Cassia Bascilaria with Comparison to Cassia Farmasiana in Antimicrobial Property and Chemical Composition.

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Abstract:

Plant gum like Acacia algenic acid, guar gum etc have been used as pharmaceutical formulation. The cassia farmasiana seed gum was found for it's binding and optimal conditions for wound healings. All evaluation were compared with widely used standard sodiumCarboxymethyl cellulose and gelatin. The gum is prepared from seed of cassia farmasiana and cassia bascilaria. The prepared gum was evaluated in different concentration like1%, 1.5% and 2% which compared with same concentration of sodium and gelatin. It also showed linearity between concentration and hardness. Increased concentration of cassia farmasiana and cassia bascilaria seed gum from 2 to 5% increased the disintegration and dissolution time than those containing. Seed gum of cassia farmasiana could be useful in function of dressing and facilating wound healing and preventing further issue such as infection are complications, and cassia bascilaria gum could be useful binding agent specially when high mechanical strength and slower release concern. The seed gum of cassia farmasiana and cassia bascilaria we used then as a coating material of cotton to improve the liquid absorption ability.

Experimental: crude gum were extracted from seed of cassia farmasiana and cassia bascilaria and carboxymethyl gums were then derived and characterized cassia farmasiana ethanolic extract was also prepared by maceration and it's antimicrobial activities were determine the different concentration of Carboxy-methyl gum was prepared in the presence of various concentration of cassia farmasiana extract.

Result: The result indicated that the amount of Carboxy-methyl gum affected the physical properties and the absorption capacity of the coated gauze.

Keyword: **Cassia bascilariia, cassia farmasiana, Carboxymethyl gum, water solubility, intrinsic viscosity, antimicrobial properties.**

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Introduction:

Various plant gum which have been used as binders include, gelatin, acaica, algenic acid it's salts and guar gum in view of importance of binders in pharmaceutical industry for the manufacture of tablets, capsule and cotton dressing materials. The knowledge regarding wound healing has been accumulated[1-4], binding agent used in dressing materials and provide the optimal conditions for wound healing. Seed gum are natural biopolymer Of polysaccharide that have important role in creating the coatings layer of gauze dressing. Cassia bascilaria and cassia farmasiana are leguminous plant that contain high amount of endosperm. Which are responsible for yielding water soluble gum polysaccharide [5,6]. The gum is glactomanann composed of D-glactoseand D – mannose in the ratio of 1:4. Polysaccharide are the material of choice, it's hydrophylic polymer because they are non-toxic and acceptable for use in pharmaceutical product[(7,8)] .The chemical structure of gum from cassia bascilaria is composed of a β (**1 →4**) -D glucanand side chain of a α(**1 →4**) -D- xylopyanose and (**1 →6**) linked [β-D-glactopyranosyl- (**1 →2**) –**α** D-xylopyranose to glucose residual[(9)]. Chemical structure can be changed via modification such as carboxymehylation and assessed the influence of the reaction condition, the alkli concentration the alkali to sodium monochloro-acetate ratio and the reaction medium time and temperature [(11-16)].

Material and Method:

Crude gums were extracted from cassia bascilaria and cassia farmasiana seeds collected in Allahabad and KNI campus in sultanpur district, respectively. Crude gums were ground into a powder form. carboxy methyl gums were derived from the crude gums of cassia farmasiana and cassia bascilariia seeds. Chemically modified the crude gum powder in ethanol under reaction conditions of 70°C for 1 hour. Next, sodium hydroxide and monochloro-acetate acid in a ratio of 1.60 moles were used to react with 0.5 miles of crude gum. The reaction product was precipitated and washed with ethanol to remove impurities [(16-20)]

Chemical composition of seed gums:

Moisture and ash contents were determined according to the American Society for testing and materials methods (ASTM-D2974-87) [13] and AOAC official method 923.03 (32.1.05) [14] respectively. Protein and fat contents were determined according to the AOAC official method of Analysis 920.87(32.1.22) and 922. 06 (32.1.14) (14), respectively.

Intrinsic viscosity:

The intrinsic viscosity [η] of dilute solution of crude and carboxy-methyl gum was measured at 25.0 ± 0.1 °C using a cannon-fenske routine viscometer (9721-A53) (ASTM-D2515, ISO 3105, Series 100). Solution had relative Viscosities of approximately 1.2-2.0 to assure good accuracy and linearity of the extrapolation to zero concentration. The viscosity was conventionally obtained by double extrapolation to zero concentration using Huggins and Kraemer's equations, respectively,

$$\eta_{sp}/C = [\eta]+K'[\eta]^2C \quad -1$$

$$\text{In } \eta_r/C = [\eta]+K''[\eta]^2C \quad -2$$

Water solubility:

The water solubility of the crude andcarboxymethyl gum was evaluated. Different concentration of gum sample dispersions were prepared. All aqueous solutions were stirred for 30 minute using a magnetic stirrer at ambient temperature. The non dissolved material was removed via centrifugation at 4000 rpm for 10 min. The supernatant was collected and then dried at 100 °C for 1h. The solubility (%) was calculated as follows:

$$\text{Solubility (\%)} = \frac{\text{Weight of gum in the supernatant}}{\text{Weight of gum in the suspension}}$$

Antimicrobial activities of cassia bascilariia and farmasiana extract:

Staphylococcus aureus (ATCC 1466) and Escherichia coli (ATCC 780) we're used as representative gram positive and gram negative bacteria respectively, because they are commonly found in the human respiratory system and on the skin. The bacterial stock culture were incubated at 37°C for 24 hon nutrient agar. The bacterial suspension were compared to a 0.5 McFarland turbidity standard to obtain concentration of 1×10^7-10^8 CFU/ml.

The antimicrobial activity of cassia bascilaria and cassia farmasiana extract against two pathogenic bacteria was investigated using the agar disk diffusion method (13). The herbal extract at concentration of 100, 200, and 300 mg/ml were screened for antibacterial activity against S. aureus and E coli. The test culture were spread on nutrient agar plates. Whatman filter paper (NO.1) was cut into disks of 0.6 cm in diameter, soaked in cassia bascilaria and cassia farmasiana extract solutions and then placed on prepared plates, which were incubated at 37 °C for 18-24 h. DMSO was used as a negative control. The zone of growth inhibition were recorded in milimeter. The experiments were counducted in triplicate.

Table 1. Chemical compositions of crude and carboxymethyl gum. All values (%) are presented as the mean ± SD, (n=3)

Components (%)	**Cassia bascilariia**		**Cassia farmasiana**	
	Crude	Modified	Crude	Modified
Moisture Ash Protein Fat	4.20 ± 0.05 0.08 ± 0.00 3.45 ± 0.10 15.00 ± 0.65	2.67 ± 0.10 0.00 ±0.00 0.00 ± 0.00 2.50 ± 0.40	7.07 , ± 0.15 0.12 ± 0.01 1.00 ± 0.10 10.00 ± 1.50	6.50 ± 0.20 0.00 ± 0.00 0.00 , ± 0.00 4.50 , ± 0.60
Polysaccharide	80.00 ± 3.50	90.11 ± 1.4 0	88.00 ± 1.80	94.16 ± 2.50

polysaccharide content (%) =100 – (protein% + fat%)

Table 2. Intrinsic viscosity and water solubility of crude and carboxymethyl gum physical properties of seed gum

Gum type **Cassia bascilariia**	$[\eta]H^A(dlg^{-1})$	$[\eta]K^B(dlg^{-1})$	**Water solubility(%)**
Crude gum	5.00	5.14	20.9
Carboxymethyl gum	5.90	20.9	89.65
Cassia farmasiana			
Crude gum	10.12	10.88	40.09
Carboxymethyl gum	10.50	11.02	94.2

$^A[\eta]_h$ is the intrinsic viscosity from Huggins' Plot (Eq.1) and $^B[\eta]_k$ is the intrinsic viscosity from Kraemer's Plot (Eq. 2)

RESULT

Chemical composition

Carboxy-methyl or modified gums were developed through a chemical reaction to assess the quality and usability of crude gums from cassia bascilaria and cassia farmasiana seeds. The results indicated that compared with the findings for their corresponding crude gums, the carboxy-methyl gums had fewer impurities such as protein and fat content and higher polysaccharide content (Table 1). The obtained degrees of carboxy-methyl substitutions of 0. 1526 and 0.1522 respectively (data not shown).

Physical properties of seed gum:

As previously reported crude gum from cassia bascilaria and cassia farmasiana seeds were carboxymethylated to improve functional properties such as viscosity, swelling volume, water solubility and absorption capacity. Hence, the intrinsic viscosity and water solubility of the crude and modified gums were investigated, as presented inTable2.

Discussion:-

The Carboxy modification of the gums derived from cassia bascilaria and cassia farmasiana diminished the amount of Protein and fat in the crude gums. This is because protein and fat were dissolved and eluted in ethanol, sodium hydride and monochloroacetic acid which were solvents used in the reaction. A part from gum Purification, the carboxy- modification process also enhanced the water solubility of the native gums This is because the carboxy-methyl gums had higher polysaccharide content (Table-1) and more carboxy-methyl group facilitating hydration in aqueous solution.

The antibacterial activity of cassia farmasiana was evaluated against S. aureus and E.coli C. odorata could Prohibit only gram-Positive bacteria (S. aureus) This result may be because E. Coli is gram negative, its call wall contains-lipo-polysaccharide Preventing the accumulation of antimicrobial agents in the cells. Similar findings were reported by Viral et. Al 30 who found that the ethanol extract of cassia farmasiana levels showed inhibitory effect against S. aureus. But not against E.Coli. Researchers reported that the ethanol extract of C. farmasiana leaves showed inhibitory ativity against both S. aureus and E. coli 20-21 the cassia farmasiana

extract inhibited the growth of S.aureus at a starting concentration of 30 Mg/Ml. This discrepancy may be because the antimicrobial activity of cassia farmasiana extract is related to the amount of natural compound, such as total phenolic and flavonoid compounds which are largely dependent on the plant source, Part of the plant material extracted type of solvent used and extraction Procedure 21-22.

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