

Phytochemical Screening of various Health Promoting Components in Red Grape Seed (*Vitis vinifera* .L), *Tinospora cordifolia* and *Phyllanthus emblica* fruit extracts

¹Dr.M.Muniya Naik, ²A.Jayasankar ³P.Ramesh Kumar ⁴P.Venkata Viswa Prasad ⁵Dr.D.Veera Nagendra Kumar ⁶C.Narasimha Rao ⁷M.Rama Mohan, ^{*8}V.Uday Kiran, ⁹ Dr.P.Subramanyam, ¹⁰K. Chandra mohan

¹Dept of Zoology, Govt. Degree College, Rayachoty-AP.

²Dept of Zoology, S.V.C.R.Govt. Degree College, Palamaner, Chittoor-AP.

³Dept of Zoology, Govt. Degree College Paderu, Alluri Sitharamaraju(Dt)-AP.

⁴Dept of Zoology Govt.Degree College for Women, Rayachoty-AP.

^{5&6}Dept of Zoology, Govt. Degree College for Men (A)-Kadapa-AP.

⁷Dept of Zoology, SV College of Arts & Computer Sciences, Proddatur-AP.

⁸Dept of Zoology, Loyola Degree College (YSRR) Pulivendula-AP.

⁹Dept of Botany, SKR & SKR Degree College for Women (A) Kadapa-AP.

¹⁰Dept of Zoology SCNR Govt Degree College Proddatur-AP.

Corresponding Author:

Mr. V.Uday Kiran

Lecturer In Zoology

Loyola Degree College (YSRR)

Email- vempati.uday6@gmail.com

Abstract:

Objective: The aim of the study is to screen the phytochemicals present in the Red Grape Seed (*Vitis vinifera* .L), *Tinospora cordifolia* and *Phyllanthus emblica* fruit extracts .

Methodology: Red grapes (*Vitis vinifera*.L), *Tinospora cordifolia* and *Phyllanthus emblica* Extracts were found to provide a wide range of health promoting and health protecting properties, exhibiting plenty of potential compounds to screen and exhibit different varieties of polyphenolic compounds. Phytochemicals are organic chemical elements that exist naturally in plants and have positive effects on human health.

Results: The extracts of Red Grape Seed, *Tinospora cordifolia* and *Phyllanthus emblica* shows the presence of polyphenolic compounds such as flavonoids, isoflavonoids, anthocyanidins, phytoestrogens, terpenoids, carotenoids, limonoids, phytosterols, glucosinolates and fibres as well as alkaloids, glycosides and polyphenols. The phytochemicals are typically created by a variety of metabolic processes in plants. They are crucial in defending plants against environmental dangers including stress, drought, pathogenic attack etc.

Conclusion: The findings of this study clearly demonstrate the significant influence of Red Grape (*Vitis vinifera*.L) Seed, *Tinospora cordifolia* and *Phyllanthus emblica* fruit extracts on the healthcare system and its potential to offer medical benefits, such as the prevention and treatment of Neurological and Physiological diseases.

Keywords: *Phytochemicals, *Nutraceuticals, *Polyphenols,* Flavonoids, *Health beneficial components.

Introduction:

With the aim of defending themselves from illnesses, plants such as *Phyllanthus emblica*, *Tinospora cordifolia*, and Red grapes produce phytochemicals, which have antibacterial properties. They are used as a component of traditional medicine to treat various metabolic, immune, and neurological diseases in people. Increased phytochemical synthesis in medicinal plants is possible through artificial plant cultivation. This research study focuses on in-vitro synthesis of phytochemicals and their therapeutic potential (**Aanchal Bansal and Chinmayee Priyadarsini, 2021**).

Red Grape Seed Extract (RGSE) is rich in polyphenols, a compound that's high in antioxidants. **OPC (Oligomeric Proanthocyanidins/procyanidins)** is more powerful antioxidant than Vitamin C, Vitamin E and Beta-Carotene. These anti-oxidants help protect cells from free radical damage and promote healthy circulation (**Gupta et al. 2020**). **Red Grape Seed Extract (RGSE)** has been shown to remain in the body for as long as 3 full days, and is 20 times more potent than Vitamin C, and 50 times stronger than Vitamin E. The extract was first found to promote cardiovascular health, and now, it has been found to contain the richest sources of OPCs. The research done on **Red Grape Seed Extract (RGSE)** first came about in late 20th century from the "**French paradox**", where the French had very low rates of heart disease, while some of their diet and other factors would contribute to higher incidence of heart diseases.

Foods made from plants contain substances called "**Phytochemicals**". These compounds impart flavour, colour and scent to plants. Researchers are only now beginning to understand the various functions these compounds may have. But they might also be good for our health when we eat them. Promising research suggests they may have the possible health promoting effects such as:

- ❖ Potential to improve health
- ❖ Potential to reduce the risk of obesity and cardiovascular diseases

- ❖ Protect the cells against type 2 diabetes
- ❖ Helps to improve the immune system
- ❖ Protect cells and DNA from damage that may lead to cancer
- ❖ Reduce inflammation
- ❖ Slow the growth rate of some cancer cells
- ❖ Helps to regulate hormones.

Experts compare Red Grapes health benefits to those of *Phyllanthus emblica*, *Tinospora cordifolia* which have antibacterial properties (www.roswellpark.org).

MATERIAL AND METHODS

Collection of Plant materials:

The medicinal plants of **Jeevakona, Sheshachalam-Reserved forest, Tirupathi** situated in the Rayalaseema belt of Andhra Pradesh, was the source of the leaf or plant samples of *Tinospora cordifolia*, *Phyllanthus emblica*, and Red Grapes. With the aid of various floras, the selected plant species have been previously identified.

Preparation of extraction:

10 g of air-dried powder was added to a conical flask that had 100 ml of methanol in it and had a cotton wool stopper in it. After that, the mixture was vigorously shaken for 24 hours at 190–220 rpm. After the 24-hour period, the supernatant was collected, the solvent was evaporated to lower the final volume to one-fourth of the initial volume (12), and it was then kept at 4 °C in airtight bottles.

The leaves of a number of different plant species were carefully selected, cleaned, dried in the shade, mechanically processed, and then coarsely powdered. There was also put 10 g of the air-dried powder to a conical flask that contained 100 ml of methanol. Following the application of cotton wool to seal the flask, it was set on a rotary shaker with a speed setting of 190–220 rpm for 24 hours. The solvent was evaporated to reduce the final volume to one-fourth of the initial volume after the supernatant was collected after 24 hours (12). Following that, the supernatant was kept in airtight bottles and kept at 4 °C (**Parekh and Chanda, 2007**).

The plants powders were next extracted using the Soxhlet technique and 90% methanol, and the resulting extracts were employed in a number of chemical colour reaction experiments to identify different phytochemical groups. Phytochemical screening, which assessed the qualitative chemical composition of crude extracts using frequently used precipitation and coloration reactions, allowed for the identification of the major natural chemical groups, including starch, alkaloids, flavonoids, tannins, reducing sugars, amino acids, and lignins. If these chemicals were present or not in the examined crude extract was determined by these analyses' general responses (**Sudipa et al., 2013**).

Results:

Tinospora cordifolia, *Phyllanthus emblica* and Red Grape seed extracts were the plants with the highest concentration of phytoconstituents, including starch, alkaloids, flavonoids,

tannins, reducing sugars, amino acids, tannins, phenols, steroids, and lignins, according to a preliminary phytochemical analysis of their methanolic extract (**Table-1**). Figure 1 depicts the chemical colour reaction tests for the chemical components of the plant extracts under investigation. Starch, alkaloids, amino acids, and lignins have all been positively impacted by methanolic extracts of the entire plant of the three plants mentioned above. However, only a small number of bioactive components exhibit weak extraction rates. This study aims to assess various phytochemicals in particular plants. All bioactive substances, including alkaloids, flavonoids, resins, tannins, reduced sugars, amino acids, terpenoids, starch, and steroids, can be found in *Tinospora cordifolia* in significant amounts. The tannin content of methanolic extracts is not present in Red grape seeds (**Table.1**). Regardless of the circumstance, our experiment revealed that a qualitative analysis of conventional chemical tests reveals the coloration for it to produce meaningful results.









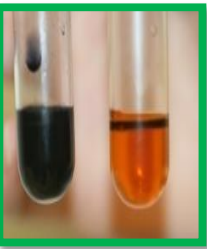
Table-1: Screening of Phytochemicals for Methanolic plant extracts of selected Plants

Sl. No.	Micro chemical Tests	Colouration	Selected Plants		
			Tinospora cordifolia	Phyllanthus emblica	Red Grape Seeds
1	Starch by weak Iodine solution	Blue black	++	++	++
2	Alkaloids by Wagner's reagent	Dark brown	++	++	++
3	Flavonoids by 10% NaOH solution	Yellowish brown	++	++	+++
4	Tannins by 10% aqueous Lead acetate solution	Light yellow ppt.	++	++	+++
5	Reducing sugars by Benedict's reagent	Brick red	++	++	++
6	Amino acids by Ninhydrin reagent	Lemon yellow	++	++	++
7	Lignins by Phloroglucinol reagent	Yellowish Orange	++	++	++
8	Phenols by litmus test	Red Colour	++	++	++
9	Terpenoids by Salkowski test	Reddish Brown Colour	++	++	+
10	Steroids by H ₂ SO ₄ test	Red Colour	++	++	++

(+) = indicates presence; (-) = indicates absence

Fig 1: Photographs of investigated medicinal plants

<p>Tinospora cordifolia (Source. https://commons.wikimedia,)</p>	<p>Red Grapes (<i>Vitis vinifera</i> .L) Source: https://fineartamerica.com</p>
	
<p>Phyllanthus emblica (Source. https://nurserylive.com)</p>	
	

Figure-2: Chemical colour reaction tests of whole plants extractions in selected medicinal Plants.				
<i>Alkaloids'</i>	<i>Phenols</i>	<i>Tannins</i>	<i>Amino acids</i>	<i>Reducing sugars</i>
				
<i>Terpenoids & Steroids</i>	<i>Lignin</i>	<i>Flavonoids</i>	<i>Starch</i>	
				

Discussion:

Medicinal properties of selected plant species:

- 1. Tinospora Cordifolia:** Traditional ayurveda practitioners have long utilised tinospora cordifolia to treat a variety of ailments, including fever, jaundice, chronic diarrhoea, cancer, dysentery, bone fractures, pain, asthma, skin diseases, deadly insect stings, and eye issues (Raj. S.J TAA et al., 2022).
- 2. Phyllanthus emblica:** The most medicinally advantageous portion of the plant is its fruit, which has been used in Ayurveda as a potent rasayana and in traditional medicine to treat diarrhoea, jaundice, and inflammation. Different plant parts have been shown to have anti-diabetic, hypolipidemic, antibacterial, antioxidant, antiulcerogenic, hepatoprotective, gastroprotective, and chemopreventive properties. This plant is well known for all its pharmacological characteristics (Raj. S.J TAA et al., 2022).
- 3. Red Grapes:** Resveratrol, an antioxidant, is the component of Red Grapes that causes the greatest buzz. Red wine was first advocated for consumption because of its high resveratrol content, but researchers now concur that table grapes and grape juice are also excellent sources. Due to a longer fermentation process, Red wine contains more Resveratrol than white wine. Wine, grape juice and grapes all contain antioxidants that are beneficial to the cardiovascular system. These anti-oxidants, also known as “Polyphenols or Flavonoids”,

can relax blood vessels and lessen inflammation. Like aspirin, they also lessen the ability of platelets to clot. The skin and seeds of grapes contain the majority of these antioxidants.

A diet high in nutrients can include grapes, but no one meal can guarantee heart health. Because fruit contains sugar, some diabetics feel that they should avoid eating it. However, those with diabetes can eat fruits with a low glycemic index without any problems. With a low glycemic index, the fruit's sugar won't cause a spike in blood sugar right away. Glycemic load is another figure that is useful for diabetics. This calculation accounts for how much sugar is contained in a typical portion. Due to the presence of the aforementioned bioactive chemicals of medicinal significance, Red grape seed extract has been demonstrated to decrease the risk of atherosclerosis, diabetes complications, high cholesterol, cancer prevention, dementia, neurological diseases, and wound healing. **Bagchi et al., 2004** is one example. Researchers discovered that proanthocyanidin-rich red grape seed extract outperformed other well-known antioxidants including vitamin C, vitamin E and beta-carotene in terms of their ability to fight free radicals. As a result, in a human clinical study, participants with hypercholesterolemia who took grape seed extract supplementation saw an effective reduction in oxidised LDL.

Conclusions: The results of the most recent research suggest that three different medicinal plants' extracts can yield the best results. However, more investigation is required to characterise the chemical structure, evaluate the biological activities and do a full analysis that includes qualitative or semi-qualitative analysis. The three plants mentioned above are undoubtedly highly advantageous. These plants may be used to treat several common and other types of ailments. Exploring these plants' full potential in the pharmaceutical and medical industries is important for their efficient utilization.

ACKNOWLEDGEMENT

I thank the research supervisor for giving necessary support for my research work. I am thankful to my co-researchers for their immense support for this article preparation. I also thank the Co-ordinator, DBT-supported Bioinformatics Infrastructure Facility, Department of Zoology, Sri Venkateswara University, Tirupati for providing computer lab facilities to carry out this research work.

References:

1. **Aanchal Bansal and Chinmayee Priyadarsini (2021)**. Medical properties of Phytochemicals and Their Production, Natural Drugs from Plants, DOI: 10.5772/intechopen.98888 @ Published: July 15th, 2021.
2. **Alireza Sarkaki, Yaghoub Farbood, Mohammad Badavi (2007)**. The effect of grape seed extract (GSE) on spatial memory in aged male rats. **Pak J Med Sci July - September 2007, Vol. 23 No. 4, 561-565.**
3. **Ana Topalovi , Mirko Knezevi, Balsa Bajagi, Ljubica Ivanovi, Ivana Milasevi, Dijana Đurovi, Boban Mugosa, Ana Podolski-Reni and Milica Pesic (2020)**. Grape (*Vitis vinifera* L.): health benefits and effects of growing conditions on quality parameters. *Biodiversity and Biomedicine*, 2020, Pages 385-401.
4. **Bagchi, D., Bagchi, M., Stohs, S. J., Das, D. K., Ray, S. D., Kuszynski, C. A., et al. (2000)**. Free radicals and grape seed proanthocyanidin extract: Importance in human health and disease prevention. *Toxicology*, 148(2-3), 187197.
5. **Grosso G., Micek A., Godos J., Pajak A., Sciacca S., Galvano F., Giovannucci E.L. (2017)** Dietary flavonoid and lignan intake and mortality in prospective cohort studies: Systematic review and dose-response meta-analysis. *Am. J. Epidemiol.* 2017 doi: 10.1093/aje/kww207.
6. **Gupta, M., Dey, S., Marbaniang, D. et al. (2020)**. Grape seed extract: having a potential health benefits. *J Food Sci Technol* **57**, 1205–1215 (2020).
7. https://commons.wikimedia.org/wiki/File:Tinospora_cordifolia_fruits.jpg
8. <https://fineartamerica.com/featured/juicy-taste-of-autumn-red-grapes-clusters-9-jenny-rainbow.html>
9. <https://nurserylive.com/products/phyllanthus-emblica-amla-seeds>
10. **Jigna Parekh, Sumitra V. Chanda (2007)**. In vitro Antimicrobial Activity and Phytochemical Analysis of Some Indian Medicinal Plants, *Turk J Biol* 31 (2007) 53-58.
11. **Liu Y.J., Zhan J., Liu X.L., Wang Y., Ji J., He Q.Q (2014)**. Dietary flavonoids intake and risk of type 2 diabetes: A meta-analysis of prospective cohort studies. *Clin. Nutr.* 2014;33:59–63.
12. **Madhavi Gupta, Sanjay Dey, Daphisha Marbaniang , Paulami Pal , Subhabrata Ray , and Bhaskar Mazumder (2020)** Grape seed extract: having a potential health benefits, *J Food Sci Technol.* 2020 Apr; 57(4): 1205–1215.
13. **Menezes R., Rodriguez-Mateos A., Kaltsatou A., González-Sarrías A., Greyling A., Giannaki C., Andres-Lacueva C., Milenkovic D., Gibney E.R., Dumont J., et al. (2017)** Impact of flavonols on cardiometabolic biomarkers: A meta-analysis of randomized controlled human trials to explore the role of inter-individual variability. *Nutrients.* 2017;9:117.

14. **S.Swapna Rekha And M.Bhaskar.***(2013) Screening and identification *in vitro* antioxidant activities of phytochemical compounds in ethanolic grape (*vitis vinifera*) seed extract, **Int J Pharm Bio Sci 2013 July; 4(3): (P) 609 – 617, ISSN 0975-6299.**
15. **Sudipa Nag, Anirban Paul and Rituparna Dutta** (2013) Phytochemical Analysis of Methanolic Extracts of Leaves of Some Medicinal Plants. International Journal of Scientific and Research Publications, Volume 3, Issue 4, April 2013 1 ISSN 2250-3153.
16. **T. Amala Arockia Raj. S.J, M. Rama Mohan, M. Muniya Naik, A. Jayasankar, V. Uday Kiran*, G.Sankaraiah, L. Nagaraju and B. Naresh** (2022) Health - promoting components of phytochemicals found in selected medicinal plants on the Loyola degree college campus (YSRR) Pulivendula-YSR Kadapa, International Research Journal of Plant Science (ISSN: 2141-5447) Vol. 13(4) pp. 01-5, June, 2022
17. **Wang X., Ouyang Y.Y., Liu J., Zhao G. (2014):** Flavonoid intake and risk of CVDA systematic review and meta-analysis of prospective cohort studies. *Br.J. Nutr.* 2014;111:1–11.