

Proximate Analysis of Terminalia Belerica (fruit ,stem,leaf sample) of Ralegaon Region

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Abstract: As a part of research work it appears sufficient by promising to carry out Proximate Analysis of Moisture, Ash Content, and Solubility of Terminalia Belerica Fruit ,Stem, Leaf Sample in cold water ,Hot water,1% NaOH and Hydrochloric acid. The work is the record of these investigations.

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I. Introduction

In the recent two decades, scientists and researchers from pharmaceuticals, medicinal, agricultural, industrial and from organic chemistry are interested in herbal medicines due to their efficiency of curing almost all diseases in human beings but local practitioners are not aware of scientific information. Nearly 4% of medicinal plants are being used by 80% of worlds population for health cure throught the world while only 2.47% of which have been chemically investigated. Modern pharmacopoeia contains 24% drugs derived from plants. Ethno botanical studies revealed that 2,000 plants species are identified as drug yielding for their different uses in about 4,000 drug industries of various Indian system of medicines which represents 12% of total Indian flora.

Terminalia Belerica fruit possesses antibiotic anti- inflammatory, antipyretic, bone healing, analgesic, etc properties and useful for treatment of bloody diarrhea , skin disorders, alterative, anthelmintic, digestive tonic, analgesic in eye, ear diseases and in complains of the back and spine and also have antibacterial activity against some Gram negative and Gram positive bacteria. Juice of stem used in irregular menstruation and scurvy. Stem given internally and applied topically to bone fractures. Paste of the stem given for asthma. The tender succulent stem and young leaves are eaten in curries. The plant is mentioned in the ancient system of medicine such as Ayurveda. The primitive people of antiquity have been using Terminalia belerica fruit for treating above said diseases. The practitioners know medicinal value of Terminalia belerica but do not know the exact scientific knowledge of it. Up till now very little attempt on phytochemical study was carried out on Terminalia belerica and it was noted that this plant contains high amount of vitamin-C, carotene-A, anabolic steroidal substances and calcium (Murthy and Sheshadri 1939). It also contains ascorbic acid 479 mg and carotene 267 units per 100 gms. The stem contains two asymmetric tetracyclic triterpenoids, presence of B-sitosterol also reported. Analysis of the air dried Terminalia belerica plant reported to contain moisture 13.1, protein 12.8, fat and wax 1.0, fibre 15.6, carbohydrates 36.6, ash 18.2% and small extent of carbonates, phosphates, sodium, potassium, magnesium and calcium etc. So, it was thought interesting to carry out the proximate analysis viz, Moisture content,ash content, cold water solubility, hot water solubility, 1% NaOH and HCL solubility of Terminalia belerica fruit, stem, leaf sample have been investigated in proximate analysis .

Hence ,with above aim and objectives the present research work has been designed. This research work is an account of these investigations which deals with proximate analysis of extractive products of Terminalia belerica specially with the plan parts such as fruit, stem and leaves which are used by tribal and other medical practitioners.

II. Procedure

2.1 . Preparation of Sample –

First the site was selected in Ralegaon,Dist-Yavatmal of Maharastra State .The samples were collected in September-18.They were washed smoothly by distilled water,the fruit,stem and leaves were separated from plants by scissor and all were shed dried at room temperature .Each part of the sample was crushed separately in pestle-mortar to isolate fine powder .This powder was treated as sample powder for various analysis.

1.2. Proximate Analysis-

(1) Moisture content-

i) Moisture content of fruit sample of Terminalia belerica-

Silica crucible was taken.It was kept in an oven at 100⁰C and weighed.This process was repeated till silica crucible showed constant reading.Fruit sample (1gm) was taken in a crucible and crucible was kept in oven at 110⁰C for 1 hr.It was then weighed after cooling and kept in oven again till it showed constant weight.

ii) Moisture content of Stem sample of Terminalia belerica-

Silica crucible was taken.It was kept in an oven at 100⁰C and weighed.This process was repeated till silica crucible showed constant reading.Stem sample (1gm) was taken in a crucible and crucible was kept in oven at 110⁰C for 1 hr.It was then weighed after cooling and kept in oven again till it showed constant weight.

iii) Moisture content of Leaf sample of Terminalia belerica-

Silica crucible was taken.It was kept in an oven at 1000C and weighed.This process was repeated till silica crucible showed constant reading.Leaf sample (1gm) was taken in a crucible and crucible was kept in oven at 1100C for 1 hr.It was then weighed after cooling and kept in oven again till it showed constant weight.

The fruit sample was analyzed for moisture content by above method and the percentage of the moisture of sample is calculated by applying the following formula.

$$\% \text{ of moisture} = \frac{\text{Loss of weight of sample}}{\text{Weight of sample taken}} \times 100$$

$$\% \text{ of moisture} = \frac{0.132}{1 \text{ gm}} \times 100$$

$$= 13.2 \%$$

In this way the percentage of moisture content of fruit, stem and leaf were analyzed and depicted in the following table

| Samples | Actual Weight of sample taken (gm) | Weight of sample after analysis(gm) | % of loss weight of sample (gm) | Moisture content (%) |
|---------|------------------------------------|-------------------------------------|---------------------------------|----------------------|
| Fruit | 1.000 | 0.868 | 0.132 | 13.2 |
| Stem | 1.000 | 0.737 | 0.263 | 26.3 |
| Leaf | 1.000 | 0.816 | 0.184 | 18.4 |

(2) Ash content-

i) Ash content of fruit sample of Terminalia belerica-

Silica crucible was taken.It was kept in an oven at 100⁰C and weighed.This process was repeated till silica crucible showed constant reading. Moisture free 1 gm. Fruit sample was taken in a silica crucible and heated on blue flame of gas burner for 3 hrs. and then placed in a furnace at 600⁰C for 5 hrs. Sample was totally converted in to white ash.This process was repeated till it showed constant weight.

ii) Ash content of Stem sample of Terminalia belerica-

Silica crucible was taken.It was kept in an oven at 100⁰C and weighed.This process was repeated till silica crucible showed constant reading. Moisture free 1 gm. Stem sample was taken in a silica crucible and heated on blue flame of gas burner for 3 hrs. and then placed in a furnace at 600⁰C for 5 hrs. Sample was totally converted in to white ash.This process was repeated till it showed constant weight.

iii) Ash content of Leaf sample of Terminalia belerica-

Silica crucible was taken.It was kept in an oven at 100⁰C and weighed.This process was repeated till silica crucible showed constant reading. Moisture free 1 gm. Leaf sample was taken in a silica crucible and heated on blue flame of gas burner for 3 hrs. and then placed in a furnace at 600⁰C for 5 hrs. Sample was totally converted in to white ash.This process was repeated till it showed constant weight.

The fruit sample was analyzed for ash content by above method and percentage of ash content is calculated by applying the following formula.

$$\% \text{ of Ash} = \frac{\text{Loss of weight of sample}}{\text{Weight of sample taken}} \times 100$$

$$\% \text{ of Ash} = \frac{0.107}{1 \text{ gm}} \times 100$$

$$= 10.7 \%$$

In this way the percentage of ash content of fruit,stem and leaf were analysed and depicted in the following table

| Samples | Actual Weight of sample taken(gm) | Weight of sample after analysis (gm) | % of loss weight of sample (gm) | Ash content (%) |
|---------|-----------------------------------|--------------------------------------|---------------------------------|-----------------|
| Fruit | 1.000 | 0.893 | 0.107 | 10.7 |
| Stem | 1.000 | 0.822 | 0.178 | 17.8 |
| Leaf | 1.000 | 0.868 | 0.132 | 13.2 |

(3) Cold water solubility-

i) Cold water solubility of fruit sample of Terminalia belerica-

In 200 ml glass beaker oven dried 1 gm.fruit sample was taken. To it, 100 ml. distilled water was added and it was kept for 1 hr.It was filtered through previously weighed sintered glass crucible washed with distilled water,dried in oven at 110⁰C and weighed.

ii) Cold water solubility of Stem sample of Terminalia belerica-

In 200 ml glass beaker oven dried 1 gm.Stem sample was taken. To it, 100 ml. distilled water was added and it was kept for 1 hr.It was filtered through previously weighed sintered glass crucible washed with distilled water,dried in oven at 110⁰C and weighed.

iii) Cold water solubility of Leaf sample of Terminalia belerica-

In 200 ml glass beaker oven dried 1 gm.Leaf sample was taken. To it, 100 ml. distilled water was added and it was kept for 1 hr.It was filtered through previously weighed sintered glass crucible washed with distilled water,dried in oven at 110⁰C and weighed.

The cold water solubility of fruit sample was analyzed by known method and percentage of solubility of each sample is calculated by applying the following formula.

$$\% \text{ of Cold water solubility} = \frac{\text{Loss of weight of sample}}{\text{Weight of sample taken}} \times 100$$

$$\% \text{ of cold water solubility} = \frac{0.1200}{1 \text{ gm}} \times 100$$

$$= 12.2 \%$$

In this way the percentage of solubility in cold water of fruit, stem and leaf were carried out and depicted in the following table

| Samples | Actual Weight of sample taken(gm) | Weight of sample after analysis (gm) | Loss of weight of sample (gm) | Cold water solubility (%) |
|---------|-----------------------------------|--------------------------------------|-------------------------------|---------------------------|
| Fruit | 1.000 | 0.880 | 0.120 | 12.0 |
| Stem | 1.000 | 0.840 | 0.160 | 16.0 |
| Leaf | 1.000 | 0.860 | 0.140 | 14.8 |

(4) Hot water solubility-

i) Hot water solubility of fruit sample of terminalia belerica-

In 200 ml. glass beaker oven dried 1 gm. Fruit sample was taken. To it,150ml. distilled water was added and it was heated over boiling water bath for 1 hr.and filtered through previously weighed sintered glass crucible. Residue was washed with hot water.Dried in oven at 110⁰C and weighed.

ii) Hot water solubility of Stem sample of terminalia belerica-

In 200 ml. glass beaker oven dried 1 gm. Stem sample was taken. To it,150ml. distilled water was added and it was heated over boiling water bath for 1 hr.and filtered through previously weighed sintered glass crucible. Residue was washed with hot water.Dried in oven at 110⁰C and weighed.

iii) Hot water solubility of Leaf sample of terminalia belerica-

In 200 ml. glass beaker oven dried 1 gm. Leaf sample was taken. To it,150ml. distilled water was added and it was heated over boiling water bath for 1 hr.and filtered through previously weighed sintered glass crucible. Residue was washed with hot water.Dried in oven at 110⁰C and weighed.The hot water solubility of fruit sample was analyzed by known method and percentage of solubility of each sample is calculated by applying the following formula.

$$\% \text{ of hot water solubility} = \frac{\text{Loss of weight of sample}}{\text{Weight of sample taken}} \times 100$$

$$\begin{aligned} \% \text{ of hot water solubility} &= \frac{14.00}{1 \text{ gm}} \times 100 \\ &= 14.0 \% \end{aligned}$$

In this way the percentage of solubility in hot water of fruit,stem and leaf were carried out and depicted in the following table

| Samples | Actual Weight of sample taken(gm) | Weight of sample after analysis (gm) | Loss of weight of sample (gm) | Hot water solubility (%) |
|---------|-----------------------------------|--------------------------------------|-------------------------------|--------------------------|
| Fruit | 1.000 | 0.860 | 0.140 | 14.0 |
| Stem | 1.000 | 0.810 | 0.190 | 19.0 |
| Leaf | 1.000 | 0.830 | 0.170 | 17.0 |

(5) 1% NaOH Solubility-

i) 1% NaOH Solubility of fruit sample of Terminalia belerica-

In 200 ml.glass beaker oven dried fruit sample was taken .To it, (1% 100 ml)aqueous sodium hydroxide solution was added. It was heated over water bath for 1 hr.and filtered through oreviously weighed sintered glass crucible,washed with distilled water, dried in oven at 110⁰Cand weighed.

ii)1% NaOH Solubility of Stem sample of Terminalia belerica-

In 200 ml.glass beaker oven dried stem sample was taken .To it, (1% 100 ml)aqueous sodium hydroxide solution was added. It was heated over water bath for 1 hr.and filtered through oreviously weighed sintered glass crucible,washed with distilled water, dried in oven at 110⁰Cand weighed.

iii) 1% NaOH Solubility of Leaf sample of Terminalia belerica-

In 200 ml.glass beaker oven dried leaf sample was taken .To it, (1% 100 ml)aqueous sodium hydroxide solution was added. It was heated over water bath for 1 hr.and filtered through oreviously weighed sintered glass crucible,washed with distilled water, dried in oven at 110⁰Cand weighed.

The 1% NaOH solubility of fruit sample was analyzed by known method and percentage of solubility of each sample is calculated by applying the following formula.

$$\% \text{ of NaOH solubility} = \frac{\text{Loss of weight of sample}}{\text{Weight of sample taken}} \times 100$$

$$\begin{aligned} \% \text{ of NaOH solubility} &= \frac{0.380}{1 \text{ gm}} \times 100 \\ &= 38.0 \% \end{aligned}$$

In this way the percentage of solubility in 1% NaOH of fruit,stem and leaf samples were carried out and depicted in the following table

| Samples | Actual Weight of sample taken(gm) | Weight of sample after analysis (gm) | Loss of weight of sample (gm) | 1% NaOH solubility (%) |
|---------|-----------------------------------|--------------------------------------|-------------------------------|------------------------|
| Fruit | 1.000 | 0.620 | 0.380 | 38.0 |
| Stem | 1.000 | 0.510 | 0.490 | 49.0 |
| Leaf | 1.000 | 0.490 | 0.510 | 51.0 |

(6)1% HCl Solubility-

i)1% HCl Solubility of fruit sample of Terminalia belerica-

In 200ml. glass beaker oven dried 1 gm. fruit sample was taken.To it,(1%,100ml) hydrochloric acid was added. It was heated over water bath for 1hr.and filtered through previously weighed sintered glass crucible, washed with distilled water,dried in oven at 110⁰C and weighed.

ii)1% HCl Solubility of Stem sample of Terminalia belerica-

In 200ml. glass beaker oven dried 1 gm. stem sample was taken.To it,(1%,100ml) hydrochloric acid was added. It was heated over water bath for 1hr.and filtered through previously weighed sintered glass crucible, washed with distilled water,dried in oven at 110⁰C and weighed.

iii) 1% HCl Solubility of Leaf sample of Terminalia belerica-

In 200ml. glass beaker oven dried 1 gm. leaf sample was taken. To it, (1%, 100ml) hydrochloric acid was added. It was heated over water bath for 1hr. and filtered through previously weighed sintered glass crucible, washed with distilled water, dried in oven at 110⁰C and weighed.

The 1% HCl solubility of fruit sample was analyzed by known method and percentage of solubility of each sample is calculated by applying the following formula.

$$\% \text{ of HCl solubility} = \frac{\text{Loss of weight of sample}}{\text{Weight of sample taken}} \times 100$$

$$\% \text{ of HCl solubility} = \frac{0.970}{1 \text{ gm}} \times 100 = 97.0 \%$$

In this way the percentage of solubility in 1% HCl of fruit, stem and leaf were carried out and depicted in the following table

| Samples | Actual Weight of sample taken (gm) | Weight of sample after analysis (gm) | Loss of weight of sample (gm) | 1% HCl solubility (%) |
|---------|------------------------------------|--------------------------------------|-------------------------------|-----------------------|
| Fruit | 1.000 | 0.030 | 0.970 | 97.0 |
| Stem | 1.000 | 0.020 | 0.980 | 98.0 |
| Leaf | 1.000 | 0.030 | 0.970 | 97.0 |

III. Conclusions

In the present paper, the author studied the moisture content, ash content, solubility in cold, hot water, 1% NaOH and Hydrochloric Acid. The Proximate Analysis of fruit, stem and leaf of Terminalia belerica has been analysed and specified in the tabular form.

References

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