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RASAPANCAKA QUANTITATIVE SCORING MODEL (RQSM) OF BILVADI PANCAMULA AND ITS PROBABLE THERAPEUTIC ROLE IN THYRO-OBESITY: AN AYURVEDIC CONCEPTUAL REVIEW

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ABSTRACT

Introduction: Research trends indicate that thyroid-stimulating hormone (TSH) changes may be secondary to obesity. The age-old principles laid out in the texts of *Ayurveda* closely correspond to the pathophysiology of Obesity and hypothyroidism, particularly with regard to *Agnimandya*, *Medodhatu dushti* and *kapha dosha* imbalance. Direct management of obesity is listed under the texts of *Ayurveda*, while hypothyroidism remains *anukta vyadhi*. The present work aims to deduce the *Ayurvedic* pharmacodynamics of *Bilvadi panchamula*, a classical drug listed in text for the management of obesity, in context of thyrobesity using RQSM, and to predict the formulation's therapeutic potential. **Materials and Methods:** The classical texts of *Ayurveda* were reviewed to collect the data on the properties of *Bilvadi panchamula* and the pathogenesis of thyrobesity. The RQSM was employed to predict the *rasapanchak* of *Bilvadi panchamula* and to assess the drug's therapeutic potential. The effectiveness of *Bilvadi panchamula* in the *samprapti vighattan* of thyrobesity was analysed and reported. **Results:** The formulation predominantly comprised *Tikta* and

Kashaya Rasa, *Laghu* and *Ruksha Guna* (80% each), *Ushna Virya* (60%) and *Katu Vipaka* (100%). **Conclusion:** Based on the *Rasapanchaka* Quantitative Scoring Model (RQSM), *Bilvadi Panchamula* demonstrated a pharmacodynamic profile characterised by predominant *Tikta-Kashaya Rasa*, *Laghu-Ruksha Guna*, *Ushna Virya*, and *Katu Vipaka*, indicating potential *Kapha-Medohara* and *Agnideepana* action. A Literature-based inference approach indicates that the formulation is predicted to have therapeutic potential for addressing the *Ayurvedic* pathophysiological mechanisms underlying thyrobesity, particularly *Agnimandya*, *Medodhatu Dushti*, and *Kapha Dosha imbalance*.

KEYWORDS: *Brihat Panchamula*, *Sthaulya*, *Agni*, *Rasapanchak* scoring.

INTRODUCTION

Hormonal imbalance is an outcome of lifestyle modification, where the incidence of hypothyroidism is more common in women than in men.[1] Primary hypothyroidism occurs at an annual rate of 1 to 2 per 1,000 in females, whereas the rate for males is 2 per 10,000.[2] Research indicates that the female-to-male ratio for hypothyroidism varies across different studies, ranging from 6:1.[3]

Hypothyroidism is associated with obesity, and these two common clinical conditions have been linked closely. The term ‘thyrobesity’ has clinical significance, as the prevalence of obesity is increasing worldwide, and thyroid dysfunction often coexists.[4] The link has become more relevant in the context of an unprecedented rise in the prevalence of obesity worldwide. A novel view suggests that changes in thyroid-stimulating hormone (TSH) may be secondary to obesity.[5] Thyroid hormones regulate basal metabolism and thermogenesis and play an important role in lipid and glucose metabolism, food intake, and fat oxidation.[6] Hypothyroidism-induced obesity is mediated through reduced basal metabolic rate, altered lipid metabolism, leptin resistance, and chronic low-grade inflammation. This dual burden contributes to increased risk of cardiovascular disease, infertility, and impaired quality of life.[7]

Burden of the disease

One of the most common endocrine disorders is thyroid illness. An estimated 0.5 to 5% of people worldwide suffer from clinical hypothyroidism, and 5-20% suffer from subclinical hypothyroidism.[8] According to a national-level research conducted in cities of urban India, the prevalence of hypothyroidism was found to be 10.9%, with notable differences by region,

age, and gender. The prevalence was much higher in females (15.86%) than in males (5.02%). According to other research, the incidence rises with age, peaking among people aged 46-54. According to a recent population-based study, there is a growing burden of hypothyroidism, with an incidence rate of about 15 per 1000 people each year.[9] Among hypothyroid patients, weight gain and obesity are reported in nearly 40–60%, establishing a strong clinical link between the two. According to WHO (2024), more than 1 billion people globally are obese, with a rising incidence in developing countries, including India. Obesity is a major risk factor for diabetes, hypertension, dyslipidemia, cardiovascular diseases, and certain cancers.

Hypothyroidism-linked obesity magnifies morbidity by increasing metabolic sluggishness, psychological stress, infertility, and cardiovascular risk. Subclinical hypothyroidism is substantially linked to an increased risk of obesity, hypertension, higher triglyceride levels, and decreased high-density lipoprotein cholesterol levels, according to a meta-analysis.[10] Obesity raises the risk of hypothyroidism, according to studies.[11]

Obesity and hypothyroidism contribute substantially to healthcare expenditure due to lifelong medication, diagnostic monitoring, and management of associated complications. The management of hypothyroidism in other systems of medicine is limited to lifelong intake of drugs, which have adverse effects on the population over long-term ingestion. Presently, there is an urgent need for a safer, more effective cure so patients can avoid the adverse effects of available treatment modalities.

In *Ayurveda*, hypothyroidism and its associated obesity can be understood in terms of *Agnimandya* (low digestive/metabolic fire), *Meda Dhatu Vriddhi* (excess adipose tissue accumulation), and *Kapha–Vata* imbalance. The clinical presentation parallels *Sthaulya*, as described in classics such as the *Charaka Samhita*, in which *Mandagni* leads to improper digestion and tissue metabolism, resulting in *Medoroga* (obesity).

The *Ayurvedic* system of medicine has a vast literature, including diverse flora with significant medicinal properties & *Bilvadi Panchamula* is one of them, with the potential to deliver effective results in hypothyroidism associated with obesity. It is highlighted in the present work, which aims to generate the evidence base to substantiate it.

Sthaulya (Obesity) is mentioned in detail in *Ayurvedic* texts, along with other *nindit purusha* (undesirable physical appearance), which can be understood in terms of various hormonal disorders. If we try to have a keen insight into the pathogenesis of hypothyroidism according to the principles of *Ayurveda*, it is caused by dysfunction of the *Agni*. Hypofunction of *Jatharagni*, which in turn affects *Dhatvagni*, eventually brings out a pathological sequence, and ultimately, the diseased condition is developed. Looking into its *Doshika* dominance, *Kapha-associated Pitta Dushti is due to vitiation of Vayu by Margavarana. Predominantly Annavaha, Rasavaha,* and *Medovaha Srotodushti* can be considered the cause of the disease. The same are also associated with obesity. Further, several contemporary studies substantiate that the pathophysiology of Obesity and hypothyroidism are associated in many ways, and obesity is a classical symptom observed in hypothyroidism. The interplay between thyroid dysfunction, particularly hypothyroidism, and obesity has given rise to the growing notion of "thyrobesity," which refers to the presence and mutual influence of both disorders. The connection between these two conditions paved the way for the present work, where the efficacy of a drug is planned to be tested in hypothyroidism-linked obesity. The selected intervention is *Bilvadi Panchamula Churna*, mentioned in the context of *Sthaulya chikitsa* in *Charaka Samhita*.

MATERIAL AND METHODS

A thorough review of the classical *Ayurvedic* literature was conducted to compile and analyze the therapeutic properties of *Bilvadi Panchamula*, as well as to understand the *Ayurvedic* perspective on the pathogenesis (*samprapti*) of thyrobesity. Descriptions of the constituent drugs of the formulation in the authoritative Ayurvedic texts, in respect of their *rasa, guna, virya, vipaka,* and *karma*, were critically examined using a literature-based inference methodology. To reinforce the quantitative evaluation, the *Rasa Panchaka*-based Rational Quantitative Scoring Method (RQSM) was employed to forecast the aggregate *Rasapanchaka* profile of *Bilvadi Panchamula*. The therapeutic potential of *Bilvadi Panchamula* was assessed in relation to its ability to intervene at various stages of the *samprapti* of thyrobesity, as predicted by the RQSM.

The likelihood of the formulation producing *samprapti vighatana* (disruption of disease pathogenesis) was systematically analyzed, thereby providing a scientific rationale for its selection and therapeutic application in the management of thyrobesity.

OBSERVATIONS

The properties of the constituents as observed in the classical texts of *Ayurveda* were collected and reported for further analysis. The same are listed in Table 1.

***Bilvadi Panchamula Constituents* Table: 1.**

Sr.No.	Constituent *Dravya*	Latin name & Family	*Rasa*	*Guna*	*Virya*	*Vipaka*	*Dosha Prabhava*
1.	*Bilva*[12]	*Aegle marmelos Corr.* Rutaceae	*Kashaya, Tikta*	*Laghu, Ruksha*	*Ushna*	*Katu*	*Vatakapha shamaka*
2.	*Agnimantha*[13]	*Premna integrifolia Linn.* Verbenaceae	*Katu, Tikta, Kashaya, Madhura*	*Laghu, Ruksha*	*Ushna*	*Katu*	*Kaphavata shamaka*
3.	*Shyonaka*[14]	*Oroxylum indicum Vent.* Bignoniaceae	*Kashaya, Tikta*	*Laghu, Ruksha*	*Shita*	*Katu*	*Tridosha Shamaka*
4.	*Patala*[15]	*Stereospermum suaveolens DC* Bignoniaceae	*Kashaya, Tikta*	*Laghu, Ruksha*	*Anushna*	*Katu*	*Tridosha Shamaka*
5.	*Gambhari*[16]	*Gmelina arborea Linn.* Verbenaceae	*Kashaya, Tikta, Madhura*	*Guru*	*Ushna*	*Katu*	*Tridosha Shamaka*

The properties of each constituent of the *Bilvadi panchamula* were quantified to determine the proportions of the dominant *Rasa, Guna, Virya, Vipaka*, and *Dosha prabhava* in the *Bilvadi panchamula churna*, and to analyse the drug's efficacy in the management of Thyrobesity. The results of the RQSM analysis are presented in Table 2.

RQSM Analysis based on the composition of the Constituents Table: 2.

Rasa	No. of Drugs	*Guna*	No. of Drugs	*Virya*	No. of Drugs	*Vipaka*	No. of Drugs	*Doshaghnata*	No. of Drugs
Madhura	2/5	*Laghu*	4/5	*Ushna*	3/5	*Katu*	5/5	*Vataghna*	2/5
Katu	1/5	*Guru*	1/5	Shita	1/5			*Kaphaghna*	2/5
Tikta	5/5	*Ruksha*	4/5	Anushnashita	1/5			*Tridoshghna*	3/5
Kashaya	5/5								

DISCUSSION

The management of hypothyroidism in other systems of medicine is limited to lifelong intake of drugs, which may have adverse effects over long-term ingestion. Presently, there is an urgent need for a safer, more effective cure so patients can avoid the adverse effects of available treatment modalities.

In *Ayurveda*, hypothyroidism and its associated obesity can be understood in terms of *Agnimandya* (low digestive/metabolic fire), *Meda Dhatu Vriddhi* (excess adipose tissue accumulation), and *Kapha-Vata* imbalance. The clinical presentation for obesity parallels *Sthaulya*, as described in classics such as the *Charaka Samhita*, in which *Mandagni* leads to improper digestion and tissue metabolism, resulting in *Medoroga* (obesity).[17] As Hypothyroidism is not directly listed in any of the classical texts of *Ayurveda*, its pathophysiology and management are to be decoded through the principles of *Anukta Vyadhi Nidana*.[18]

The *Ayurvedic* system of medicine has a vast literature, including diverse flora with significant medicinal properties. *Bilvadi Panchamula* was evaluated as one of the potential drugs to deliver effective results in hypothyroidism associated with obesity.

Table 2 shows that the formulation had *Tikta* and *Kashaya rasa* dominance (100%), followed by *Madhura (*40%) and *Katu Rasa* (20%). *Laghu* and *Ruksha Guna* were dominant (80%), and Guru Guna was observed in 20%; all Dravya were predominantly Ushna Virya (60%) and *Katu Vipaka (*100%). 60% of drugs were *Tridoshaghna* and rest 40 % were specifically *Vata* and *Kaphahar.*

Probable Action of Drug based on *Dosha, Dushya* and *Samprapti Vighatana* properties

- *Dosha*: *Bilvadi panchmool*, drugs are *Vatakaphaghna* or *Tridoshaghna.* It reduces the dominant *Dosha, Kapha and Vata* in case of Thyrobesity.
- *Dushya*: *Ushna Virya* property, which helps to balance Vata and Kapha dosha, and *Meda Dushti* is depicted by the drug. Moreover, the drug has a *Tikta Rasa* dominant property. *Karma* of *Tikta Rasa* is *Dipana, Pachana, Lekhana, Medoshoshana,* this way the drug can be useful in the management of Thyrobesity.[19]
- *Agni* and *Ama*: *Sthaulya*, is a result of *Medodhatvagnimandya*. Hence, the *Agnidipana* property of *Bilvadi Panchmula* would counterbalance the main pathological factor, i.e., *Agnimandyajanita Ama.*

Sthaulya (Obesity) is mentioned in detail in *Ayurvedic* texts, along with other *nindit purusha* (undesirable physical appearance), which can be understood in terms of various hormonal disorders.[20] If we try to have a keen insight to the pathogenesis of hypothyroidism according to the principles of *Ayurveda*, it is caused by dysfunction of the *Agni*. Hypofunction of *Jatharagni*, which in turn affects *Dhatvagni*, eventually brings out pathological sequence, and

ultimately, the diseased condition is developed. This cycle is wrecked (*Samprapti Vighatana*) by *Kashaya - Tikta Rasa* and *Ushna-Virya Pradhana* drugs.

Considering its *Doshika* dominance, Kapha associated *Pitta Dushti* with vitiation of *Vayu* due to *Margavarana* and predominantly *Annavaha*, *Rasavaha* and *Medovaha Srotodushti* can be considered the cause of the disease.[21] The same are also associated with obesity. Further, several contemporary studies substantiate that the pathophysiology of Obesity and hypothyroidism are associated in many ways, and obesity is a classical symptom observed in hypothyroidism. The interplay between thyroid dysfunction, particularly hypothyroidism, and obesity has given rise to the growing notion of "thyrobesity," which refers to the presence and mutual influence of both disorders.

Based on the percentage distribution of all content drugs, *Bilvadi Panchmula* has dominance in *Tikta* and *Kashaya Rasa*, *Laghu* and *Ruksha Guna*; *Ushna Virya*; *Katu Vipaka*; *Kapha Vata Nashana* properties. These play a pivot role in the management of Thyrobesity, which is *Medo Dhatvagni Mandya Janita Kaphavata Pradhana* disease.

CONCLUSION

The present work highlights and presents the preliminary data required to establish the principles behind the relevance of *Bilvadi Panchamula* in the management of Thyrobesity. Experimental studies have also reported anti-obesity, hypolipidemic, and endocrine-modulating effects for various constituent drugs separately, supporting their potential therapeutic relevance. Consequently, while the formulation demonstrates a sound theoretical basis and promising pharmacological profile, definitive conclusions regarding its clinical efficacy and safety cannot yet be established. This warrants future research with a focus on well-designed randomized controlled clinical trials, standardized drug preparation, quality assurance, and mechanistic studies integrating Ayurvedic principles with contemporary biomedical outcomes.

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