority of 19th and 20th-century scientists are credited with discovering the thyroid gland and its diseases.

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In 1909, the Nobel Prize in Medicine or Physiology was awarded to Swiss surgeon Emil Theodor Kocher, for his work in thyroidology. He had innovated many techniques in hernia, osteomychtis, dislocations, the use of silk sutures, sepsis, and thyroid surgery. He observed postoperative hypothyroidism in his thyroidectomy patients. Dr. Kocher remains the only winner of the Noble Prize for work done in thyroidology (16). The understanding of the physiology of thyroid hormones in metabolism, the description of the role of iodine, the implementation of public health programs for iodine supplementation to prevent goiter, and the use of thyroid hormone replacement—first with animal extracts and then with synthetic levothyroxine developed in 1927—all occurred during the late 19th and early 20th centuries. These were followed by the creation of radioactive iodine and thiouracils as a non-surgical treatment for hyperthyroidism (17, 18).

One of the famous scientists David Marine (1880-1976), proved that iodine is necessary for thyroid gland function. Later, he treated Graves' disease with iodine (19). It should be noted that although the universal and absolute validity of the iodine-deficiency theory has frequently been questioned, to date no serious objection has been raised against iodine prophylaxis, concluding this historical survey—which does not claim to be a comprehensive study of the subject. There are studies on the beneficial effects of iodine prophylaxis from all over the world, and if this approach were widely implemented, it would seem plausible at least to accomplish a significant reduction in endemic goiter in the world, if not to eradicate it. This calls for focused effort and a protracted, coordinated follow-up of the effectiveness of prophylactic treatment, nevertheless (20).

Thyroid gland diseases are a topical medical and social problem of modern society. Thyroid gland disorders, after diabetes mellitus, are the second most prevalent diseases among endocrine abnormalities, according to figures provided by the World Health Organization. More than 665 million individuals worldwide experience endemic goiter and other thyroid gland conditions, according to the WHO. The prevalence of thyroid gland problems is thought to be rising by about 5% annually. In economically developed nations, there has been a 51.8% increase in incidence in women's new diagnoses of thyroid gland illness and a 16.7% increase in incidence in men's diagnoses over the past five years (21). The present paper aims to study the history of the development of thyroidology in Georgia.

Methodology

Desk research is conducted to review the empirical evidence on the development of thyroidology in Georgia, to identify the main drivers and key actors of the process and analyze their roles in the development of thyroidology in Georgia. For the analytical appraisal of thyroidology and the following keywords and word, combinations are used: thyroidology, thyroid gland, development of Georgian medicine, goiter. Synonyms and variations in spelling are considered. The search for relevant publications with the above-mentioned keywords is conducted in the following databases: PubMed, ScienceDirect, Medline, Cochrane Database of Systematic Reviews, and Google Scholar. Literature is searched in January-September 2022. The language of publications is limited to English, Georgian, and Russian. The search process excludes publications that provide only a general discussion of the development of thyroidology. Grey literature studies and informational papers are also captured. Publications are identified as relevant if they present empirical evidence and original analysis results.

Results and discussion

There is limited literature about the development of thyroidology in Georgia. The initial search yielded 25 articles and reports in Georgian, 15 in Russian, and 10 in English. Evidence-based publications about the development of thyroidology in Georgia were searched. Most of the articles and reports only described ancient documents and medical books, also achievements of modern medicine in the field of thyroidology. The documents also included discussions and authors' perceptions about the achievements and challenges of thyroidology. These articles and reports were excluded from the review. Only 15 articles and reports in Georgian, 8 in English and 2 in Russian met the relevance criteria (provided empirical evidence) and were included in the literature review. , We divided the major findings reported in the publications, into the following sub-groups: (i) ancient Georgian manuscripts, sources representing the development of Georgian medicine, that consist also information about pathologies of thyroid glands, (ii) Russian and Georgian documents that include the development of thyroidology in Georgia during Soviet period and (iii) Georgian and English documents cover the post-Soviet period and presents short description of the current situation in thyroidology in Georgia. Each sub-group is discussed separately.

Georgian traditional medicine, also known as Georgian folk medicine, was developed at a crossroads of the East and West, combining the fundamentals of both medical systems. The history of Georgian medicine is presented in "Karabadine" which is the general name of the ancient Georgian "Doctors' or Treatment Books" (22). The first information about the phytotherapeutic treatment of goiter was presented in16th-century medical encyclopedia titled "Iadigar Daudi" - Georgian: იადიგარ დაუდი (23). "Qiqvi" is an old Georgian word and means thyroid gland. According to Karabadine, the treatment of goiter was complex and a mix of natural remedies and various magical and religious processes (23). Special spells and folk remedies for the goiter treatment are described in the Karabadines, for example in the Adjara region special magic spells were used to treat Qiqvi and other health-related problems (24). In old manuscripts, we found information about a royal family member who suffered from goiter or Qiqvi problems in the 17th century. The same source clarified that the treatment was done but the diseased person

died (25). Vakhushti Bagrationi, in the manuscript published in 1745 "Description of Georgian Kingdom" first time described widely spread Qiqvi problems. "In the valley between rivers Rioni and Tskhenistskali, it is observed that some men and women have in the front next quite big formation that they are calling Qiqvi"- wrote Batonishvili in his manuscript (26).

At the end of the 19th and the beginning of the 20th century, endemic goiter and cretinism were identified as a problem by researchers in the mountainous areas of the country. Doctor Pantiukhov traveled and studied the spread of the goiter in Georgia. He identified the main endemic areas such as Svaneti, Racha, and the areas near river Tskhenistskhali, Rioni and Enguri. All three rivers originated from the Caucasus ridge, namely mountain Fasi. In eastern Georgia endemic area was concentrated near the river Aragvi. According to his manuscripts, he wrote the following regarding the spread of cretinism in Racha-Svaneti; the physiological type of the inhabitants near the source of the River Rion and its branches changed: their faces are disfigured, and senseless, and their mental development was severely impaired (27).

Later, a Georgian ethnographer and folklore scientist Tedo Sakhokia, in the manuscript described that in some regions of Georgia people, mostly men suffered because of goiter. He also discussed that the Qiqvi problems were related to the lack of soda salt in the water and the lack of iodine in the soil (28).

During the Soviet period, it was recognized that Georgia is a goiter endemic area. In 1921, the action plan to fight the goiter endemic was worked out. Geographical, pathomorphological, and clinical aspects of goiter were assessed. Tbilisi State University and the best researchers were involved in the large-scale research works. In the first stage, the medical-geographical, sanitary-hygienic, pathomorphological, and clinical aspects of gout were studied. And in a complex way with it - sanitary-hygienic and household conditions, drinking water consistency, nutritional factors, infestations, and other contributing factors to the development of endemic goiter were studied (29). A large scientific-research mission was launched in Georgia to study the spread of goiter. Tbilisi Faculty Surgical Clinic was the main base from which clinic employees/researchers went on scientific missions. During that time the causes of goiter were not identified, and some scientists thought that the reason might be water, and some thought it might be related to soil or air. In 1925, the research was expanded to the whole territory of Georgia. The new areas of Goiter were identified and as a result, it was stated that the goiter was a health problem not only in the western but also in eastern Georgia (29). In 1929, the special committee fought the spread of goiter. In the same year, the head of the committee for the fight against goiter published the manuscript in the journal "Tanamedrove Medicina". In the manuscript, the evidence about the spread of goiter was discussed, namely, the author mentioned that goiter was spread homogenously in western as well as in eastern Georgia. Later new evidence was established about already established and new endemic areas. As a result, a map with 37 endemic areas from the country's 72 administrative entities was developed (30).

According to historical sources, in 1935 scientists made a great contribution to the study of endemic goiter issues. The Republican clinic and the national commission for fight goiter were established The same year an important article was published, in which the author noted that the prevalence of goiter in Kvemo Svaneti was 43.6% (30). That was the time when the first republican clinic to fight goiter and the first Soviet journal "Soviet endocrinology" was launched. Since that time scientific manuscripts on goiter endemic and new treatment methods were published. Later the clinic to fight goiter was also established in the Adjara region as the area was endemic. Also, small clinics and ambulatories were established in rural palaces. Massive screening and conservative and surgical treatment started in the country (31).

Iodine prophylactic measures were introduced in the later 40s of the last century. Georgia was one of the pioneers in the field of iodine prophylactic. It was an important stage for the prevention of goiter and cretinism development. One of the preventive measures was related to the distribution of Iodized salt. The first artisanal production of iodized salt was started in Nalchik, Russia in 1934.Later based on this experience, the production of iodized salt started in Georgia, in Kutaisi-in Imereti region. From this region, iodized salt was distributed in all regions of the country, and the endemic areas were supplied. As it is revealed by the sources, the establishment of the manufacturer in the Imereti region supported the reduction of the spread of goiter in Qvemo Svaneti. the prevalence was reduced from 42.7% to 14% over six years, from 1938 to 1944. The medical staff is involved in the implementation of Iodine prophylactic measures in Qvemo Svaneti was awarded the special honors medal (30).

The stable supply of endemic areas by Iodized salt and mandatory prophylaxis of children, pregnant women, and lactating women by antiserum reduced the cases of goiter. Improvement of social-economical, hygienic factors and healthcare determinants supported improving the population's well-being and reducing the spread of goiter in Georgia. The scientific and health service work provided during the above-mentioned decades was significant (30).

For a better understanding of the development of endemic areas and the high prevalence of goiter, in 1949, researchers started to study iodine balance in nature. The research stated that there was a correlation between the spread of endemic goiter areas and fresh water. The research was led by the Moscow Biogeochemical Laboratory named by Academic A. Vinogradov. During this period, a lot of scientific manuscripts were published among them was also the manuscript "the distribution of pure water in Zemo Svaneti, collation between pure water and goiter endemic". That work described the research that was done in Svaneti, where 47 samples of drinking water were taken from endemic areas. As it was revealed that in goiter endemic areas drinking water consistency of iodine was significantly less compared with the villages outside of endemic areas. It also revealed that in the villages where wa-

ter consisted of iodine prevalence of goiter was significantly low (31). During the same period, another study for the comparison of biogeochemical conditions of western and eastern Georgia. This study proved the connection among environmental factors, iodin balance, and prevalence of the goiter (31).

After five decades of hard affords, endemic goiter was eliminated in the early 1970s. Significantly reduced prevalence of cretinism and myxedema. The achievement created the illusion that Georgia is not a goiter-endemic country. Misconceptions and the abolishment of the production of iodized salt worsened the situation. That was followed by several strategic mistakes, namely the production and utilization of iodized salt, and the closing of the specialized goiter clinics (32). As a result, the prevalence of thyroid gland pathologies increased during the 80s of the last century (32).

On April 26, 1986, the Chernobyl disaster happened. As a result, iodine, cesium, plutonium, and strontium radioisotopes were among the radioactive compounds that were released during the tragedy (33). Even though the radioactive contamination of the territory of western Georgia, particularly that of the Black Sea coastal region, had been much higher than in some regions of Belarus and Krasnodar, the radioactive contamination of the territory of Georgia because of the Chernobyl0 accident has never been a topic for consideration by Soviet and international societies. The radioactive background on some parts of Georgia's Black Sea coast increased 100,000–500,000 times after the Chernobyl disaster (34, 35).

In the early 90s of the last century, the collapse of the Soviet empire was related to the economic and social collapse of the country. The new reality affected the functioning and development of the healthcare system (36). It was observed that problems with the thyroid gland increased after the Chernobyl disaster. The significant increase in goiter and other types of thyroid gland problems was approved by various studies in the 90s. Also, it was noticed that the incidence of goiter among children increased (32).

In the late 90s, UNICEF conducted an epidemiological study on iodine deficiency in eastern European countries, which explored that the frequency of goiter varied from 36% to 93% among children in Georgia. Also, the level of the Thyrotropic hormone was higher than 5mc/ml among 65% of newborns (37). During the same period, namely in 1995-98, the head of the republic endocrinology center, Z. Sekhniashvili organized the expedition in the various regions of Georgia. The expedition studied the prevalence of goiter among 6-12 years old children and revealed severe iodine deficiency. Based on study findings the State health programme for the prevention of disorders caused by iodine deficiency was established. Since 1997, the programme was managed by the Tbilisi iodine deficiency prophylaxis center. Later, in 2002 the center was renamed and called the National Nutrition Center of Georgia. During the 1997-2007 years period, the center actively was involved in the development of laws for prophylaxis of iodine deficiency (31).

In 2004, the committee of the Georgian parliament developed an action plan for adapting the law of salt iodization. During the same period, the following project on the study of radiation background in Georgia was conducted. In 2005, the president of Georgia issued a decree on additional measures to reduce disease caused by iodine deficiency in the population of Georgia. Later, the law was adapted, and based on this the State national programme was introduced (38).

As already mentioned above, Georgia's mountainous areas have a long history of being goiter endemic hotspots. Some studies indicate that iodine shortage was a contributing factor in the South Georgian population's high index of spreading endemic goiter. Inadequate eating is another factor contributing to the prevalence of thyroid gland dysfunction in the nation (39, 40, 41). Besides goiter and other pathologies of the thyroid gland such as thyroid cancer increased during the last decades (42).

A malignant tumor in the thyroid gland's epithelium characterizes thyroid carcinoma, an oncological condition. Given that it makes up more than 1% of all oncological diseases and affects more women than men, this illness is highly prevalent. Between the ages of 40 and 60, middle-aged persons are most frequently affected by the condition. The likelihood of a complete cure is over 90% with prompt tumor identification and therapy initiation (43). It is notable that worldwide females have increased in the prevalence of thyroid gland cancer. The same situation is observed in Georgia as well. Thyroid cancer incidence rates among women have been second only to breast cancer during last few years, according to the National Cancer Registry. Moreover, the thyroid cancer incidence in Georgia was higher than in neighbouring countries such as Ukraine and Moldova or in the European Union. It is observed that there has been a significant rise in cases of thyroid cancer in women reported since 2015 (44, 45, 46).

The Georgian government has made efforts to enhance cancer management, prevention, and surveillance. To enhance cancer surveillance, a population-based cancer registry was established in 2015, and in 2017 the National Strategy for Prevention and Control of Noncommunicable Diseases and a four-year action plan were approved. Local action has been added to national leadership. The Municipal Department of Healthcare and Social Services at Tbilisi City Hall has implemented several initiatives, including cervical, breast, and colorectal cancer screenings as well as a thyroid cancer management program (44). However, there isn't a common or regular screening procedure for thyroid cancer. The patient may not live longer even after undergoing thyroid cancer screening (47). Clinical trials are examining thyroid cancer screening tests and it was revealed that by screening for thyroid cancer, it may be possible to find malignant thyroid nodules that are curable early on before the disease spreads to other parts of the body. If treatment is started right away, it may be more beneficial and cause less harm than if it is started later. False-positive screening findings could result in unneeded diagnostic tests, which could be harmful. Due to its ability to identify very small and/or indolent tumors that may never have an impact on a person's morbidity or death, screening may also lead to overdiagnosis (48, 49) Overtreatment may result from overdiagnosis (50). Based on the above-mentioned evidence, WHO and other international medical and public health institutions do not recommend the implementation of a

population-based thyroid cancer screening programme (46, 48, 49, 50).

Conclusions

Georgia is situated in cross broader of many countries. The history of Georgian medicine was influenced by different cultures and civilizations. At the same time, the development of thyroidology in Georgia is also affected by the local factors and health needs of the local population. Georgia's mountainous areas have a long history of becoming goiter endemic areas. Manuscripts indicate that iodine shortage was a contributing factor in the South Georgian population's high index of spreading endemic goiter. It is significant to mention that the efforts to manage thyroid gland disease were relevant to the time.

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