



## HERBAL DRUGS FOR THYROID TREATMENT

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### ABSTRACT

Herbal drugs have proven to be useful in number of diseases. Metabolic disorders are some disorders which progress at a slower rate but damage the whole functioning of the body. Conventional drugs available for these disorders cure symptomatically. Herbal drugs have the capacity to cure such metabolic disorders synergistically at different steps. The objective of this review lies in summarizing different herbal drugs that can be used for treating thyroid and related disorders effectively.

### KEY WORDS

*Thyroid, herbal drugs, metabolism, synergistically, disorders*

### INTRODUCTION

Today is the era of discovering new horizons in the field of medicines, specially through the exploration of phytoconstituents and secondary metabolites. A decade earlier the use of herbal drugs and phytomedicines was totally forgotten by the world because that was the time when alleopathic medicines were holding the monopoly of curing diseases and western science blindly rely on it. [1] But in last few years herbal drugs have again proven their strong presence in treating various metabolic diseases like diabetes, hormonal imbalance etc. The aim of the present review is to discuss the relevance of herbal drugs in treating a slowly progressing disease "Thyroid". In our country the two endemic diseases are Diabetes and Thyroid which have reported their presence tremendously in last few decades. Both these diseases are metabolic disorders arising due to improper life style. [2, 3]

Thyroid disorder can occur from slightly enlarge of thyroid gland, this type of disorder no need to treatment, for long life thyroid cancer. The most common causes of thyroid disorder are abnormal growth of thyroid hormones [4, 5]. Thyroid disorder is generally categorized in two ways:

#### • Hypothyroidism

Hypothyroidism means suppression of thyroid function.[2] Hypothyroidism also is divided in two ways: primary and secondary hypothyroidism. Primary hypothyroidism means the internal activity of thyroid gland, leading to decrease circulation of

thyroid hormones or failure to produce enough thyroid hormone and secondary hypothyroidism refers as normal pituitary stimulate by hypothalamic TSH-releasing hormone.[3-6] The main causes of hypothyroidism are following as:

- 1) Dysfunction of thyroid gland
- 2) Lack of TRH, (hypothalamic TSH-releasing hormone) and TSH (thyroid stimulating hormone), or both
- 3) Inadequate nutrition of iodine diet. [6]

#### • Hyperthyroidism

Hyperthyroidism means elevation of thyroid function. Hyperthyroidism refers that hyper metabolic situation due to excessive level of thyroid hormone secretion and synthesis. The most common name of hyperthyroidism is "Graves's disease". Graves's disease is autoimmune disorder. The main causes of hyperthyroidism are following as:

- 1) Increase or elevated level of thyroid hormones by synthesis and secretion.[8][11]

Thyroid disorders commonly occur in female as compared with male, a common prevalence ratio of thyroid diseases is 4:1. On data of community based studies the prevalence of hyperthyroidism in female is 2% and in male 0.2% , and about 15% of patient of hyperthyroidism occurring in old age patient above 60 year of age. Similarly for the prevalence of hypothyroidism is around 0.3% to 0.4%, which is increasing with age and most commonly more females are affected. [12]

Mainly thyroid gland is located across the trachea and its shape like a butterfly. Mostly it produce thyroxine hormone that to regulate or control the metabolic activity of the body. In the case of too much level of thyroxine metabolism, it causes weight loss , nervousness , irritability and temperature elevation. In other cases too litte level of thyroxine metabolism slow down , it causes weight gain ,deepens the voice , water retention and mental development in children.[11][14] Some condition also alter like menstrual flow , bowel function , hair growth and skin growth. Comparison study of the signs and symptoms of hyperthyroidism and hypothyroidism in table 1. "Goiter" term refer that to an enlarge thyroid gland and it may cause visible swollen in neck and it can create problem to take normal breathing and swallowing.[10]

Thyroid hormones are regulated by hypothalamus, pituitary gland and thyroid axis. The hypothalamus secretes thyrotrophic releasing hormones (TRH) in tropic region that activate pituitary gland to secrete thyroid stimulating hormones (TSH). The main function of TSH to targets and elevate the production of thyroid hormones. The mechanism of thyroid hormones is increase metabolism and consumption of oxygen, calorigenic effects , stimulates central nervous system and also involve in progression and development. The most important thyroid hormones are thyroxine (T4) and triiodothyronine (T3). The most common hormone act as biological power is T3 hormone.[12] Once thyroid released from gland into the blood, the conversion of large amount of T4 into T3, which is responsible for the metabolism of cell in the body. The main function of thyroid hormone is to regulate the body metabolism and affect the growth and other important activity in the body. [10] The aim of this article is to discuss about thyroid disorder with sign and symptoms, diagnosis and herbs which is used for treatment of thyroid disorders. Hyperthyroidism and hypothyroidism are discussed below with their medicinal plant used for treatment.

#### **Hypothyroidism**

Hypothyroidism means the deficiency of thyroid hormones or under active thyroid. It may also be caused by irregular secretion of TSH from the pituitary gland and thyrotropin-release hormone from hypothalamus gland.

#### **Symptoms of Hypothyroidism**

Hypothyroidism as a result it causes low levels of T<sub>4</sub> and T<sub>3</sub> in the systemic circulation. When not sufficient T<sub>4</sub> and T<sub>3</sub> in the systemic circulation causes

metabolism of body get slow down. Common symptoms are following below:

- Fatigue
- Difficulty to concentrating because of moodiness,
- Brain fog
- Excessive weight gain
- Skin get dry ,coarse and itchy
- Hair get dry , coarse and thin
- Feeling cold
- Constipation
- Cramps in muscles
- Increased flow of menstrual
- Blood pressure low
- Exhaustion cause feeling run down and sluggish depression
- Swelling / puffiness in hands , feet ,area of eye and face
- Miscarriage or infertility.[9][11]

#### **Diagnosis of Hypothyroidism**

The term diagnosis is the art or act for identifying a disorder or diseases from their sign and symptoms . mainly a health care professional like physician ,considers some factors when identify or determine the cause and nature of hypothyroidism, following such as:

- Symptoms like (changes feel on you) , family history , risk of factors and medical history.
- Physical examination
- TSH test: taking blood sample determine most sensitive test TSH. And other tests such as free T<sub>4</sub> , free T<sub>4</sub> index and total T<sub>4</sub> are helpful for diagnosis.[10]

#### **Hyperthyroidism**

Hyperthyroidism is also known as thyrotoxicosis. It means that hyperactivity of thyroid gland. The gland is usually increases the release of thyroid hormone, swollen the thyroid and the body process.

#### **Symptoms of Hyperthyroidism**

Hyperthyroidism as the results in increase levels of T<sub>4</sub> and T<sub>3</sub> in the systemic circulation. It causes metabolism of body get up. Common symptoms are following as:

- Irritation
- Increased perspiration from body
- Skin get thin
- Hair get fine brittle
- Weakness in muscles of upper arms and thighs
- Shaking or Severing hands
- Panic diseases

- Insomnia
- Heart get racing
- More frequent in motion of bowels
- Weight loss
- Less frequent flow of menstrual periods.[6][8][14]

**Diagnosis of hyperthyroidism**

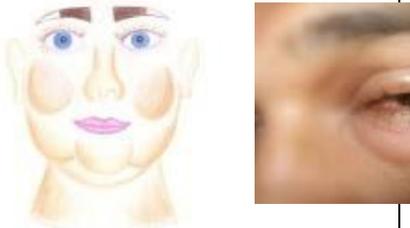
Diagnosis is done to identify a diseases or disorder from their sign and symptoms of hyperthyroidism. Diagnosis is done by various parameters including as:

- Physical examination
- Blood test: levels of thyroid hormones such as : TSH is low, T3 and T4 is high.
- Other tests: Serum cholesterol and triglycerides, Serum glucose, Radioactive iodine uptake.[11]

As comparison study of some important symptoms in Hypothyroidism and Hyperthyroidism diseases are given in Table No.1 following as:

**Table No.1: Shows the summarization of Symptoms of Hypothyroidism and Hyperthyroidism diseases**

S.No	Symptoms of Hypothyroidism	Symptoms of Hyperthyroidism
1.	<p><b>Puffiness in hands</b></p> 	<p><b>Shaking or Severeing hands</b></p> 
2.	<p><b>Weight gain</b></p> 	<p><b>Weight loss</b></p> 
3.	<p><b>Skin get dry</b></p> 	<p><b>Skin get thin</b></p> 

4.	<p><b>Hair get dry and coarse ,thin</b></p> 	<p><b>Hair get fine and brittle</b></p> 
5.	<p><b>Blood pressure low</b></p> 	<p><b>Heart get racing</b></p> 
6.	<p><b>Swelling eyes and faces</b></p> 	<p><b>Panic diseases</b></p> 
7.	<p><b>Fatigue</b></p> 	<p><b>Insomnia</b></p> 

### Treatment goals for Hypothyroidism and Hyperthyroidism diseases

A large number of herbs act as anti-thyroid activity in both thyroid diseases hypothyroidism and hyperthyroidism. In our review, we have tried to summarize few anti-thyroid herbs which have been described below. Mainly different phytoconstituents have different mechanism of action and uses against for both thyroid diseases as reported by different author have studied under each medicinal plants / herbs. Various herbal plants are available for hyperthyroidism like Bugleweed (*Lycopus virginicus*),

Gypsywort (*Lycopus europaeus*), Gromwell (*Lithospermum ruderales*), Water horehound (*Lycopus lucidus*), Lemonbalsam (*Melissa Officinalis*), Rose marry (*Rosmarinus officinalis*) and Sage (*Salvia officinalis*). And for treatment of hypothyroidism herbal plants are available such as : Gotu Kola (*Centella asiatica*), Ashwagandha (*Withania Somnifera*), Guggul (*Commiphora mukul*), and Coleus or forskohlii (*Plectranthus barbatus*).[5-6] Bladder wrack (*Fucus vesiculosus*), is a special type of brown algae, which occupy a unique place in treatment of both hypothyroidism and

hyperthyroidism. Some important plants used for treatment of thyroid disease are discussed below:

- a) **Bugleweed (*Lycopus virginicus*):** Bugleweed is used as thyrosuppressive agent that suppress the thyroid function are the one which are most effective herbs for thyroid disease. The herbs is belonging to family of Lamiaceae . it contain hydrocinnamic acid derived such as lithospermic acid , rosmarinic acid , chlorogenic acid and caffeic. Bugleweed and its extract have many beneficial effects such as it have ability to inhibit the binding of stimulating antibodies for Grave's diseases to the thyroid diseases , blockage production of thyroid stimulating hormones (TSH) , decrease deionization of peripheral T4 and also inhibit metabolism of iodine [5][15-18].
- b) **Lemon balm (*Melissa Officinalis*):** lemon balm is the herb used as thyrosuppressive agent in treatment of hyperthyroidism. It is effective in blockage of TSH binding to the receptor by act on the hormones and receptor itself. It also act on inhibiting the cyclic AMP production to stimulating by TSH receptor as antibodies. It contains large amount of rosmarinic acid. Mostly rosmarinic acid affects IgG antibodies. They have ability to instead of creating a receptor response on thyroid gland, the response in immune system by reduce the loading of IgG , because of that IgG antibodies cannot be direct act on thyroid gland. Because of this result we conclude that lemon balm may also inhibit autoimmune activity in immune system. From traditionally, lemon balm are used to treatment of symptoms associated with hyperthyroidism such as insomnia, tachycardia and hyperactivity also.[6]
- c) **Motherwort (*Leonurus cardiac*)**  
In older studies, it studied that motherwort is herb which mostly used in the combination with other herbs. Most commonly motherwort has an anti-inflammatory activity, because it contains quercetin, as a flavonoids.  
For treatment of autoimmune diseases, it is important to reduce inflammation or swelling, because of that motherwort a good choice for treatment of hyperthyroidism. In this case, the enzyme 5 deiodanse is inhibit, when the addition to reducing inflammation. From traditionally motherwort uses include to treating symptoms of anxiety, palpitations and tachycardia. [6][23-24].
- d) **Gromwell (*Lithospermum ruderale* )**  
Gromwell has basically shown similar activity as bugleweeds. The gromwell herbs are belonging

to family of Boraginaceae. It also contain rosmarinic acid The main function of herbs in hyperthyroidism is blocking the binding of TSH to thyroid follicles ,it also inhibit transport of iodine to thyroid follicles , and as similar to bugleweeds it also decrease the peripheral deionization of T4 and also decrease the secretion of thyroid hormones.[7] [16][18]

- e) **Rose marry (*Rosmarinus officinalis*)**  
Rose marry is a herbs which is a member of Lamiaceae plant. It contains a large amount of Rosmarinic acid which is used in treatment of hyperthyroidism. Rosemary plant is similarly act as lemon balm , because in research it investigated that rosmarinic acid act on the effect of TSH on receptor site , also inhibit immunoglobulin effects on Thyroid stimulating hormone (TSH) receptor , and it also decrease the peripheral conversion of T3. The rosmarinic acid may also beneficial in the treatment of Grave's diseases.[6] [27]
- f) **Sage (*Salvia officinalis*)**  
**Sage** herbs are also belonging from the member of Lamiaceae plants. it also contain rosmarinic acid. Both rosemary and sage contains rosmarinic acid in a high percent. Similar it act on act on the effect of TSH on receptor site , also inhibit immunoglobulin effects on Thyroid stimulating hormone (TSH) receptor , and it also decrease the peripheral conversion of T3. Because of that Sage is also known as thyrosuppressive and sage herbs also have other activity such as antiviral, antioxidant, nervine and spasmolytic.[5],[9-10][27]
- g) **Gotu Kola ( *Centella asiatica* )**  
Gotu Kola leaf is commonly beneficial for treatment of hypothyroidism. It contain asiatic acid, asiaticoside, brahmoside, , and brahmic acid also called as madecassic acid. Morre suggested that gotu kola has property to stimulate T4 synthesis. It also used as nervous system regulator to enhance the energy and vitality. Because of that it energzing effect of this herbs it enhance or stimulate the synthesis of T4. Mostly tincture of gotu leaf is used for treatment of hypothyroidism.[6][7]
- h) **Ashwagandha ( *Withania Somnifera* )**  
Ashwagandha is a saponin glycoside which known as Indian ginseng or winter cherry, it is an adaptogen plant belonging to Solanaceae family. It also has antioxidant properties. It contains alkaloids, steroidal and saponin chemicals which

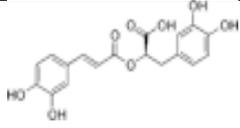
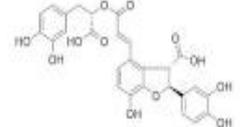
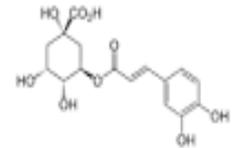
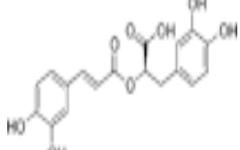
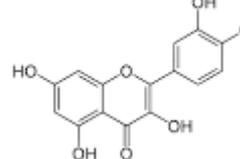
is essential for active in the hormonal pathways in system. These chemical constituents involve in increase the production of T4 hormone with the help of conversion of T4 to T3. In 2011 study Ashwagandha extract has ability to improve thyroid activity and also enhance the antiperoxidation activity in tissue.[5-6][25-26]

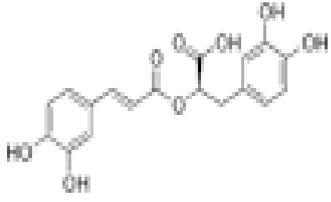
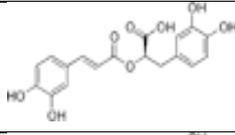
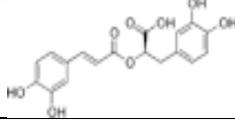
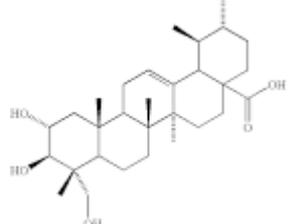
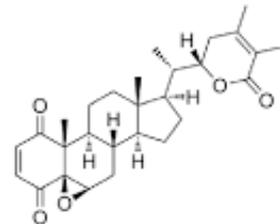
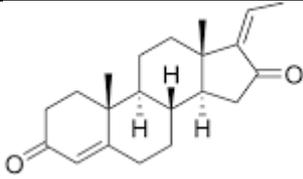
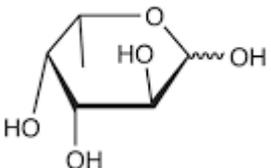
i) **Guggul ( *Commiphora mukul* )**

Guggul extract contains oleo-resin from tree of *Commiphora mukul* . In Oleo-resin of guggul contain Z- guggulsterone, which have strong

thyroid stimulating activity. Guggulsterone also increase synthesis of T3 by improving the conversion of T4 to T3 and hepatic lipid peroxidation and also increase levels of T3. When levels of T3 increase it can reduce the LDL cholesterol level in the patient who suffering from hypothyroidism. Weight loss can be stimulated. In India guggul is used as thyroid stimulants from traditional Ayurvedic medicine. So its directly acting on thyroid gland to stimulant thyroid hormones.[12-14][30-32]

**Table 2. List of Plant Used In Treatment of Thyroid Diseases**

Type of diseases	Name of plant (biological sources )	Chemical constituent	Chemical structure	Uses
Hyperthyroidism	<b>Bugleweed (<i>Lycopus virginicus</i>)</b>	Rosmarinic Acid		Used As Thyrosuppressive Agent
		Lithospermic Acid		
		Chlorogenic Acid		
	<b>Lemon balm (<i>Melissa Officinalis</i>)</b>	Rosmarinic acid		Used As Thyrosuppressive Agent
	<b>Motherwort (<i>Leonurus cardiac</i>)</b>	Qurectin		It Has Anti-Inflammatory Activity , Because Of That It Used In Combination

	<b>Gromwell</b> ( <i>Lithospermum ruderale</i> )	Rosmarinic acid		Also Used As Thyrosu-Pressive Agents
	<b>Rose marry</b> ( <i>Rosmarinus officinalis</i> )	Rosmarinic acid		Thyrosu-Pressive Agents
	<b>Sage</b> ( <i>Salvia officinalis</i> )	Rosmarinic acid		Thyrosu-Pressive Agents
<b>Hypothyroidism</b>	<b>Gotu Kola</b> ( <i>Centella asiatica</i> )	Madecassic acid		Enhance Synthesis Of T4
	<b>Ashwagandha</b> ( <i>Withania Somnifera</i> )	Withaferin		Improve Thyroid Activity ,Enhance Antiperoxidation
	<b>Guggul</b> ( <i>Commiphora mukul</i> )	Guggulosterone		Thyroid Stimulants In Hypothyroidism
	<b>Bladder wrack</b> ( <i>Fucus vesiculosus</i> )	Iodine and  L-fucose		Iodine Deficiency, Goiter ,. Myxedema

**g) Coleus or forskohlii (*Plectranthus barbatus*)**  
Forskohlii is a herbs mostly used for treatment of hypothyroidism, because it contain essential oils and terpens. Mostly commonly production and synthesis of thyroid hormones are enhanced by forskohlii or coleus. And it also activates Production of cyclic AMP. It also used with the

combination of synthetic drugs to increase production of thyroid gland, if the patient has not been to use medication therapy for long period of time [5-6][33].

**h) Bladder wrack (*Fucus vesiculosus*)**  
Bladder wrack is a special type of algae, which one beneficial advantage is that this algae used in

therapy of both antithyroid disorder both hypothyroidism and hyperthyroidism. Bladder wrack is obtained from algae not from any plant source, because of that it belonging from the family of Fucales. Traditionally use of bladder wrack involve in thyroid function in different conditions if whether is hyperactive, or normal and or is in underactive. Bladder wrack is category of seaweeds and all seaweeds contain variable amount of iodine. Dried bladder wrack contains approx. 50 mg of iodine. Iodine helps to stimulate thyroid gland. It contains substance that help to restore the normal function of thyroid gland and also reduce the size of goiter presence in thyroid. It is necessary to intake iodine in case of low iodine levels, because it cause side effect and cause hyperthyroidism. It contains iodine and L-fucose compound, it have anti-obesity, anti-inflammatory, antioxidant and anticarcinogenic properties.[6],[14]

#### CONCLUSION:

Ethno medicinal an area of research dealing with medicine derived from plants, animals and minerals including indigenous belief, concept, knowledge and practice among the ethane group. There is a trend to discover new medicines from vegetable source on establishing novel user for older medicines. To get new medicines for diseases ethno medicinal route is now issued. The knowledge is now received before it is completely lost due to change in social economic condition and rapid urbanization.

The review lead to evolve with very interesting facts. The versatility exhibited by various plant interestingly irises the zeal to know more about their plant profile, their phytochemical activity and range of pharmacological activities exhibited. The herbal cure is gaining world wide acceptance and has emphasized the head of modern scientific exploration and evaluation of ethno medicine from plants. In expensive, effective and safe indigenous medication is gaining acceptance from both urban and rural people. The green remedy over the world is pushing the knowledge of primitive sociation on ascending spiral. This will lead to remarkable discoveries from plant based ethno medicines.

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**Conflict of Interest: Nill**

#### REFERENCES:

1. Nagarathna P.K.M, Deepak Kumar Jha ; Study on Antithyroid Property of Some Herbal Plants ; Int. J. Pharm. Sci. Rev. Res., 23(2), Nov – Dec 2013 , page no 203-211
2. Yarnell Eric and Abascal Kathy , Botnical medicine for thyroid regulation ; Alternative and Complementary ; copyright from US Library ; year- 2006 ; page no-107-112
3. Michaël Friedman ; Thyroid Autoimmune Disease ; Journal of Restorative Medicine 2013; 2: page 70-81
4. Jassin jouria ; thyroid disorders: a comprehensive review ; nursing.elitecme.com ; page 103-156
5. Brown R and Francis G.L ; Autoimmune Thyroid Disorders ; Journal of Thyroid Research ;year 2011; page 1-2
6. Garg S.C ; Essential oils as therapeutics ; Natural product Radiance ; year 2005; volume 4(1) ; page no. 18-26
7. Sahani B.S ; Thyroid disorder, available on www.homoeopathyclinic.com
8. Palacios S.S , Corrales E.P , Galofre J C ; Management of Subclinical Hyperthyroidism ; Int J Endocrinol Metab., year-2012; volume 10(2) , page no.490-496
9. Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services , Oregon Health & Science University ; January 2004.
10. American Thyroid Association, Hypothyroidism, A booklet for patients and their families, publication of the American thyroid association (ATA), Copyright 2013 ; available from website-www.thyroid.org.
11. Truter Ilse , Clinical review: hyper- and hypothyroidism S Afr Pharm J ; year 2011 ; Vol 78 No 6 ;page no 1-14
12. Maalik A, Khan F A ,Mumtaz A. et al, Pharmacological Applications of Quercetin and its Derivatives: A Short Review ; Tropical Journal of Pharmaceutical Research ; year 2014; volume 13 (9): page 1561-1566
13. Christa sinadinos, herbal therapeutic treatments for hypothyroidism ; Copyright– northwest school for botanical studies ; page no.1-11
14. Mary Bove ; Botanical Insights into Autoimmune Thyroid Disease ; copyright 2012 Diversified Business Communications ; page no-1-9
15. Brownlee, iain, fairclough, andrew, hall ; The potential health benefits of seaweed and seaweed extract; Sheffield Hallam University Research ;year-2012 ; page no 1-12
16. Other use of sea weeds ; a guide to the seaweed industry ; year 2003
17. Dhargalkar .V.K ; Pereira .N ; Seaweed : Promising Plant Of The Millennium ; Science And Culture, year-2005;volume no 71,page no. 60-66
18. Paul M ; Christopher I.R. , Brooks M et al, Nutrition Reviews, Vol. 65, No. 12; page no.535-544
19. Gade R\*, M.Siva Tulasi M.S, V.Aruna ; Seaweeds: A Novel Biomaterial; International Journal of Pharmacy

- and Pharmaceutical Sciences ; Year-2013; Vol 5 (2); page no. 40-44
20. Tiwari S, Gehlot.S, Gambhir I.S.; Review *Centella Asiatica*: A Concise drug review with probable clinical uses ; Journal of Stress Physiology & Biochemistry, Vol. 7 No. 1 2011, page no.. 38-44 .
  21. M. Umadevi .M, Rajeswari .R ,Sharmila Rahale C et al ; Traditional And Medicinal Uses of *Withania Somnifera* ; The pharma innovation ; Year -2012 ; vol. 1(9); page no.109-110.
  22. Mishra L C ; Dagenais S ; Scientific Basis for the Therapeutic Use of *Withania somnifera* (Ashwagandha): A Review ; Alternative Medicine Review ;Year-2000; Volume 5 (4); page 334-346.
  23. Materska M.; Quercetin and its derivatives: chemical structure and bioactivity – a review; polish journal of food and nutrition sciences ; Pol. J. Food Nutr. Sci. 2008, Vol. 58, No. 4, Page no.407-413.
  24. Pal .D , Verma. P ; Flavonoids: A Powerful And Abundant Source Of Antioxidants ; Int J Pharm Pharm Sci, Vol 5(3), page no. 95-98.
  25. Singh. G, Sharma P.K , Dudhe R and Singh S ; Biological activities of *Withania somnifera* ; Annals of Biological Research ; year- 2010, volume 1 (3); page no.56-63.
  26. Satyavati GV. Gum guggul (*Commiphora mukul*) - The success of an ancient insight leading to a modern discovery. Indian Journal Medicine Research; year 1988; volume 87: page no.327-35.
  27. Won J, Hur YG, Hur EM, et al. Rosmarinic acid inhibits TCR-induced T cell activation and proliferation in an Lck-dependent manner. European Journal Immunol.year- 2003; volume 33:page no. 870–9.
  28. Kang MA, Yun SY, Won J. Rosmarinic acid inhibits Ca<sup>2+</sup>-dependent pathways of T-cell antigen receptor-mediated signaling by inhibiting the PLC-gamma 1 and Itk activity.; Blood; year-2003;volume 101:page no. 3534–42.
  29. Frances D. Botanical approaches to hypothyroidism: avoiding supplemental thyroid hormone. Med Herb. Year- 2002; volume12: page no.1–5.
  30. Singh AK, Tripathi SN, Prasad GC. Response of commiphora mukul (guggulu) on melatonin induced hypothyroidism. Anc Science Life year 1983; volume 3: page no 85–90.
  31. Tripathi YB, Malhotra OP, Tripathi SN. Thyroid stimulating action of Z-guggulsterone obtained from Commiphora mukul. Planta Medicine , year-1984; volume 50: page no.78–80.
  32. Tripathi YB, Tripathi P, Malhotra OP, Tripathi SN, Thyroid stimulatory action of (Z)-guggulsterone: mechanism of action. Planta Medicine, year- 1988; volume-54: page no. 271–7.
  33. Mary Shomon, About.com Guide Thyroid Disease Symptoms- Hypothyroidism and Hyperthyroidism Updated August 26, 2013.

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