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COMMUNICATION

A New Binder for Pharmaceutical Dosage Forms

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ABSTRACT

Gellan gum is a biodegradable polysaccharide recently approved by the U.S. Food and Drug Administration (FDA) for industrial use as a food additive. The objective of the present investigation was to evaluate its potential use as a binder for pharmaceutical dosage forms. Tablets were prepared with gellan gum and evaluated for tablet characteristics. Efficiency of gellan gum and its effects on various disintegrants were also studied.

INTRODUCTION

Binder is considered to be the most fundamental factor in determining granule properties and quality of the tablet. Gellan gum is an anionic linear microbial polysaccharide obtained from *Pseudomonas elodea* (1). It consists of a linear tetrasaccharide repeat structure; each repeating unit comprises four sugar units 1,3-β-D-glucose, 1,4-β-D-glucornic acid, 1,4-β-D glucose, and 1,4-L-rhamnose (2). Owing to its nontoxicity and excellent adhesive properties, gellan gum was evaluated for its potential use as binding agent, with ibuprofen as a model drug.

MATERIALS

Gellan gum (food grade), Kelco International, USA
Ibuprofen IP, Seksheria Chemicals, India

METHODS

Ibuprofen tablets were prepared with gellan gum by the wet-granulation technique, and the optimum binder concentration required for standard tablets was determined. The efficiency of the newly investigated binder was determined by conducting comparative evaluation

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Table 1

Granule Properties of Various Binders Versus Gellan Gum Binder

Binder (Conc. (2% w/w)	Granule Size (% < 177 μm)	Moisture Content (%)	Density (g/cc) Bulk	Density (g/cc) Tapped	Hausner's Ratio	Compressibility Index	Angle of Repose	Flow Rate (g/sec)
Starch	28.64	1.29	0.38	0.45	1.18	15.55	34.82	2.80
Acacia	13.54	1.00	0.31	0.33	1.06	6.06	37.43	2.40
Gelatin	8.47	1.95	0.32	0.35	1.08	5.71	35.58	2.68
HPMC	9.03	1.69	0.33	0.36	1.09	8.33	38.19	2.15
PVA	7.24	1.15	0.33	0.41	1.24	19.51	36.52	2.72
PVP	4.18	0.99	0.30	0.34	1.13	11.76	30.14	2.88
Gellan gum	3.45	1.20	0.39	0.45	1.15	13.33	28.60	3.15

Table 2

Tablet Properties of Various Binders Versus Gellan Gum Binder

Binder (Conc. 2% w/w on Dry Basis)	Hardness (kg/cm^2)	Friability (%)	Dissolution Time, *T*-90 (min)
Starch	2.00	9.70	>300
Acacia	1.50	14.46	270
Gelatin	2.00	8.95	>300
HPMC	2.00	9.45	>300
PVA	3.00	6.08	>300
PVP	5.00	2.08	280
Gellan gum	6.00	0.95	230

with conventional binders. Ibuprofen tablets were prepared separately by the wet-granulation technique with various wet binders (2% w/w on dry basis) such as acacia, gelatin, starch (paste), hydroxypropylmethylcellulose (HPMC), polyvinyl pyrrolidone, and polyvinyl alcohol, and evaluated for various tablet characteristics. The effects of gellan gum on various disintegrants were studied by preparing tablets using gellan gum (2% w/w on dry basis) as a wet binder and incorporating various conventional disintegrants in the formulations.

RESULTS AND DISCUSSION

Studies revealed that the optimum gellan gum concentration required for standard tablets was 2% w/w on dry basis. The percentage of fines observed was high in the case of starch, acacia, and HPMC. PVP and gellan gum showed a good compressibility index, with angle of repose of 30.14 and 28.60, respectively, as illustrated in Table 1. The flow rate was found to be satisfactory with gellan gum binder. High percentage friability and low hardness of tablets were observed with all binders except PVP and gellan gum. Tablets prepared with gellan gum binder (without any disintegrant) took 230 min to release 90% of the drug, as depicted in Table 2. No significant effect was observed with the incorporation of conventional disintegrants, indicating the good compatibility of gellan gum with various disintegrants.

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