



# COMPARATIVE STUDY OF PROXIMAL ANALYSIS OF FRESH POMEGRANATE FLOWER POWDER AND DRY POMEGRANATE FLOWER POWDER - A WASTE MANAGEMENT STUDY

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## Abstract

Pomegranate flower is usually considered as a by-product of pomegranate cultivation as drop rate of flowers are very high and leads to agricultural waste. The present study was done to analyze the nutritional values of fresh pomegranate flower and dry pomegranate flower powder. Pomegranate flowers were procured from different areas of Delhi, NCR and nutritional analysis of fresh pomegranate flowers and pomegranate flower powder was done. The results revealed that the amounts of anthocyanins present in dry pomegranate flower powder were more as compared to fresh pomegranate flowers and the differences were statistically significant. According to NHANES (National Health and Nutrition Examination Survey) 2007-2008, the daily requirement of anthocyanins is 11.6g per day for people below 20yrs and women above 20yrs has to take 12.6g per day whereas for men the recommendation is 10.6g per day. Hence it can be recommended to consume 2.5 teaspoons of dry pomegranate flower powder to an individual to fulfil the daily requirement of antioxidants to take one step ahead to prevent various diseases like diabetes, nephrotoxicity, hepatotoxicity, oxidative stress, arthritis etc.

**Key words:** Pomegranate Flower, Anthocyanins and Waste Management.

## Introduction

Pomegranate flower is a part of shrub which grows as a small tree up to 5m only and comes from the family of Punicaceae (Fosang A, 2005). Flowering in pomegranate tree occurs very early as on one year old spurs. Pomegranate flowers are odourless but very colourful. Plant tends to produce more flowers than they can support to develop into fruit. Pomegranate flower is usually considered as a by-product of pomegranate cultivation as all flowers do not develop as pomegranate due to environmental conditions which includes soil type, climate and use of pesticides etc. which causes drop fall of flowers and leads to agricultural waste. Studies found that it is having tremendous nutritional value and health benefits. Various properties shown by flower are: Peroxisome proliferator-activated receptor (PPAR) (Huang *et al.*, 2005) - alpha/-gamma activator property according to which PPAR - alpha helps in fatty acid uptake and oxidation, inflammation and vascular function whereas PPAR - gamma helps in fatty acid uptake and storage, glucose homeostasis and inflammation (Dinesh Babu, 2010). Hence PPARs are major regulators for lipid and glucose metabolism. Antioxidative property as presence of two anthocyanins - pelargonidin 3, 5-diglucoside and pelargonidin 3-

glucoside in its purified form showed strong radical scavenging activities (Kaur *et al.*, 2006). Anti-inflammatory property (Li *et al.*, 2008) and hepatoprotective property (Motamedi and Nematbakhsh, 2014). Health benefits of pomegranate flower are: helps to regulate blood glucose, ensures heart health, prevents arthritis (Taylor and Giusti, 2015) and also reduce cisplatin chemotherapy induced nephrotoxicity (Xu *et al.*, 2017). Hence, instead of being treated as an agriculture waste pomegranate flower can be utilized as a food ingredient and also can be used for food product formulation. Although India produces a large amount of pomegranate but the nutritional properties and health benefits are less focused by communities. Considering all these factors the present study was done to analyze the nutritional values of fresh pomegranate flower and dry pomegranate flower powder.

## Materials and Methods

Fresh pomegranate flowers are procured from different areas of Delhi, NCR and divided into two different sections. Fresh pomegranate flowers were nutritionally analysed for energy, protein, fat, carbohydrate, dietary fibre, anthocyanins, ash and moisture content by food testing laboratory. Another section of pomegranate flowers were dried at room

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temperature for about 1 month. Dried flowers are then converted into powder through the process of grinding and proximal analysis was done for energy, protein, total fat, carbohydrates, dietary fibre, ash, moisture and anthocyanins content. Nutritional analysis was done by ITS laboratory, Noida which is NABL and ISO certified laboratory certificate No. TC-6179 and certificate No. 160227309 respectively. The results were statistically analyzed by SPSS software version 21.

### Result and Discussion

The proximal analysis of fresh pomegranate flower and dry pomegranate flower powder reveals results as:

Table 1 shows the nutritional properties per 100gm of extract developed from fresh pomegranate flowers. The powder has 21.8 kcal of energy, <0.1g of protein, 2.37g of total carbohydrate, <0.1g of total fat, 1.04g of dietary fibre and 274.5mg of anthocyanins.

Table 2 shows the nutritional properties per 100gm of extract developed from dry pomegranate flowers powder. The powder has 285.6 kcal of energy, 9.4g of protein, 10.84g of total carbohydrate, 2.35g of total fat, 14.84g of dietary fibre and 448.8mg of anthocyanins.

Table 3 shows that antioxidant content in fresh pomegranate flower and dry pomegranate flower powder is statistically significantly as p-value is <0.01.

### Conclusion

The study conclude that dry pomegranate flower powder is more nutritious as compared to fresh pomegranate flowers due to loss of moisture content which enhance the nutritional properties of the ingredient. Fresh pomegranate flowers and dry pomegranate flower powder have high content of anthocyanins which can help to prevent various diseases like diabetes, CVD's and other metabolic disorders. RDA of anthocyanins by NHANES (National Health and Nutrition Examination Survey) 2007-2008 stated as 11.6g per day for people below 20yrs and women above 20yrs has to take 12.6g/day whereas for men the recommendation is 10.6g/day (Zhang *et al.*, 2011). Hence we can recommend 2.5 teaspoons of dry pomegranate flower powder to an individual to enhance anthocyanins content in the body.

### Limitations

Shelf life of dry pomegranate flower powder can be analyzed to assure the stability of its nutritional properties.

### Acknowledgement

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**Table 1: Nutritional Analysis of fresh pomegranate flowers**

S. No.	Parameter	Values / 100gm
1	Energy (Kcal)	21.8
2	Protein (gm)	<0.1
3	Total Fat (gm)	<0.1
4	Total Carbohydrate (gm)	2.37
5	Dietary Fibre (gm)	1.04
6	Anthocyanins (mg)	27.45
7	Ash Content (%)	4.27
8	Moisture Content (%)	67.8

**Table 2: Nutritional Analysis of dry pomegranate flowers powder**

S. No.	Parameter	Values/100gm
1	Energy (Kcal)	285.6
2	Protein (gm)	9.4
3	Total Fat (gm)	2.35
4	Total Carbohydrate (gm)	10.84
5	Dietary Fibre (gm)	14.84
6	Anthocyanins (g)	44.88
7	Ash Content (%)	2.53
8	Moisture Content (%)	11.8

**Table 3: Antioxidant content in fresh pomegranate flowers and dry pomegranate flower powder**

Antioxidant	Fresh Pomegranate Flower	Dry Pomegranate Flower Powder	P- value
Anthocyanins	27.45gm / 100gm	44.88gm / 100gm	<0.01