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A Review on the Potential of Tamarind Kernel Powder as a Natural Disintegrant

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ABSTRACT: The search for natural and sustainablealternatives to synthetic pharmaceutical excipients has gained significant momentum in recent years.Tamarind Kernel Powder (TKP), obtained from the seeds of the Tamarindus indica tree., has emerged as a promising candidate due to its easy availability, biodegradable nature, and reported disintegrant properties.The natural polymers always have exceptional properties which make them distinct from the synthetic polymers and tamarind seed polysaccharide (TSP) is one such example which shows more valuable properties for a wide range of applications.This review emphasizes the role, use, properties of tamarind seed powder showcasing its potential as a natural disintegrant in the pharmaceutical formulations.

Keywords: Tamarind kernel powder, Natural disintegrant, sustainable alternatives

I. INTRODUCTION:

Tablet disintegration is a key step for achieving rapid drug release. Disintegrants are substances or mixtures of substances used in medicine formulations to enhance dispersion or break up tablets and capsules into tiny particles for faster dissolving.[1] .Disintegrants are a class of materials that, when subjected to water, swell, hydrate, change volume or form, or react chemically to cause a disruptive change in the tablet. The disintegration of dosage forms depends on various physical properties such as the percentage of disintegrants used, the proportion of disintegrants used, compatibility with other excipients, the presence of surfactants, the hardness of the tablets, the nature of drug substances, and the types of addition..Natural disintegrants produced from natural sources have several advantages, including low cost, nontoxicity, biodegradability, environmental friendliness, and less negative effects.[2]Thus, it has been proven that natural disintegrants are usually safer than synthetic disintegrants. A lot of research has been done on the use of tamarind seed polysaccharidewhere it serves as stabilizer, gelling agent and food thickener[16].

Tamarind seed polysaccharide:

Several reactive groups with a wide range of molecular mass and chemical properties contribute to polysaccharides, which are polymers of monosaccharides. This helps to the diversity of their structures and properties.Tamarind seed polysaccharide (TSP) is one of the special features that set natural polymers apart from synthetic ones. Due to its many benefits, TSP can be used as an excipient in a number of applications.[5]. Xyloglucan(XG) is an important structural polysaccharide found in the primary cell wall of higher plants. The seeds of the tamarind tree (Tamarindus indica) contain xyloglucan. It is also referred to as 'ageing free starch' as it has similar characteristics like starch but is more stable. Natural polymers, such as TSP, have multiple advantages over synthetic and semi-synthetic polymers, including lower cost, natural origin, less side effects, local accessibility, and greater patient tolerance. However, these natural substances have limitations, such as purity, source, and microbial contamination [4]. If those properties are identified and controlled, natural substances can be effective replacements for generated polymers. Xyloglucan has advantages of biocompatibility, high drug-holding capacity, high thermal stability, non-carcinogenicity and anti-inflammatory, therefore can be used as drug delivery carrier and wound dressing in the medical field[17].

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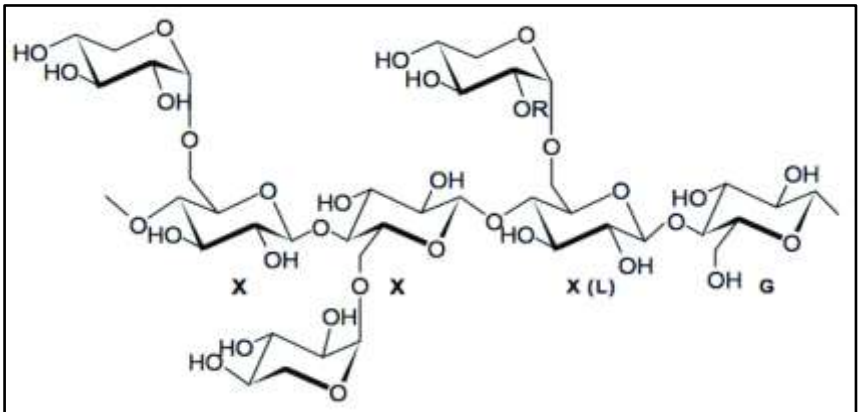

Figure: tamarind seed polysaccharide

Following is the description of tamarind seed polysaccharide:

Table No 1: phytochemical and morphological characteristics

CHARACTERISTICS	DESCRIPTION
Botanical Name	Tamarindus indica L.
Common Name	Tamarind
Part Used	Seeds
Geographical Source	Latin America, Africa, and Asia's tropical regions
Cultivation	Tamarind trees are cultivated for their fruits, seeds, and wood
Chemical composition	TSP is composed of polysaccharides primarily a combination of D-glucose, D-galactose, and D-xylose
Structure	It has a branched polysaccharide structure with D-galactose is used in place of the β-1,4-linked D-glucan backbone.
Physicochemical properties	Water-soluble and forms viscous solutions in water.Has high molecular weight (200-650 kDa)
Solubilty	Partially soluble in cold water; forms highly viscous gel upon heating

1.1. Mechanism of action of Tamarind seed in disintegration:

Tamarind Kernel Powder (TKP), obtained from the seeds of the Tamarindus indica treeis widely used as a natural disintegrant in pharmaceutical formulations due to its unique properties. Its mechanism of action in tablet disintegration is primarily attributed to the following factors[2].

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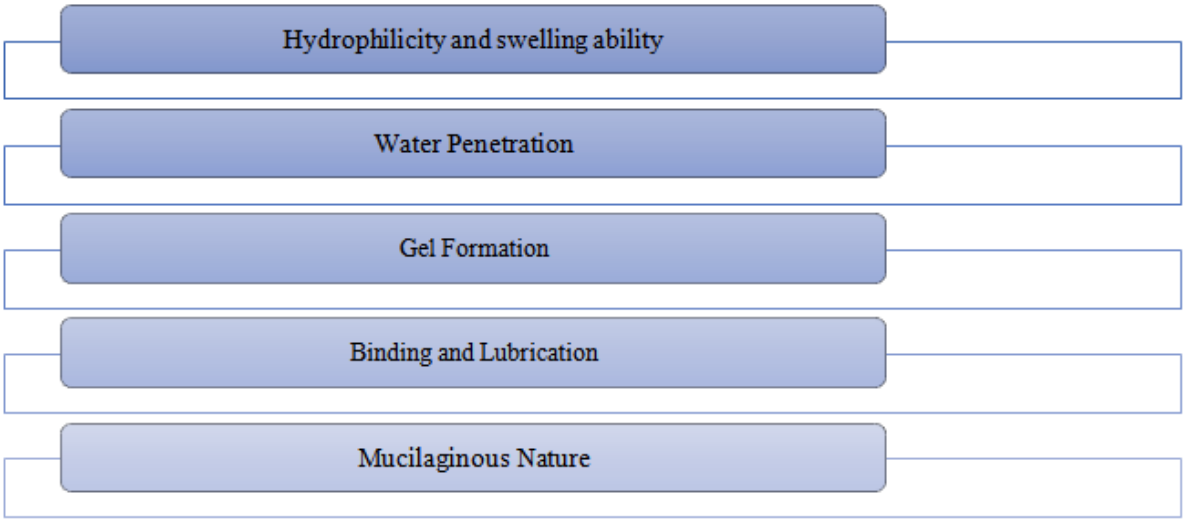

1.3 Characteristics of TKP:

CHARACTERISTICS
Polysaccharide-rich composition
High molecular weight
Good swelling properties
Disintegration efficiency
Tablet hardness and friability

1.4Advantages of Tamarind Seed Powder as a Natural Disintegrant:

Table No 2: advantages of tamarind seed polysaccharide

ADVANTAGES	DESCRIPTION
Effective Disintegration	TSP enhances tablet disintegration,leading to faster drug release .Studies have shown that tablets formulated with modified tamarind seed gum disintegrate more rapidly than those with synthetic disintegrants[6].
High polysaccharide content	Tamarind seeds contain approximately 65% polysaccharides,which contribute to their effectiveness as disintegrant.[7].
Biocompatibility	TSP is biocompatible, making it suitable for pharmaceutical applications without adverse reactions.
Naturaland Non-toxic	Being a natural productTSP is non-toxic and safe for consumption, reducing the risk of side effects associated with synthetic disintegrants [2].
Cost-Effectiveness	TSP is more economical compared to synthetic alternatives, offering cost effective option for tablet formulation.[2].
Abundant Availability	Tamarind trees are widely cultivated, ensuring a steady and sustainable supply of tamarind seeds for TSP production.
Environment friendly	As a biodegradable material, TSP contributes to environment friendly pharmaceutical product

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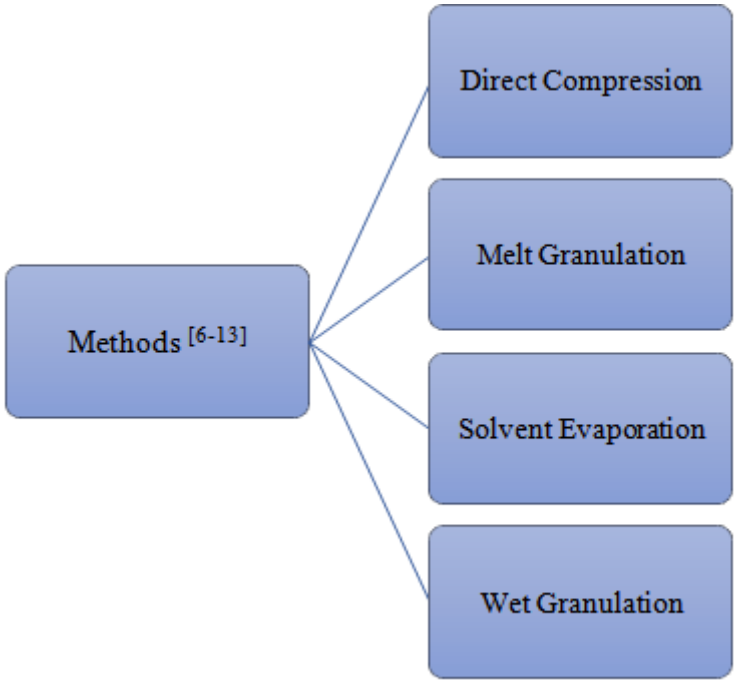
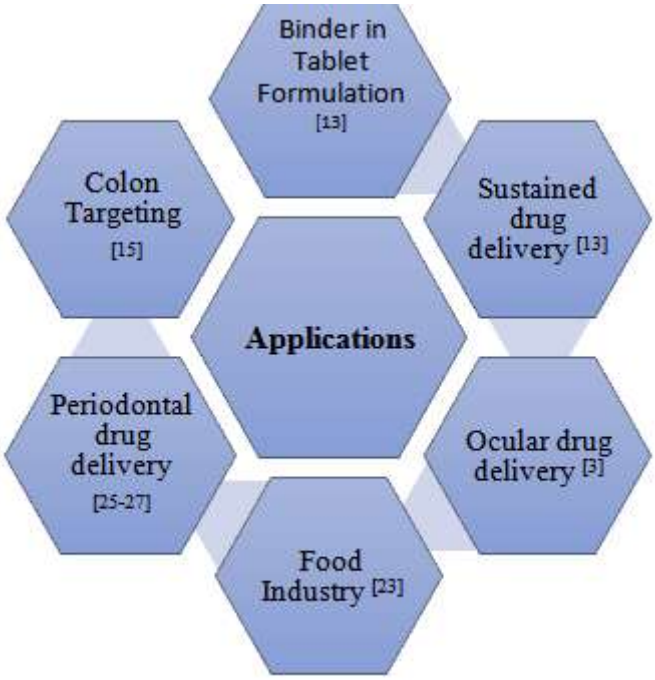
II. METHODS USED FOR THE PREPARATION OF NATURAL DISINTEGRANTS:



III. APPLICATIONS OF TAMARIND KERNEL POWDER:



IV. CONCLUSION:

Tamarind Kernel Powder (TKP) shows significant potential as a natural disintegrant in pharmaceutical formulations due to its excellent swelling, hydration, and film-forming properties. Studies have demonstrated its efficiency in improving the disintegration and dissolution of tablets, comparable to or even exceeding synthetic

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disintegrants. TKP is cost-effective, biodegradable, and widely available, making it a sustainable alternative for the pharmaceutical industry. However, further research is needed to standardize its processing and evaluate its compatibility with diverse active pharmaceutical ingredients.

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