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Research Paper

Development Of Nootropic Adaptogenic Herbal Lozenges for Stress Alleviation

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ABSTRACT

Stress is a normal part of everyday life but it is important to be able to use tools for its management otherwise chronic stress, if left untreated, can lead to a variety of stress related illnesses including hypertension, heart disease, anxiety, depression, memory impairment and chronic fatigue syndromeStress has emerged as a major public health concern, associated with cognitive decline, mood disorders, and reduced quality of life. Traditional herbal adaptogens such as Withania somnifera (Ashwagandha), Bacopa monnieri (Brahmi), and Centella asiatica (Gotu Kola) possess proven anxiolytic, neuroprotective, and cognitive-enhancing effects. The conversion of these botanicals into lozenge dosage forms offers targeted delivery, improved patient compliance, and rapid absorption through oral mucosa. This review synthesizes current knowledge on the pharmacological basis of these herbs, formulation considerations for herbal lozenges, and future directions in product development for stress management..

INTRODUCTION

Stress is characterized as a condition in which a variety of internal or external, actual or perceived difficulties or stimuli referred to as stressors threaten to upset homeodynamic balance. In order to maintain this ideal homeodynamic state within a physiological range, organisms have evolved a highly complex system known as the stress system, which aids in self-regulation and adaptability by rerouting energy in accordance with the demands of the moment.(1)The two main components of the stress response are typically thought to be the sympathetic adrenomedullary (SAM) system and the hypothalamic pituitary adrenocortical (HPA) axis. It is commonly known that these systems play a key role in energy mobilization and the redistribution of nutrients and oxygen to active organs and tissues, which is a metabolic function that extends beyond stress.(2)

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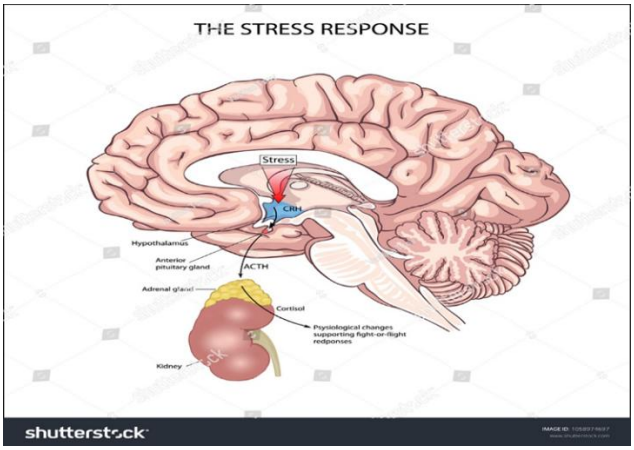
There are two types of stress: acute and chronic. Acute stress causes brief physiological alterations that can be reversed with prompt medical attention and the achievement of homeostasis in a constrained amount of time. However, long-term or chronic stress can cause major health harm, including metabolic syndromes, obsessive-compulsive disorder (OCD), generalized anxiety disorder (GAD), severe cardiovascular problems, hypertension, endocrinological problems, and visceral obesity(3)



ADAPTOGENS

Originally, adaptogens is described as compounds that improve the "state of non-specific resistance" stress is a physiological state associated with a number of neuroendocrine system illnesses. Adaptogens have been shown to have neuroprotective, anti-fatigue, antidepressant, anxiolytic, nootropic, and central nervous system stimulating properties in studies conducted on animals and isolated neuronal cells. Furthermore, several clinical studies show that adaptogens have an anti-fatigue impact that boosts mental work capacity in the face of stress and tiredness, especially in terms of improved attention and tolerance to mental depletion. It was shown that the hypothalamic-pituitary-adrenal axis was linked to the stress-protective effect of adaptogens, which was linked to the maintenance of homeostasis through many modes of action.(4)

NOOTROPICS

A nootropic drug maximizes the potential of the brain and improves cognition. Known as "smart drugs," nootropics were created about thirty years ago to treat cognitive impairments. Nootropics come in a wide variety of forms and serve a variety of purposes, from sedation to stimulation. One of the most studied subjects in pharmacology and neuropharmacology today is nootropics. In 1972, C. E. Giurgea was the first to coin and define the term "nootropic." The Greek word noos (mind) and tropein (towards) are the roots of the word "nootropics," which means "acting upon the mind" in Greek. It has been used to characterize psychotropic medications that have a direct and selective impact on the cerebral cortex's integrative functioning(5)

LOZENGES

Lozenges holding medicine come in flavors, meant to melt gently in the mouth. Some start as melted mixtures poured into shapes - using gelatin or sugar blends like sucrose and sorbitol. Others form under pressure, squashing powdered ingredients into dense pieces. When made by pouring liquid into molds, they often get called pastilles instead. If pressed together like compacted powder, names such as troches might show up on labels. These slow-dissolving formats

help people who struggle swallowing pills manage treatment more easily. A steady trickle of active substance keeps levels stable right inside the mouth area. Throat linings soak up medication bit by bit through close contact with dissolving layers. For ages, these small discs have eased light discomforts from irritated throats. Their role grew wider over time, carrying numbing agents directly where needed. Germ-fighting substances also travel this way when aimed at local infection sites.(6)

TYPES

Some dissolve slow in the mouth - these come in shapes that fit easy, carry medicine plus taste good too. Called troches sometimes, or pastilles instead. Softness defines pastilles more; they hold lots of sugar, maybe gelatin mixed in. Hard kinds often use syrup and sugar blended tight, glued with something sticky like acacia. Machines press certain ones together strong, squeezing them into form under heavy force. Slow melting in the mouth is what lozenges aim for. Their job isn't crumbling but vanishing bit by bit through dissolution. Heat-resistant components work best when mixing up custom lozenges on demand. A fresh wave of soft and chewable types now appears again in pharmacies, gaining favor fast. Polyethylene glycol forms the core of most softer versions, while their chewy cousins rely on gelatin softened with glycerine.(6)

Herbal Agents Used in Nootropic Adaptogenic Lozenges

1. Ashwagandha (Withania somnifera)

Active Constituents

- Withanolides
- Alkaloids
- Saponins

Pharmacological Properties

- Adaptogenic activity
- Anti-stress and anxiolytic effects
- Neuroprotective activity
- Cognitive enhancement

Rooted in ancient healing practices, Ashwagandha - known scientifically as Withania somnifera - has quietly stepped into modern awareness. Because of its role in helping bodies handle daily strain, it's often studied for calming effects. Anxiety symptoms show change too. Behind these outcomes lies a mix of natural ingredients found in the plant, especially substances called withanolides. These components interact with key systems regulating stress hormones. One such system is the HPA axis, which manages how we respond to pressure. When this network adjusts due to supplementation, cortisol tends to ease downward. As hormone shifts occur, emotional balance can follow along similar lines. (7)

2. **CENTELLA ASIATICA**

Gotu Kola is another important herb known for its cognitive and neuroprotective properties.

Active Constituents

- Asiaticoside
- Madecassoside
- Triterpenoids

Found across warm regions, it often grows near water and gets harvested for food or flavoring. People have turned to this herb for centuries because it supports brain function and physical stamina. Healing cuts, calming nerves, easing

seizures - its uses stretch back through generations. Doctors once gave it to children facing mental development challenges along with those struggling with constant worry. Studies show it helps people remember things more quickly and pick up new information faster. When harmful substances like lead acetate harm nerve cells, extracts from this plant may reduce the damage. Its role in shielding brain tissue comes down to how it handles internal stress at a cellular level.(8)

3. SANKHPUSHPI

Chemical Constituents

Major phytochemicals present in Shankhpushpi include:

- Alkaloids (Shankhpushpine)
- Flavonoids
- Glycosides
- Coumarins
- Triterpenoids
- Steroid

From ancient practice comes a plant called Shankhpushpi - botanical name Convolvulus pluricaulis Choisy. This herb shows up in traditions aiming to sharpen thinking, ease anxious thoughts, while also tending to overall mind balance. With traits that shield nerve cells, lower swelling, plus fight oxidative harm, it finds frequent use as a nourishing support for the brain. People sometimes turn to it when facing low mood, restless feelings, seizures, or fading recall. Research points toward real influence in how nerves respond, especially around worry, remembering things, staying steady under pressure(9)

MATERIAL:-

Ingredient	Role	Quantity (g)
Ashwagandha extract	Adaptogen (stress relief)	5.0 g
Sankhpushpi extract	Nootropic	5.0 g
Gotu Kola extract	Cognitive enhancer	5.0 g
Sucrose	Base / Sweetening agent	25 g
Liquid glucose	Binding & texture improvement	12.5g
Honey	Natural sweetener & soothing	1.0 g
Agar	Gelling agent	2.5 g
Citric acid	Flavor enhancer	0.6 g
Magnesium Stearate	lubricant	0.2g
Glycerin	Plasticizer	1 ml

Collection of herbs

Herbs samples were purchased from local Ayurvedic store in Bhilai, storage conditions were properly maintained with respect to light and temperature.
For Plant authentication the sample has been sent to Govt V.Y.T. college, durg.
Authentication has been done.

Preparation of extracts

The roots, leaves of Ashwagandha, Gotu kola, Sankhpushpi were condensed to a powder and was passed through sieve no. 40 and stored in an amber colored bottle till further use. The powdered drug was extracted by methanol
using Maceration for about 24 h and the extracts was isolated .

METHODOLOGY:-

Formulation of Herbal Lozenges:-

Step 1: Preparation of Agar Solution

- Soak Agar in a small quantity of purified water (~5–10 mL) for 10–15 minutes.
- Heat gently until agar completely dissolves and forms a clear solution.

Step 2: Preparation of Sugar Base

- Take sucrose and liquid glucose in a clean beaker, heat the mixture with continuous stirring.
- Add Gelatin magnesium stearate dissolve it in small amount of warm water and add this to the syrup.
- Continue heating until a uniform syrup is formed (avoid overheating or caramelization).

Step 3: Incorporation of Agar

- Slowly add the hot agar solution into the sugar syrup.
- Stir continuously to get a uniform gel-like consistency.

STEP 4: Addition of herbal extracts and excipients:-

- Once the base is ready remove it from heat and let it cool slightly.
- Add Ashwagandha, Gotu kola, brahmi extract. Mix it well to ensure uniform distribution
- Add Acacia, Honey, Citric acid, Mix thoroughly to ensure uniform distribution.

- **STEP 5: Molding**

- Pour the warm viscous mass into pre-lubricated molds (lightly greased with oil or dusted with talc).
- Ensure uniform filling of molds.

- Allow the molds to cool at room temperature.

EVALUATION

- 1.Physical parameters: The medicated lozenges were examined in terms of clarity, texture and consistency. Texture of lozenges in terms of stickiness was evaluated by visual inspection of the product.
- 2.Weight variation test: 10 lozenges from each batch were individually weighed in grams on an analytical balance. The average weight and standard deviations are measured.
- 3.Thickness test: The thickness in millimeters was measured individually for 10 pre weighed lozenges by using verniercalipers.
- 4.Hardness test: The hardness of lozenges was measured using a Monsanto Hardness Tester.
- 5. Moisture content: By Gravimetric method, one gram sample is weighed and placed in a desiccator at for 24 h.
- 6. Mouth dissolving time: The time taken by the lozenge to dissolve completely was determined by placing each lozenge in separate beaker containing 100 ml phosphate buffer pH 6.8 at 50 rpm using mechanical stirrer and time was noted at 37°
- 7.Stability studies: The optimized formulations were subjected to stability studies at temperature i.e., 40°C/75% RH for a period of month

PHYSICAL APPEARANCE

S.NO.	PARAMETER	OBSERVATION
1.	Colour	Amber/Golden Brown
2.	Shape	Hexagonal
3.	Surface	Smooth
4.	Consistency	Solid
5.	Taste	Sweet with mild herbal flavour
6.	Odour	Characteristic herbal aroma
7.	Clarity	Clear

2.HARDNESS

The hardness of lozenges also depends on the temperature.

S.no.	Sample	Hardness(N)	Temperature
1.	1	720	60
2.	2	690	58
3.	3	780	55
4.	4	820	52
	Average	752	56

3.THICKNESS

Thickness should be Uniform for dose Consistency.

It may vary according to shape and size

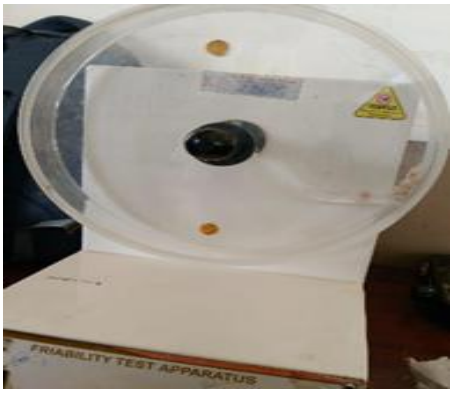
S.no	Sample	Thickness(mm)
1.	1	5.0
2.	2	4.8
3.	3	5.3
4.	4	5.5
	Average	5.15

4. WEIGHT VARIATION

Weight variation test determines whether each lozenges contains a uniform amount of drug.

SAMPLE	WEIGHT(g)
1.	5.5
2.	5.6
3.	5.7

5.FRIABILITY



Friability measures the tendency of lozenges to crumble or break. It indicates mechanical strength.

Sample	Initial Weight(gm)	Final Weight(gm)	Friability(%)
1.	5.5	5.4	0.72%
2.	5.6	5.5	0.64%
3.	5.7	5.6	0.58%

5. MOISTURE CONTENT- 1.2%

6. DISINTEGRATION- 7-9 min

RESULT AND DISCUSSION

The Prepared herbal lozenges were evaluated for various physicochemical parameters. The lozenges has been found to be uniform in color, shape, appearance. The average weight, thickness, hardness was within the acceptable limits that indicates that formulation was uniform contains good mechanical strength, indicates that they are in a good quality.

The prepared herbal lozenges have depicted the satisfactory herbal characteristics. Overall, the formulation meets all standard criteria and is therefore completely suitable for stress alleviation.

CONCLUSION

The purpose of study was to create a herbal lozenges for stress alleviation in an individual. Stress is a common condition that targets every age group individual. Lozenges has been considered as a better alternatives for the medicines. They can be used by any age group individual. Lozenges are affordable and can be recommended easily. The formulation has been done and the result have been found within a range. Therefore, presenting herbal lozenges for a calm mind.

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