



EFFECT OF THE SAFFRON FLOWER (*CROCUS SATIVUS* L.) EXTRACTS TOWARD THE BACTERIUM *STAPHYLOCOCCUS AUREUS* THAT CAUSES CONJUNCTIVITIS PUS

* Aliaa Saadoon Abdul-Razaq Al-Faraji

Center for Market Research & Consumer Protection / University of Baghdad.

*Corresponding author e-mail: alia.sadon@yahoo.com

ABSTRACT

Number of chemical and alcoholic and aqueous extracts have been prepared from Saffron flower (*Crocus sativus* L.). The primary chemical diagnosis results show that the Saffron of aqueous and alcoholic extracts contain the active ingredients such as Flavonoids, Coumarins, Alkaloids, Tannins, Polyphenols, Steroids and Glycosides and PH value of aqueous extract was 5.0 while alcoholic extract is 6.0. All extracts for Saffron were tested or examined for antimicrobial activity toward *Staphylococcus aureus* from different cutaneous infections (S1, S2 and S3). The results showed that antimicrobial activity depend on kind of extract and tested microorganisms. The inhabitation zone of aqueous extract of Saffron against S1 was 23mm at concentration 200mg/ml and 12mm for S2 at 200mg/ml too with LSD= (p<0.05). While alcoholic extract for Saffron against S1 is 10mm at conc. 200mg/ml and 9mm against S2 at the same conc. But S3 has diameter 7mm at 200mg/ml too with LSD= (p<0.05).

KEYWORDS: Saffron flower (*Crocus sativus* L.), Ethanolic extract, aqueous extract, biological activity.

INTRODUCTION

Crocus sativus commonly known as saffron crocus or autumn crocus is a species of flowering plant of the crocus genus in the Iridaceae family and it is best known for the spice saffron, which is produced from parts of the flowers (2-5,7-10). The name "Saffron" is derived from the Arabic word zafaran which means yellow, the ancient Greek called it "Koricos" where as Romans used the term "Crocum"^[7]. Saffron it is an herbaceous perennial cormous plant. The height of the plant is about 0.25 to 0.5 foot and the width is about 0.25 to 0.5 foot. The best season for the growth saffron is early spring. It prefers sunny to part shady, moderately dry, well-drained, ordinary garden soil. The flower styles are commonly used as a flavoring and yellow coloring for various foods such as bread, soups, sauces, rice and puddings^[10]. The stigmes of the plant are mainly used for its medicinal properties extensively in traditional medicine for various purposes, as an aphrodisiac, antispasmodic, expectorant, for treatment of stomach ailments, reducing stomachache and for relieving tension. It is also used to treat insomnia, measles, dysentery, jaundice, cholera, eye disorders, asthma, arthritis, cold and coughs^[2,10].

The aim of present study is Evaluation the inhibition activity of saffron against *Staphylococcus aureus* which causes conjunctivitis pus.

MATERIALS & METHODS

Plant sampling

Saffron flower (*Crocus sativus* L.) has been obtained from the herbseleers in the local markets in the city of Baghdad during March 2016. Saffron flower was prepared for

extraction process in market research and consumer protection laboratories – Baghdad University.

Examining the Groups and active compounds existing in the plants parts subject of the research

The resins, tannins, Glycosides, Alkaloids, Flavours, Coumarin, Saponins, Phenols and PH have been examined as shown in Ajina and *et al.*, 2009^[11].

Preparation of plant Aqueous Extracts

The extract has been prepared by taking (20)gm of saffron flower and solved in (200)ml of distilled sterilized water and let stand for 24 hours and the mixture is screened through several layers of gauze and then centrifuged at rate 3000 rpm for 10 min. and then dried in oven at 40°C for 24 hours^[14].

Preparation of Alcoholic Plant Extracts

They have been prepared by taking (20)gm of saffron flower and extracted in (200)ml of ethanol (96%) and let stand for 48 hours and the mixture is filtered by whatman filter paper and then centrifuged at rate 3000 rpm for 10 min. and then dried in oven at 40°C for 24 hours^[12].

Preparation of Bacterial Suspension

The bacterial suspension has been prepared in concentration of 1.5×10^8 bacterial cell/ml by McFarland technique as previously prepared Jabbar 2007^[6], for three isolation of *S. aureus* as shown in table (1) which was obtained from microbiology laboratory of market research and consumer protection center laboratories – Baghdad University as they have been examined after being biochemically tested and activated on the nutritional broth.

TABLE 1: Represents the bio-isolations of *S. aureus*

Isolation no.	Germ
S1	conjunctivitis pus
S2	conjunctivitis pus
S3	conjunctivitis pus

Evaluation of inhibitory activity of plant extracts against microorganisms

The well diffusion technique has been used including preparation of nutritional agar medium as per the supplier's instructions and poured in petri dishes and then the medium has been vaccinated with 0.1ml of the prepared bacterial suspension for each bio isolation of tested *S. aureus* and the suspension is diffused by using a disinfected piece of cotton and the dishes have been left for quarter an hour and then (2-3) wells have been made of 10mm in diameter by using cork driller. The dried alcoholic extract of the plant has been dissolved in dimethyl sulphoxide (DMSO) in concentration 2mg/ml and 0.1ml has been added for each of the prepared raw aqueous and alcoholic extracts by using the micropipette to the wells on basis of *S. aureus* for each germ type of *S. aureus* isolations for all extracts and then the dishes have been incubated at 37°C for 24 hours and the inhibition diameter has been measured apart from the well diameter [11]. The finding have been compared with three types of commonly used wide spectrum antibiotics as positive controller Erythromycin (15mcg), Oxacillin (1mcg) and

optimdex T in order that the germ isolation sensitivity can be tested of *S. aureus* to the antibiotics .

Statistical Analysis System (SAS)

The alcoholic and aqueous extracts of saffron by using SAS program (2012) for studying the effect of the factors considered in the different characteristics and LSD-Difference Significant among the averages by testing LSD-Less Significant Difference under level of (p<0.05) [13] .

RESULTS & DISCUSSION

Testing the groups and compounds existing in Saffron the subject of Study

The table (2) show primary chemical testing on the effective compounds and groups in the aqueous and alcoholic extracts of the plant Saffron the subject of the study. The results showed that all extracts used in the study contain: tannins, Glycosides, Alkaloids, flavouns, and coumarin and alcoholic extract has resins while the aqueous extract doesn't has resins but both extracts have not carry the gum and saponins and PH values of extract was 5.0 while the alcoholic extract is 6.0 .

TABLE 2: Results of primary specific tests of Saffron extracts

Tests	Aqueous Extract	Alcoholic Extract
PH	5.0	6.0
Gum	-	-
Alkaloids	+	+
Saponins	-	-
Steroids	+	+
polyphenols	+	+
Flavouns	+	+
Coumarians	+	+
Resins	-	+
Glycosides	+	+
Tanins	+	+

The effect of aqueous and alcoholic extracts of saffron on inhibition of the test bacteria

Table (3) shows the averages of inhibition zone formed by the aqueous extract of Saffron against antimicrobials of the tested *Staphylococcus aureus* where the aqueous extract of Saffron showed strong inhibitory effect on S1 at inhibition diameter of 23mm at the concentration 200mg/ml and the aqueous extract of saffron has strong effect on S2 at concentration 200mg/ml diameter of 12mm

with LSD=(p<0.05).Table (4) shows inhibition zone diameter in mm for the growth of the antimicrobials when treated with alcoholic extracts of Saffron where it has been found there is sensitivity of S1 towards Saffron at inhibition zone of 10mm at concentration 200mg/ml and sensitivity of S2 and S3 of Saffron at inhibition effect of 9mm and 7mm respectively at concentration 200mg/ml too at LSD=(p<0.05) .

TABLE 3: Inhibition Zone Diameters (mm) for the Growth of Antimicrobials when tested with plant Aqueous Extract of Saffron

Bacteria	Concentration (mg/ml)				LSD value
	200	100	50	0	
S1	23	19	18	0	5.94 *
S2	12	7	1	0	4.18 *
S3	7	3	1	0	2.66 *
LSD value	6.28 *	6.02 *	5.42 *	0.00 NS	---

* (P<0.05).

TABLE 4: Inhibition Zone Diameters (mm) for the Growth of Antimicrobials when tested with plant Alcoholic Extract of Saffron

Bacteria	Concentration (mg/ml)				LSD value
	200	100	50	0	
S1	10	2	2	0	4.61 *
S2	9	5	3	0	3.88 *
S3	7	6	1	0	3.06 *
LSD value	3.09 NS	3.15 *	1.75 NS	0.00 NS	---

* (P<0.05).

Table (5) shows the pharmaceutical sensitivity of antimicrobials tested towards some antibiotics where the antibiotics Erythromycin, Oxacillin and Optimadex T gave

preference in use as S1, S2 and S3 showed high sensitivity towards these antibiotics, S3 showed high resistance toward Oxacillin.

TABLE 5: Pharmaceutical Sensitivity of the Tested Antimicrobials towards some Antibiotics

Bacteria	Antibiotics			LSD value
	Erythromycin 15 mg	Oxacillin 1 mg	Optimadex T	
S1	2	2	24	5.72 *
S2	19	7	34	5.86 *
S3	2	0	22	5.24 *
LSD value	4.977 *	3.61 *	5.077 *	---

* (P<0.05).

The result showed from the above table (3 and 4) that aqueous extract of Saffron the research subject has better results than the alcoholic extract of Saffron in deal conjunctivitis pus. The reason of that is the concentration of the toxic matter of saffron containing Glycosides which resulted in showing high sensitivity by different antimicrobials of *Staphylococcus aureus* towards Saffron itself, this means that they have high effect against inflammation.

REFERENCES

- [1]. Ajina, S.J., Hindi, M.J. & Yahya, A.I. (2009) Effect of raw alcoholic extracts of some plants parts in inhibiting the growth of types of pathetic bacteria causing food decay. Iraqi Magazine for Market Research and Consumer Protection, Vol. 2(2):1-11.
- [2]. Bhargavak, V. (2011) Medicinal uses and pharmacological properties of *Crocus sativus* Linn. (Saffron). International Journal of Pharmacy and Pharmaceutical Sciences, Vol. (3), Suppl. (3), pp.:21-26.
- [3]. Ettehadi, H., Mojabi, S.N., Ranjbaran, M. Shams, J., Sahraei, H., Hadayati, M. and Asefi, F. (2013) Aqueous Extract of Saffron (*Crocus sativus*) Increases Brain Dopamine and Glutamate Concentrations in Rats. Journal of Behavioral and Brain Science, Vol. (3), pp.: 315-319.
- [4]. Gismondi, A., Serio, M., Canuti, L. and Canini, A. (2012) Biochemical, Antioxidant and Antineoplastic Properties of Italian Saffron (*Crocus sativus* L.). American Journal of Plant Sciences, Vol. (3), pp.: 1573-1580.
- [5]. Hosseinzadeh, H., Sadeghnia, H.R., Ziaee, T. and Danaee, A. (2005) Protective effect of aqueous Saffron extract (*Crocus sativus* L.) and crocin, its active constituent, on renal ischemia-reperfusion-induced oxidative damage in rats. J. Pharm. Pharmaceut. Sci. Vol. (8), no.(3), pp.:387-393.
- [6]. Jabbar, S.R. (2007) Study of antimicrobial of some extracts of *Bassica Nigra*. AlBasra Researches Magazine (Sciences), Vol.(1),no.(3), pp.:49-54.
- [7]. Jan, S., Wani, A.A., Kamili, A.N. and Kashtwari, M. (2014) Distribution, chemical composition and medicinal importance of Saffron (*Crocus sativus*). African Journal of Plant Science, Vol. (8), no.(12), pp.: 537-545.
- [8]. Linardaki, Z.I., Orkoulas, M.G., Kokkosis, A.G., Lamari, F.N. and Margarity, M. (2013) Investigation of the neuroprotective action of Saffron (*Crocus sativus* L.) in Aluminum-Exposed adult mice through behavioral and neurobiochemical assessment. Food and Chemical Toxicology. Vol.(52),pp.: 163-170.
- [9]. Modagheh, M.H., Shahabian, M., Esmaeili, H.A., Rajbai, O. and Hosseinzadeh, H. (2008) Safety evaluation of Saffron (*Crocus sativus*) tablets in healthy volunteers. Phytomedicine, Vol. (15), pp.: 1032-1037.
- [10]. Nilakshi, N., Vijny, G.R. and Abhyankar, M.M. (2011) Detailed profile of *Crocus sativus*. International Journal and Biosciences, Vol. (2), Issue (1), pp.: 530-540.
- [11]. Perez, C., Paula, M. and Bazerque, P. (1990) An antibiotic assay by the agar-well diffusion method. J. actabiologiae, 15:113-115.
- [12]. Rani, I., Akhund, S., Shail, M. and Abro, H. (2010) Antimicrobial Potential of Seed *Eruca Sativa*. Pak. J. Ot., 42(4): 2949-2953.
- [13]. SAS (Statistical Analysis System) (2012) Users Guide Statistical Version 9.1th ed. SAS Inst. Inc. Cary. N.S. USA.
- [14]. Shofalih, Andrew (2005) Alternative medicine, herbal therapy and medical plants, translation: Omar AL-Ayoobi, International Academy, Beirut-Lebanon.