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Extraction, Characterization and Evaluation of Okara Mucilage

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ABSTRACT

Mucilage is the thick, gluey substances produced by nearly all plant and some microorganisms. Okra mucilage is extracted from the plant of the *malavaceae [A. esculantus].* Which is originally from Egypt, but it also in cropped in southern Asia elsewhere for nutritional purposes. Their use as potential reinforcement in polymer composites requires the understanding of their microstructure and mechanical properties. This work investigates the extraction methods, solubility behavior, TLC, loss on drying, ash value, FTIR spectra, surface tension, organoleptic properties. Extracted mucilage is soluble in warm water while insoluble in organic solvents. This can shows that it safely used in dosage form without causing any adverse effect.

Keywords: Okara Mucilage, Pharmaceutical Excipients, Controlled-Release Formulation

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INTRODUCTION

Mucliages are most commonly used adjuvant in pharmaceutical preparations. Plant mucilages are pharmaceutically important polysaccharide with wide range of applications such as thickening gelling agent, binding, disintegrating, suspending, and emulsifying, stabilizing and gelling agents. They have been also used as matrices for sustained and controlled release drugs. Naturally available mucilages are preferred to synthetic materials due to their non toxicity low cost, emollient and non irritating nature. Acacia, tragacanth, gum ghati, gum karaya are popular examples of plant mucilages. As a present paper deals with isolation, phytochemical screening and evaluation of binding properties of *Hibiscus esculentus* mucilage's. As a dose formulators essential to develop cost-effective and less tedious procedures for preparation of sustained release formulations on the industrial scale. The most commonly used method for fabricating drugs in a controlled-release formulation is by incorating them into a matrix containing a hydrophilic rate controlling natural polymer[1].

Now a day many research are going on for the use of natural occurring biocompatible polymeric material in designing of pharmaceuticals dosage form for oral controlled release administration .most of the natural gums are biodegradable and nontoxic, which hydrate and swell contact with aqueous media, so these have been used for the preparation of dosage form. Polysaccharide obtains forms plants has been shown to be useful for the construction of drug delivery systems[2]. Regular research is going on in field of use of natural occurring biocompatible polymeric material in designing of dosage form for oral controlled release administration. Natural gums are biodegradable and nontoxic, which hydrate and swell on contact which aqueous media, and these have been for the preparation of dosage form[3].

Natural are playing an important role as pharmaceutical excipients. These are easily available biodegradable and having economic. Biocompatibility of these natural polymers promotes their use as in pharmaceutical formulations. Present work used granulation compression technique to prepare tablets. In present study diclofenac sodium a non-steroidal anti-inflamentary drug is selected as model drug [NSAID] with analgesic and antipyretic properties[4]. Diclofenac sodium is used treatment is used in treatment of pain, dysmenorrhea, ocular inflammation, osteoarthritis, rheumatoid arthritis, ankylosingspondvlitis, and actinic keratosis.

MATERIAL AND METHODS

Extraction:

Extraction procedure:-okra (a. *Esculantus*) was obtained from local market of India. Collected okra was carefully washed and dried under shad for 24h ,further dried at 30-40^{0}c until constant weight is obtained. Size was reduced through sieve no. #22and stored it in air tight container for further use. Extractions of mucilage include 2 steps[5].

Step 1:-method used for extraction is soxhlet extraction method. Take a 10gm powder of okra. Pack into the soxhlet apparatus. Then using the solvent extraction starts. The solvents can be a use for the extraction is water. Start the extraction. After the completion perform second step.

Step2:-isolation of mucilage: the obtained extract pour in petriplate. The mucilage was further dried to constant weight at 35-45^{0}c in hot air oven. Hard mucilage cake was grinded and sieved through sieve #22, store in dessicator for further use[6,7].

Soxhlet extraction of mucilage

1. Organoleptic evaluation of isolated mucilage: isolated mucilage was characterized for organoleptic properties such as colour, odour, taste, fracture and texture

2. Determination of purity of okra mucilage: to determine purity of extracted mucilage, facts, tannins and amino acids were performed

3. Phytochemical test:

Aqueous extract was mixed molishs reagent followed by addition of sulphuric acid the violet color ring appeared at junction, showing presence of other chemicals.

4. Physicochemical properties of okra mucilage:

A. Loss on drying: the test was carried out according to the procedure described to the procedure described by authors elsewhere. One gram of power was weighed accurately in a weighing bottle and was dried in a weighing bottle and was dried in a hot air oven at 105° c and the weight was checked a intervals of 10 min, until a constant weight was obtained. The percentage of weight lost by the powder was calculated using equation

Loss on drying = (initial weight-final weight ÷ initial weight) x100

B. Ash values: as discussed by authors in previous publication ash values such as total ash, acid insoluble ash and water- soluble ash were determined using equation 1,2, 3 respectively

Total ash value = [weight of ash ÷weigh of polymer]x100

Acid insoluble ash=[weight of acid insoluble ash ÷weight of dried powder] x100

Water soluble ash = weight of water soluble ach÷ weight of dried powder x100

Solubility behavior: as already described by author s one part of dry mucilage powder was shaken with different solvents and further solubility was determined

C. ph of mucilage: the mucilage was weighed and dissolved in water separately to get a 1% w/v solution. The ph of solution was determined using digital ph meter as described by previous publication

D. swelling index: a s described by authors in previous publication swelling index were calculated as per equation

Swelling index = final volume –initial volume ÷ final volume x100

E. surface tension: the surface tension of the selected mucilage was determined by drop count method, using a stalagmometer. The surface tension of the polymer has been reported to influence the binding quality of the polymer. Surface tension was calculated as per equation 5.

$$\sigma_{solution} = \sigma_{water} \, xm_{(solution)} \div m_{(water)}$$

Where,

Σ = surface tension of solution
Σ =surface tension of water
$M_{(solution)}$ =weight of water

F. viscosity: as described by author's viscosity of okra

Mucilage was determined using oswald viscometer were

Calculated using following equation;

$S = wxt_s p_s \div t_w p_s$

Where,

S= viscosity of solution W = viscosity of water
T= time P= density

5. TLC characterization:-TLC is method for analyzing mixtures by separating the compounds in the mixture. It is used to identify the compound and purity by comparing with standard. It is calculated from retention factor[8,9].

5. FTIR spectra:-

Take about 1/8" of the solid sample on a microspatula and about 0.25-0.50 teaspoons of KBR. Mix thoroughly in a mortar while grinding with a pestle. If the sample is in the large crystals, grind the sample separately before adding KBR.

Place just enough special to cover bottom in pellet die. Place in press and press at 5000-10000 psi. Check pellet press brochure for details. Carefully remove the pressed sample from die and place in the ftir sample holder. The pressed disc should be nearly clear if properly made. If it is translucent, regrind and repress. Add 1% of mucilage in the 99% of kbr repeat the above procedure[10].

RESULTS AND DISCUSSION

Extraction:

The extraction was carried out using soxhlet extraction and 4 cycles are obtained. Yield was found to be 12.14w/w.

Mucilage obtained was 12.14w/w

Organoleptic evaluation of isolated mucilage:

Sr.no.	Parameters	Obs.
1	Colour	Brownish
2	Odour	None
3	Taste	Characteristic

Phytochemical test:

Sr.no.	Test	Present/absent
1	Carbohydrates	+
2	Hexose sugar	+
3	Monosaccharide's	-
4	Protein	-
5	Fats and oils	-
6	Tannins and phenolic compounds	-
7	Alkaloids	-
8	Amino acids	-
9	Mucilage	+
10	Gums	-

Physicochemical properties of okra mucilage:

Sr.no.	Parameter	Obs.
1	Loss on drying	8.97%
2	Ash value:	
A	Total ash value	6.93%
B	Water soluble	5%
C	Acid insoluble	0.87%
3	Ph of mucilage	7.5
4	Swelling index	28
5	Surface tension	0.0305 joule/m sq
6	Viscosity	62.32 CP

TLC:

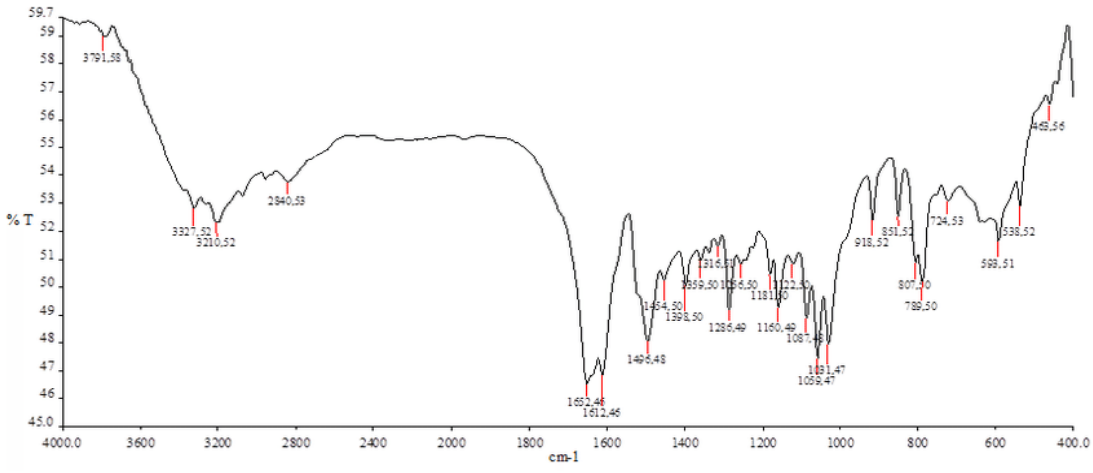
TLC for okra mucilage

R_f value:-

Spot 1:-0.302

Spot 2:-0.794

FTIR:-



FTIR spectra for okra mucilage

Interpretation of FTIR spectra:-

Sr. No.	Wave no. (cm^{-1})	Functional group
1	1662	C=O
2	1258	C-O
3	1080	C-C
4	2840	C-H
5	3327	O-H

After extraction and further precipitation by ethyl alcohol the yield of mucilage was 12.14w/w obtained. The isolated sample was subjected to identification; this showed presence of carbohydrates in sample powder. Confirmation of mucilage was done when it gave negative test of tannins, Alkaloids and protein. This can be considered as proof for purity of the isolated mucilage as depicted in table 1.

The results for loss of drying showed value of 8.97%. This indicated that mucilage is hygroscopic in nature and need to be stored in air-tight containers. In solubility behavior of okra mucilage was found to be soluble in warm water, slightly soluble in cold water and insoluble in benzene, glycerine, paraffin. Surface tension of o.25%w/v. Solution of mucilage was found to be 0.0305 joule/m sq. Other phyto-constituents were absent in the isolated powder, ph of 1% solution was found to be 7.5. Result obtained of okra mucilage and observed that mucilage is brownish colour, odourless, testless, rough and irregular in shape. Ash values were calculated to characterize mucilage; total ash acid insoluble ash and water soluble ash were found 6.93%, 0.87% and 5%respectively. The TLC characterization was also studied and Rf value was found to be 0.302, o.794. FTIR spectra also obtained. The all data obtained tabulated.

CONCLUSION

Results of evaluated parameters showed that okra derived mucilage can be used as pharmaceutical excipient to formulate solid oral dosage form. It has acceptable ph and organoleptic properties, so can be easily used to formulate various dosage form.

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