

## PREPARATION & EVALUATION OF MEDICATED POLYHERBAL BLENDED JELLIES AND JAMS FOR DIABETES MELLITUS

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### ABSTRACT

Medicated polyherbal blended jellies & jams formulations are more suitable for child & old age patients, which is going to be easy administration & facial high absorption of drugs. This study aims to prepare such a jelly preparation that maintains glycemic levels in patients suffering Diabetes Mellitus (DM). Due to resistance & side effects of conventional synthetic medication, herbal drug preparations are well-accepted. The Jellies and jam are alternatives for traditional methods like 'Churna' and 'Tablets'. Hydro alcoholic extracts of *Tinosporacordifolia*, *Pterocarpus marsupium*, *Momordicacharantia*, *Syzygiumcumini* *Gymnemasyvestre*, [6] *Embelica officinalis*, *Punicagranatum* [7] blended with Chia seeds Mucilage & medicated Jellies are prepared. Physical & chemical evaluations were conducted. The polyherbal jellies provide ideal antidiabetic activity with enhanced patient compliance, economic & feasible formulation.

**Keywords:** Diabetes mellitus, Jellies, Antidiabetic activity, glycemic level.

### INTRODUCTION

Jellies are transparent or translucent non greasy semi-solids. They can be chewed or simply swallowed with water. Jams are thick sweetened nutritional spreads conventionally made of fruit preserves and pectin base. Jellies and Jams are with high sugar content. A spectrum of dosage forms is available for problems of child & old age patients such as syrups, suspensions, chewable tablets, etc., but they may have disadvantages. Oral jellies as unit dosage forms can offer a better solution. Herbal extracts of *Syzygiumcumini* (Stimulates insulin secretion from pancreas) *Momordicacharantia* (carbohydrate digestion regulation, glucose metabolism & utilization, possesses insulin-mimetic. *Tinosporacordifolia* (Promotes insulin secre-

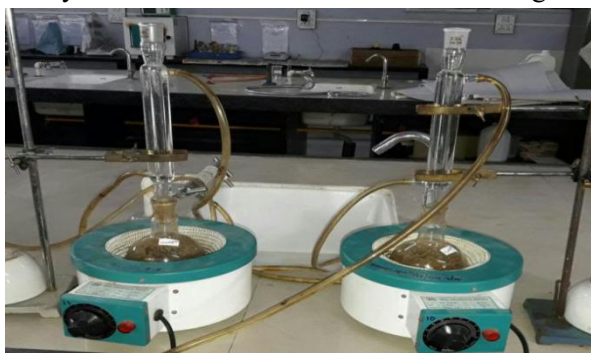
tion, immunomodulator) *Gymnemasyvestre* (stimulates insulin secretion from pancreas) *Pterocarpus marsupium* (Declines blood glucose level) *Punica-granatum* (improves OGTT & increased their serum insulin level) *Embelicaofficianlis* Antioxidants & Anti diabetic are used in the formulation. To give an appropriate consistency a base of chia mucilage is used instead of pectin base which is a rich source of omega3 acid and may show Antidiabetics activity. Stevia is used as a bio sweetener. [8] The objective of this work is to prepare patient friendly dosage form for DM as well as to provide a rational way to administer herbal drugs.

**MATERIALS AND METHODS:** The following crude drugs are used in the given proportion. The quantities indicate the amount of hydroalcoholic extracts used per 5 grams of jelly. Chia seeds are used in amount for preparation of the jelly base. Guava fruits were used as a fruit base as it has a low level of glycaemic index.

Refer [2]

**Procedure:**

1. Hydro alcoholic extractions of herbal Drugs:



2. Herbal drug powders of *Tinosporacordifolia*, *Pterocarpusmarsupium*, *Momordicacharantia*, *Syzygiumcumini*, *Gymnemasylvestre*, *Embelicaofficinalis*, *Punicagrantum* were checked for presence of extraneous materials and sieved through # 40. 50 gm of each of the powders was extracted with alcohol and water (3:7) for 3 days.

3. The extracts were filtered and concentrated.



4. The extracts were stored in a dry place.
5. Preparation of Jam and Jelly base
6. The guava fruits were taken and chopped finely and kept for boiling for extraction until a pasty consistency was achieved. Chia seeds were added which further thickened the formulation due to mucilage formation.

7. This content was transferred to a beaker with constant and controlled heating, until the mixture became thick enough. After 15 minutes the hydroalcoholic extracts of *Tinosporacordifolia*, *Pterocarpus marsupium*, *Momordicacharantia*, *Syzygiumcumini*, *Gymnemasylvestre*, *Embelica officinalis*, *Punicagrantum* were added accordingly at the end of the cooking.
8. Sweetener was added according to the formula and procedure.
9. A part of the preparation was set in refrigerator in lubricated moulds.

**EVALUATION**

**1. PHYSICAL ANALYSIS**

**Physical observation**

The prepared jellies were observed visually for clarity, odour, texture and presence of any particles. The texture was evaluated in terms of stickiness and grittiness by mild rubbing the jelly between two fingers. [1]

**Weight variation:** The average weight of ten jellies was taken to determine weight variation. The jellies were taken out of the moulds in a beaker and weighed individually, pooled and mixed.

**Syneresis:** Gels experience syneresis or deswelling due to the release of liquid, resulting in shrinkage of gels and reduced quality. All the jellies were observed for signs of syneresis at room temp ( $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ). The formulations showing signs of syneresis were rejected and not considered for further studies

**Spreadability & Viscosity**

Viscosity was measured on Brookfield viscometer.

**2. CHEMICAL ANALYSIS**

**pH:** pH of the sample was measured by Equip tronics (Model no.EQ-611- pH meter according to manual instruction). The pH of the formulation influences the taste and stability of oral jellies. The pH of prepared jellies was measured using a digital pH meter at room temperature ( $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ). For this purpose, 0.5 g of jelly was dispersed in 50 mL of distilled water to make a 1% solution, and the pH was noted.

**Procedure:** pH meter was calibrated. We used buffer solution with pH 4 and 7 according to IP. Wash electrodes with the use of deionised water only.

**Total soluble solids:**-The total soluble solids were determined by standard method of AOAC using Abbe refractometer at room temperature.

**Procedure** Before operating, the temperature of the equipment was adjusted according to room temperature. The sample was placed between the two lower prisms and then rotating the connecting arm until the critical ray centered in the eyepiece. Reading was taken directly in ° brix.

**Moisture content:** Moisture content of the jam samples was determined.

5 g of the sample was weighed and taken in a tare porcelain dish (W1 g). Then dish was shaken till the contents were evenly distributed and placed in hot air oven, maintained at  $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and dried for at least 2 hours. It was then cooled in desiccators and lowest weight was noted (W2 g).

**Total sugar:-**

Reducing and non-reducing sugar was determined by lane Eynon method as reported in AOAC (2000).

Reducing sugars Reagents:-

1. Fehling -A: Dissolved 34.65 g of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  in 500 ml distilled water.
2. Fehling-B: Dissolved 173 g sodium potassium tartrate and 50 g of sodium hydroxide in 500 ml distilled water.

Indicator: Methyl blue [3]

**Procedure:** 2 gram of jam was taken and dissolved in distilled water and volume was made up to 100 ml with distilled water. The burette was filled with this solution. 5 ml of Fehling A and 5 ml of Fehling B solution along with 10 ml of distilled water was taken in a conical flask. The flask was heated till boiling without disturbing the flask. Diluted jam solution was added from the burette drop by drop while boiling till the colour become brick red in the flask. A drop of methylene blue was added as indicator in the boiling solution without shaking the flask. If red colour changed to blue for a moment, reduction was complete, again titrate till red colour persisted

**Calculations:**

5 ml of Fehling A + 5 ml of Fehling B will reduce, 0.05g of reducing sugar.

5 ml of Fehling A + 5 ml of Fehling B = X ml of 2% sodium = 0.05 g of reducing sugar.

100 ml of 2% solution will contain  $0.05 \times 100 = Y$  g of reducing sugar.

$X$  ml % Reducing sugar in solution =  $Y \times 100 / 2$

Non reducing sugars

**Procedure:** 2 gram of jam sample was taken and dissolved in distilled water and volume was made up to 100 ml from this solution 20 ml was taken in a flask and 10 ml of N HCL solution was added and heated in a boiling water bath for 30 min. Then on cooling 10 ml of 1N NaOH solution was added and made the volume up to 250 ml with distilled water. The burette was filled with the solution. 5 ml of Fehling A and 5 ml of Fehling B solutions along with 10 ml of distilled water was taken in a conical flask and boiled. On boiling it was titrated against the sample solution from the burette till color changed to brick red. It was tested with Methylene blue as indicator till red brick color persisted.

**Calculations:** X ml of sample solution contain = 0.05g of reducing sugar.

250 ml of jam solution contain =  $250 \times 0.05 = Y$  g of reducing sugar.

X ml 250 ml of solution was prepared from 20 ml of original 2% solution. So, 20 ml of 2% solution contain Y g of reducing sugar. 100 ml of 2% solution contain =  $Y \times 100 = P$  g of reducing sugar. 20 This 100 ml was prepared from 2g of sample. 10 ml of sample contain P g of reducing sugar. 100 ml of solution contain =  $P \times 100 = Q$  g of reducing sugar.

$2 Q$  g of reducing sugar = inverted sugar + Free reducing sugar. Non reducing sugar = Total reducing sugar – free reducing sugar.

**Physicochemical Analysis:**

**3. MICROBIAL TESTING:** 20 ml of nutrient agar was poured in petri plates and allowed to set in sterile condition. Sample of formulation was placed by streak plate technique. The plates were incubated at  $37^{\circ}\text{C}$  for 24hrs and were observed for microbial growth.

**4. SENSORY ANALYSIS**

Sensory analysis for the jam and jellies was performed. 20 individuals with DM of various age groups

were selected. They were told to chew or swallow the jellies and eat the jam, and rate the product out of 5 on the following basis.

The questions were asked to volunteers to know the feedback

### 5. STABILITY STUDIES

A physically stable medicated oral jelly should retain its viscosity, colour, clarity, taste, and odour throughout its shelf life. The stability studies were performed at three temperatures. Sufficient number of samples (10) were packed in amber colour screw capped bottles and kept in incubator maintained at 37°C. Samples were taken at intervals of 15 days for the drug content estimation.

### 5. DIAGNOSTIC ANALYSIS

Calibration of Glucometer: Initially one blood sample was taken. It was analysed for blood sugar in a certified pathology. The same blood sample was tested by glucometer. A comparison between both the results was evaluated and the difference was considered. The same instrument was used to analyse blood sugar levels in volunteer.

## RESULT AND DISCUSSION

The jams and jellies were formulated according to the procedure and was observed to be stable between 4 degree c. and room temperature. No microbial growth was observed for the formulation. The physiochemical studies suggested acidic pH of the formulations with total solids of about 53% and 56% for jellies and jams respectively. The total sugar observed was found to be less than that of marketed jam and jelly preparations. They showed slight syneresis at elevated temperature and the flow of the jam was found to be non-Newtonian. The sensory analysis indicated that most of the subjects found the formulation to be very good in taste and appearance, hence indicating better patient compliance. Blood sugar level was well maintained after administration along with allopathic drugs. The formulation therefore can be used with allopathic medicines to cease (problems) associated with DM.

## CONCLUSION

In the present study, sustained release successfully formulated using chia seed mucilage & gelatin gelling agents, action of the medicated jellies facial the easy administration & good absorption of drugs via jam and jelly dosage forms. The evaluation of formulations showed acceptable physico-chemical properties and stability. Hence that polyherbal blended jellies will be the well acceptable formulation for child and old age DM patients

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## Tables and Figures

**Table 1:**

Sr. No	Parameters	Observation for jelly	For jam
1	Color	Magenta red	Dark red
2	Odor	aromatic	Aromatic and acrid
3	Taste	Acrid and sweet	Acrid and sweet
4	PH	3.68	4.01
5	Spreadability	NA	
6	Syneresis	Slight at elevated temperature	Very slight
7	Moisture content	71.24 ( $\pm 0.15$ )	75%
8	Total solids	56%	53%
9	Total sugars	4.3%	4.1%

**Table 2:**

Sr. No.	Ingredients	Qty. (In g)	Active constituent
1	<i>Syzygiumcumini</i>	0.5	Flavonoids
2	<i>Momordicacharantia</i>	0.45	Charantin
3	<i>Tinosporacordifolia</i>	0.3	Cordifolioside A, Borapetoside C
4	<i>Gymnemasyvestre</i>	0.3	Gymnemic acid
5	<i>Pterocopus marsupium</i>	0.15	Epicatechin
6	<i>Punicagranatum</i>	0.5	Ellagic& Gallic acid
7	<i>Emblica officianlis</i>	0.45	Ellagic, Gallic, Chebulinic acid

**Table 3:**

5	Excellent
4	Very good
3	Good
2	Average
1	Poor

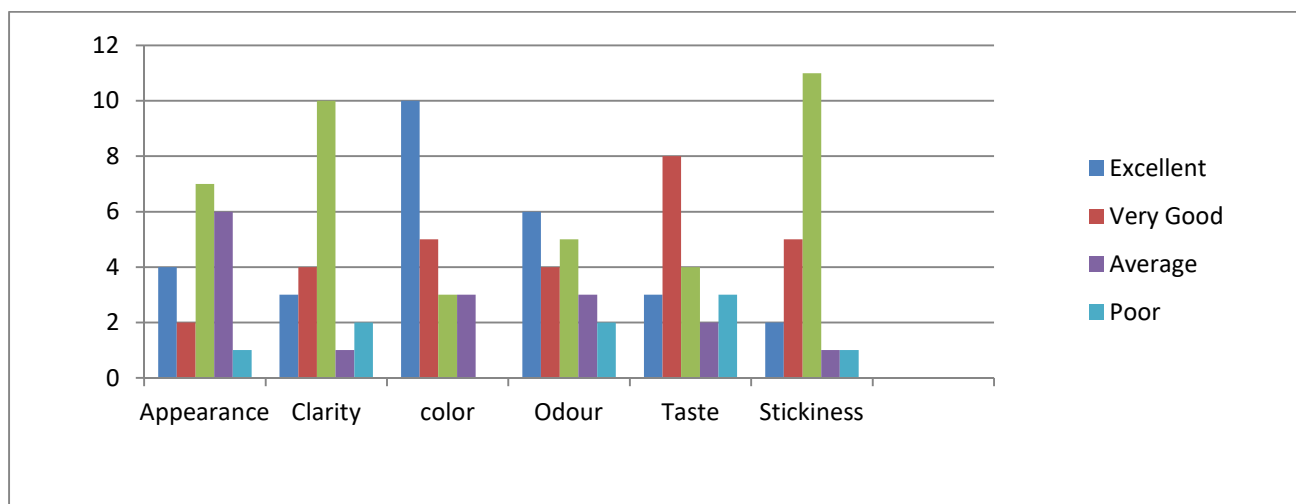
**Table 4:**

Sample Code	Time Duration (In hour)	Temperature ( $^{\circ}$ C)	Colour	Odour	Taste	pH	Moisture content
1A(jelly)		4 $^{\circ}$ C	Magenta red	Aromatic	Sweet and acrid	3.67	71.22
		Room Temp	Magenta red				71.23
		45 $^{\circ}$ C	Magenta red				71.29
1B(jam)	24hr	4 $^{\circ}$ C	Dark red	Aromatic and acrid	Sweet and acrid	3.99	75.25
		Room Temp	Dark red				75.29
		45 $^{\circ}$ C	Dark red				75.66
2A		4 $^{\circ}$ C	Magenta red	Aromatic	Sweet and acrid	3.67	71.21
		RoomTemp	Magenta red				71.22
		45 $^{\circ}$ C	Magenta red				71.22
2B	48hr	4 $^{\circ}$ C	Dark red	Aromatic and acrid	Sweet and acrid	4.00	75.25
		Room Temp	Dark red				75.28
		45 $^{\circ}$ C	Dark red				75.22
3A		4 $^{\circ}$ C	Magenta red	Aromatic	Sweet and acrid	3.67	71.23
		Room Temp	Magenta red				71.22
		45 $^{\circ}$ C	Magenta red				71.22
3B	72hr	4 $^{\circ}$ C.	Dark red	Aromatic and acrid	Sweet and acrid	4.00	75.25
		Room Temp	Dark red				75.25
		45 $^{\circ}$ C	Dark red				75.20

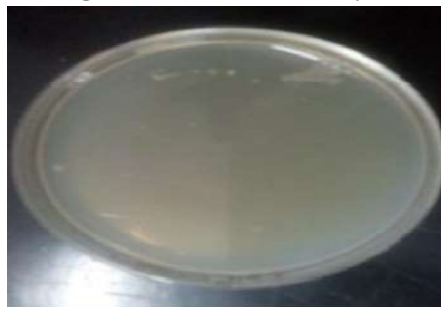
**Table 5:**

Patient no.	Day	Blood sugar level of Fasting	Blood sugar level after allopathic medication administration (Without Jellies)	Blood sugar level after allopathic with Jellies medication administration At Morning
1	1	126	170	NA
2		135	200	
3		110	180	
4		140	165	
5		160	169	
6		155	177	
1	2	121	NA	140
2		130		170
3		105		155
4		145		150
5		166		145
6		160		152
1	3	122	NA	150
2		133		160
3		102		145
4		141		139
5		164		151
6		159		148
1	4	130	NA	146
2		129		158
3		115		143
4		139		141
5		150		150
6		154		145

**Figure 1:** The following statistics were obtained wherein the formulation was rated as good by maximum Volunteers



**Figure 2: Microbial Analysis**



**Source of Support: Nil**

**Conflict Of Interest: None Declared**

How to cite this URL: Amruta. P. Sonawane Et Al: Preparation & Evaluation Of Medicated Polyherbal Blended Jellies And Jams For Diabetes Mellitus. International Ayurvedic Medical Journal {online} 2019 {cited August, 2019} Available from: [http://www.iamj.in/posts/images/upload/1259\\_1265.pdf](http://www.iamj.in/posts/images/upload/1259_1265.pdf)