



# “Formulation And Evaluation of Syrup of Drumstick and Tamarind Plant Extract of Treatment for Immunity Enhancer”

- 1)Jokar Mayuri Dhondiba ,
- 2)Pothare Prashant Ashrinath,
- 3) Bhadre Akash Bharat

Guided by :-

**Dr. Hingane L.D**  
(M. Pharm , PhD)

**ADITYA PHARMACY COLLEGE BEED**

Dr. Submitted to Dr Babasaheb Ambedkar Marathwada University Chhatrapati Sambhajinagar.  
Department of Bachelor pharmacy, Aditya pharmacy college , Beed.  
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## ABSTRACT :-

This ancient medical science had started long ago that plant extract could do a lot to strengthen the body. Moringa is herbs that can help ward off many health complications and during COVID-19 pandemic, it should be your go-to herbs for immunity strengthening. So what makes moringa such a powerful immunity booster? The vitamin C content of moringa is more than that of oranges. Vitamin C is one of the chief nutrients that our bodies need toward building a strong immunity. The aim of this literature review was to provide advance research information for the future scientists to discover new drug molecules from the medicinal plant, Moringa oleifera syrup. (Moringaceae). The plant provides sarichandr, a combination of zeatin, quercetin, beta-sitosterol and kaempferol.

This review gives the scientific information regarding pharmacological potentials of moringa Oleifera syrup.

Moringa oleifera hydro- alcoholic leaf extracts (1000mg/kg) and Moringa oleifera aqueous pod (fruit) extract (750 mg/kg) contain high amount of tannin, phenolic compounds and flavonoids. The poly phenolic constituents of this plant could be contributory to their ethano-medical use. Thus, it can be concluded that extracts of Moringa oleifera produce significant antioxidant activity and the presence of kaempferol in leaves of Moringa oleifera showed the antioxidant activity which was also reported by Tamarindus indica is recognized highly around the world for its nutritional and high health promotion values. In the recent past, antioxidants from natural sources and their use in prevention and treatment of various ailments have been extensively studied. Wide distribution of polyphenol and flavonoid compound in Tamarindus indica are believed to be responsible for its high antioxidant activity. Phenolic compound present in tamarind are beneficial for immunological health.

The flavonoid present in different parts of tamarind are known to exhibit defence mechanism as anti-inflammatory, antidiabetic and antihyperlipidemic agent for the treatment of several human health hazards.

## INTRODUCTION :-

Immune response is an important self-defence mechanism that protects the host from numerous pathogenic infections. An immune response includes innate and adaptive immunity. Innate immunity occurs immediately when the infectious agents approach the external barrier, whereas the adaptive response causes the formation of immunological memory that allows quicker and more effective responses upon next encounter with the same pathogen. Medicinal plants and herbs play a critical role in boosting our immunity during the COVID-19 pandemic. It is also very important to consume supplements in the form of immune nutrients such as vitamin A, C, E, D, B-complex, zinc and copper that will support your body to fight against the pathogen.

*Moringa oleifera* is a fast-growing drought-resistant tree of the family Moringaceae native to the Indian subcontinent. Common names include moringa, drumstick tree, horse radish tree, and bean oil tree. It belongs to the family Fabaceae, native to tropical Africa. It is widely cultivated in tropical and subtropical regions and extensively used in foods, beverages, and traditional medicine. The leaves have 7 times more iron than oranges and 4 times more potassium than bananas. As an antioxidant, it seems to help protect cells from damage. One of the most important benefits of moringa is its potent immunity-boosting properties. Its high antioxidant content also boosts the immune system and keeps you safe from infection. Moreover, moringa is also rich in iron and vitamin-A nutrients that enhance the functioning of the immune system.

## OBJECTIVE :-

- ▶ Formulation of syrup from drumstick leaves and tamarind plant extract for immunity enhancement.
- ▶ Evaluation of syrup from drumstick leaves and tamarind plant extract for immunity enhancement.

## PLAN OF WORK :-

For any investigation, an organized and integrated effort with expertise is essential. Therefore, the current work was followed with a plan which is described below:

### 1) Literature Review

- Conduct a thorough review of literature on immunity enhancer diseases and their current treatments.
- Review studies on the immunity enhancer of Drumstick plant and Tamarind plant. These plants have available vitamin C and vitamin B12.
- Identify the limitations of existing research and gaps in knowledge.

### 2) Selection of drug

- Plant based on tamarind tree and *Moringa oleifera* leaves obtained from the tree.
- Syrup contains all the herbal drugs which show immunity-boosting and health benefits activity like *Moringa oleifera* and tamarind plant, etc.

### 3) Selection of excipient

### 4) Formulation

- Solution with heat.

- Solution by agitation
- Addition of sucrose to a liquid medication or flavored liquid.
- Precolation.

### **Batch Formulation of syrup**

- Vehicle-Purified water are used to vehicle in syrup.
- Additives.
- Chemical stabilizers.
- Colouring agent.
- flouring agent.
- Preservative

### **5. Evaluation test**

- Following evaluation parameter are carried for syrup: PH, Taste, Colour, Odour, Viscosity.

### **6. Discussion and Conclusion**

- Discuss the findings of the study in the context of existing literature.

- Identify the strengths and limitations of the study.

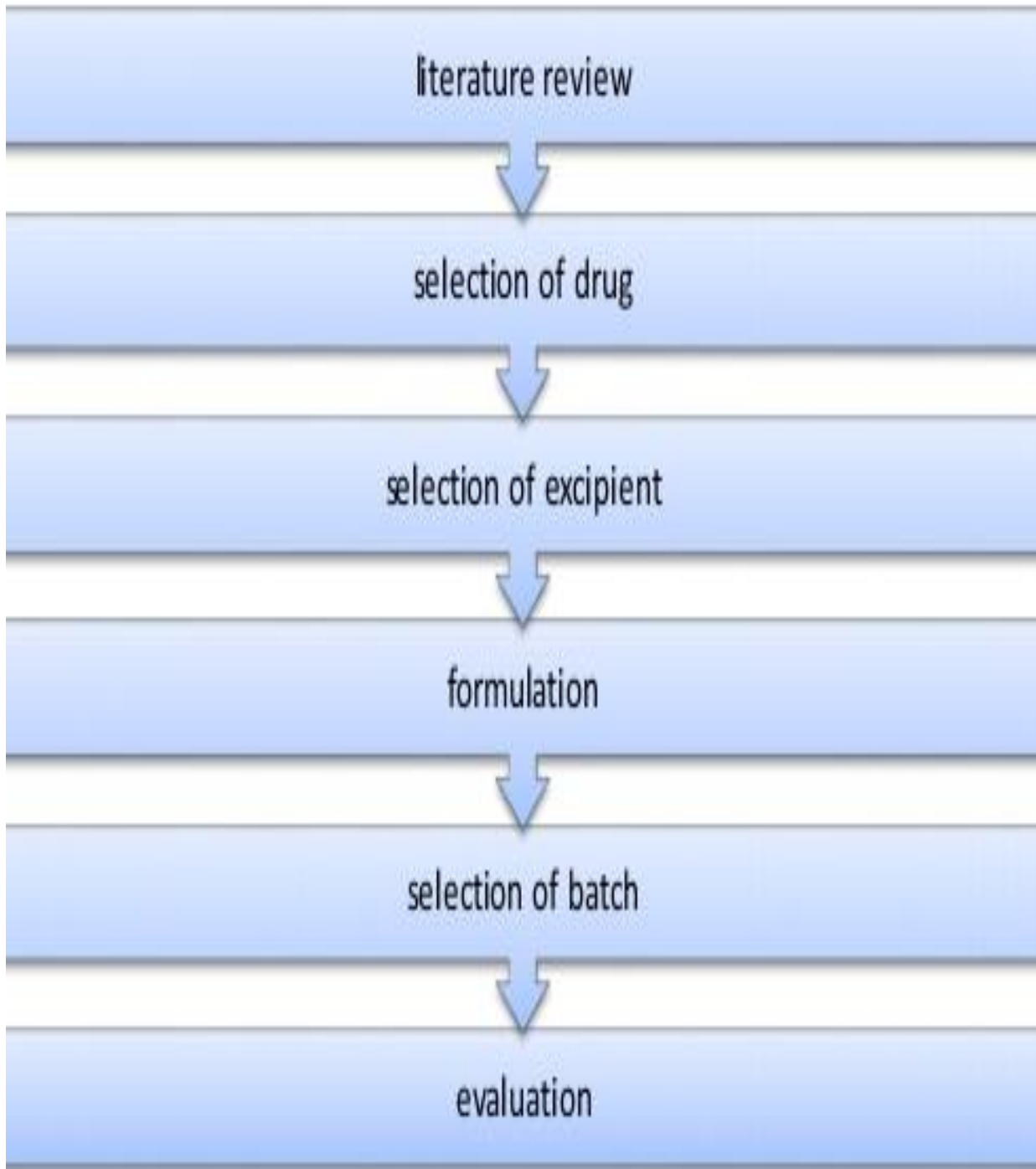
- Suggest areas for further research.

- Conclude the study by summarizing the key findings and their immunity booster..

- By following

this plan of work ,conduct a rigorous study on the immunity boosting treatment of extracted drumstick leaves and tamarind tree with immunity enhancer. This study can contribute to the development of alternative treatments immunity deficiency that are effective against both bacteria and viruses, and have the potential to improve patient out-comes.





**Figure 1: Schematic Diagram of Plan of Work**

## REVIEW OF LITERATURE :-

Sr. No.	Literature Title	Author Name	Name of Journal/book	Discription
1	Extrction Of Tartaric Acid From Tamarind Pulp And Analysis Of Acid Composition In Leaves	M.G . SanthosbRoopa Mr V. Kasi Viswnatham	International Journal of Student Research in Technology and Management	Method Of Preparation
2	Enhanced Extraction Of Phenolic Compound From Moringa Leave Using Subcritical Water Ethano Mixture	H Susanto, a Taufin Sunaryoo Et Al	IOPConf.Series:material science and Engineering	Extraction Methods for Moringa Leaves
3	Medical Evidence ForIts Nutritional, therapeutic and Prophylactic properties	Jed W.Fahey,SC.D	Tree forJournal	Plant Profile Lifeincluding Nutriationa & Therapeutis

4	Utilization Potential of Moringa Oleifera Leaves Syrup in Prevention Anemia	Rd Halim , Dr.Dra.Yusnelti	International Journal of Science and Health care Research	Therapeutic effect of Moringa Oleifera
5	Chemical Constituents of Tamarindus Indical .Leaves	Julio Cesar Escalona-Arranz ,Renato Perez-Roses	Revista Cubanade Quimica	Chemical Constituents of Tamarindus Indica. Leaves
6	Traditional uses, phytochemistry and pharmacological properties of Moringa Oleifera plant	Garima Mishra ,Pradeep Singh	World Journal of Pharmaceutical Science	Pharmacological properties of Moringa oleifera
7	A Review on Nutritive importance and it's medicinal appication	Laxmi Priya, Gopalkrishnan	Science Direct	Nutritional importance and its medica application

8	A Review on Safety and Efficacy of Moringa Oleifera	Sid Stohs, Machel J.Hartman	Research Gate	Safety and Efficacy of Moringa Oleifera
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## DRUG PROFILE :-



A. Drumstick plant (*Moringa oleifera*)

### 1. Taxonomy and Botanical Description

-Kingdom: Plantae

-Family: Moringaceae

-Genus: *Moringa oleifera*

-Species: *Moringa oleifera*

-Common Names: Drumstick plant, shewaga.

-Description: *Moringa oleifera* is fast growing ,drought-resistant tree of the family moringaceae native to the Indian subcontinent .It is native to the dry tropical areas in North-western india ,in the south of the Himalayas, and is now the most widely cultivated spread and naturalized moringa species around the world.

fig no.2 Moringaoleifera

### 2. Chemical Constituents

-*Moringa oleifera* contains various chemical constituents, such as alkaloids, flavonoids, phenol stannin,terpenes,proteins,minerals,glycosides,vitamins.

-Some of the major compounds found in drumstick leaves are vitamins,proteins,mineral.

### 3. Pharmacological Properties

-*Moringa oleifera* has been shown to possess various pharmacological properties, such as anti-inflammatory ,immunity boosting, antioxidant ,anti-diabetic, anti-cancer ,andanti-ulcer activities.

-Several studies have demonstrated the immunity enhancer activity of drumstick leave which is attributed to the presence of compounds such as proteins and vitamins.

-*Moringa oleifera* leave have also been shown to possess immunity enhancer activity against various which is attributed to the presence of compounds such as vitamins and proteins.

### 4. Traditional Uses

-*Moringa oleifera* have been used intraditional medicine for various purposes ,such as treating immuno deficiency, skin infection ,anemia ,asthma ,headache ,heart problem.

## 5. Modern Uses

-Drumstick leaves have been use for the treatment of various diseases, from immuno deficiency, hypertension and diabetes.

-Moringa oleifera in rich source of flavonoids that gives protection to various chronic diseases, including cardio vascular diseases, diabetes and cancer.

## 6. Adverse Effects

-Prolonged use of moringa oleifera has been associated with various health problem lower blood pressure, stomach gas ,diarrhea, .

## 7. Precautions and Warnings

Drumstick leave should not be used during pregnancy and breast feeding as it may cause harm to the fetus or the infant. It may also interact with certain medications and supplements, so it is important to consult a health care provider before using it in such cases.

## 8. Drug Interactions

Moringa oleifera may interact with certain medications and supplements, including blood-thinning medications, anti-diabetic medications, and herbs or supplements that affect blood sugar levels. It is important to consult a health care provider before using moringa oleifera leave along with any medications or supplements.

## 9. Dosage and Administration

The appropriate dosage of moringa oleifera depends on various factors such as the user's age, health ,and medical history. There is no standard dosage for moringa oleifera, as it is commonly used as at raditional remedy and not regulated by the FDA.

## 10. Conclusion

Drumstick leave is a traditional medicinal plant that has been used for various purposes such a immunity enhancer. It contains various phytochemicals that contribute to its pharmacological activities. It is important to use drumstick leave with caution and consult a healthcare provider before use ,especially if pregnant or breast feeding or taking any medications or supplements.

## B. Tamarind plant:

### 1. Botanical Information

-Scientific name: *Tamarindus indica*

-Common names:Tamarind tree

-Family: Fabaceae

-Order: Fabales

-Species: Tarmarindus indica



**fig no.3 Tamarindplant**

### 2. Chemical Constituents

-Tamarind leave contains various chemical constituent such as tartaric acid, aceticacid, succinic acid, flavonoids, glycosides.

### 3. Pharmacological Activities

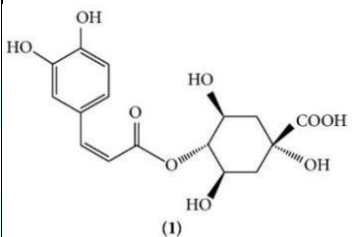
-Tamarind leave has been show various pharmacological activity such as, anti-oxidant, anti-inflammatory, anti-diabetics, analgesic, antimicrobial activity.



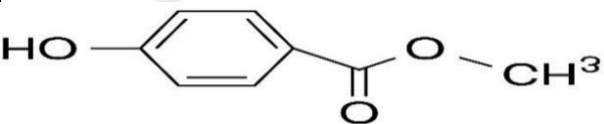
#### 4. Medicinal Uses-

-Traditional medicine: Tamarind has been used in traditional medicine for a variety of ailments including diarrhea, constipation, fever and malaria.

-Modern medicine: Tamarind has potential as a therapeutic agent for inflammation, nutritional, diabetes.

common name	tamarind tree
kingdom	plantae
order	fabales
family	fabaceae
structure	
genus	tamarindus indica
species	tamarindus indica
phytochemical constituents	vitaminC, carotenoids
ash volume	2-7%w/w
moisture	1-3%w/w
properties	antioxidants

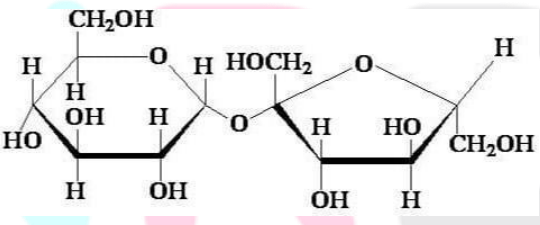
#### Excipients profile :-

Name	Methylparaben
Accession No.	DB14212
Molecular formula	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>
Molecular weight	152.1473
CAS NO.	99-76-3
Type	Small Molecule
Groups	Approved
Structure	

Synonyms	Methyl 4-hydroxy benzoate Methyl-p-hydroxybenzoate
DrugCategories	Acids,carbocyclic Benzene Derivatives
Description	This compound belong to the class of organic compound known sasp-hydroxybenzoic acid alkyl ester.These are aromatic compound containing benzoic which is esterified with an alkyl group and para substituted with ahydroxyl group
IUPASName	Methyl 4-hydroxybenzoate

**Table no :- 5 Excipients profile of methylparabean**

**Excipients profile of Sucrose :-**

Name	Sucrose
Accession no	DBO2772
External IDS	GEN-410NSC-406942
Molecularformula	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>
Molecular weight	342.2965
CAS No.	57-50-1
Type	Small molecule
Group	Approved ,Experimental ,investigational
Structure	
synonyms	1- $\alpha$ -D-Glucopyranosyl-1-2- $\beta$ -D-
IPUAS Name	$\beta$ -D-fructofuranosyl $\alpha$ -D-glucopyranoside

**Table no:- 6 excipient profile of Sucrose**

## MATERIALS AND EQUIPMENT :-

Material	Function
Drumstickleave extract	Drug
Tamarindleavesextract	Drug
Sucrose	Sweetingagent
Methylparaben	Preservative

Table no:- 7 Material

- **Moringa oleifera:-**

it is show the the medical properties.

Moringa leaves are rich in vitamin A,C,B1,B2,B3{Niacin},B6 and folated To help to improve the immunity Materials

- **Tamarind:**

-It show the herbal medical properties.

-It contain the anti-inflammatory properties.

-from boosting your immunity to keeping your liver and heart safe from disease tamarind do your health aword of good.

- **-Sucrose:-**

-it is use in sweeting agent.

-it is often use in medication to impart a more pleasant taste to often unpalatable chemical.

-sucrose is used as a preservative in canning syrup preservationbbband on metcuring.

- **Methylparaben:-**

Methylparaben paraben is preservative.

- **Distilled water:-**

The use of boiled purified water in the preparation of syrup can enhance it spermanency .

## Method :-

- **Method of preparation of syrup:**

1. Solution method with heat

2. Solution by agitation method.

3. Addition of sucrose to a liquid medication or flavoured liquid percolation.

4. Percolation method.

**1. Solution method with heat:**

-This method is suitable preparation method if the constituent are not volatile or not degraded by heat.

-Purified water is heated to 80-85°C and then removed from heat source.

-weight desired amount 60mg of sucrose is added with vigorous agitation.

- Then other required heat stable component are added to the hot syrup the mixture is allowed to the cool and its volume is adjusted to proper level by the addition of purified water.

**2. Solution by agitation method:**

-Sucrose and other ingredient dissolve in purified water through agitation (without heat).

**3. Addition of sucrose to a liquid medication or flavoured liquid:**

-This method is often used with drumstick and tamarind extract/

-Drumstick and tamarind extract add in syrup.

-Methylparabean is added to dissolve these are act as preservative also.

**4. Percolation(cold process):**

-Sucrose is placed in suitable percolator.

-Water is placed through sucrose slowly.

-Then eck of percolator is packed with cotton.The rate of percolation is regulate the rate of dissolution.

**Formulation of syrup :-**

Formulation of herbal syrup

Srno	Ingredients	Weight	Function
1	Moringa olifera	25 gm	active ingredients
2	tamarind	25gm	active ingredients
3	sucrose	60 gm	sweeting agent
4	Methyle parabean	1ml	preservative
5	distilled water	Quantity sufficient	diluent

Table no:-8 Formulation table

**List of material with their manufacturer :-**

Srno	Material	Manufacturer
1	Moringa oleifera leave extract.	Shamantak Enterprises.
2	Tamarind leave extract	Shamantak Enterprises
3	Methyl paraben	College pharmaceutics lab kashti
4	Sucrose	College pharmaceutics lab kashti

**Table no:9 Material and manufacturer****List of equipment and their manufacturer :-**

Srno	Equipment	Manufacturer
1.	Electronic balance	Virgo
2.	PH Meter	Max Electronic India
3.	Magenetic stirrer	Rajendra Electric Motor Industries
4.	Brookfield viscometer	Brookfield Engineering Lab

**Table no: 10 Equipment list.****Experimental work :-****Pre-formulation study:**

Pre-formulation study is an investigation of physical and chemical properties of a drug substance alone and when combined with excipients. It is the first step in the rationale development of dosage forms.

**Physical Characterization of ingredients:**

The active ingredient that is in syrup was physically characterized according to following methods-

**Nature:**

The drug was observed viscous for the determination of its nature.

**Color:**

The drug sample was viewed visually for the determination of its color against contrast backgrounds.

**Taste:**

Taste of syrup was checked.

**pH:**

pH is a measure of how acidic/basic solution is. The range goes from 0-7, with 7 being neutral. pH of less than 7 indicate acidity, where as a pH of greater than 7 indicates a base. pH is really a measure of the relative amount of free hydrogen and hydroxide ion in the solution. pH of syrup of optimum Drumstick and Tamarind was determined by using digital pH meter.

**Procedure for formulation of syrup :-**

**Weight 60 mg sucrose in beaker then add 20ml distilled water**

This mixture is heated on water bath at 60°C with stirring

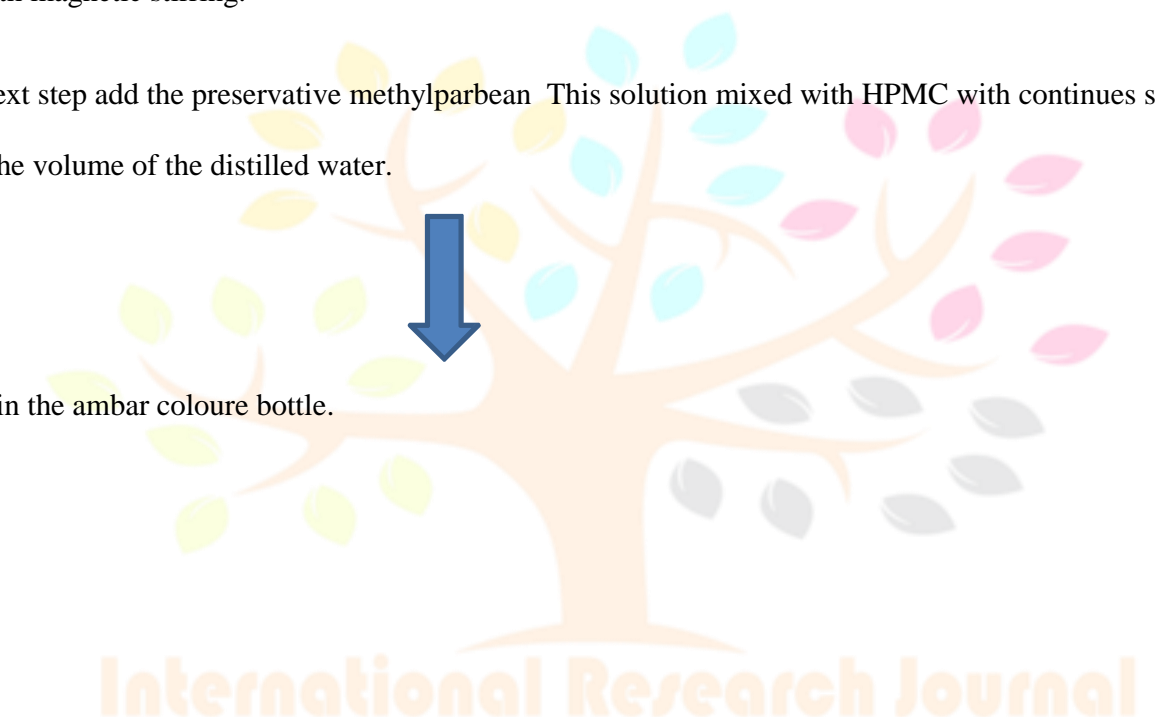
Keep beaker aside for cooling

Add the first the drumstick extract 25mg and second add the tamarind extract 25mg in this mixture with continues stirring with magnetic stirring.

Add the next step add the preservative methylparaben This solution mixed with HPMC with continues stirring.

Make up the volume of the distilled water.

Syrup fill in the amber coloured bottle.

**Formulation table :-**

Srno	Ingredient	F1	F2	F3	Function
1	Moringa oleifera	12mg	12.5mg	25mg	Activeingredient
2	tamarind	12mg	12.5mg	25mg	Activeingredient
3	Sucrose	36mg	40mg	60mg	Sweetingagent
4	Methyle paraben	0.2g	0.6g	1g	Preservative
5	Distilled water	qs	qs	qs	Vehicle

**Evaluation of final batch syrup :-****PH evaluation-**

PH of syrup was measured by using PH meter. switch on instrument wash the electrode with distilled water and off wipe moisture dip electrode in standard PH buffer and cheak the phre move the electrode from buffer wash and wipe off moisture and placed electrode in gel after amin check the PH of syrup.

**Density:-**

Density is an important concept because it allow substance determine what substances will float and what substances will sink when placed in a liquid.

**Formulation:-**

Density=mass/volume

Density of syrup =1.26g/ml

**Viscosity:-**

The viscosity of syrup of studied using Brookefield viscometer. the sample was placed in a beaker ans was allowed to equilibrate for viscometer. The sample 30ml was placed in beaker and was allowed to equilibrate for 5 min before measuring the digital reading using as pindle No.130 at 20 rpm. At this speed the corresponding reading on the viscometer was noted.

**Stability study:**

Protect from the sunlight Stored in cool and dry place.

**RESULT AND DISCUSSION :-**

In the following research, syrup was characterized ,formula for the preparation of syrup was developed, the base with active ingredient was used and formulated syrup for immunity inhancerwere evaluated according to the procedure mentioned in chapter. The results obtained during the investigation are given in the following section and result are discussed.

**Preformulation study:**

Physical characterization of active ingredient

**Moringa oleifera leaves extract :-**

Sr. NO	Tests Grade	Observation G/100	Standard G/100	Remark
1	Discription	Brownish – Black Colour	Black Colour	PassetheTest
2	Odourand Teste	Aromatic	Aromatic	PassetheTest
3	Solubility	Miscible	Miscible	PassetheTest

4	%Moisture	2.17%W/W	1.3 %W/W	Passes the Test
5	% Ash content (as per I.P)	3.82%W/W	2.7%W/W	Passes the Test
6	Nature	Semi Solid	Semi Solid	Passes the Test

**Table.7.1. Moringa Oleifera leaves extract**

**Tamarindus Endica Extract :-**

Sr. NO	Tests Grade	Observation G/100	Standard G/100	Remark
1	Description	Black Colour	Black Colour	Passes the Test
2	Odour and Taste	Aromatic	Aromatic	Passes the Test
3	Solubility	Miscible	Miscible	Passes the Test
4	%Moisture	1.70%W/W	1.3%W/W	Passes the Test
5	% Ash content (as per I.P)	2.45 %W/W	2.7%W/W	Passes the Test
6	Nature	Viscous	Viscous	Passes the Test

**Table 7.2 Tamarindus Endica Extract**

**Compatibility Study:**

Compatibility Study was studied by using FTIR Graph.

**FTIR of Moringa oleifera**

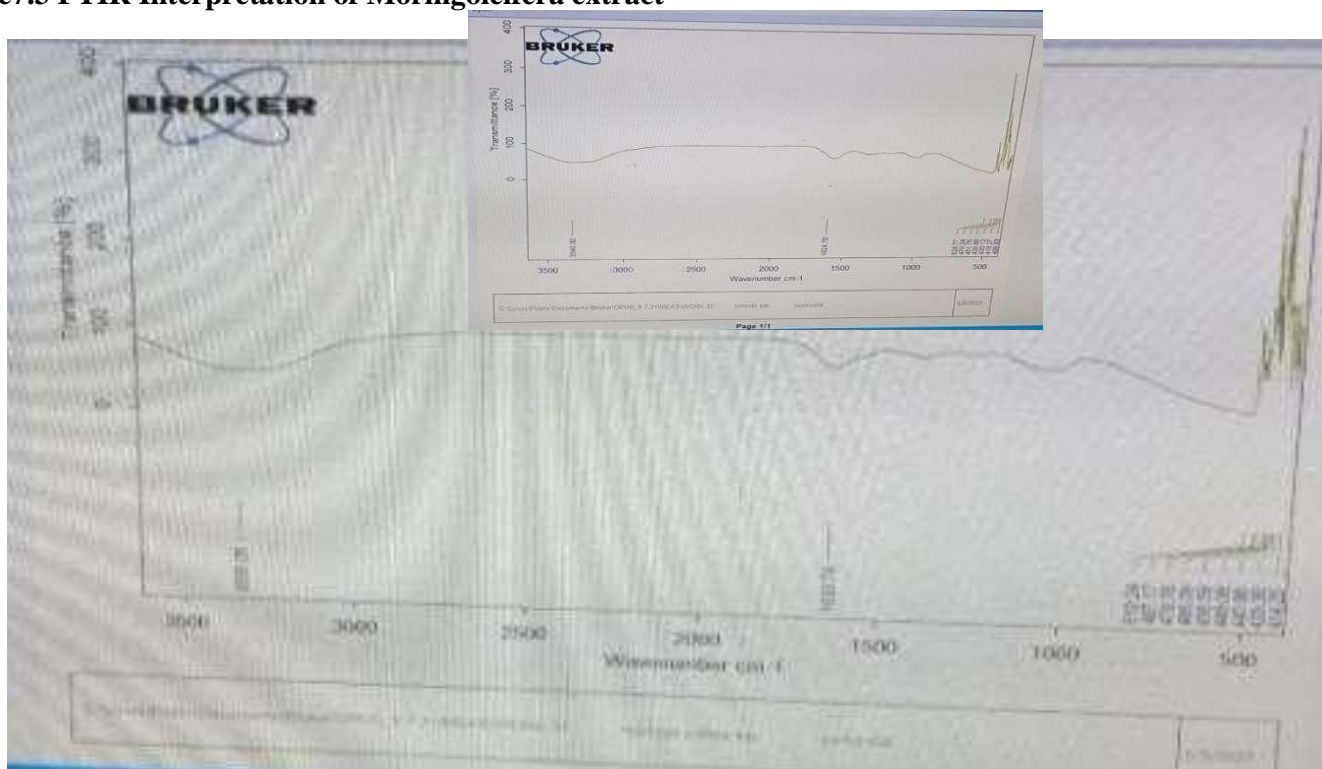


### Fig7.1.FTIR of Moringa Oleifera

#### FTIR Interpretation of Moring oleifera extract

Wave Number	Observed Group
3000-3500	O-H Stretch
2607	C-H Stretch
1580	C-O Vibration
1110	C-C

Table7.3 FTIR Interpretation of Moringoleifera extract



#### FTIR of Tamarindus Endica Extract:

Fig7.2.FTIR of Tamarindus Endica Extract

WaveNumber	ObservedGroup
3065	O-H Stretching
1056	C-H Bending
720	C=C

Table7.4FTIR of Tamarindus Endica Extract

**FTIR of SUCROSE :-**

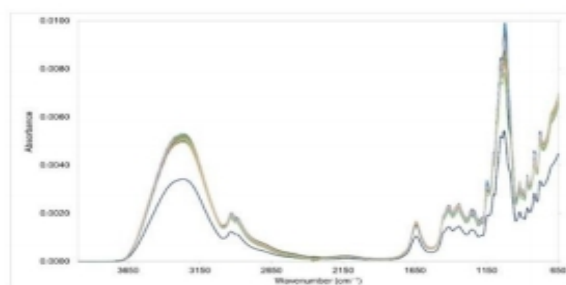


**Fig.7.3 FTIR of Sucrose**

Sr. No	Wave Number	Observation group
1	3000-3700CM-1	O-H
2	3000 CM-1	C-H

**Table 7.5 FTIR of Sucrose**

**FTIR of Mix :**



**Fig.7.4 FTIR Mix**

Sr. No	Wave Number	Observation group
1	3276	O-H
2	3684	Al -OH
3	800	C=C

**Table 7.6 FTIR MiX**

## Discussions :-

Moringa oleifera leaves are an excellent source of nutrition and natural

### Evaluation Parameter:

#### Organoleptic evaluation

Sr.No	Physiological Appearance	Observation
1	Colour	Greenish black
2	Odour	Characteristic
3	Taste	Sweet
4	Homogeneity	Good

Table 7.7: Organoleptic evaluation

### PH and Viscosity :

The PH of syrup formulation of select batch was measured by using diital PH Metre in a range 6

Viscosity of formulation , where measured by brookfield viscometer viscosity of syrup are show in table the formulation F1 , F2 , F3 batche show the viscosity between 99.4 To 99.6

FORMULATION	Viscosity (cp)	PH
F1	99.4	05
F2	99.4	10
F3	99.6	06

Table7.8. PH and Viscosity

### Stability study:

Open container	Close container
Not stable	Stable

Table7.9 stability study

One month stability study was done with an open an close container and it show that open container containing syrup are not stable . close container syrup was stable .

energy for human aronud theworld who work lack in many nuritional supplements such as protein ( $9.38 \pm 0.23 \text{g} \cdot 100\text{g}^{-1}$ ), carbohydrate ( $56.33 \pm 0.27 \text{g} \cdot 100\text{g}^{-1}$ ), lipids ( $7.76 \pm 0.21 \text{g} \cdot 100\text{g}^{-1}$ ) and fibers ( $11.23 \pm 0.16 \text{g} \cdot 100\text{g}^{-1}$ ) (Table 1). 100g of Moringa

oleifera leaves can provide about 17.5 g of daily requirement. Moisture ( $10.74 \pm 0.05$  g.100g<sup>-1</sup>) in food determines the rate of food absorption and the keeping quality of food. The reported value indicated that Moringa oleifera leaf protein

might not be stored at room temperature for a long period. Ash ( $4.56 \pm 0.13$ ) in food determines largely the extent of mineral matters likely to be found in food substance, the reported value of ash ( $4.56 \pm 0.13$ g.100g<sup>-1</sup>) indicated that moringa leaves are a good source of minerals. Moringa oleifera is a good source of fiber ( $11.23 \pm 0.16$  g.100g<sup>-1</sup>) that might be taken as a part

of diet to clean the digestive tract by removing potential carcinogens from the body and hence prevents the absorption of excess cholesterol. The fat and carbohydrate content is very valuable as a main source of energy for human body. The same results mentioned by (Sodamade et al. 2013), who revealed that Moringa oleifera leaves are nutritionally adequate and given the promising source of dietary minerals in most developing countries. It is however important to stress that leaf protein concentrates is not food on their own but it contains nutritional potential that could find application in food ingredient, infant formula, food supplement and food formulation. The Moringa leaves mineral concentrations might be candidate to be one of the important sources of essential elements for human body.

## SUMMARY AND CONCLUSIONS :-

Moringa is considered as nutrients rich plant of the Obtained results in this study indicated that the leaves have immense nutritional value such as phytochemicals, vitamins, minerals, proteins, vitamins and amino acids. So, the leaves might be used to combat malnutrition, especially among infants and nursing mothers. Many of the benefits of Moringa oleifera leaves are attributed to rich nutrients like protein elements and rich antioxidants, which come from vitamins, and polyphenols that makes the Moringa leaves an important part of healthy and balanced diet. Our results proved that the Moringa oleifera leaves contain good antimicrobial activity agents as presented by the composition of the secondary metabolites of the leaf extract. These results confirmed that Moringa oleifera leaves extract might be a potent source of natural antioxidants with a high health benefits. This indicates that Moringa oleifera leaves extracts may be used as a natural antioxidant and

antimicrobial agent with reasonable safety margins in pharmaceutical and food application.

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