

# Design Validation of a Complete Thyroid Awareness Software

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**Abstract**—1. **Background:** In recent times thyroid disease has emerged as a significant public health problem in Bangladesh which is currently a considerable burden on the society as a whole in the healthcare sector. So after thinking about all the public and talking to thyroid patients we implemented our prototype through which the public can be aware about thyroid. And they will benefit in many ways by using our prototype interface. And quality of life will continue to accelerate.

2. **Research problem and objective:** Although thyroid disorders have become a major problem and little is known about them in public health and initiatives need to be taken around the world to increase and support them through may be able to eat and drink and so that primary solid types may be more encouraged General patients and they need to have much more knowledge to take as much of this thyroid.

3. **Methods:** We are able to employ a multidisciplinary approach that includes patient-centered research community programs and educational discussions to achieve our main goals. More emphasis is placed on reaching out to the underprivileged general public. Community outreach concerns include organizing seminars and conducting seminars. This information helps us create support and educational materials that are more specifically tailored to each patient

4. **Key Results or Justification:** As a result of our efforts we have been able to have a significant increase in the awareness and understanding of thyroid disease in the target population through early detection and surety of various symptoms and recognition of thyroid health management. Experience and advice through our patient-centered research will be revealed indefinitely, guiding us to tailor interventions tailored to meet individual needs.

5. **Conclusions:** Thyroid awareness is an important step we can take towards increasing the various outcomes of thyroid disease in the general population, according to various projects. We are very serious about advancing this ongoing effort in research and education to increase health awareness and quality of life for those affected by thyroid disease.

## I. INTRODUCTION

### A. Background

What we can see is that many people in this world are suffering from very chronic diseases that are different. Both their health and population systems are very important. Their health committees can be very serious. We plan to employ strategies so that we can integrate more patient-centered research programs, research resources, and different teaching and learning strategies. Educational initiatives should create and distribute various educational resources through social media through website information and unique channels reaching out to disadvantaged communities. Explore the needs and difficulties experienced by thyroid patients through research surveys and various interviews One of the main components of our approach is to promote a variety of resources, especially through active engagement with communities in these marginalized areas. We act as a very important and instructive place where we encourage early recognition. We post various support groups that help people with thyroid disease manage their condition better. You stay with us To better target our

efforts to the needs of thyroid patients, we conduct patient-centered research through surveys and interviews about the needs and experiences of thyroid patients, and it is essential to do so. Help support areas that call for new and additional resources from a patient perspective. Because this research is so flexible and ongoing, we are able to update and refine different strategies as both real-world feedback and new paradigms in thyroid care to understand the barriers to efficient and diagnostic treatment. Preliminary results from this effort suggest that the general public and medical professionals are becoming more aware and health conscious about thyroid disease. People are more likely to consult a doctor when they feel goals and when they are aware of their illness they are more likely to follow the doctor's plan. Patient education is being used for the minister so that the patient is very well informed. Thyroid awareness projects may use social media in the future to increase awareness by adding more digital tools and platforms to developing mobile applications for thyroid health and management. To ensure that our efforts are as successful and comprehensive as possible, we want to work more closely with international thyroid organizations to coordinate our resources and strategies around the world.

#### B. Motivation

Awareness of thyroid disease and encouraging the public to take care of thyroid disease is very important. Many people don't know much about thyroid disease. So our main aim is to understand and create awareness about how important thyroid is for overall health. The thyroid helps regulate things like our energy levels, metabolism, hormones, and affects how we feel every day. We try to learn from those who have faced thyroid problems and take their experiences and present it to the public so that people understand that it is possible to deal with this problem and we are all on their side. When we can highlight the causes and preventions of thyroid disease in humans, people will be interested to learn more and be aware of this disease.

#### C. Problem Statement

Despite the importance of thyroid disease in global health care, it is often underrepresented and despite the fact that millions of people worldwide are affected by thyroid disease, there is a great lack of understanding and awareness surrounding its position. People with thyroid disease face various barriers like unemployment, insufficient funds for treatment and social marginalization etc. Besides, one of the problems is the lack of reliable information, most of the patients do not know about the causes, symptoms, remedies of thyroid disease. So we need to solve this problem by harnessing the power of technology and innovation and through collaborative efforts between researchers, technologists and community stockholders we will be able to solve this disease problem.

#### D. Objective And Contribution

As the prevalence and prevalence of thyroid disease is high in our country so when the user first enters our prototype he

will know about thyroid disease awareness and since there are many types of thyroid disease such as hypothyroidism, hyperthyroid thyroid cancer etc he will know and be aware about them. As children and pregnant women in our country are more affected by thyroid disease, special emphasis has been given in our prototype for them. Besides, we are providing a serious game in our prototype so that users can become aware about thyroid disease by playing this game. Besides, we have an app called Medicine Reminder so that users can set an alarm and take their medicines on time. We take experiences and advice from those who have already dealt with thyroid disease that we can convey to other users through stories. Besides, we will organize various programs and try to make people aware by making awareness videos.

## II. RELATED WORKS AND LITERATURE REVIEW

A. Before making this paper we have studied various papers related to thyroid. It has looked at various aspects such as ethnographic research, health interventions, environmental variables that affect the thyroid. The work of those papers is mentioned below: [1] Thyroid Disorder in Bangladesh: An Epidemiological perspective written by A.B.M Kamrul Hasan published in 2023. [2] Thyroid disorders in Khulna district: a community based study. written by A.K Paul, S Rahman Miah, A A Mamun, S Islam in 2006 [3] Hypothyroidism in Bangladesh: Is Autoimmunity the Next Big Threat? written by M A Hannan, A B Kamrul-Hasan, M N Karim, S Selim in 2022. [4] Approach to management of hypo and hyperthyroidism in Bangladesh: a nationwide physicians' perspective survey written by Shahjada Selim, Marufa Mustari, Tawshique Ahmed Khan in 2024. [5] Iodine deficiency disorders in Bangladesh. written by Iodine deficiency disorders in Bangladesh in 1996. [6] Knowledge, Attitude, And Practices Towards Thyroid Risk Of Women: A Study In Barishal . Written by Taslima Aktar Rani, Md.Ohidur Zaman, Md.Tanvirul Islam in 2020. After reading these publications well, we started working on the public interest initiative by understanding the thyroid of Bangladesh. And for this we are collecting data with the public through surveys, interviews, focus groups and working on how to make people aware of thyroid.

B. The Research gap In our project we try to talk to users through surveys, interviews, focus groups and diaries. And try to understand their point of view. By doing this, the understanding with the user is better and the current health is understood. These individuals serve as blueprints for empowering the rest of the public. We will also try to improve user feedback by adding a virtual chat box interface to our prototype. Besides, we will try to establish the foundation of thyroid prevention among the masses by using our tradition and culture.

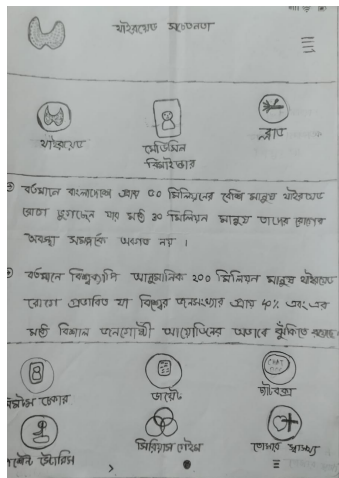


Fig. 1. paper prototype

### III. METHODOLOGY

The threat of thyroid disease is getting longer in Bangladesh, especially in the busy metropolis of Dhaka. Every time panic and anxiety arise in every patient of this thyroid disease. So we are trying to talk to thyroid patients to make them aware and remove the fear of this thyroid disease and try to know what their needs are. One of them is Ethnographic research like we know from them according to user behavior, culture, environment. Trying and trying to make them aware. Besides, we are trying to talk to the public through surveys, interviews, focus groups and diaries to make them aware.

#### A. User Research and Design

Need Finding - Persona Development - Iterative Design

We are focusing on personality development by talking to them. We are working on how to address the cultural and social aspects of their socio-economic development along with the meaning of their lives. We developed our prototype a chatbot interface for thyroid health awareness And we are trying to understand their expressions by talking to the users and trying to make them aware of what to do and how to prevent them from this thyroid disease. Cultural sensitivity: We have designed our user interface using our cultural heritage so that users can be aware of their linguistic preferences.

#### B. Paper Prototype

As the number of thyroid diseases is increasing in Bangladesh and mothers of babies and newborn babies are more affected by this disease, we thought of everyone and we first developed a paper prototype called Thyroid Awareness which will contain all kinds of information. Thyroid can be of different types like hypothyroidism, hyperthyroidism, thyroid cancer etc. We will analyze each of these classifications of thyroid such as thyroid awareness, causes, symptoms and remedies etc. In addition, we will put an interface called Medicine Reminder in our prototype where the user can set

when to take medicine by setting an alarm. In addition, we will put an interface called Symptom Checker in our paper prototype where the user can come and check the symptoms of thyroid. We are putting an interface called diet in our paper prototype where thyroid patients should maintain their diet list. And how to avoid thyroid disease they will maintain a food list. In addition, our prototype will have an interface called Chat Box and interface called Patient Stories and Thyroid Puzzle. Where each interface will have different functionality. And by using which the user will benefit and be aware.

By editing our paper prototype survey form, we tried to know from each user what things need to be implemented in our prototype. Or what things can be implemented that will benefit the general public and make them aware of thyroid disease. Besides the survey form, we tried to conduct one-to-one interviews with thyroid patients and group them together to collect group-wise data. Then based on all user input we start working on our prototype implementation

#### C. Development of the Conversational Agent

Natural Language Processing - Knowledge based development - Personalization

We blend responsive and empathetic virtual artificial intelligence into our interactions with users for thyroid awareness. This chatbot is trained to understand the nuances of the Bengali language, and ready to address all your questions and concerns regarding thyroid health. By using this chatbot the user can know if he has symptoms of thyroid disease. And will know everything what to do for treatment. This chatbot provides personalized responses generated by the AIL algorithm instead of a simple manual, and ensures that all of your thyroid's guidelines are followed.

### IV. PROTOTYPE IMPLEMENTATION

We built our prototype with Figma. First we made a paper prototype and then we made our final prototype based on all the data and all the suggestions from the users. Since most of the people in Bangladesh are mobile phone users, we used our prototype as a mobile phone frame. And later we will implement it with Flutter and add the backend code with it. Our prototype used entirely shades of blue and green. So that there is no effect on the eyes. And so that even color-blind people can see it. And we used full Bengali in our prototype. So that all public can be aware about Thyroid Disease by easily reading this prototype of ours.

Home page will come first after user login. Home page brings together all the features of our prototype like thyroid key, all types of thyroid and medicine reminder, symptom checker, diet, chat box, Thyroid puzzle etc. Then, whenever the user needs the interface, he can enter the interface and act accordingly.

Thyroid : If the user wants to know more about thyroid and there are many people in Bangladesh who don't have



Fig. 2. Home Page



Fig. 3. Thyroid

enough idea about thyroid then our interface is for them. As we know, thyroid is a gland in the human body. which looks like a butterfly. It lies below the voice box in the middle of the throat and surrounds the trachea. It is an immune gland. The thyroid gland produces hormones that affect all body processes. There are many different types of thyroid disease. One of which is hypothyroidism, which occurs when the thyroid gland produces too much thyroid hormone. This condition is called thyroid. Hypothyroidism accelerates the body's metabolism, which can cause many symptoms such as weight loss, hand tremors, and a fast and regular heartbeat. Another type of



Fig. 4. Medicine Reminder

thyroid is hyperthyroidism which is called underactive thyroid. It is more affected when the thyroid gland does not produce enough thyroid hormone to meet your body's needs. Apart from this, there is a risk of death for the thyroid as well as thyroid cancer. A statistic of 2006 showed that about 15 percent. of people in the country are suffering from this thyroid disease, among which 26 percent. are school going people. As the prevalence of thyroid disease is high, we all need to be aware and work together. And any new variant of thyroid disease we will update on our interface and try to make the public aware.

**Medicine Reminder:** When a user wants to enter the Medicine Reminder interface, he must create an account after creating an account. They can set alarms for all types of thyroid related drugs. Since many people from children to the elderly are affected by this thyroid disease in Bangladesh, it is not possible for all of them to remember when and what time to take all these thyroid medicines, so this interface is created thinking about everyone.

**Blood Test:** In our interface, users can save all their thyroid related blood tests and other test reports. If the user wants to do the test, how many points are coming and what time the test was done, he can keep this store. And later he can proceed with further treatment with this information.

**Symptom checker:** We are trying to communicate with our user based on artificial intelligence in this symptom checker interface. And predicting if they have thyroid based on their symptoms. We are trying to talk to the user through various questions such as: are you male or female, how old are you, do you game less even on hot days? Do you feel tingling, buzzing or burning for no reason, do you have to clear your throat regularly while talking or singing, do you have dry skin, do you suffer from leprosy or digestive problems. Are you gaining weight for no apparent reason, have your movements become



Fig. 5. Blood Test



Fig. 6. Symptom checker

slower, do you feel that the skin on your hands, elbows or arms has thickened, do you have any swelling on your face, Through more than one such question, we try to predict his thyroid disease through a conversation with the user.

**Your Health:** A statistic of 2006 showed that about 15 percent of people in the country are suffering from thyroid disease, among which 10.5 percent. of people have IDG which means throat swelling at some point in their life. And about 26 percent of school students in the country are affected by this IDG disease and every year one in 2300 new born babies are born deformed due to thyroid disease only which is 0.5 percent. of the total population of Bangladesh which is 40



Fig. 7. Your Health

to 50 lakh children. And one study showed that the mother of the newborn baby is more affected by the disease along with the baby. So thinking about all the users such as mothers of newborn babies, parents, pregnancy etc. separately for all thyroid disease awareness, how we can avoid thyroid disease, prevention methods, causes of thyroid disease are analyzed here. And according to the new variants of thyroid disease we will try to update our interface constantly.

**Serious Game(Tyro Puzzle):** In our prototype we have implemented a serious game called Tyro Puzzle. So that user can be aware about thyroid by playing games and learn about thyroid. Before entering the Thyro puzzle interface, the user must open an account. And before playing the game, the user can go to our rules option and read all the rules. As our main objective is to inform the user about thyroid through playing the game and to make the user aware about thyroid, so before each step of the game we ask the user to know about thyroid, only then he can play the game and if he can't give the correct answer, we will give him the correct answer. Will provide so he can learn about thyroid and take it to the game later. Thus, before each step of the game, we will ask the user about the thyroid. Provide the user with the correct answer about Thyroid. And let the user play the game and if the user wants to see his given score from the scoreboard.

**Chatbox:** We have created an interface called chatbox with the help of artificial intelligence in our prototype. So that users can share with us all their opinions, interests etc. We provide



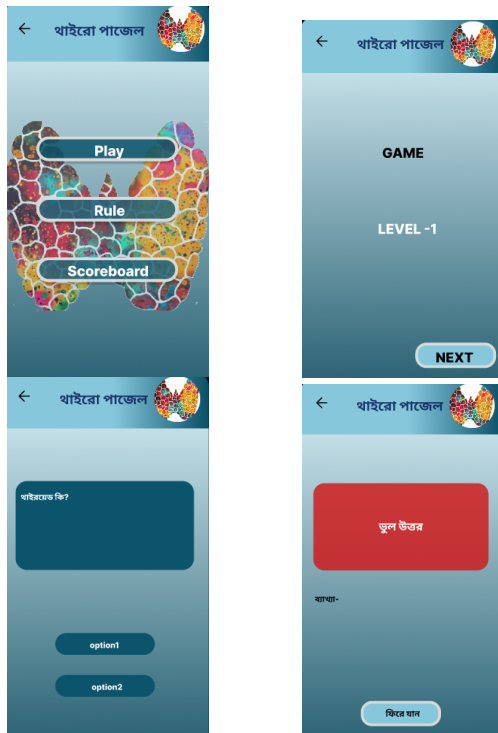


Fig. 8. Tyro Puzzle

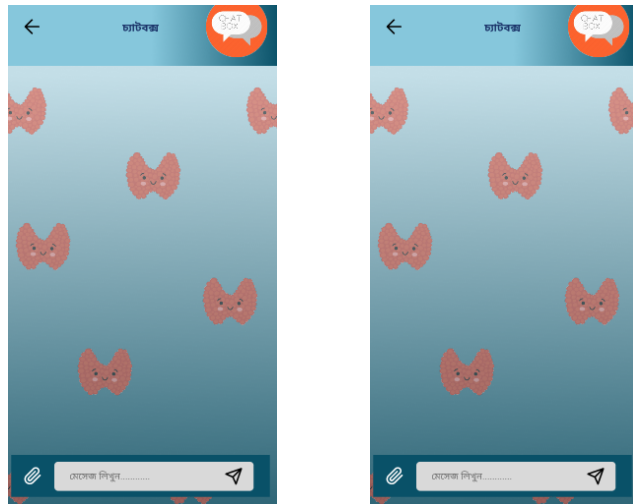


Fig. 9. chatbox

them with various services such as what are the symptoms of thyroid disease, what kind of test should be done to detect thyroid disease, or doctor's advice on how to take treatment to cure thyroid disease, we try to give all kinds of advice through conversation. As the prevalence of thyroid disease in Bangladesh is gradually increasing. And thyroid disease is a threat to all populations from children to old age so we added an interface called Diet in our prototype keeping everyone in mind.

Patients Stories: We speak directly to all members of the

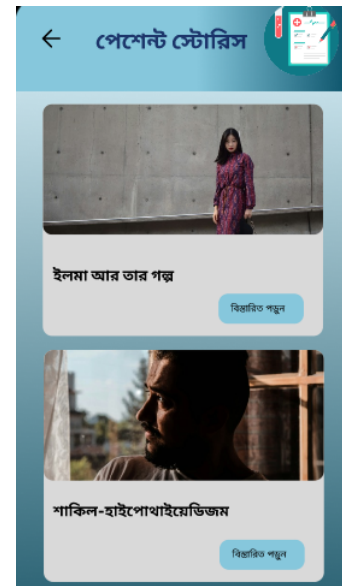


Fig. 10. Patients Stories



Fig. 11. Diet

public and capture their views on our Patient Stories interface. For example, I have tried to highlight the stories of those who are suffering from thyroid disease, the stories of those who have already recovered from thyroid disease, and the stories of those who have no knowledge or idea about thyroid. So that people can be aware about thyroid by comparing their real life through stories. And can move your life forward.

Diet: Here we have prepared different food lists for children, elderly and mothers of newborn babies, like how to maintain a food list if suffering from thyroid disease. Or how to maintain a diet after recovering from thyroid disease. And in order to avoid thyroid disease, we need to be aware of how to maintain the food list, all kinds of suggestions are attached to this interface.

## USABILITY AND USER EXPERIENCE EVALUATION

**A. Study Design:** Goal: Thyroid awareness or software or products of various functions and practical merits we have to root this conclusion through trial drugs. Methodology How much of the design with an iterative mixed method should use both techniques Basic navigation and union functionality should be evaluated throughout the paper using a scenario-based task We have to conduct various tests.

**Initial Usability Testing:** Assess the fundamental navigation and functionality of the paper prototype using scenario-based tasks. Testing more than once is required to refine the Figma prototype features and interface after feedback has been taken into account. **Complete Evaluation:** Conduct thorough testing for efficacy and usability on the refined prototype.

### B. Participants:

It is very important to include different people in our target group who can take care of people with thyroid disorders and give them different aspects about thyroid and discuss with them about thyroid and treatment and they should stay. They can achieve medical and pressure professionals with a sample size of 50 to 200 participants. They should be given access to evaluations involving both technical and operational experts.

### C. Measures and Data Analysis:

The degree to which this software can extract certain tasks to complete them such as monitoring symptoms, reminding oneself to take prescription drugs, and meeting their work hours with skills. The app is fully tested and requires surveys. Analyzing statistical techniques used in this task error survey process is the very transfer president's bone time check to make feedback or take challenges.

#### (d) Findings:

Among the different results we expect, we can include different opinions about how moderate it is to use this application, how easy it is to find reasonably strong pills, according to different drugs, or through symptom tests that will use them with different specific councils to identify usability problems. An in-depth analysis of these issues based on observations and direct user feedback to make our recommendations for improvement will be seen to meet the diverse needs of thyroid patients as well as present a variety.

## DISCUSSION AND FINDING RESULT

People of our country still have misconception and lack of awareness about thyroid for this reason we are interested in creating an app or website. We want to develop an app through which people can get knowledge about thyroid and get prevention. For that purpose we started a survey. Many people respond to our survey. Most of them were between 21 and 40 years of age. Among them, males were 44.4 percent and females were 55.6 percent. Overall they were maximum students and that percentage is 69.2 percent. In the survey we asked them if they were aware of thyroid. Surprisingly,

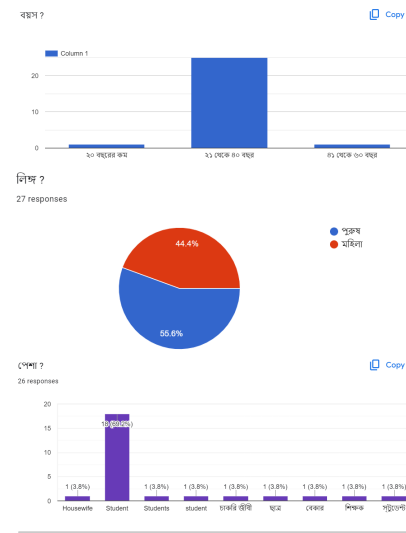
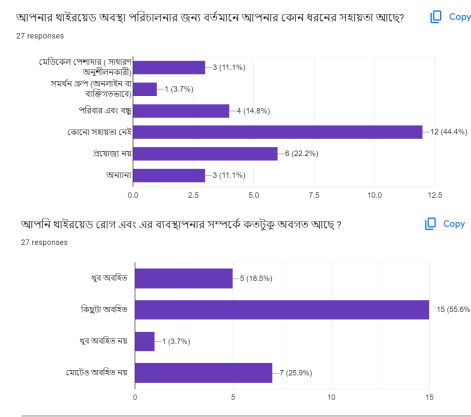
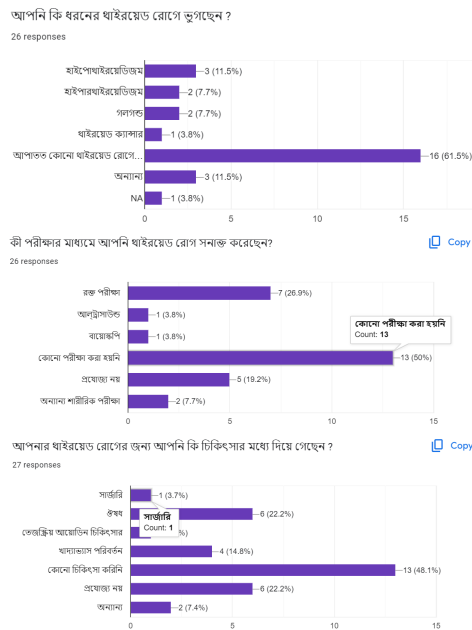


Fig. 12. Symptom checker



Fig. 13. Diet

maximum among them were aware of Thyroid and their percentage was 82.6 percent. We ask them more about that are they aware of Thyroid disease causes a variety of physical and emotional disturbances, and these thyroid hormones affect metabolic rate and protein synthesis. And 30.4 percent people are not aware about it. We mainly want to work with people who are not aware of thyroid. That's why we also ask them if they are suffering from thyroid disease. And many of them said they were not suffering from thyroid disease for now. But 11.5 percent of them are suffering from hypothyroidism. And we are So glad that we can work with them. We ask them what tests have diagnosed for thyroid disease. 26.9 percent of them said they diagnosed thyroid disease through a blood test. We ask them what treatment they are taking for thyroid disease, 22.2 percent told us they were treating them with medication and also 14.8 percent also said they changed their diet. Ask them what support they currently have for managing their thyroid. 11.1 percent of them told us they were getting help from doctor and 14.8 percent said they were getting help from family and friends. Ask them whether they are aware of thyroid disease and its management. Sadly, only 55 percent of them



While the project is already progressing, the next steps for us are to expand the technical framework of the Thyroid awareness project and build platform accessibility are two major areas for future development. All mobile development in the Users can update the process on the mobile application side on the flat platform to improve the experience and increase accessibility. We can take better experiences and ultimately provide backend and analytics services for personal experiences. Thyroid patients using this app know the details of their disease and they can follow it. In the future, we can



also publish it worldwide to bring it to a bigger scale so that thyroid patients can be more understanding with our app.If we can use the back end in the app in the future we can help patients more and we can take more platforms through the app. If we can add more content, we can help them more through this app.

#### REFERENCES

- [1] Thyroid Disorders in Bangladesh: An Epidemiological Perspective written by A.B.M Kamrul Hasan.Accepted: 13-Apr-2023; Published: 04-May-2023.
- [2] Paul AK, Miah SR, Mamun AA, Islam S. Thyroid disorders in Khulna district: A community based study. Bangladesh Med Res Counc Bull 2006;32:66-71
- [3] Hannan MA, Kamrul-Hasan AB, Karim MN, Selim S, Stocker MR, Diug B, et al. Hypothyroidism in Bangladesh: Is autoimmunity the next big threat? Mymensingh Med J 2022;31:449-57
- [4] Shahjada Selim, Marufa Mustari, Tawshique Ahmed Khan Approach to management of hypo and hyperthyroidism in Bangladesh: a nationwide physicians' perspective survey. Volume 14 - 2023— <https://doi.org/10.3389/fendo.2023.1322335>.
- [5] et al. Iodine deficiency disorders in Bangladesh.Indian J Pediatr 1996;63:105-10
- [6] TaslimaAktor Rani, Md.Ohidur Zaman,Md.Tanvirul Islam Knowledge, Attitude, And Practices Towards Thyroid Risk Of Women: A Study In Barishal IOSR Journal of Humanities And Social Science (IOSR-JHSS), Volume 25, Issue 7, Series 6 (July. 2020) 05-14.