Original Research Article

A comparative account on total flavonoid contents in green grapes vs. black grapes (vitis vinifera l.)

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Abstract

Grapes are one of the most popular fruits in the world because of their taste, texture, flavor, variety, and ease of portability. They are of various colors with numerous properties. Present study encompasses a comparative account drawn between Green grapes vs. Black grapes in context of their total flavonoid content. Evaluation of total flavonoid content was done by using aluminium chloride colorimetric method. Methanolic extracts of green and black grapes were used for the study. Analysis says that methanolic extract of black grapes has more flavonoid content i.e. 263.3 ± 1.1 mg rutine/g dry weight as compared to methanolic extract of green grapes i.e. 205.6 ± 1.5 mg rutine/g dry weight. Thus, presence of high amount of flavonoids in black grapes make them more potent for prevention against chronic ailments as compared to green grapes.

Key Words: Green grapes, Black grapes, Methanolic extracts, Total Flavonoid Content, Colorimetric method, mg rutine/g dry weight.

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INTRODUCTION

Grapes are known as 'The Queen of Fruits'. Apart from adding vibrance and appeal to food, they are also very beneficial. They contain immunity-boosting vitamin C, simple sugars for providing instant energy, and anti-inflammatory antioxidants Ahmad and Ali Siahsar (2011). Grapes can be characterized into three types based on their color – Green/White, Black/Blue and Red grapes. It is a well known fact and has also been proved in many researches that grapes and its parts are a reservoir of antioxidants Li H. *et al*. (2008). Many researches are being carried out to evaluate its different phytochemical contents and to derive something beneficial out of it for human well being. As mentioned above grapes are categorized into three types according to their colors but to decide which one out of them is more healthier, is tricky. To confirm the same total flavonoid contents of both green and black grapes was evaluated. Flavonoids are a group of plant metabolites which provide health benefits through antioxidant effects and cell signalling pathways. They are found in a variety of fruits and vegetables and are an essential pigment to impart colour which is needed to attract pollinating insects. Flavonoids are the most important groups of secondary metabolites and bioactive compounds in plants Kim *et al*. (2003). Flavonoids comprise a large number of substances which play significant role in defending biological systems against the detrimental effects of oxidative processes on macromolecules, such as carbohydrates, proteins, lipids and DNA Halliwell and Gutteridge (1989). Flavonoids present in tea, cocoa, chocolate, fruits, vegetables and wine are extremely efficient antioxidant compounds which assist to lower the incidences of stroke, heart failure, diabetes and cancer. Their anticancer effects have been comprehensively investigated. Moreover, antioxidants impose positive

effects on health improvement and are also added in food for delaying oxidation of food and preventing them from degradation Hras *et al*. (2000). Kaempferol, a type of flavonoid, was revealed to reduce the growth of ovarian cancer cell lines (91%) and A2780/CP70 (94%) by concentration of 20 and 40 µM, respectively as well as breast cancer cell lines Luo *et al*. (2009). Epigallocatechin 3-gallate is a proficient antiangiogenesis agent which inhibits tumor cell invasion and proliferation Tang *et al*. (2007) and is observed inhibiting growth of the NBT-II bladder tumor cells and breast cancer cell lines Chen G. (2004). Keeping in view tremendous amount of beneficial effects of flavonoids, black and green grapes were compared in terms of their total flavonoid content which was evaluated using Aluminium chloride colorimetric method.

MATERIAL AND METHODS

Collection of Sample: Fresh green and black grape berries (Samples) were collected from Ganesh grape garden, Nashik. Collected samples were taken to laboratory for further processing. Samples were thoroughly washed with double distilled sterile water. Extraction was done by using maceration process.

Extraction of Extract: 500 grams of both samples were grounded and dipped in 50% methanol. The mixture was left for four days with occasional shaking or stirring. The extracts were 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.

Spectrophotometric Quantification of Total Flavonoid Content: Total flavonoids were measured by a colorimetric assay according to Dewanto *et al*. (2002). An aliquot of diluted sample or standard solution of rutin was added to a 75 µl of $NaNO_2$ solution, and mixed for 6 min, before adding 0.15 mL $AlCl_3$ (100 g/L). After 5 min, 0.5 mL of NaOH was added. The final volume was adjusted to 2.5 ml with distilled water and thoroughly mixed. Absorbance of the mixture was determined at 510 nm against the same mixture, without the sample, as a blank. Total flavonoid content was expressed as mg rutin/g dry weight (mg rutine/g DW), through the calibration curve of Rutin. All samples were analysed in three replications.

RESULT AND DISCUSSION

Methanolic extracts of green and black grapes (*Vitis vinifera* L.) were used for present comparative study. Total flavonoid content was expressed in terms of rutine equivalent (the standard curve equation: $y = 0.001x - 0.118$, $R^2 = 0.985$). The values obtained for the concentration of total flavonoids are expressed as mg rutine/g dry weight. Total flavonoid content in green and black grapes are mentioned below in table 1:

Table 1: Total Flavonoid Content (expressed as mg rutine/g dry weight) of grape extract

Sample	Total Flavonoid Content ± S.D.
Green grape methanolic extract	205.6 ± 1.5
Black grape methanolic extract	263.3 ± 1.1

The aluminium chloride colorimetric method is one of the most commonly used method for the total flavonoid determination. After addition of Al (III), a yellow coloured complex was formed, which then immediately turned to red after addition of NaOH, and the value of absorbance was measured at 510 nm. In present study, total flavonoid content of Black grape methanolic extract (263.3 ± 1.1 mg rutine/g dry weight) was observed to be higher than total flavonoid content of Green grape methanolic extract (205.6 ± 1.5 mg rutine/g dry weight). Similar to present study Bodo A. *et al*. (2017) drew a comparison between total flavonoid content of different tissues of three berry coloured variant grapevines (*Vitis vinifera* L.) i.e. Goher conculta (G. White, G. Altering and G. Red). They concluded that the amount of flavonoid was lowest in G. Red shaded leaves (31 mg QE/g) and highest in G. Altering sun leaves (96 mg QE/g). Flavonoids were distributed in similar amounts in berry skin and leaves. Moreover, skin of G. Red possessed highest amount of flavonoids (71.1 mg QE/g dw) while skin of G. white possessed lower amount of flavonoids (44.4 mg QE/g dw) and seed of G. Altering possessed highest amount of flavonoids (113.9 mg QE/g dw) while skin of G. Red possessed lower amount of flavonoids (93.4 mg QE/g dw). Likewise Shao D. *et al*. (2016) conducted a study in which seeded and seedless Chinese raisins of black, reddish brown and yellowish-green grape variety were compared alongwith each other in terms of their total flavonoid content and various other factors. In their study it was found that although seeded yellow green variety of grape exhibited higher flavonoid content (6.90 ± 0.68 µmol RE/g) as compared to seeded black variety of grapes ((5.64 ± 0.61 µmol RE/g)) and reddish-brown seedless variety ((1.20 ± 0.14 µmol RE/g) but the difference in total flavonoids contents of raisins from different color or different seeded status was not significant. Present study shows that black grapes have high flavonoid content as compared to green grapes hence more beneficial too.

CONCLUSION

Grapevine is a polyphenol-rich plant, hence consumption of its berry, juice or wine may serve health-promoting benefits. In present study Green and Black grapes (Vitis vinifera L.) were compared for their total flavonoid content and it was concluded that black grapes possessed higher flavonoid content. High flavonoid content leads to

reduced risk of cancer, heart disease, asthma, and stroke and helps in promoting healthy blood vessel functions. This implies that consumption of black grapes leads to several health beneficial favourable effects.

REFERENCES

1. Ahmad, S.M., and Ali Siahsar, B. (2011). Analogy of physicochemical attributes of two grape seeds cultivar. Ciencia e Investigación Agraria. 38(2), 291-301.
2. Bodo, A., Csepregi, K., Szata, B.E., Nagy, D.U., Jakab, G., Kocsis, M. (2017). Bioactivity of Leaves, Skins and Seeds of Berry Color Variant Grapevines (Vitis vinifera L.). Journal of Pharmacognosy. 5(1): 16-22.
3. Chen, G. (2004). Effect of low fat and/or high fruit and vegetable diets on plasma level of 8-isoprostane-F2alpha in nutrition and breast health study. Nutrition Cancer. 50: 155-160.
4. Dewanto, X., Wu, K., Adom, K., R.H., Liu. (2002). Thermal processing enhances the nutritional value of tomatoes by increasing total antioxidant activity. Journal of Agriculture and Food Chemistry. 50: 3010–3014.
5. Halliwell, B. and Gutteridge, J. M. C. (1989). Free Radicals in Biology and Medicine. 2nd Edition Clarendon Press, Oxford. 173-175.
6. Hras, A.R., Hadolin, M., Knez, Z., Bauman, D. (2000). Comparison of antioxidative and synergistic effects of rosemary extract with alphatocopherol, ascorbyl palmitate and citric acid in sunflower oil. Food Chemistry. 71: 229-233.
7. Kim, D., Jeond, S., Lee, C. (2003). Antioxidant capacity of phenolic phytochemicals from various cultivars of plums. Food Chemistry. 81: 321-326.
8. Li, H., Wang, X., Li, P., Li, Y., Wang, H. (2008). Comparative Study of Antioxidant Activity of Grape (Vitis vinifera) Seed Powder Assessed by Different Methods. Journal of Food and Drug Analysis. 16(6): 67-73.
9. Luo, H., Rankin, G.O., Liu, L., Daddysman, M.K., Jiang, B.H., Chen, Y.C. (2009). Kaempferol inhibits angiogenesis and VEGF expression through both HIF dependent and independent pathways in human ovarian cancer cells. Nutrition Cancer. 61: 554-563.
10. Shao, D., Zhang, L., Du, S., Yokoyama, W., Shi, J., Li, N., Wang, J. (2016). Polyphenolic Content and Color of Seedless and Seeded Shade Dried Chinese Raisins. Food Science and Technology Research. 22(3): 359-369.
11. Tang, F., Chiang, E., Shih, C. (2007). Green tea catechin inhibits ephrin-A1- mediated cell migration and angiogenesis of human umbilical vein endothelial cells. The Journal of Nutritional Biochemistry. 18: 391-399.

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