

## A STUDY ON TOTAL PHENOLIC CONTENT OF GREEN GRAPES IN DIFFERENT SOLVENTS

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### ABSTRACT

Grapes are well known for being rich in phytochemicals and antioxidant property. They have drawn attention not only because of their important role in health but also for their benefits of deriving different products from them. In present study green grape extract was prepared for which methanolic, ethanolic and aqueous solvents were used. Total Phenolic Content (TPC) was estimated spectrophotometrically by Folin-Ciocalteu method. Out of the three solvents TPC of Green grape methanolic extract was found to be the highest i.e.  $134.4 \pm 0.2$  mg/g GAE followed by green grape ethanolic extract and then green grape aqueous extract.

**KEYWORDS:** Total Phenolic Content, antioxidant, phytochemicals, methanolic, ethanolic, aqueous, Folin-Ciocalteu, GAE.

### 1. INTRODUCTION

The interest in polyphenolic antioxidants has increased remarkably in the last decades due to their elevated capacity in scavenging free radicals that are associated with various human diseases. Phenolic compounds are widely distributed in the plant kingdom. They are found in many foods in different concentrations.<sup>[1]</sup> Phenolic compounds are present in the pulp, skin, and seeds of grapes. They are considered one of the most important quality parameters of grapes and their products since they add to their color and organoleptic characteristics such as flavor, bitterness, and astringency. Phenolic compounds are efficient antioxidants.<sup>[2,3]</sup> These compounds due to their antioxidant properties prevent the damage of cells by oxidative stress.<sup>[4,5,6]</sup> Health benefits of polyphenols are well known, especially in the prevention of diseases such as cancer, cardiovascular, inflammatory and neurodegenerative diseases.<sup>[7,8,9]</sup> Biological

activity of polyphenols depends on their bioavailability. Phenolic compounds are ubiquitous in plants, and when plant foods are consumed, these phytochemicals contribute to the intake of natural antioxidants in the human diets.<sup>[10]</sup> Use of phenolic compounds as preservatives has been documented and interest has been focused on using them as food preservatives.<sup>[11,12]</sup> The objective of present study was therefore to determine levels of phenolic compounds in green grapes prepared using methanol, ethanol and water as solvents.

## 2. MATERIALS AND METHODS

### 2.1 Plant material

The berries of green grapes were collected from farms of Nasik and were brought to lab and then washed and were further processed for extraction.

### 2.2 Extraction

Extraction was done by using maceration process. Grape berries (500gm) were grounded and dipped in solvent (methanol) and the mixture was left for four days with occasional shaking or stirring. The extract was then taken out and allowed to dry in oven. This process was repeated with the left over grounded residue of berries until the solvent runs clear. Same process for extraction was done with other two solvents i.e. ethanol and water.

### 2.3 Determination of Total Phenolic Content (TPC)

The total phenolic content (TPC) was determined by spectrophotometry, using gallic acid as a standard, according to the Folin-ciocalteu method described by Maurya S. and Singh D.<sup>[13]</sup> Total phenolic content were expressed as mg/g gallic acid equivalent (GAE). Concentration of 0.01, 0.02, 0.03, 0.04 and 0.05 mg/ml of gallic acid were prepared in methanol. Concentration of 0.1 and 1 mg/ml of plant extract were also prepared in methanol and 0.5 ml of each sample were introduced into test tube and mixed with 2.5 ml of a 10 fold dilute folin ciocalteu reagent and 2 ml of 7.5% sodium carbonate. The tubes were covered with parafilm and allowed to stand at room temperature for 30 minutes. Absorbance at 760nm was recorded spectrophotometrically. Experiments were performed in triplicate.

## 3. RESULTS AND DISCUSSION

Methanol, ethanol and aqueous extracts of green grapes were prepared to examine the total phenolic content. The total phenolic content using the Folin ciocalteu's reagent is expressed in terms of gallic acid equivalent (the standard curve equation:  $y=0.005x + 0.0652$ ,  $R^2=0.9761$ ). The values obtained for the concentration of total phenols are expressed as mg of

GA/g of extract. The contents of total phenols in various green grape extract are mentioned below in table 1.

**Table 1: Total Phenolic Content (expressed as mg/g gallic acid equivalent) of grape extract**

Sample	Total Phenolic Content $\pm$ SD
Green grape ethanolic extract	128.6 $\pm$ 0
Green grape methanolic extract	134.4 $\pm$ 0.2
Green grape aqueous extract	124.13 $\pm$ 0.12

Folin-Ciocalteu method is a rapid and widely used assay to determine total phenolic content (TPC). This method is based on the reducing power of phenolic hydroxyl groups, but it is well known that different phenolic compounds have different responses towards Folin-Ciocalteu reagent. In the present study TPC of Green grape methanolic extract was found to be the highest i.e. 134.4 mg/g GAE followed by green grape ethanolic extract i.e. 128.6 mg/g GAE. Least TPC was observed in Green grape aqueous extract i.e. 124.13 mg/g GAE. According to a previous mentioned work on commercial raisins produced from Sultana variety grapes by Susana S, Maria D. Rivero-Perez *et al.* <sup>[14]</sup> like our results no significant difference was found among the three samples analyzed. Total phenolic compound values ranged from 110.8 to 406.9 mg/100 g raisin (average value of 215.8 mg/100 g raisin) for all raisin grapes analyzed. Work of Butkhup *et al.* <sup>[15]</sup> reported highest total phenolic content in the grape seed extract (116.73 g gallic acid equivalent /100 g db), followed by the grape skin extract (75.20 g gallic acid equivalent /100 g db) and the whole grape extract (48.04 g gallic acid equivalent /100 g db).

#### 4. CONCLUSION

Grape is a natural product rich in polyphenols and other various kinds of phytochemicals. Results obtained in our study shows that green grape methanolic extract is a rich source of phenolic compound. Other two extracts i.e. ethanolic and aqueous extracts also have significant amount of phenolic content in them. This concludes that green grapes may be exploitable as a potential source of phenolic compounds for possible use as antioxidant agents and can be used in human nutrition as well. It can be used for medicinal and therapeutic purposes also.

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