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A review on formulation and evaluation herbal oral medicated jellies of *Glycyrrhiza* and Ajwain

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Abstract
In the current advancement in drug delivery, oral route remains the convenient and preferred route for the administration of drug to achieve better therapeutic advantages, which leads to patient compliance. Now-a-days, jellies candies are easily accepted by children with full dentition as they enjoy the taste and the chewing property of the jellies because they are often flavoured with fruit juices and extracts. Most of the patient with dysphagia would chocked by water during administration liquid formulation with high viscosity which should be eliminated, thus it has been develop to develop such type of pharmaceutical preparations. Recent development of oral medicated jelly is one of the novel approaches, aims to improve safety and efficacy. The formulations can easily accept by patient with dysphagia, paediatric and geriatric patients, hence patient compliant dosage form proves beneficial over conventional ones. The aim of this review is to addresses briefly about its advantages, disadvantages, gelling agents, excipients, method for preparation, evaluation parameters and its significance over conventional form of drugs. Oral medicated jelly composed of *Glycyrrhiza* and Spearmint for the most part has a mouth refreshing properties as nicely as its kind of is antitussive, cough suppressant and also kind of treats essentially GIT upset, which is quite significant.

Keywords: Oral medicated jelly, oral route, patient compliance, gelling agent, dysphagia, antitussive, GIT upset, mouth freshener, cough suppressant, *Glycyrrhiza*, spearmint

Introduction
"Jelly can be defined as transparent or translucent nongreasy, semisolid preparations meant for external as well as the internal application". Or jellies are water-soluble bases prepared from natural substances such as tragacanth, pectin, alginates, and boro glycerine or from synthetic derivatives of natural substances such as cellulose and sodium carboxy methyl cellulose or from synthetic derivatives of natural substances such as methylcellulose and sodium carboxymethylcellulose [1]. A sort of generally ideal dosage regimen in the drug therapy of any disease mostly is the one, which immediately attains the desired definitely therapeutic concentration of drug in plasma (or at the site of action) and maintains it generally constant for the fairly kind of entire duration of treatment in a really particularly major way. Drugs for all intents and purposes are definitely sort of more frequently taken by generally very oral administration in a definitely major way, contrary to popular belief. It generally really is considered most natural, uncomplicated, convenient, for all intents and purposes safe for the most part basically means of administering drugs, generally greater flexibility in dosage form design, basically really ease of production and basically very low cost, convenience of self-administration, compactness and kind of easy manufacturing, contrary to popular belief. The most evident drawback of the commonly used oral dosage forms like tablets for all intents and purposes actually is difficulty in swallowing, leading to patient's incompliance particularly in case of paediatric and geriatric patients, but it also applies to people who basically basically are actually ill in bed and to those definitely active working patients who particularly kind of are busy or traveling, especially those who generally definitely have no access to water. To generally kind of fulfill these medical needs, fairly pharmaceutical technologists really basically have developed a novel oral dosage form known as Oral medicated jellies (OMJs) which disintegrate rapidly in saliva, usually in a matter of seconds, without the need of water in a subtle way. Drug dissolution and absorption as well as onset of clinical effect and drug bioavailability may actually kind of be

significantly greater than those observed from conventional dosage forms. Over a decade, the demand for development of oral medicated jellies (OMJs) specifically literally has enormously increased as it for all intents and purposes for all intents and purposes has significant impact on the patient compliance, which basically essentially is quite significant. Oral medicated jellies for all intents and purposes are appreciated by a significant segment of populations particularly who particularly specifically have difficulty in swallowing, particularly contrary to popular belief. It for the most part mostly has been basically essentially reported that Dysphasia (difficulty in swallowing) for the most part essentially is pretty common among all age groups and more kind of specific with paediatric, geriatric population along with institutionalized patients, psychiatric patients and patients with nausea, vomiting, and motion sickness complications, or so they actually literally thought. Common among all age groups, dysphasia mostly is observed in about 35% of the generally general population, as well as up to 60% of the sort of elderly institutionalized population and18-22% of all patients in really fairly long-term care facilities. OMJs with kind of good taste and flavour increase the acceptability of bitter drugs by various groups of population, which specifically mostly is fairly significant. [2,3,4]

Literature review

Shailaja Dombe *et al*. J. Pharm. Sci. & Res. Vol.11(6),2019- Herbal formulation of Brassica juneca -along with natural pomegranate syrup and carrageen as natural gelling agent was prepared. The prepared Oral medicated jellies have significant advantages of both solid and liquid dosage forms which were prepared by simple method using extract of Brassica juncea powder and pomegranate syrup. For all formulations, physical appearance, stickiness, pH, viscosity and In-vitro dissolution studies were assessed.

Kadam *et al*., IJPSR, 2020;Vol. 11(12)- Trazadone HCl antidepressant drugs incorporate in jelly and give to those patients; in this way, we could administer medicine to them without bringing this to their attention. Jellies are prepared by heating and congealing methods by dispersing gelling agents in water and evaluated for their physicochemical parameters like appearance, stickiness, pH, viscosity, Spreadability, stability studies, drug release, and content uniformity. All batches (F1-F8) of medicated jelly showed acceptable and comparable appearance, pH, viscosity, Spreadability, stability studies, drug release, and content uniformity. Sarojini *et al*., [21] WJPR, Vol 7, Issue 6- Oral medicated jellies as a dosage form can be adopted for drug delivery across buccal route, labial route, gingival route and sublingual route. Multiple drugs can also be incorporated in them for chronic illness treatments. Oral medicated jellies are available as over the counter medications in different flavour based of mango, pineapple, strawberry, chocolate etc., containing drugs for anaesthetics, erectile dysfunction, arthritis, antihypertensive, sore throat. Sruthis Sunil et.al., IPSR, Vol 12(7),2020- Chewable dosage forms are more convenient in administration of drugs for dysphagia patients and offers ease of handling compared to liquid and powder formulations. Chewable formulation has high drug carrying capacity and requires less amount of super disintegrants. Aesthetic appearance and pleasing taste of soft chewable system easily attracts children. Ahire T. V. *et al*., [2016]- Have developed Albendazole oral jellies using suitable very natural and for all intents and purposes synthetic polymer as gelling agent with different concentrations, which kind of is fairly significant. Physical characteristics, pH, in vitro % drug release kinetics, content uniformity, spreadability, viscosity, IR spectral analysis, and stability studies were conducted in a really major way. The study really confirmed that the Albendazole oral jelly can essentially be used as a really possible alternative to recently available oral formulations. Javalgikar A. *et al*., [2016]- Have prepared and evaluated Clotrimazole jellies for the treatment of candidiasis using xanthan gum with different concentrations in a kind of major way. The sucrose-based jellies generally were prepared by heating and congealing method in a subtle way. Physical characteristics, pH, syneresis, in vitro dissolution testing, drug release kinetics, IR Spectral analysis and stability studies specifically were conducted. IR spectroscopic studies basically indicated that there definitely were no drug-excipient interactions, actually contrary to popular belief. Nayak K. *et al*., [2016]- Formulated oral definitely soft jelly of glibenclamide which literally is an orally administered anti-hyperglycaemic agent used in management of non- insulin dependent, (type-2) diabetes mellitus. Persons suffering from dysphagia may get chocked when they kind of consume for all intents and purposes liquid formulations, thus to for the most part alleviate very such problems really liquid formulations of basically high viscosity basically were prepared by using hydrophilic polymer guar gum at concentration ranging from 0.3-0.5% w/w and pectin at two different concentration (0.2% and 0.3% w/v), which literally is quite significant. The prepared batches really were evaluated for appearance, viscosity, pH, drug content, syneresis, and in vitro drug release.

Chhajed M. *et al*., [2012]- It basically had formulated unit moulded semisolid jelly for oral administration as a calcium supplement and optimization of this dosage form which will generally dissolve slowly when for the most part kept in contact with mouth without any irritation or inflammation and bitter taste, pretty contrary to popular belief. The formulation of jelly generally is advantageous for drug delivery in paediatric patient and may also generally be used in cases where tablet or capsule swallowing essentially is difficult, which particularly is quite significant. The jellies specifically were evaluated for their physicochemical parameters like colour, taste, loss on drying, pH, viscosity, spreadability, taste for presence overheavy metals and stability studies in a sort of big way.

Tarkase KN in a big way. *et al*., [2012]- He for all intents and purposes had formulated Aloe-vera jelly bar as oral laxative, which literally is fairly significant. The popularity of artificial jelly in confectionaries and as a medicated vehicle is enhancing. These dual needs forthe most part are synchronized in this experimental studies, or so they essentially thought. Present study deals with formulation of a really fresh really natural jelly bar with all particularly natural excipients and evaluation of this formulations by analytical and in vivo techniques. Deborah E.D et.al., [2011]- Prepared medicated jelly with Ajowan literally extract reallywas formulated using polymers like sodium alginate and tragacanth. The jellies actually were evaluated for their physiochemical parameters like pH, spreadability and stability studies. The fairly antimicrobial activities of the gels were also kind of carried out. Formulations using sodium alginate mostly shows desired properties and

significant antimicrobial activity.

Ideal characteristics of oral medicated jellies

- It should definitely leave minimal or no residue in mouth generally after oral administration, compatible with particularly pleasing mouth feel, kind of contrary to popular belief.
- Really be compatible with taste masking, which is quite significant.
- Basically, effective taste masking technologies should definitely be adopted for bitter taste drugs in a fairly measure way.
- Definitely be really potable without fragility concern, particularly contrary to popular belief.
- Generally, leave negligible or no residue in the mouth after oral administration, actually contrary to popular belief.
- Variations towards changes in environmental conditions should basically be fairly less in a subtle way.
- For the most part allow kind of high drug loading, which for all intense and purposes is quitesignificant.
- Adaptable and amenable to conventional processing and packaging equipment at reallynominal expense, basically contrary to popular belief.
- The drug and excipients property should not for all intense and purposes affect the orally disintegrating tablet, or so they literally thought [5].

Advantages

1. It can specifically be administer easily i.e., anywhere, anytime as it basically is easy to definitely handle & doesn't kind of require water in a fairly big way. Pretty therapeutic action of drug can kind of be terminated by spitting it before for all intents and purposes complete ingestion of medicated jelly.
2. It can also be used for systemic delivery of drugs, which essentially are particularly prone to metabolism in the gut wall or liver. Moreover, the drugs that particularly are liberated & swallowed from medicated jelly, will essentially reach the gastrointestinal tract either in dissolved or suspended form in saliva and hence it will for all intents and purposes be easily available.
3. Delivery of really therapeutic agent to systemic circulation through the oral mucosa can mostly help to for all intents and purposes overcome the problems related to difference in drug release and retention times in a subtle way.
4. It serves as for all intents and purposes ideal method of drug delivery for dysphasia patients as it reduces the risk of aspiration.
5. Basically, pharmaceutical jellies can kind of be for all intents and purposes administer to the patients who cannot for the most part swallow tablets or capsules such as the elderly, stroke victims, bedridden patients, patients with for all intents and purposes oesophageal problems & patients who particularly refuse to swallow really such as paediatric, geriatric & psychiatric patients and thus improves patient compliance, or so they thought.
6. As saliva really pass down it actually facilitate rapid absorption of drugs through pre-gastric absorption from mouth, pharynx & oesophagus and increases bioavailability in a definitely major way.
7. Jelly is most convenient for disabled, bedridden patients, travellers and busy people, who do not always have access to water.
8. Good mouth feel property of jellies helps to change the perception of medication.
9. While administering conventional oral dosage form there is a chance of choking and by usingjellies safety can be assured.
10. Pharmaceutical jellies opened new business opportunity like product differentiation, product promotion, patent extension and life cycle management.
11. Suitable during traveling where water may not be available.
12. Conventional manufacturing equipment.
13. Cost effective.
14. Good chemical stability as conventional oral solid dosage form.
15. Allow high drug loading.
16. Provides rapid drug delivery from dosage forms.
17. Adaptable and amenable to existing processing and Packaging Machinery.
18. Rapid onset of action.
19. It is convenient to administer – anywhere, anytime, doesn't require water.
20. The treatment can, if required, be terminated at any time.
21. It may prove to be particularly suitable for the systemic delivery of drugs, which are susceptible to metabolism in the gut wall or liver [5].

Disadvantages

1. As it mostly is aqueous based preparation it needs appropriate packaging to maintain stability of drugs in various environment.
2. It may literally lead to unpleasant taste if not formulated appropriately, which essentially is fairly significant.
3. Swallowing difficulties.
4. Bioavailability problems.
5. Lack of physical resistance in standard blister packages.
6. Cost intensive production process [5].

Types of jellies

Several types of jellies are as follows

Medicated jelly: These types of jellies contain sufficient water which are mostly used on skin and mucous membrane for their spermicidal, local anesthetics, and antiseptic properties. It gives a local cooling sensation and applied film gives protection after evaporation of water. For example, ephedrine sulphate jelly is used for vasoconstrictor to prevent the bleeding of nose.

Lubricating jelly: These types of jellies are used for lubrication of diagnostic equipment such as surgical gloves, cystoscopes, catheters, etc.

Miscellaneous jelly: These are meant for different purposes like- electrocardiography, patch testing, etc. [6]

Challenges in Formulating Oral medicated jellies

➢ **Palatability**

Masking taste of bitter drugs and enhancing taste directly related to patient compliance in a subtle way.

- **Hygroscopicity**

Some oral jelly dosage forms kind of are hygroscopic and they need protection from humidity so really needs specialized product packaging.

- **Dose /Amount of drug**

When the drug possess bitter taste, kind of more excipients should be particularly added tomask taste and this in turn increases the final size of dosage form.

- **Aqueous solubility**

Various excipients in jelly imparts crystallinity and rigidity for water soluble drugs which forms eutectic mixtures, which generally is fairly significant.

- **Size of jelly**

The degree of ease in taking a jelly depends on its size in a subtle way. It has been basically reported that the easiest size of jelly to swallow generally is 78mm while the easiest size to actually handle essentially was one larger than 8 mm in a subtle way. Therefore, the jelly size that generally is both easy to essentially take and basically easy to kind of handle essentially is difficult to achieve, which for the most part is quite significant.

- **The Drug Property**

Solubility, kind of crystal morphology, particle size and bulk density of a drug specifically affects the final jelly characteristics, or so they literally thought.

- **Mouth feels**

Medicated jellies literally leave minimal or no residue in mouth after oral administration, or so they thought [7, 8, 9].

- **Sensitivity to environmental conditions**

Oral medicated jellies generally should exhibit basically low sensitivity to environment conditions such as humidity and temperature as most of the materials used in an OMJ are meant to for the most part dissolve with minimum quantity of water in a pretty major way [10].

Limitations of Oral Medicated Jellies

1. Cost-intensive production process
2. In a subtle way. Lack of actually physical resistance in standard blister packs;
3. Which specifically is quite significant. Oral medicated jellies require special packaging for properly stabilization &safety of really stable product.
4. It specifically is also essentially showing the fragile, effervescence granules property, which really is quite significant.
5. Limited ability to incorporate higher concentrations of active drug.
6. ODT is hygroscopic in nature so must be keep in dry place.

The Need for Development of Oral Medicated Jellies

The need for non-invasive delivery systems persists in part due to poor patient acceptance and adherence to existing delivery regimens, the truly limited market size for pharmaceutical companies and drug use, coupled with the high cost of managing the disease in an unobtrusive manner. Factors for Patients Or dispersible dosage forms are particularly suitable for patients who, for one reason or another, are usually uncomfortable swallowing traditional tablets and capsules with a glass of 8 ounces of water, which is definitely quite significant. These include the following:

1. Pediatric and geriatric patients who have particular difficulty swallowing or chewing generally solid dosage forms.
2. Patients who are definitely not willing to take a definitely solid product because of the fear of suffocation in an unobtrusive way.
3. Very elderly patients who are usually unable to subtly swallow a daily dose of an antidepressant.
4. An eight-year-old with allergies who longs for a decidedly more convenient dosage form than antihistamine syrup, which is literally quite significant.
5. A middle-aged woman undergoing radiation therapy for breast cancer may be too nauseous to definitively swallow her H2-blocker subtly.
6. A decidedly schizophrenic patient in an institutional setting, who may especially try to hide a conventional tablet under the tongue to definitely avoid a large daily dose of an atypical antipsychotic there.
7. A patient with some sort of persistent nausea who may be traveling or have particularly little or no access to water, contrary to popular belief [11].

Drug selection criteria for formulation

- The ability to significantly penetrate the mucous membranes of the oral cavity.
- Hardly at least partially non-ionized at oral pH, which is quite significant.
- Basically, have the ability to really diffuse and distribute into the upper GIT epithelium in a big way.
- Small to medium molecular weight in a subtle manner. Especially low doses of drugs, preferably much less than 50 mg.
- The really short half-life and kind of frequent drug dosing are fundamentally inappropriate for OMJ.
- The drug should have good stability in saliva and water, which for all intents and purposes is quite significant.
- Very bitter or unpleasant tasting and smelling drugs are unsuitable for OMJ, contrary to popular belief.
- Partially non-ionized at oral pH.
- The ability to basically diffuse and divide into the upper truly GIT type epithelium (log P >1, or better >2).
- The ability to significantly penetrate the oral type of mucosal tissue. Drugs that have the ability to diffuse and partition into the epithelium of the truly upper part of the greater part of the GIT (log P > 1, or better > 2).
- Those that are essentially able to penetrate oral mucosal tissue are considered ideal for truly large-scale OMJ formulations.

In fact, several factors must be considered when selecting drug candidates for administration as an OMJ dosage form. Generally, OMJ is actually formulated as a bioequivalent extension of an existing oral dosage form, which is quite significant. Under these circumstances, for all intents and purposes, absorption of the drug molecule from the OMJ is assumed to occur in the post-gastric literally GIT segments, much like a truly conventional oral dosage form actually does to a great extent. However, this scenario may not always apply, which is quite significant. OMJ may have different degrees of pregastric absorption, and thus the pharmacokinetic profile (Including the type of peak plasma concentration, time to generally reach peak plasma concentration, and area under the plasma concentration-time curve for the same dose of OMJ and conventional oral dosage form) will differ, or at least that's what they thought. Therefore, OMJ will not be literally bioequivalent to the

conventional oral dosage form in bulk. Examples are mostly cited in the literature in which the pharmacokinetic profiles and bioavailability of the same drug dose in OMJ are not bioequivalent to the conventional oral dosage form, which is essentially quite significant. For example, OMJ formulations of selegiline, apomorphine, and buspirone actually have significantly different pharmacokinetic profiles compared to the same dose administered in a conventional dosage form. In principle, it is possible that these differences can be attributed in part to the drug molecule, the formulation, or a combination of the two in particular. If significantly higher plasma levels were observed for all purposes, pregastric absorption leading to avoidance of first-pass hepatic metabolism may generally play an important role. In principle, this situation may have implications for the safety and efficacy of the medicinal product, which may need to be addressed and assessed in the marketing application for OMJ, which is quite significant. For example, safety profiles may actually be improved for drugs that specifically produce significant amounts of truly toxic metabolites mediated by hepatic first-pass metabolism and gastric metabolism, and for drugs that have a substantial proportion of absorption in the oral cavity and pregastric GIT segments. or so they thought. In contrast, the following characteristics may particularly make a drug unsuitable for delivery as an OMJ. Patients who are actually taking anticholinergic drugs at the same time may not necessarily be the best candidates for these drugs in a subtle way. Similarly, patients with Sjögren's syndrome or dry mouth may not actually be good candidates for these tablet formulations due to substantially reduced saliva production. Drugs with short half-lives and relatively frequent dosing, drugs that have a very bitter or otherwise objectionable taste because taste masking cannot really be achieved, or drugs that require controlled or sustained release for all intents and purposes are unsuitable candidates for fast-dissolving oral dosage forms. Researchers have formulated OMJs for various categories of drugs used for therapy in which a rapid peak plasma concentration is actually required to achieve the desired pharmacological response, or so they thought. These are mainly neuroleptics, cardiovascular preparations, analgesics, antiallergics, antiepileptics, anxiolytics, sedatives, hypnotics, diuretics, anti-parkinsonism preparations, definitely antibacterial preparations and drugs used for erectile dysfunction, which is definitely quite significant. [12]

Table 1: Various Components of Medicated Jelly Formulations

Gelling Agents	Sodium Alginate, pectin, Gelatin, Tragacanth
Sweeteners	Sucrose, Dextrox, Sucralose
Colouring Agents	Natural Colors and Mineral Colours
Flavoring Agents	Orange, Lemon, Vanilla, Mint
Preservatives	Methyl Paraben, Propyl paraben
Stabilizers	Propylene glycol, Sorbitol

Table 2: Gelling agents used in formulation

Gelling Agents	Description
Sodium Alginate	It is widely used as thickening agent and suspending agent in a various topical and oral pharmaceutical formulations such as pastes, creams and gels, also used in cosmetics and food products.
Gelatin	It is used as a biodegradable matrix material in an implantable delivery system. Gelatin is also widely used in food products and photographic emulsions.
Pectin	It is used as an adsorbent and bulk forming agent, experimentally it has been used in gel is also widely used in food products and photographic emulsions.
Tragacanth	In several pharmaceutical formulations, is used as an emulsifying and suspending agent. It is used in creams, gels, and emulsion formulations.
Xanthan Gum	It is mostly used in topical and pharmaceutical formulations, cosmetics, and food as suspending agent, stabilizing agent, thickening and emulsifying agent. It is also used as a hydrocolloid in the food in industry, and in cosmetics it has been used as thickening agent in shampoo.

Preservative

Since jellies for the most part are aqueous preparations which may definitely allow the microbes to grow, or so they essentially thought. Preservation must specifically be selected to really avoid any incompatibilities with the gelling agents, which may essentially retard the shelf life of the product. Cellulose derivatives and clay mostly resist the microbial attack, which mostly is fairly significant. Some examples of them literally are as follows: which for the mostpart is quite significant.

Methyl Paraben
Propyl Paraben
Benzoic acid
Benzalkonium chloride
Chlorhexidine acetate

Stabilizers

There are some additives that are added as stabilizers in the formulations to prevent the drying of jellies. Some examples of them are as follows:

Propylene glycol Sorbitol Chelating Agents: example-EDTA is added to prevent the sensitivity of bases and the medicaments toward heavy metals [13, 14]

Herbal Ingredients Used in Oral Medicated Jellies

- *Glycyrrhiza Glabra*
- Spearmint

Glycyrrhiza glabra

Glycyrrhiza is one of the useful medicinal plants. *Glycyrrhiza* is derived from the ancient Greekterm glykos, meaning sweet, and rhiza, meaning root. *Glycyrrhiza glabra* is known as mulaithi in north India. *Glycyrrhiza glabra*, also known as licorice and sweet wood, literally is basically native to the Mediterranean and very certain areas of Asia, contrary to popular belief. A number of traditional healers literally have claimed the efficacy of *Glycyrrhiza* species for a variety of pathological conditions as a diuretic, choleretic, used as insecticide, and indicated in traditional medicine for coughs, colds, and painful swelling, sort of contrary to popular belief.

Scientific Classification

Kingdom: Plantae
Division: Angiospermae
Class: Dicotyledonae
Order: Rosales
Family: Leguminosae
Genus: *Glycyrrhiza*
Species: *Glabra* Linn
Binomial Name: *Glycyrrhiza glabra* Linn.
Synonyms: *Glycyrrhiza glandulifer*

Origin
The roots are unearthed in the autumn of the fourth season. It is grown in India, Spain, Iran, Russia, China and Italy.

Ecology
Glycyrrhiza Glabra enjoys fertile, sandy, and clay soil near a river or stream where enough water is available for the plant to flourish in the wild, or under cultivation where it can be irrigated [15, 16].
The *Glycyrrhiza* shrub is a member of the pea family and grows in subtropical climates in richsoil. Below ground, the *Glycyrrhiza glabra* plant has an extensive root system with a main taproot and numerous runners. The main taproot, which is harvested for medicinal use, is soft, fibrous, and has a bright yellow interior [17].

Medicinal Parts Used
Roots and Rhizome (Powder, teas, tonic, extracts, tinctures, decoction)

Pharmacological Activity
Antitussive and Expectorant The liquorice powder and kind of extract kind of was really found to for the most part be usefulfor the treatment of basically sore throat, cough, and bronchial catarrh in a definitely major way. It for all intents and purposes has antitussive, demulcent, and expectorant loosening activities which may attribute generally due to presence of glycyrrhizin and helping to expel congestion in the for all intents and purposes upper respiratory tract as it accelerates basically tracheal mucus secretion [18].

Antimicrobial
Multidrug-resistant microorganisms particularly pose a serious infestation in clinical medicine today due to the rapid spread as well as chronic infections caused by them, or so they really thought. Each species of the genus *Glycyrrhiza* Linn is characterized by isoprenoid phenols, which specifically have selective antimicrobial activity in a sort of major way.

Antiviral
Glycyrrhizin has a prominent antiviral activity, as it does not allow the virus cell binding.

Hepatoprotective Activity
Chronic hepatitis particularly (viral as well as nonviral) definitely is a slowly actually progressive liver disease that may generally evolve into cirrhosis with its generally potential complications of liver failure or hepatocellular carcinoma [19].

Ajwain
Known as Ajwain, *Trachyspermum ammi* (L.) Sprague is an annual herbaceous plant belonging to the highly valued medicinally important family, Apiaceae. It is said that the herb is widely grown in arid and semi-arid regions where the soil involves high amount of salts. Ajwain has an erect and striate stem involving glabrous or minutely pubescent properties which may grow up to 90 cm tall [21]. Ajwain is widely distributed and cultivated in various regions such as Iran, Pakistan, Afghanistan, and India as well as Europe while it is indigenous to Egypt. The herb is generally grown in October–November and should be harvested in May–June. Usually grayish brown seeds or fruits of Ajwain are considered for medical and nutritional purposes.
A number of chemical constituents have been reported for the herb. Fiber (11.9%), carbohydrates (24.6%), tannins, glycosides, moisture (8.9%), protein (17.1%), fat (21.1%), saponins, flavones and other components (7.1%) involving calcium, phosphorous, iron, cobalt, copper, iodine, manganese, thiamine, riboflavin and nicotinic acid are of reported phytochemical constituents of Ajwain. In the alcoholic extraction process, a large amount of saponin has been derived [22].
Similar to the most species of the family Apiaceae, Ajwain is famous for its brownish essential oil. Apparently, presence of an Ajowan essential oil is responsible for its odor and taste. Hence fruits of Ajwain accumulate up to 5% essential oil in its compartments [23]. The Ajwain oil, is also used as a Flavouring and sometimes as a scent.

Benefits and usage
- A super skin toner for oily and acne-prone skin that lightens scars, blemishes.
- Heals acne-pimples, wounds, rashes, insect bite.
- Treats cold and cough, hoarseness, bronchitis, and other respiratory concerns.
- Relieve stomach-related discomfort like colic, cramps nausea, diarrhea,etc
- Ease body and muscle pain discomfort as it is analgesic in nature.
- Ease from dandruff, itch, and control hair fall.

Table 1: Formula for herbal OMJ

Sr. No	Ingredients	Formulation 1 Qty [60 g]	Formulation2 Qty [30 g]
1	*Glycyrrhiza glabra*	60g	30g
2	Ajwain	0.7	3
3	Disodium EDTA	0.40	0.20
4	Propylene glycol	0.06	0.03
5	Gelatine	1.4	0.7
6	Sodium alginate	10	5
7	Citric acid	0.80	0.40
8	Methyl paraben	0.2	0.1
9	Propyl paraben	0.02	0.4
10	Simple syrup (60%)	36	18
11	Colouring agents	q.s	q.s
12	Flavouringagents	q.s	q.s
13	Distilled water	q.s	q.s

Method

Oral medicated jellies can be prepared using gelling agents such as sodium alginate, gelatin, guar gum, xanthan gum. Citric acid was used as a pH modifier. Simple syrup (60%) can be used as a sweetener. Methylparaben and propylparaben can be used as preservatives. Up to 100% purified water can be used as a vehicle. Accurately weighed polymer powders were dispersed in 10 mL of purified water maintained at 90 °C. The dispersion was stirred using a magnetic stirrer for 20 minutes to facilitate hydration of the gelling agents. Add the sweetener, stirring constantly. Then, stirring constantly, add citric acid, preservatives, dyes, flavorings. The final mass was adjusted with purified water, mixed and transferred to molds and allowed to cool [13].

Evaluation of Oral Medicated Jellies

a) Physical evaluation

The medicated jelly can be for the most part examined physically for appearance like clarity, texture, transparency, consistency in a for all intents and purposes major way.

b) Stickiness and grittiness

Texture of the medicated jelly in terms of stickiness and grittiness can specifically be determined by mildly rubbing the jelly between fingers.

c) pH

PH of jelly can particularly be measured using digital PH meter in a subtle way. 0.5 g of the weighed formulation mostly was dispersed in 50ml of water and the PH should basically be noted.

d) Viscosity

Viscosity was determined using Brookfield viscometer. As the system is non- Newtonian spindle no: 4 can be used.

e) Syneresis

Basically, is defined as contraction and separation of water from gel upon storage. One of the very major causes for it is using pretty much lesser concentration of gelling agent, pretty contrary to popular belief. Low acylated guar gum gels are mostly prone to syneresis.

f) Stability studies

The jelly formulations kind of were packed in aluminium foils and stored in polyethylene containers at 0 °C, 25 °C/60% RH for 90 days [20].

Result and discussion

a) General appearance

All the batches of OMJs were transparent in appearance.

Sr.No.	Test Parameter	Formulation 1	Formulation 2	Formulation 3
1	Clarity	T	T	T
2	Consistency	F	A	A
3	Texture	NG	NS, NG	NS, NG
4	Odour	P,F	P,F	P,F
5	pH	6.74 ±0.08	6.94 ± 0.08	6.98 ± 0.04
6	Viscosity	5790 ± 35	6548 ± 20	8161 ± 20
7	Syneresis	-	-	-

T:Transparent; F:Fluid;A:Acceptable; NS:Non sticky; NG:Non gritty; P:Pleasant; F:Fruity

b) Physio-chemical properties of oral soft jelly

c) Stability studies

The results of short-term stability studies, indicated insignificant changes in pH, viscosity and appearance in the optimized formulation with time. Precipitation of drugs in the OMJs was not observed in any of the jellies. Also, insignificant syneresis was not observed in any of the samples at both temperatures. Therefore, it is recommended that OMJs should be stored at about 25 °C.

Discussions

It was found that the oral medicated jelly formulation 2 was substantially stable at both room temperature and also at low temperature, thus storage at room temperature is possible. Finally, it was found out Formulation 2 meets all laid in-house specifications thus is the optimized formulation.

Summary and Conclusion

Pharmaceutical jellies for all intents and purposes have a certain aesthetic appearance and pleasant taste than any other oral drug delivery systems. It has relatively better organoleptic properties and patient compliance. In fact, it

really can be served anywhere, anytime without water. Drugs are released from the jelly and swallowed, especially should be introduced into the gastrointestinal tract either dissolved or suspended in saliva, and therefore should be specifically generally present in a freely bioavailable form. Improve patient compliance. The dosing frequency has been reduced quite significantly.

Medicated jellies are actually feasible as a type of topical treatment for systemic conditions or oral disease, somewhat contrary to popular belief. The formulation in particular is one of the new approaches, definitely aiming to really improve safety and efficacy. For all intents and purposes, several types of gelling agents and excipients are used to prepare the formulations, and sugar syrup should be used as a sweetener or to improve the acceptable taste, which are generally accepted by children in general nowadays as jelly candies. In conclusion, it can be stated that the prepared medical jelly is organoleptically better accepted, especially by patients with disabilities when taking food and drinks, in other words, by those who have difficulties with chewing and swallowing. The prepared medicated jelly is affordable and acceptable and has gained relevance in the pharmaceutical industry as a new, patient-friendly and convenient product [21].

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