University of Thi-Qar Journal of agricultural research
ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 11, Issue 2 (2022) PP 36-44
https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/UTJagr.Vo11.N2/04*

Study to detect cytotoxicity of The eggplant plant (*Solanum melongena L*)

Ahlam Husain Farhoud Khalawi
Email:ahlamhu20@gmail.com
College of Science \ Department of Life Science

Conclusion

The current study included the cytotoxicity test of the active compounds isolated from the peels of the fruits of the eggplant plant, which is found in the local markets of Dhi Qar governorate and used for food and grown within the governorate and not imported during the period (July, August, September, October, November, December. January), the trend of human red blood cells for the purpose of determining the possibility of using them as drug alternatives in the future.

The peels of the eggplant plant were extracted with hexane once, then the alkaloid extract was prepared from it again. The alkaloid compounds were detected using the Drankcroff reagent and Mayer's reagent. The positive result of the detection gave an indication of the presence of alkaloid substances that are antioxidants and have a high nutritional value. The concentrations of plant extracts represented by hexane eggplant extract and its alkaloid extract at concentrations (75,50,25,10,5,100) mg/ml were prepared using DMSO solution as a solvent, and a negative control factor containing physiological salt and blood, and a positive control factor (tap water) were prepared.), and a third control factor consisted of blood solution with DMSO solvent, and the solution was monitored for (3-24) hours to observe the dissolution of blood cells.

The cytotoxicity results of plant extracts of Solanum melongena L. showed that the concentrations (75,50,25,10,5,100) mg/ml did not cause any hemolytic and therefore do not cause any cytotoxicity towards red blood cells, and the bottom layer appeared in red color Which represents human blood, and the upper layer represents the extract as well as the physiological solution. If these compounds were toxic, the decomposition of red blood cells would result. Room temperature is 30°C and inside the incubator is 27°C. Incubator made by Dander, Germany and the concentration of the substance.

I. INTRODUCTION

In recent years, it has been found that many of the antibiotics and other commonly used medicines are less effective against certain diseases, because many pathogens are able to resist the effectiveness of medicines after a period of use, and therefore it is necessary to find medicines that are more effective against diseases and less resistance to them. (Adebiyietal.2020).

As well as the need to search for the toxicity of some plants commonly used in nutrition and are of high toxicity, as they cause hemolysis, which occurs from the breakdown of the red blood cell membrane as a result of the sublimation link between toxic substances and free radicals of protein (1994, and Urasella Xian-guo) and as a result of the use of As a result of the widespread use of traditional medicinal plants as antimicrobial drugs, their non-toxicity on host cells is very necessary as it is an easy-to-apply, quick-results and inexpensive method, and therefore positive when used as drugs (Chiu et al., 2018). This leads to interest in the manufacture of preventive medical medicines and the development of biologically active antioxidants, which leads to human interest in studying medicinal plants (Ahmadet.al.,2021), as scientists are now looking

University of Thi-Qar Journal of agricultural research
ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 11, Issue 2 (2022) PP 36-44
https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/UTJagr.Vo11.N2/04*

for new sources to treat diseases (Moure et al. , 2001 ; Flores-mireles et al., 2015) One of these plants is the eggplant, Solanum melongena L .

Division: Magnoliophyta

Class: Magnoliopsida

Order: Solanales

Family: Solanaceae

Genus : *Solanum*

Species : *Solanum elongena L*

(Heywood *et al*.,2007)

Solanum melongena belongs to the Solanaceae family, and it is called in Iraq the eggplant, and in the Arab regions it is called Al-Anab, Al-Hadaq, Al-Hisl, Al-Ahkab, Al-Kahak, Al-Kahkam, Al-Mughod, Al-Mughod, and some European countries. And patalican and has the same name widely used as a vegetable in cooking, and the eggplant plant is widespread in India, which is its original homeland, from which it moved to China and then to Europe and America, while in Iraq it is widespread in fields, orchards and farms (2018.. et al.) Esther.

The eggplant plant Solanum melongena is a herbaceous, dicotyledonous plant that is covered with seeds, its height is (28-70 cm). The length of the blade is 8-30 cm (and its width is 5-25 cm) and the leaf is dark green or green-violet or violet. The flower is hermaphrodite, large in size and its diameter may reach (5) cm. Dark or black, and the seeds are small and wild in texture, with a light brown color and a kidney shape. The eggplant plant has a wedge root that reaches a depth of (100-150) cm, as well as "tolerant of temperature (70-85 Fahrenheit) and grows on slightly acidic or neutral soils. Moure et al., 2001; (Agyei-Poku., 2018).

The eggplant plant S. melongena contains flavonoids, alkaloids, tannins, sterols, triterpenes and sugars. It also contains phosphorous, calcium, magnesium, potassium, sodium, iron, fats, carbohydrates, dietary fiber, protein or vitamin C and B6, and other minerals (Agyei-Poku., 2018). .

The fruits of this type are of high nutritional value, as 100 g of it contains different percentages of carbohydrates (68%), proteins (12%) and fats (10%) also "rich in vitamins A, C and E (2018 (Carputo., 2020; Chiu). And the fruits of S. melongena are purple or black because they contain a group of anthocyanins, a main component of the peel of the eggplant, which gives it a purple color (Ginwala et al., 2019). The plant contains polysaccharides such as arabinose, glucose, galactose, mannose. These polysaccharides represent about 5-8% of the dry fruit. It was also found that the leaves of the eggplant plant contain important flavonoids such as Nicotiflorin, Isoquercitrin, Quercetin, Kaempferol and (Zhao et al., 2020; Eletta et al., 2020). 2017. While the flowers of the eggplant plant contain flavonoids, which are β-sitosterol and Ianosterol (Ginwala et. al ., 2019) (Ahmad et. al ., 2021; .

II. METHODS

field work

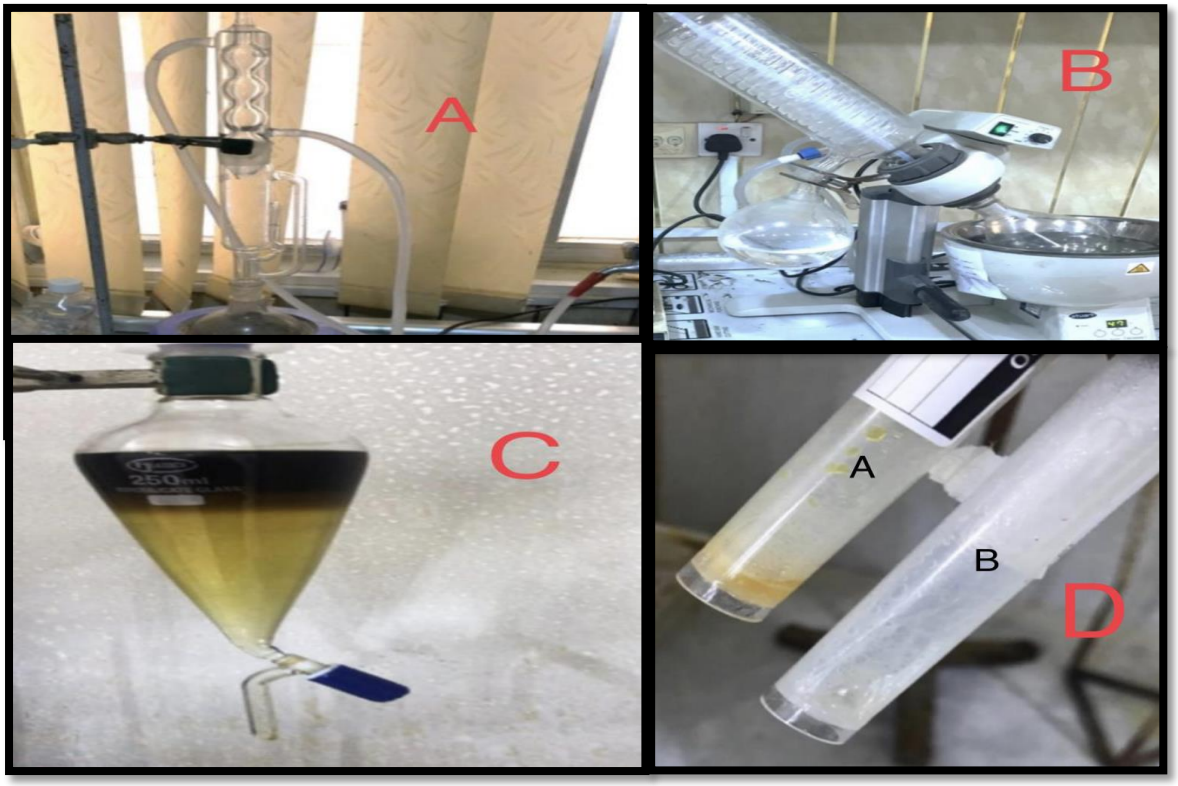
Plant samples were collected (7/1/2021 to 2/25/2022)

University of Thi-Qar Journal of agricultural research
ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 11, Issue 2 (2022) PP 36-44
https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/UTJagr.Vo11.N2/04*

1 . Plant samples collection and diagnosis Plant samples were collected from the markets in Dhi Qar Governorate, the fruits that are sold in the local markets for the period (July, August, September, October, November, December, January),

2 . Preparing the plants for the study where the plant samples were taken to the laboratory and dried away from sunlight at room temperature in a well-ventilated place and away from moisture, with stirring them from time to time for a period of not less than (10-14) days, and after drying they were crushed with a mill Large-sized electric grinder, then store and store it in airtight glass containers in the refrigerator until use, and write on it the name of the plant, the area and date of collection of the plant sample.

3 . Preparation of plant extracts of eggplant peels by extracting hexane and alkaloid extraction according to the method (Bobby et al., 2012). The process was repeated several times to obtain a sufficient amount of the plant extract of the peels of the black eggplant plant. As shown in part of the laboratory work in the picture No. (2)



Picture (2) represents

A represents the Soxehlet device

B represents the rotary evaporator device

C is a separating funnel

(D represents alkaloid extract reagents (A represents Druckenrov's reagent and B represents Mayer's reagent

University of Thi-Qar Journal of agricultural research
ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 11, Issue 2 (2022) PP 36-44
https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/UTJagr.Vo11.N2/04*

4-Determination of cytotoxicity on human red blood cells

The cytotoxicity of plant extracts was tested on human red blood cells according to the method (1994, and Urasella Xian-guo) with some modification. The blood solution was prepared (1 ml of blood added to 20 ml of sterile physiological saline solution) and the concentrations of plant extracts represented by hexane extract were prepared. Extract of alkaloids of eggplant peels and in concentrations (75,50,25,10,5,100) mg/ml using DMSO Dimethyl Sulphoxide solution) as a solvent, then 100 microliters of it were taken and added to 2 ml of blood solution, and a negative control factor containing On physiological salt and blood, and a positive control factor (tap water), and a third control factor that consisted of blood solution with DMSO solvent, and the solution was monitored for a period of (3-24) hours to observe the dissolution of blood cells.

III. RESULTS AND DISCUSSION

A kind of medicinal plant belonging to the family Solanum melongena L. was extracted. Table (1) shows the percentages of alkaloid extract in the studied plant,

Table (1): Percentages of alkaloid and hexane extracts of bramble and eggplant

The ratio %percentile	Weight extract	nature and color extract	Type extract	the plants	ت
%٦,٢٥	٥g	dark maroo	Alkaloids	*Solanum melongena L.*	1
%٦,٢٥	٥g	Dark brown	hexane		

The chemical detection of the active alkaloid compounds of the eggplant plant, where the alkaloid extract gave a positive result in the detection, as shown in Table (2).

Table (2): Chemical detection of alkaloids of the nightshade plant

University of Thi-Qar Journal of agricultural research
ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 11, Issue 2 (2022) PP 36-44
https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/UTJagr.Vo11.N2/04*

Detection result for extract	Evidence detection	detector user	Type compound	ت
Solanum melongena L.				
+	Orange precipitate	Drunkdorf	Alkaloids	١
+	White precipitate	Mayer	Alkaloids	٢

(+) The extract contains the active compounds,

(-) The extract does not contain the active compounds.

The active compounds were extracted successfully and according to the type of solvent. In addition, solvents of different polarity were used for the presence of non-polar bioactive compounds. The reason for the superiority of the alkaloid and hexane extract of the eggplant plant is that the majority of the active substances present in the plant are alkaloid compounds that were extracted with acidified alcohol (Harborne, 1984

Non-polar solvents have lower dielectric constant. View more content. Many researchers found that higher yields of extracts can be achieved by using more polar solvents (Manandhar and Dahal, 2019; Anwar et al., 2017). The color and texture of both extracts were detected. All the alkaloid and hexane extracts of the studied species were dark green in color and their texture seemed to be sticky in general. The extracts varied in color from brown to yellow and reddish black, either as a powder or viscous. This difference in color and texture can be attributed to the types of chemical components of each extract and the polarity of the solvent. Previous studies have shown variation in color and texture as well as many researchers have found that higher yields of extracts can be achieved by using more polar solvents; Harborne, 1973) (Anwar et al., 2017).

If all the extracts in eggplant contain alkaloid compounds, in addition to the presence of other compounds such as triterpenes, sterols, and coumarins, it was found that all extracts contain alkaloids, flavonoids, carbohydrates, glycosides, resins, phenols, saponins, sterols and coumarins, in addition to the presence of various types. Other compounds (2018, etal Merrcy).

Previous studies have shown that variability in color, texture, and number of bioactive phytochemicals produced by plants depends on plant age, soil nature, and treatment of plant matter Bauman,. 2019)) Selected extracts Methanol extracts were evaluated for their antibacterial, proliferative and antioxidant activities in vitro. The

University of Thi-Qar Journal of agricultural research
ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 11, Issue 2 (2022) PP 36-44
https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/UTJagr.Vo11.N2/04*

difference in yield values may be due to the difference in the properties and nature of the solvent in terms of polarity or the chemical nature of the active compounds present in the plant (Harborne, 1973). Yield between plants The difference can also be attributed to the difference in the climatic environment factors, the period and stage of harvest, the temperature, the duration of extraction, the type of solution used, or the difference in the solubility of the active substances present in each AHMED etal plant. 2019)).

The result was recorded in the absence of toxicity as shown in Table No. (3) and in Picture No. (3) and Picture No. (4), with the transformation of the blood solution into a clear solution, while the decomposition of red blood cells turns the solution into turbidity, which indicates the toxicity of the extract. .

As the concentrations did not show any hemolysis and therefore do not cause any cellular toxicity towards red blood cells, the lower sedimented layer appears in red color, which represents human blood. ; et al., Cao), erythrolysis depends on the duration of incubation, temperature, and concentration of the substance, and hemolysis occurs due to the breakdown of the erythrocyte membrane as a result of the sublimation between toxic substances and free radicals of protein (1994, andUrasella Xian–guo 2020; et al., (Bouhajeb.

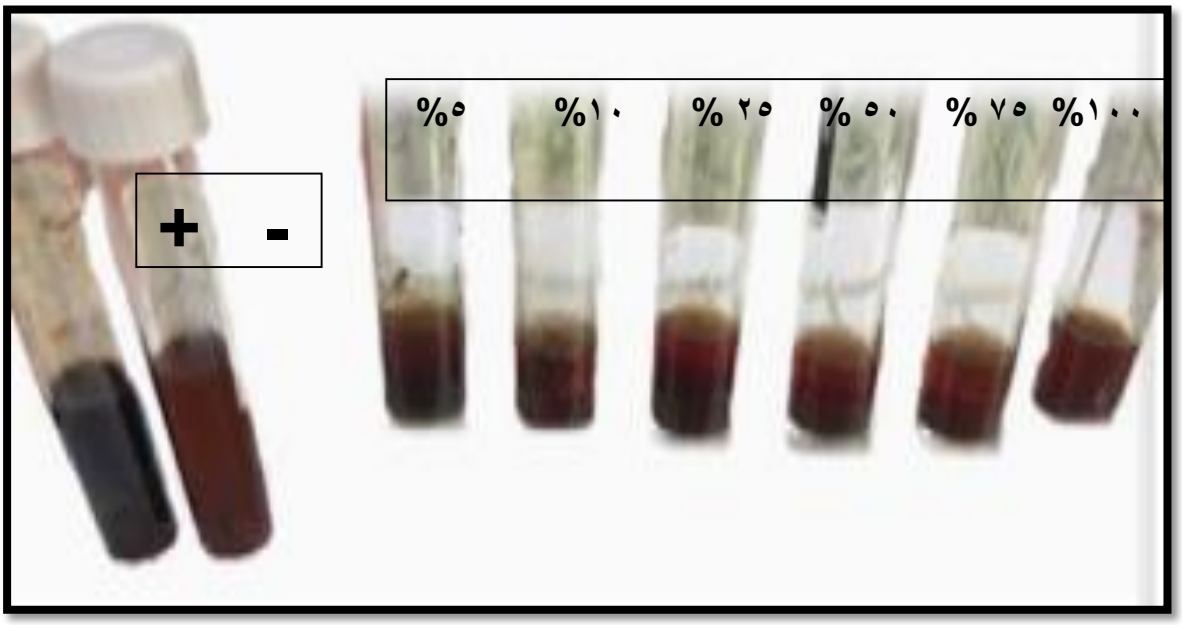
As a result of the widespread use of traditional medicinal plants as antimicrobial drugs, their non-toxicity to host cells is very necessary as it is an easy-to-apply method that has quick results and is inexpensive and therefore positive when used as drugs (2021) (Adebo et al.,.

As the concentrations did not show any hemolysis and therefore do not cause any cytotoxicity towards red blood cells, and as a result of the widespread use of traditional medicinal plants as antimicrobial drugs, the non-toxicity of them on the host cells is very necessary as it is an easy to implement method with quick results and inexpensive and therefore it is positive when used as drugs and food (Chiu et al,. and Peng,. 2018).

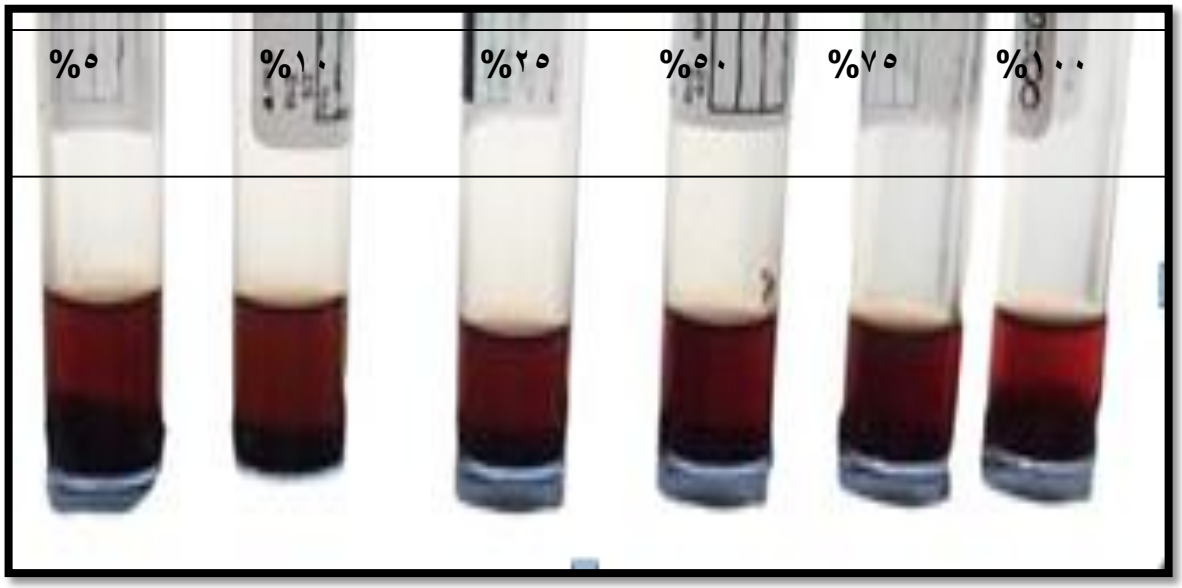
Table (3): Cytotoxicity test for hexane extract and alkaloid extract of eggplant

٥	١٠	٢٥	٥٠	٧٥	١٠٠	Extract concentration mg/ml
–	–	–	–	–	–	Studied plant extracts
–	–	–	–	–	–	Time period/3–24 hours

University of Thi-Qar Journal of agricultural research
ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 11, Issue 2 (2022) PP 36-44
https://jam.utq.edu.iq/index.php/main *https://doi.org/10.54174/UTJagr.Vo11.N2/04*



Picture (3): Represents the blood toxicity test for the alkaloid extract of the eggplant plant, which was negative



Picture (4): Cytotoxicity test of hexane extract of the eggplant plant towards red blood cells of human blood

IV. REFERENCES

1. Adebiyi ,J.A. ; Kayitesi, E. and Njobeh P.B. (2020). Mycotoxins reduction in *dawadawa* (an African fermented condiment) produced from Bambara groundnut (*Vignasubterranea*),.Food Contr., 112 p.

2. Adebo,.A; Oyeyinka,S.A. ; Adebiyi, J.A. ; Feng ,X. ; Wilkin , J.D. ; Kewuyemi ,Y.O. ;Abrahams, A.M. and Tugizimana F.(2021).**Application of gas chromatography mass spectrometry (GC-MS)-asedmetabolomics for the study of fermented foods** Int.J.FoodSci.Technol., 56.1514-1534.
3. Adebo,.A; Oyeyinka,S.A. ; Adebiyi, J.A. ; Feng ,X. ; Wilkin , J.D. ; Kewuyemi ,Y.O. ;Abrahams, A.M. and Tugizimana F.(2021).**Application of gas chromatography mass spectrometry (GC-MS)-asedmetabolomics for the study of fermented foods** Int.J.FoodSci.Technol., 56.1514-1534.
4. Agyei-Poku, B., (2018). The Effect of Pre-Treatment andOvenDryingTemperatures on the Nutritional, Anti-Nutritional Values and Colour Properties of the Fruits of Solanum Torvum. Ghana: Kwame NkrumahUniversityofScienceandTechnology, PhD thesis. 154-157
5. Agyei-Poku, B., (2018). The Effect of Pre-Treatment andOvenDryingTemperatures on the Nutritional, Anti-Nutritional Values and Colour Properties of the Fruits of Solanum Torvum. Ghana: Kwame NkrumahUniversityofScienceandTechnology, PhD thesis. 154-157
6. Ahmad Mohammad Salamatullah ; Mohammed Saeed Alkaltham;Khizar Hayat; Mohammed Asif Ahmed ;Shaista Arzoo ; Fohad Mabood Husain and Abdulhakeem . (2021). Bioactive and Antimicrobial Properties of Eggplant (Solanum melongena L.) under Microwave Cooking ustainability, 13, 1519.
7. Ahmed,A.S.;Fanokh,A.K.M. and Mahdi,M.A.(2019)b.phytochemical identification and antioxidant study of essential oil constituents of *cimum basilicum L.* growing in Iraq. Pharmacognosy Journal, 11, (4):724-729.
8. Anwar,A. ;Rehman,A. and Gilani.(2017). Chemo-eographicalVariations in the Composition of Volatiles and the Biological Attributes of*Mentha longifolia* L. Essential Oils from Saudi Arabia. International Journal of Pharmacology, ISSN 1811-7775.
9. Bauman,R.W.(2019). Mcrobiology An Introduction . In American Society For Microbiology , 12 th Edition, 19(7) 1-1039 .
10. Bobby ,M.N.;Wesely,E. and Johanson, M.(2012). High performance thin layer chromatography profile stdies on the alkaloide of *albizia lebbeck.* Asian Pacific Journal of Tropical Biomedicine,2(1): S1-S6 .
11. Bouhajeb, R.; Selmi, S.; Nakbi, A.; Jlassi, I.; Montevecchi, G.; Flamini, G.; Zarrad, I.and Dabbou, S.(2020) chemiclcomposition analysis, antioxidant, and antibacterial activities of eggplant leaves. Chem. Biodivers347-350.
12. Bouhajeb, R.; Selmi, S.; Nakbi, A.; Jlassi, I.; Montevecchi, G.; Flamini, G.; Zarrad, I.and Dabbou, S.(2020) chemiclcomposition analysis, antioxidant, and antibacterial activities of eggplant leaves. Chem. Biodivers347-350.
13. Bouhajeb, R.; Selmi, S.; Nakbi, A.; Jlassi, I.; Montevecchi, G.; Flamini, G.; Zarrad, I.and Dabbou, S.(2020) chemiclcomposition analysis, antioxidant, and antibacterial activities of eggplant leaves. Chem. Biodivers347-350.
14. Cao,S.Y. ; Li, B. Y.and Gan, R. Y. (2020).“Theinivoantioxidantandhepatoprotective actions of selected Chinese teas,” Food, 9, no.(3) : 262.
15. Carputo, D. (2020).Comparative Phytochemical Characterization, Genetic Profile, and AntiproliferativeActivity of Polyphenol-Rich Extracts from Pigmented Tubers of Di_erent Solanum tuberosum Varieties. Molecules, 25, 233.
16. Chiu, Y. J. ; Chou, S. C. ; Chiu, C. S. ; Kao, C.P. ; Wu, K. C. ; Chen, C. J. ; Tsai, J. C. and Peng, W. H. (2018). Hepatoprotective effect of the ethanol extract of *Polygonum orientale* on carbon tetrachloride-induced acute liver injury in mice.Journal of Food and Drugnalysis,26(1),369-379.

17. Chiu, Y. J. ; Chou, S. C. ; Chiu, C. S. ; Kao, C.P. ; Wu, K. C. ; Chen, C. J. ; Tsai, J. C. and Peng, W. H. (2018). Hepatoprotective effect of the ethanol extract of *Polygonum orientale* on carbon tetrachloride-induced acute liver injury in mice.Journal of Food and Drugnalysis,26(1),369-379.
18. Eletta, O. ; Orimolade, B.;Oluwaniyi, O. and Dosumu, O. (2017). Evaluation of proximate and antioxidant activities of Ethiopian eggplant (*Solanum aethiopicum* L) and Gboma Eggplant (*Solanum macrocarpon* L). *Journal of Applied Sciences and Environmental Management*, 21(5), 967-972.
19. Esther; Emem, N.;Emmanuel, O. ; Ibukun and Ganiyu ,O . (2018). Nutritional content of selected species of tropical eggplant fruit (*Solanum spp*) diet Attenuates hepatic inflammation in high-fat fed male Wistar rats induced with streptozotocin. 82(9): 1507-1528
20. Flores-Mireles, A. L.; Walker, J. N.; Caparon, M. and Hultgren, S. J.(2015). Urinary tract infections: epidemiology, mechanisms of infection and treatment options. Nature Reviews Microbiology, 13(5):269-284.
21. Ginwala, R.; Bhavsar, R.;Chigbu,D.G.I.;Jain,P. and Khan, Z.K.(2019).Potential role of flavonoids in treating chronic inflammatory diseases with a special focus on the anti-inflammatory activity of apigenin.*Antioxidants*, 8(2), 35. 1.
22. Ginwala, R.; Bhavsar, R.;Chigbu,D.G.I.;Jain,P. and Khan, Z.K.(2019).Potential role of flavonoids in treating chronic inflammatory diseases with a special focus on the anti-inflammatory activity of apigenin.*Antioxidants*, 8(2), 35. 1.
23. Haliński, Ł.P.;Topolewska, A.;Rynkowska, A.;Mika, A.;Urasińska,M.;Czerski, M. and Stepnowski, P. (2019). Impact of plant domestication on selected nutrient and anti-nutrient compounds in Solanaceae with edible leaves (*Solanum spp*.). Genetic resources and crop evolution, 66(1), 89-03.
24. Harborn,J.B.(1973).Photochemical. Methods, A guide to modern techniques of plant analysis . London. P: 287.
25. Harborne , J.B.(1984).Phytochemical Methods.2 nd ed.,Chapman and Hall.
26. Heywood,V.H.;Brummitt, R.K.;Culham,A.and Seberg, O.(2007). Flowering Plant Families of the World. Royal Botanic Garden, Kew. advances in biology and utilization. Royal Botanic Gardens, Kew, U.K. P. 111-137.
27. Manandhar,S.;Luitel,S.and Dahal,K.R.(2019).In vitro antimicrobial activity of some medicinal plants against human pathogenic bacteria . Journal of Tropical Medicine, 1895340, 5p.
28. Mercy,R. and David Udo,E.(2018). Natural products as lead bases for drug discovery and development. Res Rep Med Sci, *2*(1): 1-2
29. Moure,A.;Cruz,J.M.; Franco,D.; Dominguez,J.M.; Siherio,J.andDominguez, H.(2001). Natural antioxidants from residual sources. Food Chemistry , 72 , pp.145–171.
30. Xian-guo,H.and Urasella,M.(1994). Antifungal compound from *Solanum nigrum* .J . Ethnopharmcology. 43 : 173- 177.
31. Xian-guo,H.and Urasella,M.(1994). Antifungal compound from *Solanum nigrum* .J . Ethnopharmcology. 43 : 173- 177.
32. Xiu-Qin,L.;Chao,J.;Yan-Yan,S.;Min-Li, Y.and Xiao-Gang,C.(2009). Analysis of synthetic antioxidants and preservatives inedible vegetable oil by PLC/TOF-MS. Food Chemistry, 113(2):692-700.
33. Zhao,X.;Guo,S.;Lu,Y.;Hua,Y.;Zhang,F.;Yan,H.;Shang,E.;Wang,H.;Zhang,W.and Duan,J.(2020).Lycium barbarum L.leavesameliorate type2diabetes in rats by modulatingmetabolicprofilesandgutmicrobiota composition.Biomed. Pharmacother. 121: 109559.