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Isolation and Evaluation of *Cassia fistula* Seed Gum as Film Coating Material

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Abstract: Nature has provided us a wide variety of materials to help improve and sustain the health of all living things either directly or indirectly. In recent years there have been important developments in different dosage forms for existing and newly designed drugs and natural products, and semi-synthetic as well as synthetic excipients often need to be used for a variety of purposes. Gums and mucilages are widely used natural materials for conventional and novel dosage forms. These natural materials have advantages over synthetic ones since they are chemically inert, nontoxic, less expensive, biodegradable and widely available. They can also be modified in different ways to obtain tailor-made materials for drug delivery systems and thus can compete with the available synthetic excipients. In this research, we describe the developments in natural gums and mucilages for use in the film coating.
Key words: *Cassia fistula*, Cassia Gum, Tablet coating.

Introduction:

Film coatings are applied to pharmaceutical dosage form to protect them against the environment, to improve their appearance, to mask undesirable test or odor, to impart enteric properties and to modulate release of medicaments[1]. Since its inception, the film coating of pharmaceutical dosage form has shown significant increases in popularity, owing to the many advantages it has to offer. Film coating has been studied extensively in the pharmaceutical industry and the use of polymer has been widely accepted[2]. The main polymers used for film formation have been classified in three categories: Gastro soluble, Gastro resistant (enteric) and insoluble[3]. The most important raw material for film coating is a pharmaceutically acceptable film forming resin which should form a coherent film on the surface of the substrate under the prevailing conditions[4]. Mother nature has gifted India with great variety of flora and fauna. For centuries man has made effective use of materials of natural origin in the medical and pharmaceutical field. Today, the whole world is increasingly interested in natural drugs and excipients. Natural materials have advantages over synthetic materials because they are non toxic, less expensive and freely available. Furthermore, they can be modified to obtain tailor made materials for drug delivery systems allowing them to compete with the synthetic products that are commercially available. Many kinds of natural Gums are used in the food industry and are regarded as safe for human consumption. It should be noted that many 'old' materials are still popular today after almost a century of efforts to replace them. It is usual to strike a balance between economics and performance in the face of commercial realities[5-8].

Experimental:

Extraction and Isolation:

The seeds of *Cassia fistula* Linn. were collected from local area of Madhukar Sahakari Sakhar Karkhana, Faizpur and Authenticated from Botanical Survey of India, Pune Division by, Dr. P. G. Divakar. Then the seeds were subjected to Drying and Size reduction to course powder.

The course powder of seeds of *Cassia fistula* was defatted using Toluene and further macerate with water and chloroform. After 24 hrs the solvent filtered with muslin cloth and addition of excess of ethanol to precipitated gum in the filtrate. Precipitated gum was collected and dried in oven at 50^0C. The dried material then made fine powdered by using grinder and passed through sieve no.100 and very fine powder of gum was stored in glass bottles.

Tabletting and Coating of Tablets

Tabletting:-Dummy tablets were prepared on a single stroke compression machine, using lactose, starch 10%, magnesium stearate 1%, talc 1%, by weight per tablet, with following specifications

Description: Thickness: - 4.10 mm

Avg. weight of tablet: - 250 mg, Friability loss: - 0.4%, Hardness: - 3 Kg/cm^2

Coating Formulation:

The coating dispersion consisted of 1gm coating material (*Cassia fistula* gum=CGF) CFG1 and CFG2. PEG-400 (20%w/w and 25%w/w respectively of total solid content) and mixture of water and isopropanol in proportion of 7:3. These coating formulations were evaluated for contact angle and viscosity.

Contact angle:

The contact angles between the coating solutions of tablets were determined by the sessile drop method, placing small droplets (volume 10 µl) on the tablets. The height of the droplet and the width of the base of the droplet were measured[9].

Viscosity:

Viscosity of the coating formulation was determined by using Brookfield viscometer.

Coating Procedure

The small coating pan of Stainless steel (500 ml) was used for coating. Both coating assembly and coating procedure were modified to suit the requirements of aqueous coating. For the first three coats, the coating solution was spread with the help of spray gun (aerostar) for a short period and the coating was dried by blowing hot air intermittently on to a rotating tablet bed (drying period 15-20 min.) in the subsequent coating, the spraying time of coating solutions was increased to 10-15 seconds and drying time was reduced to 5-10 min. This manipulation in the coating process was essential to avoid the migration of water from coating solution into the core. The operating conditions employed for coating are shown in table 1.

Evaluation of Coated Tablet

Coated tablets were evaluated for the parameters affected by coating e.g. surface morphology, thickness, hardness, friability, disintegration and film adhesion.

Film thickness of coated tablet was determined by measuring the change in dimensions (crown thickness and diameter) after coating of tablets. Hardness of the tablet was measured with Monsato tablet hardness tester. It measures the pressure required to fracture the diametrically placed tablet by applying the force with two plungers and coiled spring. Friability loss was measured with Roche Friabilator. The adhesion of the polymer film was measured as the force required to remove the film from the tablet surface, using a specially designed tensile testing apparatus[10].

Stability testing

Stability of coating material was determined by exposure of coated tablets to 40^{O}C and 75 % relative humidity for 6 months, testing periodically for change in appearance, weight, hardness friability and disintegration.

Table 1: Operating conditions for coating

Item	Condition
Charge per Batch	20 Tablets
Speed of Pan revolution	35rpm
Distance of spray gun	5 cm
Spray gun Nozzle diameter	0.5 mm
Spray rate	1ml/min
Temperature of coating dispersion	Room temperature
Drying air temperature	60-70^{0}c
Coating time	4 h

Table 2: Results of contact angle

Coating solution	Contact Angle
CFG1.PEG400(20%w/w of total solid content)	51^0 15
CFG2.PEG400(25%w/w of total solid content)	49^{0}50

Table 3: Results of Viscosity

Coating solution	**Viscosity** (cps)
CFG1.PEG400(20%w/w)	16
CFG2.PEG400(25%w/w)	13

Table 4: Results of contact angle

Coating solution	Film Thickness (mm)	Hardness (kg/cm^2)	Friability (%)	Disintegration (mm)	Film Adhesion (g)
CFG1.PEG400 (20%w/w)	0.06	5	0.06	45	10.56
CFG2.PEG400 (25%w/w)	0.08	6	0.05	55	12.68

Results and Discussions

In the present article, Natural seed gum from *Cassia fistula* (CFG1 and CFG2) are synthesized and evaluated for their properties. The contact angles between the coating solution and tablet cores are shown in Table 2. According to Wenze[11], polymer solution spreads more readily when the tablet surface is rough; the contact angle decreases with increasing roughness of tablets. The coating solution was less Viscous due to the replacement of water in part with isopropyl alcohol and clear boundaries particularly at the edges indicative of uniform coating it is thus evident that the coating formulation, process condition and application procedure were all in order. Results of Hardness, friability, disintegration and film adhesion are shown in table 4. CFG2 coated tablet shows comparatively good physical properties than guar gum and CFG1 coated tablet. It is expected that the film adhesion to tablet surface increases with a decrease in the contact angle. Fisher and Rowe[12] found that adhesion with low viscosity organic based film coating solutions was higher than that with high viscosity solution. With high viscosity solutions the effective area of contact will be lower, resulting in lower adhesion values. Viscosity shown in Table 3, From the stability studies, it was observed that there were negligible changes in physical properties over the study period establishing that CFG1 and CFG2 were stable against selected environmental conditions.

Conclusion

In the present study, the film coating properties of two *Cassia fistula* seed gum CFG1 & CFG2 have been investigated to assess their potential for use in film coating. Both CFG1 and CFG2 could be used as film coating agents at concentration of 1 % w/v in a 3:7 mixture of isopropanol and water with addition of PEG 400(20%w/w and 25%w/w respectively of total solid content). CFG2 shows comparatively best result than CFG1. The *Cassia fistula* seed gum therefore promise considerable utility in film coating and in the design of gastroresistant delivery dosage form.

References:

1. Lachman, L., Lieberman, H.A., Kanig, J.L. (1991) The Theory And Practice of Industrial Pharmacy; Verghese Publishing House : Bombay, 3rd Edn ,363.
2. Phuaprodit, W., Shah, N.H., Raikar, A., Willims, L., Infield, M.H. (1995) Drug Dev. Ind. Pharm., 21 (8), 955.
3. Benita, S., Dor, Ph., Aronhime, M., Marom, G. (1986) Permeability and mechanical properties of new polymer: cellulose hydrogen phthalate. Int. J. Pharm, 33, 71.
4. Porter, S.C., Bruno, C.H. (1990) in Lieberman H.A.; Lachman L.; Pharmaceutical Dosage Form: Tablets vol-3, Marcel Dekker.
5. Nakano M., Nakamura Y., Juni K., *et al.* Sustained release of sulfamethizole from agar beads after oral administration to humans. Chem Pharm Bull., 1980, 28: 2905-2908.
6. Durso D.F., Handbook of Water Soluble Gums and Resins. New York, NY: McGraw Hill, Kingsport Press; 1980:12.
7. Bhardwaj T.R., Kanwar M., Lal R., *et al.* Natural gums and modified natural gums as sustained release carriers. Drug Dev. Ind. Pharm., 2000, 26: 1025-1038.
8. Desai A., Shidhaye S., Malke S., *et al*. Use of natural release retardant in drug delivery system. Indian Drugs, 2005, 42: 565-575.
9. Lehtola, V.M., Heinamaki, J.T., Nikupaavo, P., Yliruusi, J.K. (1995) Effect of Some Excipient and Compression Pressure on The adhesion of Aqueous Based Hydroxypropyl Mehyl cellulose film coatings to tablet surface. Drug Dev. Ind. Pharm., 21, 675.
10. Tobiska, S., Kleinbudde, P. (2003) Coating Uniformity: Influence of Atomizing Air Pressure. Pharm. Dev. Technol., 8(1), 39-46.
11. Wenzel, R.N., (1949) Surface roughness and contact angle. J. Phys. Chem., 53, 1466
12. Fisher, D.G., Rowe, R.C. (1976) The adhesion of film coatings to tablet surfaces – instrumentation and preliminary evaluation. J. Pharm. Pharmacol., 28, 886.

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