Innovative Polyherbal Chewable Formulation OF Ayurvedic Herbs FOR Effective Relief FROM Cough

Hemant Ramesh Neware[1], Nutan Khemraj Pustode[2]
Maharashtra Institute Of Pharmacy, (D.Pharm) , Betala

Abstract- *There has been a surge in interest in using Ayurvedic medicines in recent years. Since ancient times, people have employed GlycyrrhizaGlabra (liquorice), ZingiberOfficinale (ginger), and Curcuma longa (turmeric) as medicines to alleviate coughs. Ayurveda made reference to the usage of these herbal medications. Cough is a prevalent illness problem that affects people of all ages. Oral medication administration is the most popular method due to its convenience of use, fewer sterility requirements, variable dosage form design, and improved patient compliance. The objective of this research project is to create polyherbal chewable tablets using the wet granulation method for a variety of Ayurvedic medications and assess the formulations for a range of pharmaceutical criteria.*

The goal of this study was to create chewable, polyherbal pills with turmeric, ginger, and liquorice. These chewable polyherbal tablets were created using the wet granulation method with a 5% w/v acacia gum binder. The final polyherbal chewable tablet's quality was assessed for both pre- and post-formulation parameters. The preformulation tests that are assessed for the manufactured powder mixture (blend) include bulk and tapped densities, Hausner's ratio, Carr's index, and angle of repose. General look, pill size and shape, hardness, friability, weight variation, and disintegration time were all evaluated for polyherbal chewable tablets.

Keywords: Polyherbal Chewable Tablet; GlycyrrhizaGlabr; Liquorice; Zingiber Officinal; Ginger; Curcuma longa; Turmeric; Wet granulation method; Cough; Antitussive; Demulcent; Expectorant; Cough relieving activity;Disintegration Test.

I. INTRODUCTION

Medical stores sell a variety of pharmaceutical cough remedies, which are typically used to treat coughs. The use of herbal cough remedies is growing daily these days because they are highly effective and have fewer negative effects.Chewable tablets combine the strength and firmness of solid pharmaceuticals with the ease of use and the ability to provide medication without the need for water, making them a convenient dose form with many positive aspects.

For generations, Ayurvedic medications have been used to prevent and treat coughs. Although several over-the-counter drugs are available in all medical stores, antiviral and antibiotic therapy have not been shown to be effective in the absence of an initial lung infection.

A. Ideal characteristics of chewable tablets

- Simple to bite.
- Tasteful (Palatable).
- Proper size and shape.
- Break down fastly and enhance dissolution.
- Like all easy to understand dosage forms.
- Helpful for patients who experience challenges while
- swallowing ordinary tablets and capsules for them
- chewable tablets are simple to swallow (once broken
- down).
- Risk of esophagitis is reduced in chewable tablet.
- Esophagitis is caused when ingested tablet medication is
- trapped in the esophagus and dissolve while staying in
- contact with the touchy esophagus lining.
- Taste make it palatable and scope of flavors.
- Are simple and helpful to take.
- Are provided as a single unit dose so estimation of dose
- is not required.
- Improve convenience
- This dosage form donot need water are
- Easy to take ‘ on the go”

B. Advantages of Chewable Tablets

- Patient convenience
- Better absorption characteristics
- Enhanced bioavailability is achieved because of expanded ingestion rate, because of its disintegration or being bitten in t he mouth into the increased dissolution.
- Improved understanding acknowledgment through lovely taste Child friendly version.

- Chewable tablets offers more preferences over the greater size of dosage forms that are hard to swallow particularly kid and who aversion gulping.
- Effectiveness of therapeutically active agent is improved by the decrease in size through biting in mouth to by passing disintegration before a swallowed.

C. Disadvantages of Chewable Tablets

- Formulation of chewable tablets is not for the bitter tasting drugs.
- There is possibility to cause ulcer in the oral cavity due to the use of more quantity of flavor enhancing agent in chewable tablet.
- Chewable tablets utilize numerous excipient to give mass and inhance characteristics of tablets yet some excipient have unsafe to body, for example, sorbitol which causes the diarrhea and flatulence.
- Chewing of chewable tablets for prolong times cause the

II. LIST OF INGREDIENTS

1) LIQUORICE

- **Family -**Leguminosae
- **Synonymsa**-mulethi, Radix glycyrrhizae, licorice, Jethi, Madh,Yashtimadhu, Jeshtamadh.
- **Biological Soure** - Stem along with roots of glycyrrhizaglabra.
- **Chemical constituents** -Glycyrrhetic acid while glycyrrhizin are saponin glycoside. Liquiritin, isoliquiritin, liquiritigenin, isoliquiritigenin are example of flavonoids. Glyceramarin is a bitter principle . herniarin and umbelliferone are coumarin derivatives. Starch, resin, asparase,malic acid.

Fig – 1

Role of liquorice :

- Expectorant, Demulcent,Anti-inflammatory, treats Bronchial problems such as Catarrh bronchitis, cold flu and coughs.
- Sweetening Agent, Antiviral, Antibacterial.

2) GINGER

- **Family -**Zingiberaceae
- **Synonyms-**zinzibersoonth , saunth
- **Biogicalsoure -** dried rhizomes of zingiberofficinale.
- **Chemical constituents**- 5 to 8% pungent material, 1 to 2 % volatile oil, starch as well as resinous mass.The volatile oil, which contains sesquiterpenealcohol,besaabolene,zingiberene, and 6% sesquiterpene hydrocarbon zingiberol, is the substancethat gives the aroma.A yellow, oily material with a strong aroma called gingirol produces gingirone, aliphatic aldehyde and a ketone. Shagaol occurs when water from gingerol is vanished.Gingirone as well as shagaol have little pungency.When ginger, gingerol are heated along with 5% KOH or other bases, their pungent odour and tase is removed.

Fig -2

Role Of Ginger :

- Antitussive , antiviral, antiemetic ,antibatcterial.

3) TURMERIC

- **Family -**zingiberaceae
- **Synonyms** -Haldi ,Halud ,Haridra ,halad.
- **Biological Soure-** turmeric consists of the dried rhizomes of curcuma longa.
- **Chemical constituents** -colouring non volatile substance is curcuminoids. Differentiallyspelt as curcumin, bidesmethoxycurcumin and desmethoxydicinnarmoylmethane.L-

cycloisoprenmyrcene, zinziberene, sabinene, cineole, borneol,turmerone, a and y – atlantones, phallandrane and curcumone are among the volatile oils.Glucose, fructose, arabinose are sugars.

Fig - 3

Role of turmeric :

- relieving the symptoms of cough and cold by its Antiviral , Antibactrial,Anti-inflammatory properties

4) TULSI

- **Family -**Labiateae
- **Synonym -**Tulsi , Tulas
- **Biogical source** -Tuls consists of the fresh snd dried leaves of ocimum species like Ocimum sanctum L. and Ocimumbasilicum L.
- **Chemical constituents** - Phytochemical studies have shown that oleanolic acid ,ursolic acid rosmarinic acid, eugenolcarvacrol, linalool, and beta – caryophyllene are some of the main chemical constiturnts of tulsi.

Fig - 4

Role of Tulsi :

- Expectrorants
- In asthmatic patients
- Cough syrup
- Nasal decongestant

5) HONEY

- **Family –**Apidae
- **Synonym -**madhu,madh
- **Biogical source -** honey is natural product formed from nectar of flower by honey bees
- **Odour -** Hymenoptera
- **Kingdom** - Animalia
- **Phylum** - Arthropoda
- **Class** – Insecta

Fig – 5

Role of Honey:

- Used as an antimicrobial and wound-healing agent.
- Soothes sore throat and cough.
- Has antioxidant and anti-inflammatory properties.

6) CLOVE

- **Family -**myrtaceae
- **Synonym -**caryophyllum , clove buds and flower
- **Biological soure-** clove is the dried flower bud of the plant syzygiumaromaticum.
- **Chemical constituents** – Volatile oil (14- 21) Eugenol (70 – 90%)

Fig -6

Role of clove :

- Acts as a carminative.
- Used for its antiseptic propertiy.

III. METHOD OF CHEWABLE TABLES

A. Materails :

Turmeric (Curcuma longa), ginger (ZingiberOfficinale) rhizomes, and powdered liquorice (GlycyrrhizaGlabra) were obtained from the Medical Store, local market, and shop in Karad, Satara, respectively. The excipients magnesium stearate, flour, lactose, and talc were acquired from Sri Santkrupa College of Pharmacy's Practical Store House in Ghogaon, Satara. Every substance used in the composition was of laboratory quality.

B. Formulation and Development :

Polyherbal chewable tablets containing liquorice (GlycyrrhizaGlabra), turmeric (Curcuma longa), and ginger (ZingiberOfficinale) were made using the wet granulation process. Starch, lactose, talc, magnesium stearate, and acacia gum are examples of excipient substances with the associated roles of disintegrator, filler, glidant, lubricant, and binder.

C. Wet Granulation Method :

The wet granulation process is practical for small-scale chewable tablet formulations and preparations. Each component of the formulation was weighed, ground up, and screened separately using sieve number 80. With the exception of the magnesium stearate and talc, which were crushed in a pestle and mortar and then sieved using sieve number 80, every ingredient in the recipe was fully mixed. While this material was being blended, the 5% w/v acacia gum solution was progressively added .

After this mixing process, the powder mass was dried at 35°C in a vacuum drier after being repeatedly passed through sieve number 18 to produce the granules. After drying, the granules were rescreened using sieve number 18 to remove larger granules before being stored in desiccators. Before punching, the grains were mixed with talc and magnesium stearate. Powder mixes were compressed into 750 mg tablets using a single rotary punching machine and the appropriate compressing pressure. After the die cavity was filled, the final powder mixture was pressed into tablets. Its was adjusted to the required weight. [27] According to their composition, chewable tablets of ginger (ZingiberOfficinale), turmeric (Curcuma longa), and liquorice (GlycyrrhizaGlabra) are made using the wet granulation method.

Composition of poly herbal chewable tablet –

Sr no	Ingredients	Quantity taken
1.	Liquorice	650mg
2.	ginger	13mg
3.	turmeric	7mg
4.	tulsi	5mg
5.	Honey	1mg
6	clove	2mg
7.	Starch	10mg
8.	lactose	50mg
9.	talc	10mg
10.	Magnesium stearate	10mg
11.	Acacia gum	5%w/v solution (used while mixing)

Fig 7 Powder Blend

D. Pre-compressional studies of powder mixture:

The first step in creating a dosage form for a possible medication formulation is preformulation research. A main investigation is being carried out in the drug development process to learn more about the recognized properties of

ingredients and the recommended formulation schedule. As a result, this preformulation study provides the benefit of confirming that creating the drug or creating the dosage form is not fraught with difficulties.Pre-ompressional parameters, including Hausner's ratio, angle of repose, bulk density, tapped density, and compressibility indices, were studied.

- **Angle of repose [7] :**

It was determined that the angle of repose is the largest angle that can be created using the fixed funnel method between the unsupported surface of the powder pile and the ground's surface. Using the finger to cover the funnel hole, the proper amount of powder medication was added. Following the appropriate removal of the powder from the funnel, its angle of repose was calculated and expressed in θ.

Angle of repose (θ) = tan -1 height / radius

In this case, height is represented by h, radius by r, and θ = angle of repose.

- **Bulk density**

The ratio of a powder's bulk mass to bulk volume is known as bulk density. We call it homogeneity. It is represented by the symbol ρb. The bulk density is used to calculate homogeneity. Bulk density (ρb) is calculated as mass divided by bulk volume.In this case, bulk volume is represented by Vb and sample mass by M.

Bulk density (ρb) = Mass / Bulk Volume

Here, mass of the sample is denoted by M and Bulk volume is denoted by Vb.

- **Tapped density[9] :**

The weight of the powder is the definition of tapped density. mixture divided by the measurement cylinder's smallest volume that it fills. An automated electronic tapper device is used to tapa graduated cylindercontaining an estimated quantity of a medicine powder mixture or preparation in order to determine the substance's density. When the powder bed reaches its lowest capacity, the electrically powered tapper mechanism is operated for a fixed number of taps (1000). Weight of the powder mixture divided by the lowest tapped density volume that the cylinder fills.

Tapped density = Weight of powder mixture / lowest volume filled by cylinder

- **Carr's index :**

Carr's index, which indicates the percentage of the powder mixture's capacity to compress, is computed using the apparent bulk density and the tapped density. The following formula is used to determine the powder mixture's % compressibility:Carr's index is calculated as follows:

Td = Bd × 100 / Td

where Bd is bulk density and Td is tapped density.

- **Hausner's ratio [10]:**

An approximate measure of how easy it is to ascertain the flow characteristics of powder is the Hausner's ratio. A lower Hausner's ratio value (< 1.25) indicates higher flow characteristics than a higher value (> 1.25).Hausner's ratio is equal to Td/Bd, where Td stands for tapped density and Bd for bulk density.

Hausner's ratio = Td / Bd

where, Td is the Tapped Density and Bd is the Bulk Density

Pre- compression parameters of powder blend

Parameters	**Result**
Moisture contents (%)	**4.31**
Angle of repose (θ)	24 ± 0.35
Bulk density (g/ml)	0.385 ± 0.021
Tapped density (g/ml)	0.502 ± 0.031
Carr's index (%)	23.31 ± 1.04
Hausner's ratio	1.30 ± 0.02

Fig.8 Poly Herbal Chewable Tablets

E.Post-compression study (Estimation of Prepared Polyherbal Chewable Tablets) :

- **General appearance :**

The whole physical appearance of tablets determines their unique style and overall refinement, which is crucial for client happiness. The polyherbal chewable tablets were inspected for color consistency, flaws, tablet polish, depressions, pores, and pinholes.

- **Uniformity of thickness and diameter[11] :**

Tablets' distinctive style and general elegance are determined by their entire physical look, which is essential for customer satisfaction. The color consistency, defects, tablet polish, depressions, pores, and pinholes of the polyherbal chewable tablets were examined.

- **Weight variation test [12] :**

Twenty pills were weighed both individually and collectively. The total weight of all the tablets was used to calculate their average weight. Each tablet's weight was compared to the mean weight.

The percentage difference in the weight variation must remain within permitted bounds. To estimate the percentage difference, the following formula was used:

[(Individual weight - Mean weight) / Mean weight] x 100 is thepercentage difference.

A small or substantial variation in tablet weight might lead to either an excessive or insufficient dosage of medication for the patient. As a result, pills of the same weight should be included in each batch. Changes were made when compressing the tablets to attain the same weight. The IP has set guidelines for the average weight of compressed and uncoated tablets.

Example -For instance, a tablet is said to have weight variation if it includes 250 mg or more of the active component, or if the tablet or dosage form comprises (+ or -) 5% or more of the tablet's weight. The average weight of the 20 tablets was calculated after each pill was weighed individually. Next, each tablet's weight is compared to the average weight.

- **Hardness test [13] :**

Hardness is often measured by the amount of stress needed to shatter a tablet in a specific plane. The tablet hardness can be used to compute the chewing effort scale. Six prepared polyherbal chewable tablets were chosen at random and their hardness durability evaluated using the Pfizer Hardness Tester, which has been approved. Consequently, the mean of the six evaluations was applied. The features were expressed in kg/cm$^{2.[}$14].

- **Friability test [15] :**

Friability is the term used to describe a tablet's weight loss in a package or container as a result of microscopic particles being removed from the tablet's outer layer. Friability testing is done to ensure that tablets can withstand vibrations during production, operation, shipping, and transportation. A maximum of 1.0% friability is permitted. The tablet's degree of friability was assessed using a Roche friabilator. Five pills in total were weighed before being placed in the friabilator compartment.

The tablets were dropped from a height of six inches inside the friabilator compartment as a result of the pills rolling in the friabilator. During the Friability Test, the Friabilator compartment was rotated at an average speed of 25 rpm (rounds per minute). After four minutes, or 100 Revolutions, the tablets were taken out of the friabilator. After that, each tablet was weighedagain. The formula was used to estimate the tablets' percentage friability.[16]

By using the following formula, the percent friability was determined :

$F = (1 – X) / X_0 \times 100$

where, X = Weight of the tablets after test and

X0 = Weight of the tablet before test

Volume 8, Issue 4, April 2023

- **Disintegration test[17]:**

A medication must first be in solution in order for it to be absorbed from a solid dosage form following oral administration, and the most important step in accomplishing this is usually breaking apart the tablet. This is known as disintegration. The disintegration time is the amount of time required for a tablet to break down into minute particles. The breakdown period of the chewable tablet should be short to avoid the possibility of GI obstruction if the patient does not thoroughly chew the tablet.

The disintegration test calculates how long it takes a set of tablets to disintegrate into tiny particles and go through a 10 mesh screen under particular conditions.The disintegration test is carried out using the disintegration tester. A basket rack with a 10 mesh screen across the bottom and six plastic tubes that are open at both the top and bottom is calledthe tester for disintegration. That basket was immersed in an appropriate 37°C liquid bath, ideally in a 1000 mL beaker. Compressed uncoated tablets were usually tested using water heated to 37°C.[18, 19] If one or two of the tested pills did not dissolve, the test was conducted on twelve tablets. To meet pharmacopoeial requirements, the necessary disintegration time must be determined by each drug's monograph.

The disintegration period of artificially produced saliva was calculated.(pH 5.8 phosphate buffer solution). The disintegration time of six pills was measured at 37 ± 0.5°C using the USP technique. Six measurements were averaged for each batch.[20, 21]

Post-compression Parameters of Polyherbal Chewable Tablets

Parameter	**Result**
Colour	Pale brownish yellow [khaki]
Odour	Characteristics
Taste	Sweet
Texture	Smooth
Shape	Round flat plain both sides (Flat Faced
Thickness [mm]	4.4
Diameter [mm]	15.91
Weight Variation [%]	0.0282 (Under + / – 0.5 %)
Friability	0.48
Hardness Test (Kg/cm2)	5.1 ± 0.32
Disintgration Test (Minutes)	14

IV. CONCLUSION

Doctors advise using liquorice (GlycyrrhizaGlabra), ginger (ZingiberOfficinale), and turmeric (Curcuma longa) as crucial and highly efficient Ayurvedic (herbal) remedies for cough. Lastly, the study showed that these medication powders can be appropriately tableted into chewable tablets. Every pre-compressional and post-compressional test evaluated indicates that the prepared tablets produce satisfactory outcomes.Due to their antitussive, expectorant, and demulcent properties, the combination of liquorice (GlycyrrhizaGlabra), ginger (ZingiberOfficinale), and turmeric (Curcuma longa) may be more effective in treating cough.Thispolyherbal chewable tablet study indicates that the same data and techniques may be created for other natural drugs or Ayurvedic formulations to meet industrial needs, consumer tastes, and desires. As a result, it is determined that the chewable tablets may be a superior substitute for the traditional applications of the herbal compounds. April 2023, Volume 8, Issue 4 Furthermore, this study may contribute to future advancements in the realm of herbal technology.

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