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RESEARCH ARTICLE

Comparative Study on Characterization of dry fruit Terminalia Chebula Linn with Seeds and Without Seeds.

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ABSTRACT

This research aim concluded as; evaluated the standardization of purification of *Terminalia chebula* fruit as per siddha text references. Objectives were satisfied as; Standardized the purification process of dry fruit of *Terminalia chebula* in two methods. As per PLIM guideline and to develop the Standard Operating Procedure (SOP) for purification of dry fruit of *Terminalia chebula* with comparative study of sample 1(TC1) and sample 2 (TC2) Purified sample was very good medicinal valued than the un-purified sample (with seed powder sample). Finally concluded as, seed removal dry pulp of *Terminalia chebula* is very good medicinal remedy for single or poly herbal formulation in herbal medicines respectively.

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KEYWORDS

Terminalia chebula, Characterization of Raw Material, PLIM Guidelines

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INTRODUCTION

Medicinal plants are part and parcel of human society from the dawn of civilization to combat diseases and have been considered valuable and cheap source of unique phytoconstituents which are used extensively in the development of drugs against various diseases[1,2,3]. Several hundred genera of plants are used medicinally mainly as herbal preparations in the indigenous systems of medicine in different countries which have stood the test of time, and therefore, modern medicines has not been able to replace most of them. The World Health Organization reported that 80% of the world population relies chiefly on traditional medicines involving the use of plant extracts or their active constituents [4]. It has been estimated that in developed countries such as United States, plant drugs constitute as much as 25% of the total drugs, while in fast developing countries such as China and India, the contribution is as much as 80%. Thus, the economic importance of medicinal plants is much more in countries like India than in rest of the world. In the last few decades, the field of herbal medicine is getting popularized in both developed and developing countries [5]. This is because the herbal medicines are cheap, and have natural origin with higher safety margins and lesser or no side effects [6]. *Terminalia chebula* (*T. chebula*) is a flowering evergreen tree of the family Combretaceae. It has several common names such as black myrobalan, ink tree, or chebulic myrobalan (English), haritaki (Sanskrit and Bengali), harad (Hindi), harada (Marathi and Gujrati) Karkchettu (Telgu) and Kadukkaya (Tamil). In Tibet, *T. chebula* is called as the "King of Medicine" [7]. *Terminalia chebula* Linn. Is most powerful herb in herbal medicine such as; Ayurveda, Siddha and Unani medical systems. In siddha told it is "mother of herb" and it has poison itself that called in tamil verse; "*kadukkaiku aga nanju*" this means as, seed of *Terminalia chebula* Linn. Is poisonous one. That should be removed for medicine preparations.

Therefore, standardization of purification of *Terminalia chebula* Linn. is most valuable work for now-a-day. Phytochemical properties were: *T. chebula*, though, contains several phytoconstituents like tannins, flavonoids, sterols, amino acids, fructose, resin, fixed oils *etc*., however, it is fairly rich in different tannins (approximately 32% tannin content). Further, tannin content of *T. chebula* largely depends on its geographic location [9] . The chief components of tannin are chebulic acid, chebulinic acid, chebulagic acid, gallic acid, corilagin and ellagic acid. Tannins of *T. chebula* are of pyrogallol (hydrolysable) type.

There are about 14 hydrolysable tannins (gallic acid, chebulic acid, punicalagin, chebulanin, corilagin, neochebulinic acid, ellagic acid, chebulegic acid, chebulinic acid, 1,2,3,4,6-penta-O-galloyl-b-D-glucose, casuarinin, 3,4,6-tri-O-galloyl-D-glucose and terchebulin) which have isolated from fruits of *T. chebula* [10]. Phytochemicals like anthraquinones, ethaedioic acid, sennoside, 4,2,4 chebulyl-d-glucopyranose, terpinenes and terpinenols have also been reported to be present [8,11]. Triterpenoids and their glycosides have been isolated from stem bark of *T. chebula* [12]. Recent studies show that *T. chebula* contains more phenolics than any other plant [13].

TRADITIONAL VALUES OF HARITAKI: Charaka Samhita and Sushrusha Samhita, though, extensively describe various medicinal plants, *T. chebula* (haritaki) enjoys the prime place among medicinal plants not only in India but also in other countries like Asia and Africa. It is extensively used in ayurveda, siddha, unani and homeopathic medicines in India. It is a top listed plant in Ayurvedic Materia medica for treatment of asthma, bleeding piles, sore throat, vomiting and gout [7]. It is used in Thai traditional medicine as a carminative, astringent and expectorant [14]. According to Vagbhata, it is the drug of choice in the therapy of 'vata-kapha' diseases. The 'Triphala', a herbal preparation of 'three fruits' from plants *Terminalia chebula*, *Terminalia bellerica*, *Emblica officinalis*, is used as laxative in chronic constipation, detoxifying agent of the colon, food digestive problems (poor digestion and assimilation) and rejuvenator of the body [15]. Certain studies have shown that 'Triphala' stimulates apetite, and is useful in treating cancer and detoxification. Triphala is considered as the most versatile of all herbal formulations and is prescribed as a cardiotonic and for candid infection [16].

In varsa ritu (July- August), it should be taken with rock salt, in sarad ritu (September-October) with sugar, in hemanta ritu (November- December) with sunthi, in sisira ritu (January-February) with pippali, in vasanta ritu (March-April) with honey and in grisma ritu (May-June) with jaggery. According to Vagbhata, when haritaki powder fried in ghee is regularly consumed with sufficient ghee in food, it promotes longevity and boosts energy. Common gastrointestinal ailments, tumours, ascites, piles, enlargement of liver and spleen, worms, colitis can be treated well with haritaki. The bark of haritaki, if eaten after chewing, improves digestion. 'Bala haritaki' is useful in haemorrhoids and in clearing the bowels. The mixture of Triphala powder and haridra is a well known adjunct in diabetes. Bronchospasm is mitigated effectively with the combination of haritaki and bibhitaka powders with honey.

In abdominal pain due to flatulence, it is given with jiggery and ghee. The most popular combination of haritaki, musta, sunthi and jaggery is an effective panacea for diarrhoea, dysentery, flatulence *etc*. 'Haritaki siddha ghrta' is beneficial in chronic fever. The decoction of haritaki or triphala is given along with honey in hepatitis. Haritaki powder with honey and ghee is also effective remedy for anemia. In obesity, its decoction with honey reduces the excessive body fats. Regular use of haritaki improves memory due to beneficial effects on the nerves of brain. It is also valuable in dysuria and urinary stones [18].

Precautions: Haritaki should be carefully used by lean individuals, in severe weakness, fast, mental depression, pitta conditions and in pregnancy.

Safety evaluation: The ethyl acetate-soluble portion of *T. chebula* ethanolic extract containing 29.4% chebulic acid was tested for *in vitro* mutagenicity assay, and in a single- and 14-day repeated dose oral toxicity study to find out the safety in use of the plant extract. In the bacterial mutation assay, up to 5000 µg/ml concentration of the ethyl acetate-soluble portion, the numbers of colonies did not increase whether with or without metabolic activation. In the oral toxicity study, the single oral dose of the extract at 2000 mg/kg body weight did not produce mortality or abnormal lesions in the internal organs of rats. The results of a 14-day orally repeated dose showed that *T. chebula* extract had no adverse effects at 2000 mg/kg body weight in rats [19]. **OBJECTIVE defined as;** To study the Characterization of dry fruit of *Terminalia chebula* before and after purification and compare these two methods.

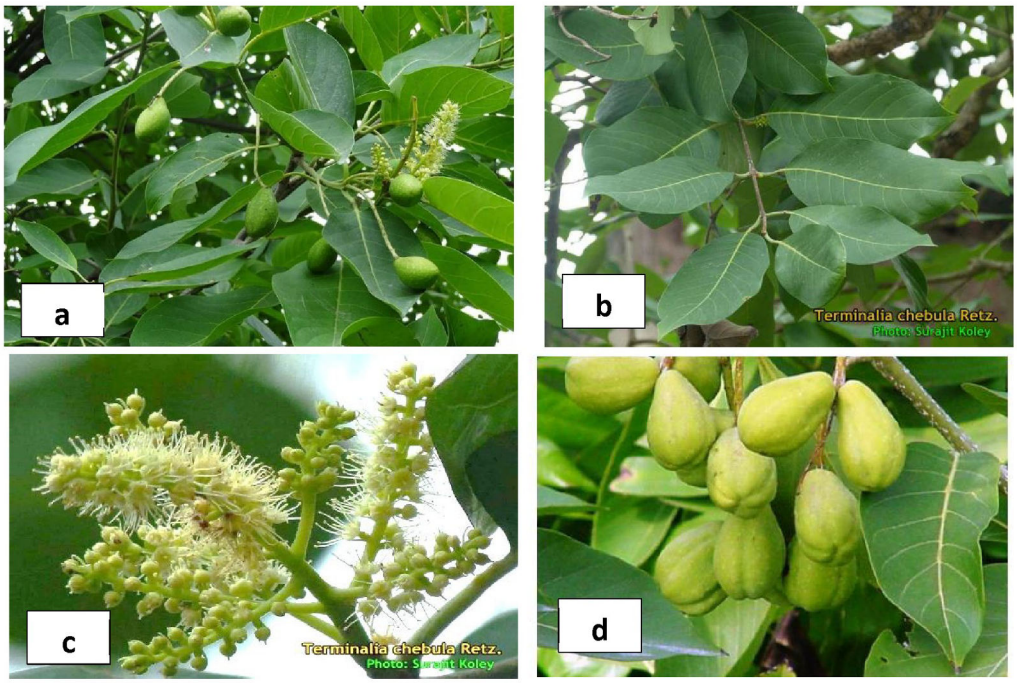

Fig. 1: **a)** Plant of *Terminalia chebula* **b)** Leaves of *Terminalia chebula* **c)** Flowers of *Terminalia chebula* **d)** Unripe fruit of *Terminalia chebula.*

Fig. 2: Ripe fruit of *T. chebula.*

Fig. 3: Ripe fruit without seeds of *T. chebula*

Phytochemical properties *T. chebula*, though, contains several phytoconstituents like tannins, flavonoids, sterols, amino acids, fructose, resin, fixed oils *etc*., however, it is fairly rich in different tannins (approximately 32% tannin content). Further, tannin content of *T. chebula* largely depends on its geographic location [9]. The chief components of tannin are chebulic acid, chebulinic acid, chebulagic acid, gallic acid, corilagin and ellagic acid. Tannins of *T. chebula* are of pyrogallol (hydrolysable) type. There are about 14 hydrolysable tannins (gallic acid, chebulic acid, punicalagin, chebulanin, corilagin, neochebulinic acid, ellagic acid, chebulegic acid, chebulinic acid, 1,2,3,4,6-penta-O-galloyl-b-D-glucose, casuarinin, 3,4,6-tri-O-galloyl-D-glucose and terchebulin) which have isolated from fruits of *T. chebula* [10]. Phytochemicals like anthraquinones, ethaedioic acid, sennoside, 4,2,4 chebulyl-d-glucopyranose, terpinenes and terpinenols have also been reported to be present [8,11]. Triterpenoids and their glycosides have been isolated from stem bark of *T. chebula* [12]. Recent studies show that *T. chebula* contains more phenolics than any other plant [13].

Part used: Dried fruit

Properties:

Suvai (Taste): *Thuvarppu, Inippu, Kaarppu, Kaippu, Pulippu* (astringent, sweet, pungent, bitter, sour)

Thanmai (Nature): *Veppam* (hot)

Pirivu (Bio- Transformation): *Kaarppu* (pungent)

Actions

• Digestive, • Expectorant, • Laxative, • Appetizer, • Nutrient

General characters

It described in *Agasthiyar Gunavagadam* in Tamil stanza means as;

Indications;

It cures Jaw, neck, cheek diseases, Filariasis, Diarrhoea, Obesity, Rheumatoid Arthritis, Jaundice.[8]

Therapeutic uses

- *Terminalia chebula* is used in Asthma, Fever and Urinary diseases.
- Used as a gargle in sore mouth and Stomatitis, spongy and ulcerated gums.
- *Terminalia chebula* is made into a paste by adding some water and is mixed with castor oil and applied over the burns and scalds [9].
- *Kadukkai* cures the diseases of the Cheek, neck, tongue and penis. It is said to be a potent drug for obesity and cures jaundice, herbal and animal poison.
- A decoction of chebulic myrobalan is a good astringent. Wash useful in bleeding piles.
- Finely powdered *kadukkai* is used as a dentifrice useful in carries teeth, bleeding and ulceration of gums.
- Coarsely powdered and smoked in a pine it affords relief in a fit of asthma.
- Equal parts of *kadukkai* and *kasukatti* rubbed into a paste and applied for tongue ulcer.
- Unripe fruit is rubbed with milk given internally for cough.
- In folk medicine, *kadukkai* is used in constipation, tympanitis, vomiting, colic, sprue syndrome, jaundice, splenic disorders, for treating cough, asthma, hiccup, throat affections, and impaired voice.
- One fruit of *kadukkai (Terminalia chebula)*, two fruits of *thantrikkai (Terminalia bellerica)*, and four fruits of *nellikkai (Emblica officinalis)* taken together, were called *Triphala.* It is prescribed as a laxative, digestive, promoter of eyesight, intellect and longevity. It is credited with the properties which enhance body resistance against diseases and induce immunity; and is included as an adjunct in a number of compound preparations.

Precautions:

Kadukkai should be carefully used by lean individuals, in severe weakness, fast, mental depression, pitta conditions and in pregnancy.

Safety evaluation: The ethyl acetate-soluble portion of *T. chebula* ethanolic extract containing 29.4% chebulic acid was tested for *in vitro* mutagenicity assay, and in a single- and 14-day repeated dose oral toxicity study to find out the safety in use of the plant extract. In the bacterial mutation assay, up to 5000 µg/ml concentration of the ethyl acetate-soluble portion, the numbers of colonies did not increase whether with or without metabolic activation. In the oral toxicity study, the single oral dose of the extract at 2000 mg/kg body weight did not produce mortality or abnormal lesions in the

internal organs of rats. The results of a 14-day orally repeated dose showed that *T. chebula* extract had no adverse effects at 2000 mg/kg body weight in rats [19].

Popular ayurvedic preparations:

Triphala curna, Abhayamodaka, Abhayarista, Pathyadi curna/vatl/kvatha, Vyaghn haritaki, Gandharva haritaki *etc*.

MATERIALS AND METHODS

Research Type: analytical research, **Research Period:** 06 months, **Work Plan: Procurement and authentication of raw drugs-** The raw drug was Procured by chief investigator from Registered raw material supply shop – Rajendra Herbal Store, Thuckalay, Kanyakumari District, Pin Code – 629 175. Tamil Nadu, India directly.

The raw material identified and authenticated by the experts of SIDDHA CENTRAL RESEARCH INSTITUTE (SCRI), Arumbakkam, Chennai – 600 106 Authentication Certificate Ref. No: T01031936L

Plant origin raw materials authenticated by identif - cation test by microscopical pharmacogenetic findings with standard references.

PREPARATION OF RESEARCH RAW MATERIAL

Cleaned all Raw Materials and grind well was preparation of Research Raw Materials

CHARACTERIZATION OF DRUG: Characterization by physico-chemical, biochemical and phytochemical analysis of the TC Chooranam.

PHYSICOCHEMICAL ANALYSIS

***Qualitative and Quantitative analysis of Terminalia chebula* Powder**

QUALITATIVE ANALYSIS:

As per Siddha aspect:

Parameters were; 1. Colour, 2. Taste, 3. Finger Print Test, 4. Floating on Water, 5. Lustreless.

As per Modern aspects

Parameters: 1. Colour in day light, 2. Odour, 3. Sense of touch, 4. Appearance, 5. Taste, 6. Solubility, 7. Action on heat, 8. Flame test, 9. Texture, 10. Water floated test.

COLOUR

About 100g of **TC** Chooranam was taken in a clean glass beaker and tested for its colour by viewing again a white opaque background under direct sunlight..

QUANTITATIVE ANALYSIS

DETERMINATION OF WATER SOLUBLE ASH

25ml of water was added to the gooch crucible containing 1g of URC and boiled for 5minutes. Insoluble matter in a sintered glass crucible was collected, washed with hot water and ignited in a crucible for 15minutes at a temperature not exceeding 450^{0}C. difference between the weight of the insoluble matter and weight of the ash represents the water soluble ash.

ACID INSOLUBLE ASH

The TC Chooranam ash was boiled for 5minutes in 25ml of 1:1 dil. HCL. Insoluble matter in sintered glass crucible was collected, washed with hot water an ignited in a crucible. That was is then collected in a desiccators and percentage of acid insoluble ash was calculated the with reference to the air-dried drug.

LOSS ON DRYING

Five grams of TC Chooranam was heated in a hot oven at 105^{0}C for 1hour and the percentage of loss of weight was calculated.

DETERMINATION OF ALCOHOL SOLUBLE EXTRACTIVE

Macerate 25 g of the TC Chooranam, with 100 ml of Alcohol of the specified strength in a closed flask for twenty-four hours, shaking frequently during six hours and allowing to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tarred flat-bottomed shallow dish, and dry at 105º, to constant weight and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug.

DETERMINATION OF WATER SOLUBLE EXTRACTIVE

Proceed as directed for the determination of Alcohol-soluble extractive, using chloroform water instead of ethanol.

pH : The pH of TC Chooranam was estimated as per the method prescribed in Indian Standard (IS) -6940 (1982). One gram of sample was taken into a 100ml graduated cylinder containing about 50ml of water and filled upto the mark with water. The cylinder was stopped and shaken vigorously for two minutes and the suspension was allowed to settle for an hour at 25^0 to 27^0. About 25ml of the clear aqueous solution was transferred into a 50ml beaker and tested for pH using DIGISUN digital pH meter (DIGISUN Electronics, Hyderabad, India).

BIOCHEMICAL ANALYSIS

Preparation of the Extract: 05 gm of TC Chooranam were taken in a 250 ml of clean beaker and 50 ml of distilled water was added to it. Then it was boiled well for about 10 min. then it is allowed to cool and filtered in a 100 ml volumetric flask and made up to 100 ml with distilled water. This preparation is used for the qualitative analysis of acidic / basic radicals and biochemical constituents in it.

TEST FOR CALCIUM: 2ml of the above prepared extract taken in a clean test tube. To this add 2ml of 4% ammonium oxalate solution and appearance of white precipitate was checked.

TEST FOR SULPHATE: 2ml of the extract was added to 5% barium chloride solution in a test tube and appearance of white precipitate was checked.

TEST FOR CHLORIDE: The extract was treated with silver nitrate solution and appearance of white precipitate was checked.

TEST FOR CARBONATE: The substance was treated with concentrated HCL and formation of effervescence of white precipitate was checked.

TEST FOR STARCH: The extract was added with weak iodine solution and appearance of blue was checked.

TEST FOR FERRIC IRON: The extract was acidified with glacial acetic acid and potassium ferro cyanide. Then appearance of blue colour was checked.

TEST FOR FERROUS IRON: The extract was treated with concentrated nitric acid and Ammonium Thiocyanide solution. Appearance of blood red colour was checked.

TEST FOR PHOSPHATE: The extract was treated with ammonium molybdate and concentrated nitric acid. Appearance of yellow precipitate was checked.

TEST FOR ALBUMIN: The extract was treated with esbach's reagent and appearance of yellow precipitate was checked.

TEST FOR TANNIC ACID: The extract was treated with ferric chloride and appearance of black precipitate was checked.

TEST FOR UNSATURATION: Potassium permanganate solution was added to the extract and discolouration was checked.

TEST FOR THE REDUCING SUGAR: 5ml of Benedict's qualitative solution was taken in a test tube and allowed to boil for 2 minutes and add 8 to10 drops of the extract and again boil it for 2 minutes. Colour change was checked.

TEST FOR AMINO ACID: One or two drops of the extract was placed on a filter paper and dried well. After drying, 1% Ninhydrin is sprayed over the same and dried it well. Appearance of Violet Colour was checked.

TEST FOR ZINC: The extract was treated with potassium ferro cyanide and appearance of white precipitate was checked.

PHYTO CHEMICAL ANALYSIS

ALKALOIDS:

The extract of TC was evaporated in a test tube. Distilled water was added, shaken well and filtered.

1. Mayer's test: To the 2-3ml of filtrate Mayer's reagent was added. Formation of yellow precipitate showed the presence of alkaloids.

2. **Dragendroff's test:** To 2mg of the ethanolic extract 5ml of distilled water was add, 2ml of Hydrochloric acid was added until an acid reaction occurs. To this 1ml of Dragendroff's reagent was added. Formation of orange or orange red precipitate indicates the presence of alkaloids.

3. Hager's test: To 2mg of the ethanolic extract taken in a test tube, a few drops of Hager's reagent were added. Formation of yellow precipitate confirms the presence of alkaloids.

TEST FOR CARBOHYDRATES:

Molisch Test: 2mg of ethanolic extract was shaken with 10ml of water, filtered and the filtrate was concentrated. To these 2 drops of freshly prepared 20% alcoholic solution of α naphthol was added. 2ml of conc. Sulphuric acid was added so as to form a layer below the mixture. Red violet ring appears, indicating the presence of carbohydrates which disappear on the addition of excess of alkali.

Legal's test: The test is employed for digitoxose containing glycosides. The extract of drug is dissolved in pyridine, sodium nitroprusside solution is added to it and made alkaline, pink or red color is produced.

Borntrager's test: it was employed for presences of anthraquinones. The drug- URC was boiled with dilute sulphuric acid, filtered and to the filtrate benzene, or ether or chloroform was added and shaken well. The organic layer was separated to which ammonia was added slowly. The ammoniacal layer shows pink to red color due to presences of anthraquinone glycosides.

TEST FOR PHYTOSTEROLS:

1. **Liebermann-Burchard's test:** 2mg of dry extract was dissolved in acetic anhydride, heated to boiling, cooled and the 1ml of concentrated sulphuric acid was added along the sides of the test tube. Formation of green colour indicates the presence of steroids.
2. **Salkowski test:** To 2ml of extract, 2ml of chloroform and 2ml of conc. $H_2SO_4$was added. The solution was shaken well. As a result, chloroform layer turned red and acid layer showed greenish yellow fluorescence.

TEST FOR FLAVANOIDS:1. Shinoda test: To the extract, 5ml of 95% ethanol and few drops of concentrated hydrochloric acid was added. To this solution 0.5gm of magnesium turnings were added. Pink colouration indicated the presence of flavonoids.

Fluorescence test: Small quantity of sample drug was dissolved separately in alcohol and a drop of that extract was placed on Whatman filter paper and observed under UV light, fluroscence indicates the presence of flavonoids.

TEST FOR TANNINS: Small quantities of TC powder were dissolved separately in water and tested for the presence of phenolic compound and tannins. In the process of testing and treating, the following observations were noted.

Dilute ferric chloride solution (5%) gives a dark green color.

10% aqueous potassium dichromate solution gives yellowish brown precipitate.

10% lead acetate solution gives a white precipitate. **Mukherjee, P.K. 2002**. Quality control of herbal drugs, business horizons pharmaceutical publishers, New Delhi. 356-358.

TEST FOR PROTEINS: Small quantity of URC drug was dissolved in few ml of water and the following reaction were carried out.

Millon's test: To 2ml of filtrate, few drops of Millon's reagent were added. A white precipitate indicates the presence of proteins.

Ninhydrin test: To 2ml of filtrate 2 drops of ninhydrin solution was added. A characteristic purple color indicates the presence of amino acids. (Yasma and Ichikawa, 1953)

Biuret test: To one portion of aqueous and alcoholic extract in few ml water one ml of 10% sodium hydroxide solution was added, followed by this one drop of dilute copper sulphate solution was added. No violet colour was obtained indicating the absence of protein.

TEST FOR FIXED OILS AND FATS

Spot test: A small quantity of URC was placed between 2 filter papers. Oil stains produced with any extract shows the presence of fats and fixed oils (Harborne, 1984).

Saponification test: A small quantity of URC was treated with few drops of 0.5N alcoholic potassium hydroxide along with 2 to 3 drops of phenolphthalein. Later the mixture is refluxed for about 2h. Soap formation indicates the presence of fats and fixed oils.

TEST FOR LIGNIN: Phloroglucinol test: Small quantities of test drug- URC was dissolved separately in few ml of alcoholic solution of hydrochloric acid and phloroglucinol gives red color, which shows lignin is present.

TEST FOR SAPONINS: Frothing test: Drug extract was shaken vigorously with water. No persistent foam was formed. (Ansari, 2006).

TEST FOR ANTHRAQUINONES: 5.0g of dried extract was shaken with 10.0 mL of benzene, this was filtered and5.0 mL of 10% ammonia solution was added to the filtrate. The mixture was shaken and the presence of violet colour in the ammonia cal (lower) phase indicated the presence of free hydroxyanthraquinones.

TEST FOR CARDIAC GLYCOSIDES:0.5g of dried extract was dissolved in 2.0 mL of glacial acetic acid containing one drop of ferric chloride solution. This was then under laid with 1.0 mL of concentrated H_2SO_4. A brown ring obtained at the interface indicated the presence of cardenolides.

Table 1: Details of samples of *Terminalia Chebula* fruit

Sample-1: TC without Seed	Sample-2: TC with Seed
	
	

Table- 2: Macroscopic evaluation of *Terminalia chebula* powder

Parameters	Sample-(1)	Sample-(2)
Odour	Odourless	Odourless
Colour	Yellowish brown	Yellowish brown
Taste	Astringent	Slightly bitter with Astringent

BIOCHEMICAL ANALYSIS

Table 3: Biochemical analysis of *Terminalia chebula* Fruit Samples

No.	Biochemical parameters	Sample (1)	Sample (2)
	CALCIUM	+	+
	SULPHATE	+	+
	CHLORIDE	-	-
	CARBONATE	-	-
	STARCH	+	+
	FERRIC IRON	-	-
	FERROUS IRON	-	-
	PHOSPHATE	+	+
	ALBUMIN	-	-
	TANNIC ACID	+	+
	UNSATURATES	+	+
	REDUCING SUGAR	+	+
	AMINO ACID	+	+
	ZINC	-	-

Table 4: Physico-chemical parameters of *Terminalia chebula* without seed (TC 1) and *Terminalia chebula* with seeds (TC 2)

S.	Parameters	TC 1	TC 2
	Total ash	5.00 ±0.25	4.47 ±0.04
	Fiber contents (crude)	0.5 ± 0.12	13.42 ±1.56
	Acid insoluble ash	38 ±1.04	2.72 ±0.34
	Alcohol soluble extractive	56 ±1.10	14.22 ±1.02
	Water soluble extractive	1.91 ±1.24	24.91 ±1.54
	Acid soluble Ash	0.25 ±0.32	1.95 ±0.65
	Water soluble Ash	0.03 ±0.41	2.03 ±0.71
	Water insoluble Ash	0.14 ±0.02	2.84 ±1.12

Table 5: Phytochemicals of *Terminalia chebula* without seed (TC 1) and *Terminalia chebula* with seeds (TC 2)

S. No.	Parameters	TC 1 (Mean % w/w)	TC 2 (Mean % w/w)
	Total Phenols	+	+
	Tannins	+	+
	Flavones	+	+
	Proteins	+	+
	Glycosides	-	-
	Reducing sugars	+	+
	Anthraquinones	+	+
	Quinones	+	+
	Alkaloids	+	+
	Saponins	+	+

DISCUSSION

According to the Result of this research revealed as; *Terminalia chebula* (TC) Sample-1: TC without Seed and Sample-2: TC with Seed observed as Macroscopic evaluation of *Terminalia chebula* powder showed as; odour and colour were same of both samples by odourless and yellowish brown. Taste was different from both sample such as sample 1 was astringent and sample 2 was slightly bitter with Astringent (Table: 2).

Biochemical analysis of *Terminalia chebula* Fruit Samples in Table 3: sample (1) and sample (2) were reported as; **Calcium, Sulphate, Starch, Phosphate, Tannic Acid, Unsaturated, Reducing Sugar and Amino Acid** were **PRESENCE** and **Chloride, Carbonate, Ferric Iron, Ferrous Iron, Albumin** and **Zinc** were **ABSENCE** (Table: 3).

In Table: 4 showed as: **Physico-chemical parameters** of *Terminalia chebula* without seed (TC 1) and *Terminalia chebula* with seeds (TC 2); Total ash of TC 1 (Mean % w/w) was 5.00 ±0.25 and TC 2 (Mean % w/w) 4.47 ±0.04, Fiber contents (crude) of TC 1 was 0.5 ± 0.12and TC 2 was 13.42 ±1.56. Acid insoluble ash of TC 1 was 38 ±1.04and TC 2 was 2.72 ±0.34. Alcohol soluble extractive of TC 1 was 56 ±1.10 and TC 2 was 14.22 ±1.02. Water soluble extractive of TC 1 was 1.91 ±1.24 and TC 2 was 24.91 ±1.54. Acid soluble Ash of TC 1 was 0.25 ±0.32 and TC 2 was 1.95 ±0.65. Water soluble Ash of TC 1 was 0.03 ±0.41 and TC 2 was 2.03 ±0.71. Water insoluble Ash of TC 1 was 0.14 ±0.02 and TC 2 was 2.84 ±1.12.

Phytochemicals of *Terminalia chebula* without seed (TC 1) were exhibited Total Phenols, Tannins, Flavones, Proteins, reducing sugars, Anthraquinones, Quinones, Alkaloids and Saponins and *Terminalia chebula* with seeds (TC 2) were exhibited Total Phenols, Tannins, Flavones, Proteins, Reducing sugars, Anthraquinones, Quinones and Saponins (Table 5)

CONCLUSION

This research aim satisfied as conclusion by the results. This research aim concluded as; evaluated the standardization of purification of *Terminalia chebula* fruit as per siddha text references. Objectives were satisfied as; Standardized the purification process of dry fruit of *Terminalia chebula* in two methods. As per PLIM guideline and to develop the Standard Operating Procedure (SOP) for purification of dry fruit of *Terminalia chebula* with comparative study of sample 1(TC1) and sample 2 (TC2) Purified sample was very good medicinal valued than the un-purified sample (with seed powder sample). Finally concluded as, seed removal dry pulp of *Terminalia chebula* is very good medicinal remedy for single or poly herbal formulation in herbal medicines respectively.

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CONFLICT OF INTEREST

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