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The Multidimensional Perspective on Trimad: A Review of its Traditional, Pharmacological, and Experiential Aspects

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ABSTRACT :

Trimad is an ancient Ayurvedic polyherbal formulation recommended for the management of obesity, known as *Sthaulya* in classical texts. The formulation consists of three key components: the tubers of Mustaka (*Cyperus rotundus*), the fruits of Vidanga (*Embelia ribes*), and the roots of Chitraka (*Plumbago zeylanica*).[1] This report provides a comprehensive review of the available literature on Trimad, examining its traditional context, the scientific evidence for its individual components, and its real-world application by traditional practitioners. While preclinical studies have demonstrated that the individual components possess promising anti-obesity, anti-diabetic, and anti-inflammatory activities, a significant research gap exists, as Trimad has not been systematically studied as a combined formulation.[2] A recent survey of Ayurvedic physicians revealed that the formulation is widely used for obesity management, with a perceived moderate efficacy (an average rating of 5 out of 10).[5] The findings underscore the critical need for rigorous, well-designed clinical trials to scientifically validate the safety, efficacy, and proposed mechanisms of action of this polyherbal combination in a modern medical context.[3]

Introduction

The Global Health Crisis of Obesity and the Role of Traditional Medicine

Obesity has emerged as a major global health crisis, recognized by the World Health Organization (WHO) as a leading cause of preventable death.[7] Characterized by an excessive accumulation of body fat, obesity is a complex, multifactorial condition associated with a host of chronic, low-grade inflammatory states and metabolic dysfunctions.[2] The condition is a primary driver of a wide range of comorbidities, including type 2 diabetes, cardiovascular diseases, hypertension, and certain cancers.[2] While conventional pharmacotherapies are available, their use is often constrained by significant side effects, limited long-term efficacy, and a high rate of discontinuation.[7] This has fueled a global interest in alternative and complementary medical systems, particularly those with a long history of use and patient tolerance, such as Ayurveda.[8] Ayurveda, an ancient Indian medical system, offers a holistic perspective on health and disease, and its classical texts contain a vast repository of therapeutic interventions, including numerous plant-based formulations for the management of obesity, or *Sthaulya*.[1]

The Conceptual Triad: A Clarification of Terminology

The term "triad" is used across various disciplines, and it is imperative to distinguish these separate concepts to maintain clarity and avoid confusion. In a sociological context, a triad is defined as a group of three people, considered a fundamental unit of analysis in microsociology.[10] Pioneered by German sociologist Georg Simmel, the study of triads explores how the addition of a third person to a dyad fundamentally alters communication dynamics, power structures, and group interactions.[10] In environmental science, the "Triad approach" is an innovative project management framework for environmental restoration, comprising three core elements: systematic project planning, dynamic work strategies, and real-time measurement technologies.[12] This approach is designed to reduce uncertainty and improve efficiency in resolving contamination issues.[12] In music theory, a triad is a chord consisting of three notes stacked in consecutive thirds, forming the harmonic basis of tonal music.[14] This report focuses exclusively on "Trimad," a specific Ayurvedic polyherbal formulation, and does not relate to these other established uses of the term "triad."

An Introduction to Polyherbalism and the Principles of Synergy in Ayurveda

Ayurveda's therapeutic approach often involves the use of polyherbal formulations, which are defined as mixtures of two or more herbs.[9] This principle is distinct from the Western pharmaceutical model, which typically focuses on isolating and administering a single active compound.[18] The rationale behind polyherbalism is the concept of synergy, where the combined effect of multiple herbs is greater than the sum of their individual effects.[17] This synergy can manifest in several ways: enhancing the therapeutic efficacy of the primary components, modulating drug absorption and metabolism (pharmacokinetic synergism), or targeting multiple pathological pathways simultaneously (pharmacodynamic synergism).[17] Furthermore, combining

herbs can help to mitigate potential side effects associated with a single, highly potent ingredient.[17] The formulation Trimad, like other well-known Ayurvedic combinations such as Triphala and Trikatu, exemplifies this fundamental principle by bringing together three specific plants to achieve a targeted therapeutic outcome.[6]

Trimad: A Traditional Ayurvedic Formulation

Composition and Pharmacological Attributes from Classical Texts

Trimad is an Ayurvedic polyherbal formulation consisting of three distinct plant parts: the tubers of Mustaka (*Cyperus rotundus*), the fruits of Vidanga (*Embelia ribes*), and the roots of Chitraka (*Plumbago zeylanica*).[1] The selection of these specific plants is not arbitrary but is rooted in their individual pharmacological properties, or
Dravyaguna, as described in classical Ayurvedic texts.[3]
Each component contributes unique attributes to the combined formulation. Mustaka (*C. rotundus*) is described as possessing a combination of tastes (*Rasa*), including bitter (*Tikta*), pungent (*Katu*), and astringent (*Kashaya*).[3] Its properties (
Guna) are described as light (*Laghu*) and dry (*Ruksha*), with a pungent post-digestive effect
(*Vipaka*) and a cold potency (*Veerya*).[3] In contrast, both Vidanga (
E. ribes) and Chitraka (*P. zeylanica*) possess a single pungent taste (*Katu*) and share the properties of being light, dry, and penetrating (*Teekshna*).[3] Their post-digestive effect is also pungent, and they both possess a hot potency (
Ushna).[3]
The deliberate combination of these ingredients, particularly the inclusion of the cooling Mustaka with the heating Vidanga and Chitraka, demonstrates a sophisticated understanding of physiological balance. According to Ayurvedic principles, obesity (*Sthaulya*) is often associated with an imbalance of the *Kapha* and *Meda Dhatu* (fat tissue).[2] The hot (
Ushna) potency of Vidanga and Chitraka is traditionally believed to enhance metabolism and "burn" excess fat, while the combination of pungent, bitter, and astringent tastes further aids in stimulating digestion and reducing fat accumulation.[3] The inclusion of Mustaka, with its astringent and cooling properties, may serve to balance the intense heating action of the other two components, potentially mitigating any adverse effects like a burning sensation.[6] This demonstrates that the formulation is not merely a mixture of three anti-obesity herbs but a carefully crafted remedy aimed at a holistic correction of metabolic function.

Classical Indications and Therapeutic Claims in Obesity (Sthaulya)

In Ayurvedic literature, Trimad has been primarily recommended for the management of obesity.[1] Beyond its well-documented use for weight management, the formulation is also prescribed for a variety of other conditions. It is described as an appetite stimulant, an anthelmintic for expelling worms, and a treatment for excessive thirst, fever, and abdominal pain.[2] The formulation is also traditionally claimed to remove plaque deposits from the body, promote healthy blood circulation, and prevent both water retention and the accumulation of new fat deposits, all of which are common phenomena associated with obesity.[2] This wide range of indications suggests a broader, systemic action rather than a single, targeted effect, which is consistent with the Ayurvedic view of treating the whole person and the root cause of the disorder rather than just the symptoms.

The Scientific Evidence Base for Trimad's Components

The traditional claims of Trimad are supported by a body of modern scientific research that has been conducted on its individual components. While the combined formulation has not been a subject of extensive clinical investigation, the isolated studies on its constituent herbs provide compelling preliminary evidence for their anti-obesity potential.[2]

Cyperus rotundus (Mustaka): Preclinical and Pharmacological Studies

Scientific studies on *Cyperus rotundus* have documented its promising anti-obesity effects.[2]
Preclinical research has shown that extracts from the tubers of
C. rotundus can induce a rapid and significant reduction in weight in obese rats.[2] The mechanism behind this effect appears to be multifaceted. The extract has been observed to have a potent lipolytic action, meaning it can mobilize fat from adipose tissue, thereby directly contributing to weight loss.[2] Furthermore, studies have suggested that
C. rotundus may contribute to weight loss by increasing energy expenditure and metabolic rate, a critical factor in long-term weight management.[2]

Embelia ribes (Vidanga): Anti-Obesity and Related Activities

The fruits of *Embelia ribes* have also been the subject of research for their anti-obesity properties. Studies on rats fed a high-fat diet demonstrated that an ethanolic extract of *E. ribes* led to a significant improvement in body weight and Body Mass Index (BMI).[2] The extract's therapeutic action appears to be linked to its ability to modulate key metabolic parameters. It has been shown to reduce serum levels of leptin, insulin, glucose, total cholesterol, and triglycerides, while simultaneously increasing beneficial HDL cholesterol levels.[2] A key finding is that the results of the *E. ribes* extract were comparable to those of gliclazide, a standard antihyperglycemic agent, suggesting a significant pharmacological effect on glucose and lipid metabolism.[2]

Plumbago zeylanica (Chitraka): Lipid Metabolism and Antioxidant Effects

The roots of *Plumbago zeylanica* have a documented history of use and are supported by scientific findings related to lipid metabolism and oxidative stress.[2] Research indicates that an aqueous extract of
P. zeylanica roots can effectively reduce serum cholesterol and triglyceride levels in rats.[2] This hypolipidemic effect is partially attributed to its ability to decrease the activity of the enzyme HMGCoA reductase, which is a crucial step in cholesterol synthesis.[2] Additionally,
P. zeylanica exhibits powerful antioxidant activity, which is particularly relevant in the context of obesity, as the condition is characterized by chronic low-grade inflammation and oxidative stress.[2]

Phytochemical Profile and Proposed Mechanisms of Action

Identification of Key Bioactive Compounds

To understand the potential mechanisms of action of Trimad, it is essential to identify its chemical constituents. Early studies have begun to characterize the phytochemical profile of the formulation using advanced analytical techniques such as High-Performance Thin-Layer Chromatography (HPTLC) and Liquid Chromatography-Mass Spectrometry (LC-MS).[4] These methods allow for the separation and identification of individual compounds in the complex polyherbal mixture.[22] A key finding from these analyses is the presence of bioactive compounds such as embelin from
E. ribes and plumbagin from *P. zeylanica*, both of which are known to have significant pharmacological activity.[4] A pilot study also demonstrated that the aqueous extract of Trimad has a total phenolic content of 279.5 mg/g dry mass, a quantity that was found to be higher than the phenolic content of its individual ingredients alone.[20] This finding provides a tangible, scientific basis for the traditional concept of synergy, suggesting that the combined formulation may exhibit a more potent and broad-spectrum effect than the sum of its individual parts.

Inferred Mechanisms of Action on Obesity and Metabolic Syndrome

While no single study has elucidated the mechanism of action for the combined Trimad formulation, a plausible, synergistic model can be proposed based on the documented activities of its individual components. Given that obesity is a complex disorder linked to chronic low-grade inflammation, oxidative stress, and metabolic dysfunction, a multi-target approach is required for effective management.[2] The combined actions of Trimad's components address this multifactorial pathology. The formulation provides a blend of anti-inflammatory, anti-diabetic, anti-hyperlipidemic, and antioxidant compounds from *C. rotundus*, *E. ribes*, and *P. zeylanica*.[2] For example, the lipolytic and metabolic-boosting effects of
C. rotundus could complement the lipid- and glucose-modulating actions of *E. ribes* and *P. zeylanica*.[2] The documented increase in total phenolic content in the combined formulation further supports the hypothesis that a synergistic effect may enhance the overall antioxidant capacity, which is crucial for combating the oxidative stress associated with obesity.[20] This approach aligns perfectly with the Ayurvedic philosophy of restoring systemic balance rather than a narrow focus on a single symptom.

The Experiential Landscape: Usage and Efficacy in Practice

The lack of formal clinical trials on the Trimad combination is partially offset by a pharmacoepidemiology study that documented the real-world usage and experiential efficacy of the formulation among Ayurvedic physicians in Pune, India.[5] This survey provides valuable insights into how Trimad is used in clinical practice.

A Survey of Ayurvedic Physicians: Usage Patterns and Dosage

The survey, which analyzed data from 70 physicians, revealed that 67% of the practitioners used Trimad for the management of obesity.[5] Interestingly, only 6% of physicians used the formulation alone, with a vast majority (83%) preferring to use it in combination with other drugs.[5] The most common dosage form was a powder, or *churna*, used by 54% of physicians.[6] The powder was most frequently administered with lukewarm water (33% of physicians) or honey (23%) as an adjuvant.[6] The dosage varied significantly among patients, with prescriptions ranging from 0.5 gm to 20 gm, and was most often determined based on Ayurvedic signs and symptoms (37% of physicians) rather than conventional anthropometric parameters.[6] These findings highlight a critical difference from the reductionist approach of modern medicine, where a standardized dose is often used for all patients. The fact that practitioners use Trimad as part of a broader, personalized therapeutic regimen—including diet and exercise—and not as a standalone "magic bullet" underscores its role as a component of a holistic treatment plan.[6]

Perceived Efficacy and Reported Adverse Effects

The physicians' perception of Trimad's efficacy was moderate, with an average rating of 5 on a scale of 1-10.[5] The most prominent beneficial effects reported were an improvement in digestion and appetite regulation, which were seen to lead to weight reduction in 23% of cases.[6] Other reported benefits included improvements in lipid profiles and increased energy levels.[6] While the formulation was reported to be well-tolerated by patients, a significant number of physicians (34%) observed adverse effects such as a burning sensation, while others reported mouth ulcers (8%) and excessive thirst (5%).[6] Despite these side effects, treatment was only discontinued in a small percentage of cases (11%), suggesting that the benefits were perceived to outweigh the discomfort.[6] This experiential data, while not a

substitute for a controlled trial, offers a crucial "proof-of-concept" that the formulation is both used and considered effective by a majority of practitioners. The moderate efficacy rating suggests that Trimad's effectiveness may be subjective and dependent on an individual's constitution and adherence to the full regimen, which includes diet and exercise.

The table below summarizes the key findings from the survey of Ayurvedic physicians.

Table 1: Findings from the Survey of Ayurvedic Physicians

Parameter	Finding	Source
Usage Frequency	67% of physicians use Trimad for obesity management.	5
Common Formulation	Powder (*churna*) (54% of physicians).	6
Adjuvants Used	Lukewarm water (33%), honey (23%), or a combination (19%).	6
Used Alone vs. Combined	Used in combination with other drugs by 83% of physicians.	5
Efficacy Rating (1-10)	Average efficacy rating was 5.	5
Primary Beneficial Effect	Improved digestion and appetite regulation (27%).	6
Common Adverse Effects	Burning sensation (34%), mouth ulcers (8%).	6

The Critical Gap: Challenges in Clinical Validation

Methodological Hurdles in Polyherbal Drug Research

Despite the strong traditional foundation and promising preclinical evidence on its individual components, the scientific validation of Trimad as a combined formulation remains a significant challenge. The research literature explicitly states that "Trimad as a combination has not been studied so far".[2] This is not simply a matter of neglect but a direct consequence of the unique methodological hurdles inherent in studying polyherbal formulations.[8] Unlike a single-compound drug, a polyherbal formulation is a complex mixture of hundreds of phytochemicals, each with potential therapeutic effects and interactions. This complexity makes it extremely difficult to ensure batch-to-batch uniformity, as the chemical composition can vary depending on factors such as plant origin, soil quality, harvesting time, and preparation methods.[8] This lack of standardization is a critical concern for both safety and efficacy.[8] For instance, a comparative pharmaceutical-analytical study of Trimad *churna* found that a market-sourced sample of Chitraka lacked plumbagin, a key bioactive compound, which was present in a laboratory-prepared sample.[4] This finding raises serious public health and regulatory concerns, as it suggests that a consumer might not receive the intended therapeutic benefit and could be exposed to an unknown product. Furthermore, the multi-component nature of polyherbal formulations poses a challenge for conducting double-blind, placebo-controlled trials, as it is nearly impossible to create a placebo with identical taste, color, and smell.[8]

Bridging the Gap: Integrating Traditional Knowledge with Modern Science

The challenges in validating polyherbal formulations do not render the task impossible but instead necessitate a new paradigm for research. The traditional, holistic approach of Ayurveda must be integrated with the rigorous, reductionist methodologies of modern science.[18] Modern tools such as bioinformatics, network pharmacology, and *in silico* methods offer a promising path forward.[18] These computational approaches can simulate the complex interactions of multiple phytochemicals and predict their collective effect on various biological pathways, providing a framework for understanding the mechanisms of action that are difficult to study in a laboratory setting.[25] This can help to identify the lead compounds and target pathways that are most critical for the formulation's therapeutic effect, which can then inform the design of future, more targeted studies. By leveraging these technologies, researchers can begin to bridge the critical gap between empirical, traditional knowledge and evidence-based, modern science, validating ancient therapeutic claims and unlocking the potential of formulations like Trimad for contemporary healthcare.[18]

Conclusion and Future Directions

Synthesis of Findings and Expert Opinion

This review has demonstrated that Trimad is a polyherbal formulation with a strong traditional foundation for the management of obesity and related metabolic disorders. While the formulation itself has not been the subject of dedicated scientific study, a large body of preclinical research provides compelling evidence that its individual components—*Cyperus rotundus*, *Embelia ribes*, and *Plumbago zeylanica*—possess significant anti-obesity, anti-diabetic, and antioxidant activities. The deliberate combination of these herbs, with their distinct pharmacological attributes, points to a sophisticated, synergistic approach to treating the multifactorial pathology of obesity. This traditional knowledge is further supported by the experience of Ayurvedic physicians, who widely use the formulation in their practice and report moderate efficacy. However, the lack of standardization and the absence of clinical trials on the combination pose a significant obstacle to its widespread adoption and acceptance in modern medicine.

Recommendations for Future Research and Clinical Studies

To bridge the critical gap between traditional knowledge and modern scientific validation, the following recommendations for future research are proposed:

- **Standardization of the Formulation:** Before clinical studies can be conducted, a standardized Trimad formulation must be developed. This involves creating clear quality control protocols to ensure consistent composition and potency, perhaps by standardizing key markers such as total phenolic content, embelin, and plumbagin.[4] This is essential for ensuring both patient safety and the reproducibility of research findings.
- **Bioinformatics and *in silico* Analysis:** The first step in understanding the formulation's mechanism should involve a comprehensive bioinformatics analysis. Using tools like network pharmacology and molecular docking, researchers can map the interactions of Trimad's known phytochemicals with the biological pathways relevant to obesity, providing a theoretical basis for its observed effects.[18]
- **Well-Designed Clinical Trials:** The most crucial step is to conduct a series of well-designed, randomized controlled trials (RCTs) to rigorously assess the safety and efficacy of the standardized Trimad formulation in human subjects. These trials should measure not only body weight and BMI but also key metabolic markers such as lipid profiles, glucose levels, inflammatory cytokines, and measures of oxidative stress.[2]
- **Explore the Synergy:** Future research should specifically investigate the synergistic effects of the combined formulation. This could involve comparative studies that measure the anti-obesity effects of the combination against each of its individual components to quantify the enhanced therapeutic benefit.[3]

By addressing these research and development needs, the scientific community can move toward a more comprehensive understanding of Trimad and potentially unlock its full therapeutic potential.

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