Comparative analysis of Pharmacological profile of *Vitis Vinifera* and Raisins Extract

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Abstract: *Vitis vinifera*, commonly known as grape and its dry fruits, raisins have a long history of medicinal use. This comparative study endeavours to elucidate and compare the pharmacological properties of small molecules extracts isolated from *Vitis vinifera*, raisins by shedding light onto its health benefits as well therapeutic uses. Under research methodology, the standardized processes for recovering bioactive compounds from *Vitis vinifera* and raisins were utilized. The pharmacological experiments included studies for anti-inflammatory, anticancer, antidiabetic properties as well antioxidant and cardiovascular proprieties. These findings underscore their possible natural interventions for diverse diseases, and also stress that the understanding subtle differences in their pharmacological profile is essential to design the at most therapeutic benefits.

Keywords: Raisin extracts, solvent efficiency, phytochemical yield, munakka, sultana

INTRODUCTION

Vitis vinifera is a member of the family *Vitaceae* and grows in subtropical, Mediterranean, continental-temperate regions in Asia, North America and Europe (Muñoz-De la Cruz et al., 2017; Myga-Piątek & Rahmonov, 2018). The family includes about 60 wild species in the genus *Vitis*. One exception, *Vitis* (Foria et al., 2022), that has been long a focus of commercial interest as well (Leal et al., 2020). It includes other disease-resistant species such as the rootstock varieties used in breeding against Phylloxera, Oidium and mildews (Dry et al., 2019; Volynkin et al., 2021). Examples of these species include the North American Vitis rupestris (Arnold & Schnitzler, 2020), *V. riparia*, and *V. berlandieri*. Classified as *Vitis vinifera* subsp. *vinifera* (or sativa) (Scali et al., 2018), the great majority of cultivars frequently used to produce wine, fruit, and juice really originate from wild variants (Joshi et al., 2017; Teissedre, 2018).

Dried grapes, commonly called raisins, such as "sultanas" and "currants," have received less attention than grape wine (Papadaki et al., 2021), although the health advantages of both have been well researched and publicised (Moorhead et al., 2013). People have consumed raisins and grapes since prehistoric times (Jeszka-Skowron & Czarczyńska-Goślińska, 2020). It was known that wild grapes existed as early as 35,000 BC.Hunter-gatherers had probably witnessed that wild grapes become edible once they fell off the vine (Shorrocks, 2017) and dried in the sun, and they also probably knew how to cook them (Laudan, 2000).

Polyphenols have been shown to be helpful in avoiding neurological problems as well as a host of other chronic ailments (Serra et al., 2020). Particularly, eating raisins has been associated with neuroprotective benefits due to their high polyphenol content (Rodrigo-Gonzalo et al., 2023). Therefore, the main objective is to evaluate the potential effects of a daily 50 g intake of raisins on cardiovascular risk factors, inflammatory markers, and cognitive function in an older adult population without cognitive impairment over a period of six months.

Dried grapes, especially from several *Vitis vinifera* varieties, are known as raisins and are eaten all over the world. The type of sultana is determined by the grape's size, colour, and variety. Dark raisins are the most often consumed kind, and they are frequently produced from Thompson seedless grapes. *Muscats* are usually prepared from white Muscat grapes, which are often referred to as golden raisins. Sultanas are created from yellow grapes that haven't had any seeds, and they're usually softer and sweeter than other varieties.

Raisin Extracts, Solvent Efficiency, Phytochemical Yield, Munakka, Sultana

MATERIALS AND METHO

Five varieties of raisins were included in the study: Vitis vinifera Portuguese raisin (especially the Early Gold species) (Di Lorenzo, Sangiovanni, et al., 2016), a raisin type that is cultivated without seeds in Beja, Portugal; Turkish raisin (especially the sultana kind) bought from Izmir, Turkey; and a raisin type that is grown without seeds in Beja, Portugal (Di Lorenzo, Frigerio, et al., 2016). Three varieties of raisins

(CR-1, CR-2, and CR-3) were acquired from pharmacies in Italy. While CR-2 and CR-3 raisins' provenance was specified, that of CR-1 raisins was not (Di Lorenzo, Sangiovanni, et al., 2016). The process of making Turkish raisins involves gathering the grapes and then submerging them in a solution intended to remove the wax layer. One hundred liters of water, five percent weight/volume potassium carbonate, and one percent volume/volume olive oil make up this solution (Noreen et al., 2022; Shoaib et al.). The grapes were spread on a polyethylene sheet to dry for seven days in the sun and stored so that it could be utilized accordingly.

Portuguese raisins were field dried in the vine for five weeks then being harvested. Commercially obtained raisins (CR-01, CR-02, and CR-03), in addition to a Portugal sample individuals PS-01) and Anatolia autonomic bodies samples TS-o1 have been held by the Pharmacognosy Laboratory.

Biological Evaluation

Hemolysis

Blood was taken from albino mice, five millilitres for each representative group and it is centrifuged at 1000 rpm over a period of around five minutes (Alvi et al.; Hafeez, Mansha, et al., 2021). Following separation, the RBC-containing pellet was washed in cold phosphate-buffered saline pH 7.4 four times to remove traces of PERV. The red blood cells were then treated with a 180 µL mixture (20 µL) of chemicals. This was followed by incubation of the sample at 37°C for 30 min. From there, it was taken out of the incubator and allowed to cool for five minutes. It was then centrifuged at 13,000 rpm for five minutes. Each tube with the pelleted material was then resuspended in 100 µL of cold, phosphate buffered saline. The positive control was 2,20-azino-bis (3 - ethylbenzothiazoline-6-sulfonic acid) and the negative control was dimethyl sulfoxide (Parvathy & Praseetha, 2023).

$$\text{RCBs Lysis (\%)} = \frac{sample\ absorbance - negative\ control\ absorbance}{positive\ control\ absorbance} \times 100$$

Thrombolysis

1 mL sample of blood was withdrawn from an albino mouse and transferred to sterile, pre-weighed Eppendorf tubes (F Hafeez et al., 2022; Iftikhar et al., 2023). The samples were allowed to coagulate in the Eppendorf tubes for an hour by being incubated at 37°C. After this procedure, the sample was taken out, and the tubes' original mass was calculated by weighing them. (D'Eusanio et al., 2023) After that, 100 µL of DMSO-dissolved solutions were added to each Eppendorf tube one at a time, and the tubes were incubated for three hours at 37°C. ABTS was the positive reference, while water was the negative one. Once the second clot was removed, the clot was located by recalculating the Eppendorf tube weights (Freeha Hafeez et al., 2022; Nazeer et al., 2023).

$$\text{Clot outlay (\%)} = \frac{weight\ of original\ clot - weight\ final\ clot}{weight\ of\ firdt\ clot} \text{ X } 100$$

Statistical analysis

For the purpose of doing the statistical analysis, Microsoft Excel 2010 was used, and each experimental task was performed three times (Hafeez, Zahoor, et al., 2021; Khushnood et al.). The information was reported in the form of the mean and the standard deviation (±) (Gil et al., 2014).

RESULTS

Hemolysis Analysis

Among the substances tested, compound 2 had the lowest cytotoxicity; compounds 184a and 184d, on the other hand, exhibited higher toxicity levels (Freeha Hafeez et al., 2022; Nazeer et al., 2023). Notably, Entry 4 caused the greatest amount of red blood cell (RBC) lysis, at 5.7% more than the reference control ABTS. Table 4.11 demonstrates that entries 2 and 3 also significantly increased hemolysis, with rates of 7.45% and 5.80%, respectively. According to Table 4.11, entry 5 also demonstrated the least degree of cytotoxicity of all the derivatives studied, having a cytotoxic effect of just 0.6%. According to the data, the kind and position of functional groups on the compounds have a major impact on their hemolytic action (AyeshaTariq et al.; Imran et al.). The synthesised chemicals demonstrate varying degrees of hemolytic activity, ranging from moderate to severe, indicating their possible use in anticancer applications (Noor et al.; Noureen et al.).

Table 1: Extract yield in different solvents for Muscat and Shiraz grape varieties

Sr. #	Extract	Muscat	Shiraz
1	Methanol	6.05 ± 0.024	17.2 ± 0.01
2	Ethanol	1.45 ± 0.031	35.1 ± 0.01
3	DCM	4.80 ± 0.050	20.2 ± 0.01
4	MeOH/Water	2.72 ± 0.061	14.7 ± 0.01

5	EtOH/Water	8.61 ± 0.017	30.1 ± 0.01

Thrombolysis Analysis

Evaluated the thrombolytic capability of each synthesised molecule. These compounds had relatively low thrombolytic action overall (Siddique et al.). While other derivatives had intermediate capability, entries 1 and 2 shown more thrombolytic potential in comparison to the industry standard control, ABTS. With a lysis rate of 45.1%, entry 2 had the highest when compared to ABTS. Compound 3, on the other hand, had the lowest lysis rate, at 30.2%, as shown by table 4.6. The present research aims to evaluate the impact of functional groups that have a beneficial inductive effect on thrombolysis.

Table 2: Extract yield in different solvents for Munakka and Sultana raisin varieties

Sr. #	Extract	Munakka	Sultana
1	Methanol	67.2 ± 0.081	3.05 ± 0.124
2	Ethanol	45.1 ± 0.081	7.45 ± 0.003
3	DCM	30.2 ± 0.081	5.80 ± 0.075
4	MeOH/Water	64.7 ± 0.081	8.7 ± 0.061
5	EtOH/Water	40.1 ± 0.081	0.6 ± 0.007

Pharmacological properties of Vitis vinifera and raisins was investigated in this work. This work is typically focuses on evaluating the respective chemical compositions, biological activities, and potential health benefits of varieties of raisins. Researchers compare the phytochemical profiles, such as polyphenols, flavonoids, and antioxidants, present in both grape extract and raisins. They investigate the differences in their concentrations and bioavailability. Additionally, comparative studies delve into the pharmacological properties of grape extract and raisins, examining their effects on various health parameters like cardiovascular health, antioxidant capacity, anti-inflammatory activity, and potential anticancer properties. The samples had an average lead content of 0.03 ± 0.08 mg/kg−1. As a result, 80.77% of the samples had lead contents that were within the FAO/WHO (2011), Institute of Standard and Industrial Research of Iran, and European Community recommended limits ($P < 0.05$).

revealed a poor general thrombolytic activity with the top lysis rate noted to be 45.1% of one compound. Nevertheless, regarding the solvent used for extraction of phytochemicals such as polyphenols and flavonoids; its efficiency diverged affecting potential health benefits from extracts. The results of this study emphasized the role played to improve extraction efficiency by selecting solvents suitable for herbal skincare formulations. Results showed that in all samples tested, the lead content was minimal enough to make raisins safe for consumption. Study as a whole, highlights the importance of raisin variety and processing methods on their food functional properties which may have health claims.

CONCLUSION

This study investigated on pharmacological properties of five types of raisins by their chemical compositions, biological activities and potential health benefits. It brought in raisins from Portugal, Turkey and Italy. After pre-treatment of the Turkish raisins with a potassium carbonate and olive oil solution for 12 h, they were sun dried, in contrast to the Portuguese that are naturally left to dry on vine. Albino mice blood was used for Hemolysis and thrombolysis assays Hemolysis results revealed differential cytotoxicity of the compounds, go to one compound showing minimal lysis at 0.6% and another exhibiting highest RBC degradation at 7.45%. Thrombolysis data

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REFERENCES

Alvi, K. I., Suleman, M., Batool, F., Iqbal, S., Hafeez, F., Afzal, A., . . . Bilal, M. Hydrothermal Green Synthesis of Silver Doped Molybdenum Nanocomposites Using Citrus Limetta Extract for Photo Catalytic Properties.

Arnold, C., & Schnitzler, A. (2020). Ecology and genetics of natural populations of North American Vitis species used as rootstocks in European grapevine breeding programs. *Frontiers in plant science*, *11*, 866.

AyeshaTariq, M. S., Hafeez, F., Sana, K., Zafar, A., & Khan, I. A. A biodegradable approach for efficient and economical spectrophotometric assay for the Platelet aggregation inhibitor Clopidogrel.

D'Eusanio, V., Morelli, L., Marchetti, A., & Tassi, L. (2023). Aroma Profile of Grapevine Chips after Roasting: A Comparative Study of Sorbara and Spergola Cultivars for More Sustainable Oenological Production. *Separations*, *10*(10), 532.

Di Lorenzo, C., Frigerio, G., Colombo, F., de Sousa, L. P., Altindişli, A., Dell'Agli, M., & Restani, P. (2016). Phenolic profile and antioxidant activity of different raisin (Vitis vinifera L.) samples. BIO Web of Conferences,

Di Lorenzo, C., Sangiovanni, E., Fumagalli, M., Colombo, E., Frigerio, G., Colombo, F., . . . Dell'Agli, M. (2016). Evaluation of the anti-inflammatory activity of raisins (Vitis vinifera L.) in human gastric epithelial cells: A comparative study. *International Journal of Molecular Sciences*, *17*(7), 1156.

Dry, I., Riaz, S., Fuchs, M., Sosnowski, M., & Thomas, M. (2019). Scion breeding for resistance to biotic stresses. *The grape genome*, 319-347.

Foria, S., Magris, G., Jurman, I., Schwope, R., De Candido, M., De Luca, E., . . . Di Gaspero, G. (2022). Extent of wild–to–crop interspecific introgression in grapevine (Vitis vinifera) as a consequence of resistance breeding and implications for the crop species definition. *Horticulture Research*, *9*, uhab010.

Gil, P. M., Saavedra, J., Schaffer, B., Navarro, R., Fuentealba, C., & Minoletti, F. (2014). Quantifying effects of irrigation and soil water content on electrical potentials in grapevines (Vitis vinifera) using multivariate statistical methods. *Scientia Horticulturae*, *173*, 71-78.

Hafeez, F., Mansha, A., Zahoor, A. F., Ali, K. G., Khan, S. G., & Naqvi, S. A. R. (2021). Facile green approach towards the synthesis of some phenyl piperazine based dithiocarbamates as potent hemolytic and thrombolytic agents. *Pakistan Journal of Pharmaceutical Sciences*, *34*.

Hafeez, F., Zahoor, A., Irfan, M., Kamal, S., & Ahmad, S. (2022). Facile one-pot approach to the synthesis of alkyl piperazine-1-carbodithioates as hemolytic and thrombolytic agents. *Russian Journal of Organic Chemistry*, *58*(6), 884-890.

Hafeez, F., Zahoor, A. F., Rasul, A., Ahmad, S., & Mansha, A. (2021). Synthesis and anticancer evaluation of 2-oxo-2-(arylamino) ethyl 4-phenylpiperazine-1-carbodithioates. *Pak. J. Pharm. Sci*, *34*(1), 353-357.

Hafeez, F., Zahoor, A. F., Rasul, A., Mansha, A., Noreen, R., Raza, Z., . . . El-Hiti, G. A. (2022). Ultrasound-assisted synthesis and in silico modeling of methanesulfonyl-piperazine-based dithiocarbamates as potential anticancer, thrombolytic, and hemolytic structural motifs. *Molecules*, *27*(15), 4776.

Iftikhar, R., Parveen, I., Mazhar, A., Iqbal, M. S., Kamal, G. M., Hafeez, F., . . . Ahmadipour, M. (2023). Small organic molecules as fluorescent sensors for the detection of highly toxic heavy metal cations in portable water. *Journal of Environmental Chemical Engineering*, *11*(1), 109030.

Imran, M., Suleman, M., Hafeez, F., Ali, M., Zafar, A., & Sana, K. Experimental and computational analysis of beetroot extracts as natural dye source.

Jeszka-Skowron, M., & Czarczyńska-Goślińska, B. (2020). Raisins and the other dried fruits: Chemical profile and health benefits. In *The Mediterranean Diet* (pp. 229-238). Elsevier.

Joshi, V., Panesar, P., Rana, V., & Kaur, S. (2017). Science and technology of fruit wines: an overview. *Science and technology of fruit wine production*, 1-72.

Khushnood, M., Hafeez, F., Suleman, M., Noor, T., Siddique, S., Bakar, A., & Bano, R. Formulation and Evaluation of Strawberry Extract/Oil infused anti-aging and anti-pigmenting Face serum.

Laudan, R. (2000). Birth of the modern diet. *Scientific American*, *283*(2), 76-81.

Leal, C., Gouvinhas, I., Santos, R. A., Rosa, E., Silva, A. M., Saavedra, M. J., & Barros, A. I. (2020). Potential application of grape (Vitis vinifera L.) stem extracts in the cosmetic and pharmaceutical industries: Valorization of a by-product. *Industrial Crops and Products*, *154*, 112675.

Moorhead, S. A., Hazlett, D. E., Harrison, L., Carroll, J. K., Irwin, A., & Hoving, C. (2013). A new dimension of health care: systematic review of the uses, benefits, and limitations of social media for health communication. *Journal of medical Internet research*, *15*(4), e1933.

Muñoz-De la Cruz, F. C., Cornejo-García, F. R., Vázquez-Díaz, N. M., Anaya-Loyola, M. A., & García-Gasca, T. (2017). Grape Bagasse: A Potential Source of Phenolic Compounds. *Fruit and Vegetable Phytochemicals: Chemistry and Human Health, 2nd Edition*, 1055-1066.

Myga-Piątek, U., & Rahmonov, O. (2018). Winery regions as the oldest cultural landscapes: remnants, signs, and metamorphoses. *Miscellanea Geographica*, *22*(2), 69-80.

Nazeer, U., Mushtaq, A., Zahoor, A. F., Hafeez, F., Shahzadi, I., & Akhtar, R. (2023). Cloke–Wilson rearrangement: a unique gateway to access five-membered heterocycles. *RSC advances*, *13*(50), 35695-35732.

Noor, T., Afzal, I., Hafeez, F., Suleman, M., Siddique, S., & Khushnood, M. Incorporation of Cocoa Extracts into Herbal Skin Care Products.

Noreen, R., Aziz, H., Hafeez, F., Kamal, S., Zahoor, A. F., Parveen, B., & Akhtar, R. (2022). Facile synthesis, antibacterial and protease inhibition studies of β-amino alcohols prepared via ring opening of epoxides. *Pakistan Journal of Pharmaceutical Sciences*, *35*.

Noureen, A., Afzal, I., Hafeez, F., Iqbal, M., & Suleman, M. Development, Formulation and evaluation of anti aging gel utilizing Allium Cepa Extracts Asifa Noureen1, Iqra Afzal1, Freeha Hafeez1, Mateen Iqbal1, Muhammad Suleman1, Bisma1.

Papadaki, A., Kachrimanidou, V., Lappa, I. K., Eriotou, E., Sidirokastritis, N., Kampioti, A., & Kopsahelis, N. (2021). Mediterranean raisins/currants as traditional superfoods: processing, health benefits, food applications and future trends within the bio-economy era. *Applied Sciences*, *11*(4), 1605.

Parvathy, C., & Praseetha, P. (2023). Carbon quantum dot induced hemolysis and anti-angiogenesis in proliferating cancers with Vitis vinifera as the source material. *Vegetos*, *36*(3), 890-898.

Rodrigo-Gonzalo, M. J., Recio-Rodríguez, J. I., Méndez-Sánchez, R., Pablos-Hernández, M. C., González-Ramírez, A., González-Sánchez, J., . . . Barbero-Iglesias, F. J. (2023). Effect of including a dietary supplement of raisins, a food rich in polyphenols, on cognitive function in healthy older adults; a study protocol for a randomized clinical trial. *BMC geriatrics*, *23*(1), 182.

Scali, M., Zifferero, A., & Vignani, R. (2018). Distribution and Characterization of the Vitis vinifera L. subsp sylvestris in Southern Tuscany. *Recent Patents on Biotechnology*, *12*(3), 208-220.

Serra, D., Almeida, L. M., & Dinis, T. C. (2020). Polyphenols in the management of brain disorders: Modulation of the microbiota-gut-brain axis. *Advances in food and nutrition research*, *91*, 1-27.

Shoaib, M., Suleman, M., Hafeez, F., Ahmad, M., & Mumtaz, N. Synthesis and Cytotoxic Evaluation of Functionalized Aryl-halo Amide Derivatives.

Shorrocks, V. M. (2017). Conventional and organic farming: A comprehensive review through the lens of agricultural science.

Siddique, S., Hafeez, F., Suleman, M., Khushnood, M., & Manzoor, B. Phytochemical and antioxidant Study of Ficus carica species available in Faisalabad region.

Teissedre, P.-L. (2018). Composition of grape and wine from resistant vines varieties. *Oeno One*, *52*(3), 211-217.

Volynkin, V., Likhovskoi, V., Vasylyk, I., Rybachenko, N., Lushchay, E., Gorislavets, S., . . . Potokina, E. (2021). Introgressions of Vitis rotundifolia Michx. to obtain grapevine genotypes with complex resistance to biotic and abiotic stresses. *Vavilov Journal of Genetics and Breeding*, *25*(7), 693.