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An observational study to explore the *Samprapti Ghatakas* in Hypothyroidism

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ABSTRACT

Background: Hypothyroidism is the most common functional disorder of the thyroid gland. It is a hypometabolic clinical state resulting from inadequate production of thyroid hormones for prolonged periods. The prevalence of this disease in India is 6% and more than 10 million cases per year are reported. It is a multisystemic disorder which has a wide range of clinical symptoms. This condition is not mentioned in Ayurveda classics by any specified name. In Ayurveda, determining the elements that contribute to *Samprapti* is essential in developing a treatment plan. Hence, the current study attempts to evaluate the *Samprapti Ghatakas* and as a result, formulate probable *Samprapti*. **Objectives:** To study and explore the *Samprapti Ghatakas* of hypothyroidism and to propose possible *Samprapti.* **Methods:** The study was conducted in 100 cases of hypothyroidism between the age of 16 to 70 years. A case proforma was prepared which includes history taking, physical signs and symptoms and required examination. The calculations were done in Microsoft excel and the values obtained were assessed on the basis of percentage of individual parameters in relation with *Samprapti Ghatakas* of hypothyroidism. **Results:** *Kapha* and *Vata* are the main *Doshas* involved in the *Samprapti*. Important *Dooshyas* are *Rasa, Meda. Agni* involved is *Dhatwagni* and the disease is caused primarily due to *Dhatwagnimandya*. *Udakavaha, Annavaha, Medovaha, Swedavaha, Purishavaha, Rasavaha* are the main *Srotas* involved with *Sanga* type of *Srotodushti*. *Udbhava Sthana* can be considered as *Amashaya; Sanchara Sthana*, *Vyakta Sthana* and *Adhishtana* is *Sarva Shareera.* All the three *Rogamarga* are involved.

Key words: *Hypothyroidism, Agni, Dosha, Dushya, Srotas, Sroto Dushti, Ama*

INTRODUCTION

The endocrine system consists of ductless glands which, by releasing chemical signals (hormones) in the blood stream, regulate function in distant organs.[1] Thyroid is the largest endocrine gland in the human body. The body's master metabolic centre is considered to be the thyroid. It is considered to be one of the most important organs of the endocrine system, as it regulates nearly all the bodily functions either directly or indirectly. But an overactive or underactive thyroid can result in a wide range of complications. Thyroid disorders are the most common disorders of the endocrine system. About 42 million people suffer from thyroid disorders in India.[2] Hyperthyroidism and hypothyroidism are the two common functional disorders of the thyroid gland, among which the most common is hypothyroidism.

Hypothyroidism is a hypometabolic clinical state resulting from inadequate production of thyroid hormones for prolonged periods, or rarely, from resistance of peripheral tissues to the effects of thyroid hormones.[3] Approximately 1 in 10 Indian adults suffer from hypothyroidism.[4] Women are 6 times more prone than men.[5] It can result from a defect anywhere in the Hypothalamic-Pituitary-Thyroid axis. In this

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ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

condition, TSH will be high, as the pituitary produces more TSH to stimulate thyroid to produce more thyroid hormones. It is divided into Primary and Secondary hypothyroidism depending upon whether the hypothyroidism arises from an abnormality in the thyroid gland itself, or occurs as a result of pituitary or hypothalamic disease.

Ayurveda is the science of Medicine that believes in complete health and wellbeing of an individual. It not only deals with treatment of diseases but also concentrates more on their preventive aspects. Hypothyroidism is a multisystemic disorder which has a wide range of clinical symptoms, which includes even psychological symptoms. This condition is not mentioned in Ayurveda classics by any specified name. There are many hypotheses put forward regarding the understanding of hypothyroidism in Ayurveda. The *Ashtonindita Purusha* chapter[6] incorporates the hampered functions of the endocrine system to the major extent. Besides these, hypothyroidism is a metabolic disorder. Ayurveda has explained a similar concept called *Agni*, which plays a major role in digestion, transformation and metabolism. When *Agni* is in a diminished state, the body's metabolic rate slows down, resulting in a variety of clinical manifestations. The shadows of functions of *Agni* can be seen in thyroid hormones. In Ayurveda, it is clearly mentioned that the root cause of majority of diseases is the hypo functioning of *Agni* and *Ama*. Here an attempt was made to appraise the condition from an Ayurvedic standpoint, based on the components involved in *Samprapti*.

Materials and Methods

Sample Source: 100 diagnosed cases of Hypothyroidism have been selected from OPD and IPD of Alva's Ayurveda Medical College Hospital and other referrals irrespective of social, economic or religious status.

Study Design: This is an observational clinical study of 100 patients suffering from hypothyroidism.

Diagnostic Criteria: TSH level more than 5.0milli IU/L.

The signs and symptoms of hypothyroidism[7]

Tiredness, Dry skin, Feeling cold, Hair loss, Difficulty in concentrating and poor memory, Constipation, Weight gain with poor appetite, Dyspnea, Hoarse voice, Menorrhagia, Paresthesia, Impaired hearing, Cool peripheral extremities, Puffy face, Diffuse alopecia, Bradycardia.

The diagnosis was based on those who are having TSH level more than 5.0milli IU/L and those having minimum 4 signs and symptoms listed above.

Inclusion Criteria

1. Patients between the age of 16 to 70 years.
2. Patients who are not on anti-thyroid medication or undergone anti thyroid treatment.
3. TSH level more than 5.0milli IU/L.

Exclusion Criteria

1. Pregnancy.
2. Congenital hypothyroidism.
3. Patients undergone thyroid surgery.

Assessment Criteria

This study includes assessment of various parameters like *Dosha, Dooshya, Agni, Ama, Srotas, Srotodushti prakara* (for deriving a *Samprapti*) individually in patients, then knowing about *Udbhava Sthana, Sanchara Sthana* and *Vyakta Sthana* of hypothyroidism.

Investigations

Thyroid function test, Blood routine

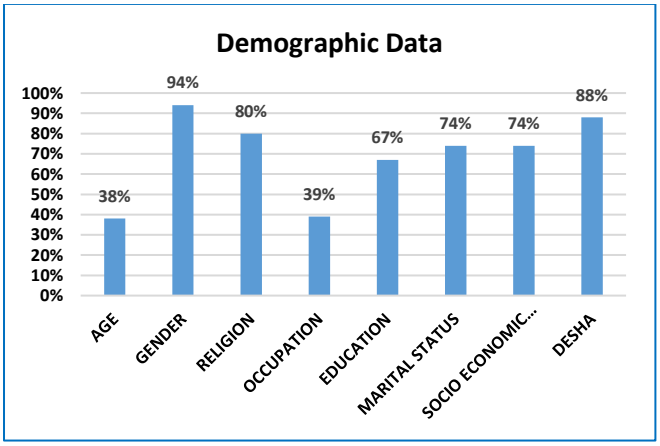
Observations

On Demographic Data

In the present study, maximum percentage i.e., 38% belongs to the age group of 31-45 years, 94% were females, 80% belonged to Hindu community, 39% were housewives, 67% were graduates, 74% were married, 74% were belonging to middle class and 88% belonged to *Anupa Desha*.

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

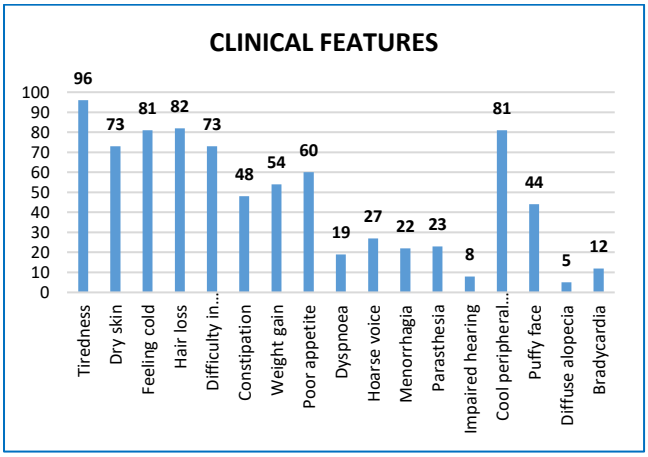
Figure 1: Distribution of patients based on Demographic Data



On Clinical Features

Among the cases, 96% were having tiredness, 82% were having hair loss, 81% had feeling cold and cool peripheral extremities, 73% had dry skin and difficulty in concentration and poor memory, 60% had poor appetite, 54% had weight gain, 48% had constipation, 44% had puffy face, 27% had hoarse voice, 23% had paraesthesia, 22% had menorrhagia, 19% had dyspnoea, 12% had bradycardia, 8% had impaired hearing and 5% had diffuse alopecia.

Figure 2: Distribution of patients based on Clinical Features



On *Dosha Vriddhi Lakshanas*

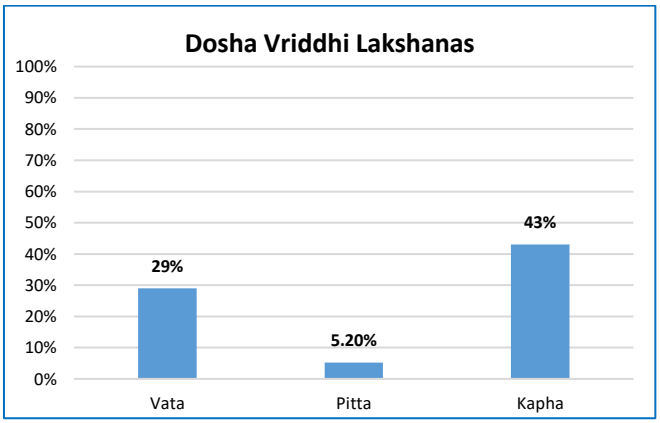
Vata Vriddhi Lakshanas - Among 100 cases, 96% of them had *Bala Bhramsha*, 92% had *Ushna Kamita*, 48% *Shakrit Graha*, 47% *Anaha*, 23% *Bhrama*, 21% *Nidra Bhramsha*, 9% *Indriyabhramsha* 6% *Krishnavarna*, 4% *Dinata* and 3% had *Karshya.*

Pitta Vriddhi Lakshanas - 21% were having *Alpa Nidra* and 16% were having *Ati Trishna*.

Kapha Vriddhi Lakshanas - 96% had *Alasya*, 85% had *Gourava,* 82% *Sheetasparsha*, 73% *Agnisada*, 40% *Atinidrata*, 36% *Shlatangatva* and 19% *Shwasa.*

Overall data related to *Dosha Vriddhi Lakshanas* - *Kapha* and *Vata* were present among majority of cases i.e., 43% and 29% respectively and in case of *Pitta* it was only 5.2%.

Figure 3: Distribution of patients based on *Dosha Vriddhi Lakshanas*



On *Dhatu Vriddhi Lakshanas*

Rasa Dhatu Vriddhi Lakshanas - 96% had *Alasya*, 85% had *Gourava,* 82% *Sheetasparsha*, 73% *Agnisada*, 40% *Atinidrata*, 36% *Shlatangatva* and 19% *Shwasa.*

Rakta Dhatu Vriddhi Lakshanas - 73% had *Agninasa* and 10% had *Kushta*.

Mamsa Dhatu Vriddhi Lakshanas - 75% had *Udara Vriddhi*, 18% had *Ganda Vriddhi* and 18% had *Adhimamsa* around *Kanta.*

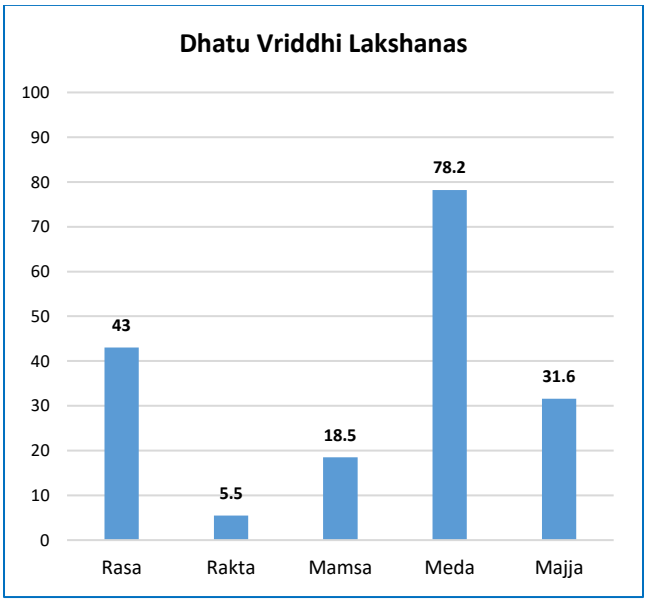
Medo Dhatu Vriddhi Lakshanas - 98% had *Shrama*, 85% had *Alpacheshta Shwasa*, 75% had *Udara Lambana,* 71% had *Sphik Lambana* and 62% had *Stana Lambana*.

Majja Dhatu Vriddhi Lakshanas - 85% of them had *Anga Gourava* and 10% had *Netra Gourava.*

Overall data related to *Dosha Vriddhi Lakshanas* - *Medo Dhatu* was involved in majority cases i.e., 78.2%. *Rasa Dhatu* was involved in 43% of cases, *Majja Dhatu* in 31.6 % cases, *Mamsa Dhatu* in 18.5% and *Rakta Dhatu* in 5.5%.

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

Figure 4: Distribution of patients based on *Dhatu Vriddhi Lakshanas*



On *Sroto Dushti Lakshanas*

Pranavaha Srotas - 19% of them had *Pranavaha Sroto Dushti Lakshanas* like *Atibaddham*, *Alpalpam, Sashabdam* and *Ucchvasantham.*

Annavaha Srotas - 74% of the people had *Avipaka*, 60% of the people had *Arochaka* and 43% had *Anannabhilasha* which are the *Annavaha Sroto Dushti Lakshanas*.

Udakavaha Srotas - 80% patients had *Oshtasosha,* 73% patients had *Jihwasosha* and *Kantasosha*, 68% had *Talusosha* and 17% had *Atipipasa*.

Rasavaha Srotas - 85% patients had *Gourava*, 73% patients had *Agninasa,* 60 had *Aruchi,* 58% had *Saada*, 45% had *Pandutva,* 35% had *Angamarda*, 16% had *Tandra*, 15% had *Asyavairasya*, 9% had *Tama* and 3% had *Krishangata*.

Raktavaha Srotas - 22% had *Asrgdhara*, 10% had *Kushta* and 4% had *Asyapaka Lakshanas.*

Mamsavaha Srotas - 41% patients had *Adimamsa Lakshana* and 18% had *Galaganda.*

Medovaha Srotas - 96% patients had *Alasya*, 79% had *Jatilibhava* of *Kesha*, 76% had *Mukhasosha*, 73% had *Kantasosha*, 68% had *Talusosha*, 40% had *Sarvakaala Nidra*, 21% had *Padasupti*, 17% had *Karasupti, Pipasa, Angasupti*, 16% had *Tandra* and 12% had *Madhurasyata.*

Asthivaha Srotas - 82% of the total had *Keshadosha*, 15% had *Nakhadosha* and 11% had *Asthishoola.*

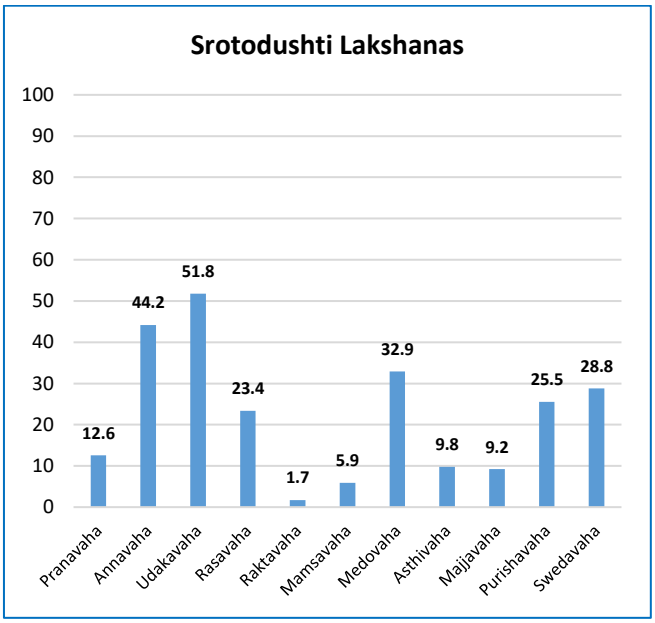
Majjavaha Srotas - 23% of patients had *Bhrama,* 9% had *Parvaruk*, 9% had *Tamodarshana* and 5% had *Murccha*.

Purishavaha Srotas - 48% had *Krichrena*, 48% had *Atigradhita*, 45% had *Alpalpam* and 38% had *Sashoola Lakshana*.

Swedavaha Srotas - 77% had *Aswedana*, 73% had *Parushya* and 23% had *Atiswedana*.

Overall data related to *Sroto Dushti Lakshanas* - *Udakavaha Srotas* was involved in majority cases i.e, 51.8% and was not involved in remaining cases. *Annavaha, Medovaha, Swedavaha, Purishavaha, Rasavaha, Pranavaha, Asthivaha, Majjavaha, Mamsavaha* and *Raktavaha Srotodushti* were present among 44.2%, 32.9%, 28.8%, 25.5%, 23.4%, 12.6%, 9.8%, 9.2%, 5.9% and 1.7% respectively.

Figure 5: Distribution of patients based on *Sroto Dushti Lakshanas*

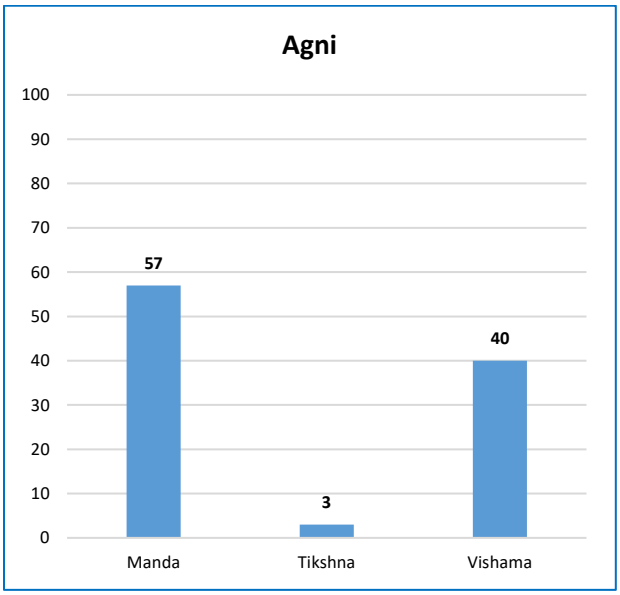


On *Agni*

Among 100 patients, majority i.e., 57% had *Mandagni,* 40% had *Vishamagni* and reamining 3% had *Tikshnagni.*

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

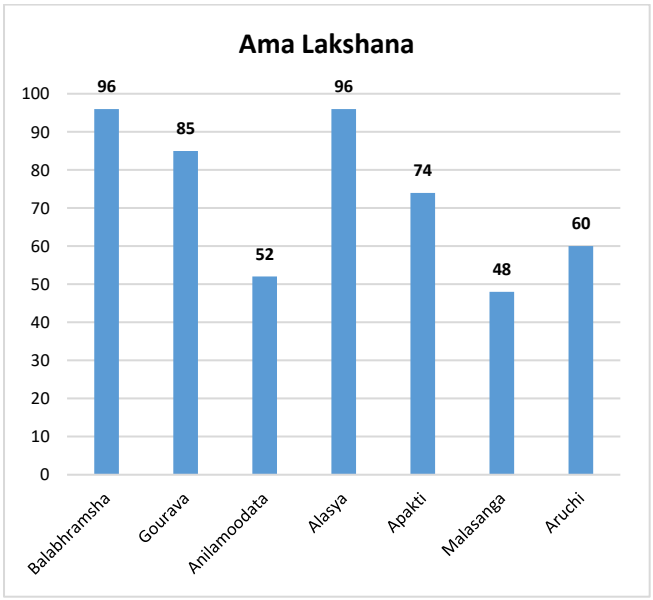
Figure 6: Distribution of patients based on *Agni*



On *Ama Lakshana*

96% of the patients had *Balabhramsha* and *Alasya,* 85% had *Gourava*, 74% had *Apakti*, 60% had *Aruchi*, 52% had *Anilamoodatha* and 48% had *Malasanga*. In the remaining it was absent.

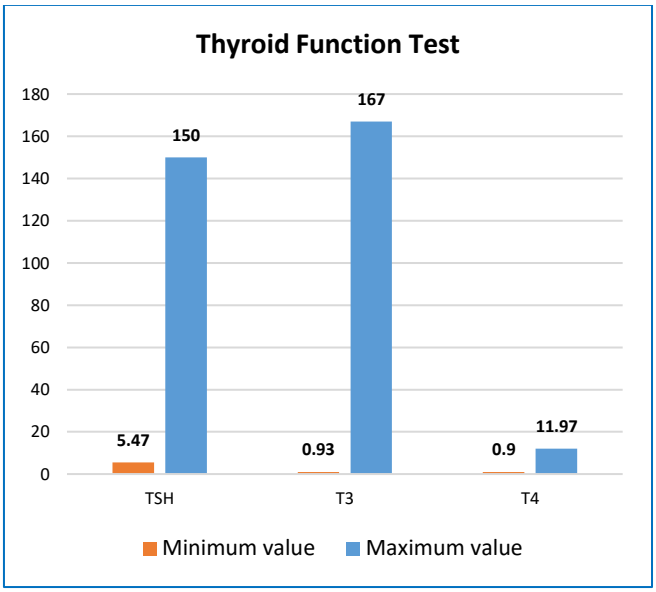
Figure 7: Distribution of patients based on *Ama Lakshana*



On Thyroid Function Test

Among 100 patients, minimum value of TSH was found to be 5.47µIU/ml, T3 0.93ng/dl, T4 0.9µg/dl and maximum value of TSH 150µIU/ml, T3 167ng/dl, T4 11.97µg/dl.

Figure 8: Distribution of patients based on Thyroid Function Test



DISCUSSION

In the present study, majority of the patients falls under *Madhyama Vaya Avastha*. The incidence of exposure to occupational stress is more in this age group. Whenever there is increased stress, the cortisol level will be increased and the body's metabolism will be reduced. Too much cortisol makes the thyroid gland work harder to produce enough thyroid hormones. Majority of the cases were females. Hypothyroidism is 6 times more common in females than males. In females, there is an interplay between thyroid hormones and the hormones that fluctuate during the menstrual cycle. Hormones play a big role in women's lives throughout menstruation, pregnancy, lactation and menopause. In this study, majority was housewives. This is in accordance with the increasing prevalence of the disease among females as well as stress that these women may adopt in order to be more susceptible to the disease. 26% were students and this may be due to the increased stress. Majority of the subjects were graduates. This may be due to a combination of factors including age and the literacy rate distribution in and around the area taken for the study. 74% of the subjects were married. This is because patients between the age group of 16- 70 years were chosen based on the inclusion criteria. A maximum percentage of 74 were belonging to middle

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

class. As hypothyroidism can be sub clinical also, people from lower socioeconomic classes may be unaware of the disease and may not have undergone screening tests. Most of the patients belonged to *Anupa Desha*. This is because the area selected for the study is *Anupa Desha* and it is of *Kapha* predominance.

Majority were found to have family history of hypothyroidism with a percentage distribution of 54. One of the most important etiological factors in hypothyroidism is genetic element. Hereditary studies have suggested that up to 67% of circulating thyroid hormones and TSH are genetically determined. Mutations in genes disrupts normal development of the thyroid gland. The diseases caused due to morbidity of sperm and ovum are *Adibalapravrutta Vyadhi*. Improperly or abnormally developed organs is seen in *Janmabalapravrutta Vyadhi.* These can also be considered as one of the causative factors of hypothyroidism. In this study, majority of the patients were females of reproductive age group and were estimated to be 76%. Out of these, 48% were having irregular menstruation and 28% were having regular menstruation. 60% were not having any complaints of dysmenorrhoea while 16% were complaining of dysmenorrhoea. 54% had no complaints of menorrhagia and 22% experienced menorrhagia. Among the females studied, 76% have not attained menopause and 18% have attained menopause. Menorrhagia is one of the clinical features of hypothyroidism. In persons with hypothyroidism, excessive Thyroid Releasing Hormone (TRH) can cause infrequent menstrual cycles. The pituitary gland releases prolactin in response to elevated TRH levels. The ability of the ovaries to make oestrogen is hampered by too much prolactin. Reduced oestrogen levels can cause a variety of reproductive health symptoms like irregular menstruation, menorrhagia, etc. According to the classics, vitiated *Rasa Dhatu* fails to nourish the *Upadhatu Artava* due to *Agnimandya*, resulting in irregular menstrual bleeding. Irregularity in menstruation may be due to the vitiation of *Vata* by the obstruction of *Kapha*.

Majority of the patients were taking mixed diet i.e., 84%. Non vegetarian food contains more triglycerides. Increased triglycerides hamper the physiological metabolism resulting in hormonal imbalance. Non vegetarian diets, which are *Guru, Snigdha* and *Abhishyandi*, produce an increase in *Kapha Dosha*, which causes *Agnimandya* resulting in the production of *Ama* and as a result the disease manifests. 84% patients were taking *Akalabhojana*, 81% were consuming *Viruddhahara* and 74% were consuming *Vishamashana*. When there is untimely intake of food, thyroid functioning will be slowed down significantly, leading to hypothyroidism. *Akalabhojana, Viruddhahara* and *Vishamashana* leads to *Ajirna,* which in turn causes *Agnimandya*, thereby producing *Ama* and results in disease manifestation. 80% were taking diet dominant of *Madhura Rasa*. Since *Madhura Rasa* is predominant of *Prithvi* and *Jala Mahabhuta* and is *Guru* in nature, it is difficult to get digested. Excessive intake of *Madhura Rasa* aggravates *Kapha* and causes *Agnimandya*. This triggers *Ama* in vulnerable persons and thereby leading to disease. 60% of the cases had poor appetite. Majority of the patients were having *Avara Abhyavaharana Shakti* and *Avara Jarana Shakti* i.e., 59% and 53% respectively. Since the hormone thyroxine decreases appetite and food intake, in case of hypothyroidism there is reduced appetite due to decreased T4. In hypothyroidism, there will be hypo functioning of *Agni,* which causes decreased appetite. *Agni Mandya* may be the initial step in the *Samprapti* of the disease. 48% had constipated bowel. The hormone thyroxine increases the secretions and movements of GIT and thus lack of T4 decreases peristaltic activity. So, in case of hypothyroidism, due to hypo secretion of T4, constipation is seen in many patients. Due to *Manda Guna* of *Kapha*, the *Anuloma Gati* of *Mala* and *Vata* is hampered and causes obstruction to *Vata* leading to *Vata Prakopa*, resulting in *Gaada Varchas*. 40% of the patients had excess sleep and 39% of them had sound sleep. Normal thyroxine is necessary to maintain normal sleep pattern. Excess sleep may be due to fatigue and lack of energy. The vitiated *Rasa* and *Kapha* induces sleepiness in a person with hypothyroidism. In this study, 87% of the patients were not doing any kind of exercises. Majority of the patients were having *Madhyama Vyayama Shakti* with a percentage distribution of 53% and 46% were having

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

Avara Vyayama Shakti. Lethargy and fatigability are the common symptoms of hypothyroidism which makes the patients to avoid exercise. According to several studies, exercise enhances tissue sensitivity to the thyroid hormones and promotes thyroid gland secretion. There will be increased *Kapha* and *Medo Dushti* which makes the person unable to do physical activities. *Agni Dipana* is one of the benefits of *Vyayama,* according to *Acharya* Vagbhata. As a result, it is understood that if one does not engage in active physical activity, his *Agni* will be weakened and if a vulnerable individual does the same, the *Agni* will be impeded, resulting in pathogenesis. *Avyayama* is also one among the *Medovaha Sroto Dushtikara Nidanas.*

Majority of the subjects i.e., 61% were having *Kapha-Vata Prakriti*. *Acharyas* have mentioned that *Prakriti* of a person influences the diseases that occur in that person. So, persons with *Kapha-Vata Prakriti* will be more prone to *Kaphaja* and *Vataja* diseases. Since *Kapha* and *Vata* are involved in the *Samprapti* of Hypothyroidism, the persons with *Kapha-Vata Prakriti* are more vulnerable to this disease. Majority of the patients have *Madhyama Pramana* and was estimated to be 81%. 62% were having normal BMI and 32% were having overweight and 3% were obese. Some studies have been conducted with a conclusion that the level of TSH in obese and overweight people is higher. But here the sample size is too less to arrive at a proper conclusion. 64% were having *Avara Satva*. In hypothyroidism, there will be impairment in the mental status of the person. One of the main clinical presentations of the disease is difficulty in concentrating and poor memory. *Shoka, Chinta, Bhaya* were seen in patients with hypothyroidism which can be considered in this context.

Discussion on Clinical features

In the present study, 96% of patients were complaining of tiredness. In people living with an underactive thyroid, the body's metabolism slows down and the process of breaking down food and transforming the nutrients into energy also hampers. This results in diminution of energy levels. *Mandagni* is one of the main causative factors for hypothyroidism. The *Ahara Rasa* formed is in *Apakva Avastha*,resulting in *Rasa Dushti*, so it fails to nourish the *Uttarothara Dhatus* and since the *Dhatus* are not getting nourishment, *Ojas* will also get hampered leading to *Dourbalya.* One of the main functions of *Agni* is to impart *Bala* in a person. Here, since the *Agni* is hampered, it causes *Balahani.*

In this study, 82% were having hair loss. The thyroid hormones play an essential role in the development and maintenance of hair follicles. Irregular functioning of T3 and T4 can cause regrowth cycle of the hair to be disturbed, meaning that there will be thinning of hair over time, without hair replacement. *Kapha* and *Rakta* does the *Samrodhana* in *Romakupa* causing hair loss.

In this study, 81% of patients were experiencing cold feeling and cool peripheral extremities. Whenever there is decreased thyroid hormones, there will be reduction in stroke volume and heart rate and the cardiac output at rest also decreases. This causes an increase in peripheral vascular resistance and blood volume will be reduced leading to decreased blood flow to tissues causing cold sensation. In hypothyroidism, there is decreased *Pitta* and also *Sheeta Guna* of both *Kapha* and *Vata* makes the person feel cold.

Out of 100 patients, 73% were complaining of dry skin. The secretion of sweat glands and sebaceous glands are reduced leading to dry, coarse skin. *Sapta Twacha* are formed from *Rakta*. The quality and quantity of *Rakta* depends on the quality and quantity of *Rasa Dhatu* and it can be understood that the features of *Twak* represents the *Rasa Saarata*. *Rasa Dhatu Dushti* in turn causes *Dushti* of *Rakta Dhatu* i.e., vitiated *Rasa Dhatu* cannot nourish the *Rakta Dhatu* resulting in dryness of the *Twak. Twak Parushyata* may also be due to the *Heena Pitta* and *Vriddha Vata Dosha* involved in the *Samprapti*.

In the present study, 73% of the patients were complaining of difficulty in concentration and poor memory. The hormone thyroxine increases blood flow to brain, so the normal functioning of brain needs the presence of thyroxine. In hypothyroidism, due to decrease in thyroxine, the person will have difficulty in concentrating and poor memory. Natural state of

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

Kapha is *Bala* for the body. But in hypothyroidism, *Kapha* is in vitiated state and as a result *Dehabala, Agnibala* and *Manobala* is also hampered. Reduced *Manobala* may cause poor memory and difficulty in concentration.

In this study, 54% of patients were complaining of weight gain. The hormone thyroxine is essential for maintaining body weight. Whenever there is a decrease in thyroxine, the body weight increases due to fat deposition. Weight gain may also be due to the imbalance between calorie intake and energy expenditure. When there is *Dhatwagimandya*, there will be *Vriddhi* of *Dhatus* and increase in *Medo Dhatu* and *Mamsa Dhatu* results in weight gain. The *Guru Guna* of *Kapha* due to *Prithvi* and *Jala Mahabhuta* may also be a reason for weight gain.

In the present study, 44% patients were having puffiness in the face. Hypothyroidism causes accumulation of hyaluronic acid which alters the composition of ground substance in dermis and other tissues causing puffiness. Vitiated *Kapha* obstructs *Rasavaha Srotas* and causes puffy face.

Among 100 patients, 27% were having hoarse voice. It occurs due to mucinous deposits in larynx or due to external pressure on the laryngeal nerve. According to *Acharya Sharangadhara*, *Swarabheda* is one among the *Kaphaja Vikaras*. He also said that increase in *Manda Guna* of *Kapha* produces hoarseness of voice.

23% of the patients were complaining of paraesthesia. Thyroid hormones exert multiple effects on neural function. Hypothyroidism can cause fluid retention resulting in swollen tissues that exert pressure on peripheral nerves causing paraesthesia. Since there is accumulation of *Kapha* in the *Samprapti* of hypothyroidism, it gets lodged in the peripheral parts of the body which causes *Vata Prakopa* resulting in *Suptata* in certain parts of the body.

22% of the patients were complaining of menorrhagia. Without sufficient thyroid hormones ovaries may not be able to produce progesterone and endometrial proliferation persists. This may be the reason for menorrhagia in persons with hypothyroidism. The vitiated *Kapha* involved in the *Samprapti* mixes with *Rakta* and cause this.

According to the present study, *Nidanas* of hypothyroidism are as follows:

Dosha Hetu: This includes the factors which directly cause *Dosha* vitiation. In hypothyroidism, *Agnimandya* is the crucial step in the formation of the disease. *Agnimandya* takes place in the *Jataragni* and *Dhatwagni* level. Any *Nidana* which diminishes *Agni* can be considered here. They can be further divided into *Aharaja*, *Viharaja* and *Manasika Nidanas*. *Aharaja Nidanas* includes the *Nidanas* causing *Dushti* of *Kapha* and *Vata*. Increase in the *Guru*, *Snigdha, Abhishyandi Guna* of *Ahara* causes vitiation of *Agni*. Intake of *Dadhi, Dugdha, Snigdhahara, Guru Ahara, Abhishyandi Ahara, Masha, Godhuma, Mamsa, Madhura Rasa,* etc. causes *Kapha Dushti. Vishamashana, Alpahara* causes *Vata Dushti*. *Viharas* predominantly includes *Divaswapna, Alasya, Avyayama* and Sedentary lifestyle, which causes *Dushti* of *Kapha* and *Meda*. *Vata Prakopa* occurs due to *Vegadharana* of *Mutra* and *Pureesha, Ucchabhashana*, *Ati adhyayana* and *Bharaharana*. *Manasika Nidanas* include *Chinta, Shoka, Bhaya*, etc. The *Manasika Bhavas* represent the current stressful life. These have a direct effect on the *Rasavaha Srotas* and does its *Dushti* at the *Dhatu* level, resulting in *Ama*.

Vyadhi Hetu: *Vyadhi Hetu* includes specific etiological factors responsible for a particular disease irrespective of *Doshas*. *Vishas* and *Dooshi Vishas* can be considered here. The role of certain drugs in the manifestation of hypothyroidism is proved. Administration of drugs like lithium, antithyroid drugs, p-aminosalicyclic acid, interferon-α and other cytokines, aminoglutethimide, dopamine agonists, rexinoids are found to be causing hypothyroidism. These drugs act as a *Dooshi Visha* which in turn alters the normal physiology of the thyroid gland.

Viprakrishta Hetu: *Viprakrishta Nidanas* are the distant cause of the disease which does not produce the disease immediately. The accumulative effects of all these *Nidanas* leads to disease manifestation. In today's society, majority of people consume unhealthy food and lead unhealthy lifestyle. The body's

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

metabolism is disrupted as a result of the cumulative impacts of this. Deviations from following the healthy diet habits, lifestyle, *Prajnaparadha, Asatmyendriyartha Samyoga, Kala Parina*ma and imbalance of *Trayopasthambha* can be taken as *Viprakrishta Nidanas.* Also, continuous exposure to particular *Ahara, Vihara* causing a *Sroto Vaigunya* at *Medo Dhatu* level can also be considered as *Viprakrishta Hetu.*

Poorvarupas are the *Avaykta Lakshanas*. The prodromal symptoms of hypothyroidism cannot be seen in any of the medical textbooks. Here, *Avyakta Ama Lakshanas* in the *Koshta* can be taken as the *Poorvarupa*. It includes heaviness of the body, low digestive power, fatigue, weakness, etc in the milder form.

Discussion on *Dosha*

In the present study, it was observed that *Kapha* and *Vata* were present among majority of cases i.e., 43% and 29% respectively and in case of *Pitta* it was only 5.2%. From this it can be understood that *Kapha* is the important *Dosha* involved in the *Samprapti* of hypothyroidism. This is based on the symptoms including fatigue, lethargy, weight gain, poor concentration and memory, puffiness of the face and cold intolerance. *Guru, Sheeta, Mridu, Snigdha, Manda, Sthira* and *Picchila* are *Kapha Gunas* that appear to be linked with these symptoms. Even though all these properties of *Kapha* are involved in the *Samprapti* of hypothyroidism, *Manda Guna* of *Kapha Dosha* is the key property in *Vikalpa Samprapti* of this disease which align with the symptoms of an underactive thyroid. Along with this, *Vata* gets involved making it a more or less *Vata- Kapha Samsarga* condition. When these *Kapha Gunas* get vitiated, they cause *Vata Samrodhana*. The *Yogavahi* property of *Vata* has strong contribution in this particular *Roga Samprapti*. *Vata* aggravates *Kapha Dushti* in hypothyroidism. *Chala* is one of the *Gunas* of *Vata*. *Vata* can be considered as any mobile unit of the organism. The effect of *Vata* can be related to the synthesis of thyroid hormones, which includes iodide trapping, oxidation of iodide and iodination of tyrosine. *Chala* and *Sukshma Guna* of *Vata* are predominantly responsible for the transportation of hormones through *Sthoola* and *Sukshma Srotas*.

The positive and negative feedback mechanism of hormones can be thought to be controlled by *Vata* as it is the initiator for any stimulation or inhibition. *Vata,* as a result of *Avarodha* by *Kapha* can cause cold intolerance, constipation and tiredness. As a result, *Vata* and *Kapha* are two *Doshas* that may be included. The *Kapha Dosha* prevents *Pitta Dosha* from its cellular level functions, thus impairing *Agni.*

Discussion on *Dhatu*

Among the *Sapta Dhatu, Medo Dhatu* was involved in majority cases i.e., 78.2%. *Rasa Dhatu* was involved in 43% of cases, *Majja Dhatu* in 31.6%, *Mamsa Dhatu* in 18.5% and *Rakta Dhatu* in 5.5%. The most essential *Dhatus* involved in the *Samprapti* of hypothyroidism are *Rasa* and *Meda*, as can be seen from this. *Dosha-Dooshya Sammurcchana* in different *Dhatus* results in systemic manifestation of the disease. One of the main clinical presentations of hypothyroidism includes weight gain along with poor appetite. This indicates *Agnimandya* of both *Jataragni* and *Dhatwagni.* It further leads to the production of *Sama Rasa Dhatu* which qualitatively and quantitatively lacks *Poshakas* and *Poshyas. Ama*, as a part of *Mala* is increased and vitiates *Rasa Dhatu* thereby producing *Lakshanas* like *Agnisada, Alasya, Sheetasparsha, Shlatangatva, Shwasa, Atinidrata*, *Arochaka, Avipaka, Gourava, Tandra, Saada.* Generalised weakness, cold intolerance, excess sleep, dyspnoea, poor appetite, etc are the common presentations of hypothyroidism.

The *Guru Guna* of *Kapha Dosha* and excess *Meda Dhatu* prevents *Pitta Dosha* from its cellular level functions, thus impairing *Agni.* Due to *Dhatwagnimandya,* the *Poshaka Rasa* of *Meda* undergoes *Apaka* leading to *Medo Roga.* Vitiated *Meda* produces *Lakshanas* like *Shrama, Alpa Cheshta Shwasa, Lambana* of *Sphik, Sthana, Udara, Alasya, Sarvakaala Nidra* etc. The common presentations of hypothyroidism include Tiredness, dyspnoea, weight gain, excess sleep, puffy face, swelling of the neck, etc.

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

Discussion on *Srotas*

Udakavaha Srotas was involved in majority cases i.e., 51.8% and was not involved in remaining cases. *Annavaha, Medovaha, Swedavaha, Purishavaha, Rasavaha, Pranavaha, Asthivaha, Majjavaha, Mamsavaha* and *Raktavaha Srotodushti* were present among 44.2%, 32.9%, 28.8%, 25.5%, 23.4%, 12.6%, 9.8% 9.2%, 5.9% and 1.75% respectively. As evidenced by the data, the common *Srotas* involved in the disease hypothyroidism are *Udakavaha, Annavaha, Medovaha, Swedavaha, Purishavaha* and *Rasavaha Srotas*. The common feature of hypothyroidism includes reduced appetite. This concludes that *Agnimandya* affects primarily on the *Annavaha Srotas* producing symptoms like *Arochaka, Avipaka, Anannabhilasha, Asyavairasya*. It further leads to the production of *Ama* where the *Adyarasa* undergoes *Apakvata,* vitiates the *Rasavaha Srotas* thereby producing *Lakshanas* in addition to the above said *Lakshanas* such as *Gourava, Tandra, Saada.* Thyroid hormones promote growth as they enhance amino acid uptake by tissues and enzymatic systems involved in protein synthesis thus promoting bone growth. Carbohydrate metabolism is also regulated by thyroid hormones as it stimulates glucose uptake, gluconeogenesis. These actions may be compared to functions of *Rasavaha Srotas* as it supplies nutrition and energy to all body tissues. Weight gain, numbness of limbs, loss of strength of hair, dryness of mouth, lips, throat, tiredness, etc symptoms of hypothyroidism can be understood as vitiation of *Medovaha Srotas*. Thyroid hormones help in fat metabolism by mobilizing lipids from adipose stores and accelerates oxidation of lipids to produce energy. Lipid metabolism can be compared to functions of *Medovaha Srotas*. Constipation and reduced sweating can be understood as the vitiation of *Purishavaha* and *Swedavaha Srotas* respectively. *Apana Vata Dushti* results in symptoms like *Anaha, Adhmana, Gaadavarchas*, etc. Decreased thyroid hormones decreases motility of GI tract which results in delayed digestion and evacuation and causes constipation. *Sweda* is the *Mala* of *Medo Dhatu*. Whenever there is *Medo Dhatu Dushti*, it leads to *Sweda Dushti. Vriddha Vata*, due to its *Rooksha Guna*, decreases *Jalaamsha,* thereby leading to *Aswedana.* Hence, the probable *Srotas* involved are *Udakavaha, Annavaha, Medovaha, Swedavaha, Purishavaha* and *Rasavaha Srotas*.

Discussion on *Agni*

The proper functioning of *Agni* is foremost important for maintaining good health. The energy expenditure, thermogenesis, development and growth are all signalled by thyroid hormones. Moreover, skeletal muscles are target of thyroid hormones. Thyroid hormones have effect over the complexion also. As every cell in the body depends on thyroid hormones for regulation of their metabolism, so the health of an individual depends on thyroid hormones. They also have effect over the mood swings which indirectly decides the enthusiasm of the person. Alteration in the levels of thyroid hormones affects the functions of immune system too. So, the shadows of functions of *Agni* and its importance can be seen in the thyroid hormones. *Agnidushti* in the form of *Mandagni*, *Teekshnagni* or *Vishamagni* can produce disease. In this study, among 100 patients, 57% had *Mandagni* and 40% had *Vishamagni.* From this, it is clear that hypothyroidism has a direct impact on *Agni. Mandagni* is the root cause for almost all diseases and that holds true in this case also. The use of *Agnivaishamyakara Ahara Vihara Seva* results in *Agnimandya*. It further leads to the formation of *Apakva Annarasa* which results in *Ama*. Since the *Gunas* of *Ama* and *Kapha* are similar, *Kapha* has a tendency to become vitiated. Moreover, *Mandagni* is common amongst *Kapha Prakriti* individuals. In this study, majority belonged to *Kapha Pradhana Prakriti.* The *Kapha Dosha* prevents *Pitta Dosha* from its cellular level functions and impairs *Agni.*

Discussion on *Ama*

The use of *Agnivaishamyakara Ahara Vihara Seva* results in *Agnimandya* leading to the formation of *Ama* which is the prime step involved in the *Samprapti* of hypothyroidism. These *Ama* in turn causes vitiation of *Doshas* resulting in *Sama Doshas* especially *Kapha Dosha*. The presence of *Ama* will have its own set of signs and symptoms like *Srotorodha, Balabhramsha,*

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

Gourava, Anilamoodatha, etc. The symptoms of hypothyroidism reflect the symptoms of *Ama* like- *Srotorodha* and Stunted growth, *Balabhramsha* and delayed milestones, *Gourava* and puffiness of face, weight gain, *Anilamoodatha* and respiratory turbulence, *Alasya* and lethargy, sleepiness, *Apakti* and decreased appetite, *Malasanga* and constipation, reduced perspiration, etc. Out of 100 cases, *Ama Lakshanas* like *Balabhramsha*, *Alasya, Gourava*, *Apakti, Aruchi*, *Anilamoodatha*, *Malasanga* can be seen in 96%, 96%, 85%, 74%, 60%, 52% and 48% respectively. The *Ahara Rasa* formed is in *Apakva Avastha*, so it fails to nourish the *Uttarothara Dhatus* and since the *Dhatus* are not getting nourishment, *Ojas* will also get hampered leading to *Dourbalya. Mandagni* is one of the main causative factors for hypothyroidism. One of the main functions of *Agni* is to impart *Bala* in a person. Here, since the *Agni* is hampered, it causes *Balahani* and *Alasya.* In hypothyroidism, there will be hypo functioning of *Agni,* which causes *Aruchi*. Due to *Manda Guna* of *Kapha*, the *Anuloma Gati* of *Mala* and *Vata* is hampered and causes obstruction to *Vata* leading to *Vata Prakopa*, resulting in *Gaada Varchas* and *Anilamoodata*.

Discussion on remaining *Samprapti Ghatakas*

Here, in this disease the type of *Srotodushti* is *Sanga.* Hypothyroidism is a hypo metabolic clinical state resulting from inadequate production of thyroid hormones. There will be fall in serum concentrations of thyroid hormones. Since there is a lack of hormone production, it can be considered as *Sanga* type of *Srotodushti*. Hypothyroidism is a disorder that is strongly linked to the involvement of *Agni. Kapha* is the primary *Dosha* involved in the disease pathogenesis. *Amashaya* is the seat of *Kapha Dosha.* As a result, *Amashaya* is the *Udbhava Sthana.* Thyroid hormones are having impact over every biochemical configuration of the body. The *Doshas* after getting vitiated spread throughout the body. So, the *Sanchara Sthana* can be considered as *Sarva Shareera*. The clinical manifestations of hypothyroidism can be seen in the whole body. So, *Vyakta Sthana* can be understood as *Sarva Shareera*. Since the clinical manifestations can be seen in the whole body, *Adhishtana* can be considered as *Sarva Shareera*. Since the clinical presentations of this disease can be seen in the whole body, it can be considered as a disease involving *Bahya*, *Abhyantara* and *Madhyama Rogamarga*.

Probable *Samprapti* of Hypothyroidism

Figure 9: Probable *Samprapti* of Hypothryoidism

Nidana Sevana

↓

Kapha Pradhana Dosha Prakopa

↓

Dhatwagnimandya (Medo Dhatu)

↓

Production of *Sama Rasa Dhatu*

↓

Sama Rasa qualitatively and quantitatively *lacks Poshakas and Poshyas*

↓

Ama is increased as a part of *Mala* and accumulates in *Uttarothara Dhatus*

↓

Improper formation of *Uttarothara Dhatus* from *Rasa* to *Shukra*

↓

Manifestation of *Dhatu Dushti Lakshanas*

↓

Signs and symptoms of Hypothyroidism

Samprapti Ghatakas

Table 1: *Samprapti Ghatakas* of Hypothyroidism

Dosha	*Kapha, Vata*
Dooshya	*Rasa, Meda*
Agni	*Dhatwagni*
Ama	*Dhatwagnimandya Janya Ama*

ISSN: 2456-3110 ORIGINAL ARTICLE July 2022

Srotas	*Udakavaha, Annavaha, Medovaha, Swedavaha, Purishavaha, Rasavaha*
Srotodushti	*Sanga*
Udbhava Sthana	*Amashaya*
Sanchara Sthana	*Sarva Shareera*
Vyakta Sthana	*Sarva Shareera*
Adhishtana	*Sarva Shareera*
Rogamarga	*Bahya, Abhyantara, Madhyama*

CONCLUSION

In this study, an attempt was made to explore the *Samprapti Ghatakas* of hypothyroidism and to frame probable *Samprapti* of the disease. After the completion of this study, following conclusions were drawn. *Aharaja Nidanas* includes the *Nidanas* causing *Dushti* of *Kapha* and *Vata*. Increase in the *Guru*, *Snigdha, Abhishyandi Guna* of *Ahara* causes vitiation of *Agni*. Intake of *Dadhi, Dugdha, Snigdhahara, Guru Ahara, Abhishyandi Ahara, Masha, Godhuma, Mamsa, Madhura Rasa,* etc. causes *Kapha Dushti. Vishamashana, Alpahara* causes *Vata Dushti*. *Viharaja Nidana* predominantly includes *Divaswapna, Alasya, Avyayama* and sedentary lifestyle, which causes *Dushti* of *Kapha* and *Meda*. *Vata Prakopa* occurs due to *Vegadharana* of *Mutra* and *Pureesha, Ucchabhashana*, *Ati Adhyayana* and *Bharaharana*. *Manasika Nidanas* include *Chinta, Shoka, Bhaya*, etc. Hypothyroidism has a direct impact on *Agni. Mandagni* is the root cause for almost all diseases and that holds true in this case also. Due to *Nidana Sevana, Kapha Pradhana Dosha Prakopa* happens, leading to *Dhatwagnimandya (Medo Dhatu)*. *Agnimandya* of both *Jataragni* and *Dhatwagni* occurs. It further leads to the production of *Sama Rasa Dhatu* which qualitatively and quantitatively lacks *Poshakas* and *Poshyas. Ama*, as a part of *Mala* is increased and vitiates *Rasa Dhatu*. This *Ama* accumulates in *Uttarothara Dhatus* resulting in improper formation of *Rasa Dhatu* to *Shukra Dhatu*. Thus, there will be manifestation of *Dhatu Dushti Lakshanas* ending up in the clinical signs and symptoms of hypothyroidism. *Kapha* and *Vata* are the main *Doshas* involved in the *Samprapti*. Important *Dooshyas* are *Rasa, Meda. Agni* involved is *Dhatwagni* and the disease is caused primarily due to *Dhatwagnimandya*. *Udakavaha, Annavaha, Medovaha, Swedavaha, Purishavaha, Rasavaha* are the main *Srotas* involved with *Sanga* type of *Srotodushti*. *Udbhava Sthana* can be considered as *Amashaya; Sanchara Sthana*, *Vyakta Sthana* and *Adhishtana* is *Sarva Shareera.* All the three *Rogamarga* are involved.

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