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# Iron chelating activity of Indian guava leaves (*Psidium Guajava*) in various extracting solvents

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**Abstract**
Metals with normal concentration have essential roles in body metabolism, however in higher concentration they can be induce sever toxicity. Treatment with chelating agents is useful practice to reduce metal toxicity in live organism. The leaves of Indian Guava (Psidium Guajava) were taken with the aim of evaluating the chelating activities. The extract in three different solvents viz. aqueous, methanol and petroleum ether were prepared. The ability was studied by using Benzie and Strain method in EDTA was used as standard for this purpose. Methenolic extract was found to be most effective iron chelator. Highest activity was found in 1000µg/ml concentration of guava leaves i.e. 68.20% that of standard EDTA was found to be 89.00%. In conclusion the methanolic extract of Indian guava (psidium guajava) could be used in treatment of iron overload diseases.

**Keywords:** guava leaves (Psidium Guajava), solvents

## 1. Introduction
Patients with chronic anemia such as that thalassemia, require regular blood transfusions in order to improve both quality of life and survival. Humans are unable to eliminate the iron released from the breakdown of transfused red blood cells and the excess iron is deposited in the form of hemosiderin and ferritin, in various parts of the human body such as kidney, liver, spleen and myocardium. When iron overload results in the tissue damage which gives rise to severe complications such as heart failure, endocrine dysfunction like diabetes, hypothyroidism, liver failure and early death. In chelation therapy the complex is form with chelating, when the iron is present in excess amount in the tissues which is excreted in the feces and /or urine. The synthetic compounds like as Butylate hydroxytoluene and Butylated hydroquinone that were used as antioxidants therapeutically which showed side effects [4].
Guava (Psidium Guajava), also known locally as jambu batu. The tree is very hardy and can grow to about 7-8 meters. On average, the fruit contains 74-87% moisture, 13-26% dry matter, 0.5-1% ash, 0.4-0.7% fat and 0.8-1.5% protein (Chin and Yong, 1980). It is rich in ascorbic acid (Vitamin C), at levels for higher than most imported and local fruits.
Guava is good source of minerals like iron, calcium and phosphorus as well as many vitamins like ascorbic acid, pantothenic acid, vitamin A and niacin (Paull. and Goo, 1983). It is also reported to be rich in antioxidants like phenolics and carotene (Luximon Raman *et al.* 2003).
Guava, as in many other fruits and vegetables, is also rich in antioxidants that help to reduce the incidence of degenerative diseases such as arthritis, arteriosclerosis, cancer, heart disease, and brain dysfunction. (Monash University Malasia *et al.* 2006).
The effect of phenolic compound on absorbance of these metals has been studied and indicated the phenolic monomers and polyphenols form complex with metals. Juglans regia and coffea Arabica shows great activity of iron chelation which can be an important tool for treatment of various diseases like thalassemia. Thalassemia patient usually shows under production of normal globin proteins (Maggie *et al.*, 2002). The aim of current work is to evaluate chelating ability of Guava (Psidium Guajava) against iron overload by in vitro technique so we can get to know its metal chelating potential for iron.

## 2. Material and Methodology
### Collection of material
The Indian guava leaves are collected from guava trees of Akola city, Maharashtra. The identification was made from botany department of Shri. Shivaji College of Akola. The leaves were grinded by grinder and used for extract.

### Preparation of extract
Guava leaves were grinded by mechanical grinder and subjected to soxhlet apparatus for extract preparation. Various concentration of aqueous, methanolic and petroleum ether extract were prepared such as 250µg/ml, 500µg/ml, 750µg/ml and 1000µg/ml.

## 3. Iron Chelating Activity
The iron chelating activity of guava leaves were determined by method of Benzie and Strain (1996) [5].
The principle is based on formation of 1, 10 Phenanthroline Fe complex and its disruption in presence of chelating agent. The reaction mixture containing 1 ml of 0.05% 1, 10 Phenanthroline in methanol 2ml ferric chloride (200µM) and 2ml of various concentration of guava leaves extract (Aqueous, Methanolic and petroleum ether) such as 250µg/ml, 500µg/ml, 750µg/ml and 1000µg/ml was incubated as room temperature for 10min and absorbance of same was measured at 510nm of spectrophotometer. EDTA was used as a classical metal chelator.

**Observation**

**Table 1:** Effect of different extract of *Psidium Guajava* on iron chelation.

| Concentration in µg/ml | Aqueous extract (%activity) | Methanolic extract (%activity) | Petroleum ether extract (%activity) | EDTA as standard (%activity) |
|---|---|---|---|---|
| 250 µg/ml | 20.00 | 45.00 | 32.30 | 54.00 |
| 500 µg/ml | 35.80 | 56.60 | 49.00 | 64.00 |
| 750 µg/ml | 41.10 | 64.30 | 54.50 | 79.00 |
| 1000 µg/ml | 51.60 | 68.20 | 60.10 | 89.00 |

## 4. Conclusion

The excess metal ions in human body cause damaged to the biomolecules such as lipids, proteins and DNA.The chelating activity of plants helps to reduce the excess metal ions by interrupting in oxidizing chain reaction. The efforts of the study are the identification of iron chelating activity of leaf extract *Psidium guajava*. There is a increase in the chelating activity when the concentration increases. As the concentration increase the chelating capacity also increase. At 250µg/ml concentration, methanolic extract of *Psidium guajava* displayed 45.00% which is increased to 68.20% at 1000µg/ml iron chelating activity. In support to this, the results of our study indicates that methanolic extract of *Psidium guajava* has better chelating capacity as compared to aqueous and petroleum ether extract.

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