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Evaluates the Active Substances of Extracts of *Capsicum Annuum* on *Enterobius Vermicularis*: In Vitro Study

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Annotation: The present investigation was conducted to evaluate the impacts of both cold and hot aqueous extracts of Iraqi Capsicum annuum (C. annuum) fruits on palsy and death of Enterobius vermicularis (E. vermicularis) (in vitro), as well as to identify the main effective secondary compound (alkaloid, terpenoid, and phenolic compounds) of these extracts for analyses by (GC/MS) gas chromatography/mass spectroscopy, along with take-out utmost concentrated compound to assess their impact on the palsy and death of pinworms.

Current findings showed that cold aqueous extract of C. annuum had a high impacts, where its arithmetic rate for palsy and death of pinworms were 474.33 and 619.58 minute, respectively; followed by hot aqueous extract where its drive the palsy and death of pinworms at 577.58 and 773.50 minute , respectively, with a considerable significance difference.

Regarding to the secondary compounds containing in of C. annuum fruits, current study detected that phenolic compounds had greatest impact on E.

vermicularis, they cause palsy at 312.50 minute and led to death 417.33 minute. The next compound in order of importance was alkaloid compounds; they are cause palsy at 465.75minute and led to death 621.17 minute. Concerning terpenoid compounds, they are cause palsy at 335.75minute and led to death 446.25 minute, with significance differences.Mebendazole medication had a high effectiveness leading to pinworms' palsy and death an arithmetic rate of 235.00 and 314.00 minute in125 mg/ml concentration, respectively, with a considerable significance differences.

In the context of finding obtaining by GC/MS technique, the current study assured that Iraqi C. annuum fruits contain palmitic acid, with a retention time about 56.010 minutes, where, it had a great efficient with concentration of 125mg/ml, the average arithmetic for palsy about 10 minutes and for death about 15 minute, with significance differences.

Keywords: Enterobius vermicularis, Capsicum annuum, secondary compounds, GC-MS, Palmitic acid.

1-Introduction:

E.vermicularis is pertinent to the phylum Nematoda and is an intestinal parasite that damages the intestines and is pathogenic to humans. It is called threadworm, pinworm, or seat-worms [1]. Indeed, humans are the only known host of *E.vermicularis* where the occurrence rate reach 200 million or more worldwide; therefore it is the utmost frequent human helminthosis [2]. The length and thick of female pinworms are about 8–13 mm and 0.3–0.5 mm respectively, while the male length and thick are about 2–5mm, 0.1–0.2mm respectively; cycle of infection with these worms begins when an ova is transferred from the perianal skin with a contaminated finger or tools is swallowed (3). In general, symptoms of these pinworms include: perianal pruritus, intense irritation and scratching along with excoriation of skin surrounding the anus (4), also loss appetite, nausea, salivate, irritability, loss weight, scared dreams, enuresis and insomnia (5).

Scotch tape is usually employed to the laboratory diagnosis, which is adequate to observe eggs of *E. vermicularis* (6).

The treatments of pinworm are mebendazole, pyrantel pamoate, or albendazole [3], mebendazole drug (Vermox) is methyl 5-benzoyl-2- benzimidazole carbamate), it has been utilized to treat the individuals infected with pinworm, Ascaris, trichuriasis as well as hookworms with slight side effects as headache and dizziness (7), it is relatively new broad spectrum anthelmintic that have excellent therapeutic effects on nematode infections (1) it is insolvable in water and its pharmacologic impact is the permanent inhibition for up-taking of glucose by nematodes, in mammalian, including human, (1,8,9).

Medicinal Plants possess bioactive secondary metabolites, including terpenoids, alkaloids, tannins, saponins, and others, which have extensively studied owing to their numerous potential therapeutic, including (to name a few) anti-infective properties, anticancer activity, anti-inflammatory impacts, and with metabolic disturbances (10) Plant secondary metabolites are classified into phenolics, flavonoids, alkaloids, and terpenoids arising from both type primary and secondary metabolisms (11), secondary metabolites are a principle source of new medications for diversity of biomedical occupation and chemical constituents [12]. Indeed, utilization of plants to heal a several human diseases since ancient times and the most of the pharmaceutical products currently employ as herbal remedy, inclusive the aspirin, digitalis, opium, and quinine (13)

C.annuum L. returns to the Solanaceae family and is classified as a vegetable of very high biological value, and it includes sweet as well hot pepper, which is the most exceedingly cultivated species of pepper worldwide (14, 15, 16); it is a vegetable with the highest biological value and has a key role in human diet (15, 17), and is a precious exporter of exogenous antioxidants that is engaged with the balance of reactive oxygen species (ROSs) (18, 19). From these antioxidants that contained in fruits of Capsicum annuum vitamins C, E, beta-carotene, chlorophyll, polyphenols or lycopene which exhibit a high antioxidant efficacy and protect toward the deleterious impacts of several free radicals as ROSs (20, 21), thus these fruits important for prevention of neoplastic disease, cardiovascular and neurological disturbances (22, 23), along with diabetes mellitus (18;19,24).

Hot pepper is as well affluent in phenolic-derived compounds with a powerful physiologically and pharmacologically features, also has a high antioxidant activity (25,26).

The fruits of capsicum are utilized for caring of cough, sores throat, toothache, various parasitic infections, rheumatism, and wounds restoration (27) and as well empoyed as an antiseptic, counter-irritant, stimulators for appetite (28), as well as their immunomodulator effects (29) . In addition to the additional effects against bacteria and cancer associated with chilies (28). Red pepper had used medicinally for their ability to boost digestive function; specifically, it is administered in the cases of atonic dyspepsia and flatulence (28,29) as boosting the movement of gastric antrum, duodenum, jejunum and colon (29). It could as well boost the secretions of pepsin, and bile acid (30). Chilies are well-known to have a protective impacts versus the gastrointestinal upset (31) such as dyspepsia , appetite mislaying, gastro-esophageal reflux ailment together with gastric ulcers (29) as a results to different mechanisms e.g. curtailment of food transition period during the gastrointestinal tract as well as their impact as anti-Helico pylori (31). What's more, the leaves of this plant possess antioxidant effectiveness. (32).

The Gas Chromatography Mass Spectrometry (GC/MS) is a tool widely employed for separation the chemical mixtures (GC component) besides to recognized components at the molecular level (33); this technique is an important instrument for their ability to accurate analysis for the environmental specimens, it’s a tool that joins characteristics of gas- chromatography along with mass spectrometry to pick out distinct organic compounds found in an organic matter, including Alkanes, Fatty acid, Alkenone, Sterols (34). Recently, GC-MS tool had become the of option for pursuit organic compounds obtained from the various plants and in their fossil counterpart, which may be a starting point for our understanding for evolution through time, also could help out in paleoclimate reconstruction (33,34).

Palmitic acid has long been viewed inversely due to its possible adverse health effects, thus

overshadowing its manifold vital physiological vigors, the Palmitic acid is a common saturated fatty acid, accounting for nearly twenty to thirty percent of entire fatty acids of human's body, and could be acquired by the food or endogenously synthesized by lipogenesis (35). In spite of its negative conception, it has special structural and functional roles, especially in utero along with infancy, as it is uniquely bring in human milk (36). Although lipids and fatty acids representing a tiny portion of the edible part of peppers, but they have a significant metabolic and structural value; where the nutritional quality of lipids is primarily determined by their fatty acid contents (37). Principle class of secondary metabolites of *C. annum* are the presence of polyphenols ,the common fatty acids in *C. annum* plant are palmitic, oleic , as well as linoleic acid (38).

Aims of current research is extracting active substances from *Capsicum annum* plant as well as examining their biological effectiveness against the *E. vermicularis in vitro* compared with Mebendazole.

2-Methodology

2-1- Collection of *Capsicum annum* fruits:

Flower buds of *Capsicum annum* fruits have been taken from the local market at February-2021. *Capsicum annum* had dried in a shadiness place, and grinding by an electric grinder to obtain a soft powder; then this powder putted in a plastic container and save in refrigerator.

2-1-1-Preparing the aqueous extract:

The cold water extract has been prepared by dissolving 10% of Capsicum annum powder with 200ml of distilled water by mean of a mixer for about 30 minutes, after that exposed to centrifugation for nearly 10 minutes at 3000 rolls per minute, then the extract has been desiccated using an oven at 45 C for bring about a dried extract, which saved it in the refrigerator until usage. As for the hot water extract, it was prepared in the same way, except that boiling water was used instead of cold water [39].

2-1-2- The Extraction of plants' secondary component

2-1-2-1-The extraction of crude alkaloid

10g from dried powder was extracted through putted it on the filter papers was fixed on the thimbles and subsequently 200 ml of ethanol (%99) was add, for one day (24 h) by soxhlets. Rotary evaporator has been employed to concentrate the newly formed products; where it dissolved in 5ml of ethanol, by adding 30ml of H_2SO_4 (2%); after this the rotary evaporator was employed for removing the ethanol alcohol. Mayer's assay gives a white product to confirm alkaloids existence. 10% of NH_4OH has been putt in an isolating funnel and putting 10ml of chloroform, mixture of product had separated into two layers; bottom layer was selected since it has the alkaloids, and using the rotary evaporator to concentrate it, the new (dried) product saved in icebox [40].

2-1-2-2: The Extraction of crude phenolic:

For phenolics extraction a method of performed by [41] was performed, where 20g of dehydrated extract put in a glass flask contains 400ml of CH3COOH (%2) by utilizing the reflex condenser in a water bath at 70°C until 8 h. After filtering the new solution and adding N-propanol and NaCl to the separation funnel, the top layer containing the phenolics was removed, focused using a rotary evaporator, and the dehydrated product was then stored in a refrigerator.

2-1-2-3: The Extraction of crude terpenoid:

Crude terpenoids were extracted using a previously designed method by (42). In this method, 20g of desiccated powder material which extracted through using the solvent (chloroform) in soxhlet with chloroform (200ml) at 45Cº for entire day (24 h), then the sample was concentrated by rotary evaporator, sample contains terpenoids extract was desiccated in the oven at 45-40Cº. The dehydrated substance was conserve in shut glass bottles to use later. Reagents were applied

utilizing the standard procedures to expose the existence of alkaloid, phenolic as well as terpenoid. Due to the importance and competence of phenolic compounds, it had selected to analysis by GC-MS setup.

2-1-2-5: Chemically analysis of phenolics using GC/MS technology

Phenolics compounds was assessed with GC/MS, which was practicable on agilent technology (Little Falls, California, USA) (6890 series) GC system, providing with (5973) MS detector and an auto-injector (7683 series) was working. Compounds have been isolated by (Rtx®-Wax capillary column) (30m, 0.25mm, film diameter 0.25µm; RESTEK, Pennsylvania, USA). Helium of 5N5 grade has been working as gas's carrier, with current rate about 0.8 mL/minutes; the split ratio is 60:1. Volume of sample involvement was 1µl and the injector was held at temperature 230°C, while column oven was fixed at 70°C for two minutes, at that time organized at130°C for 30°C/minutes and alter the gradient to 230°C with10°C per minutes. Ultimately, it's held at 230°C until 6 minutes, the entire run period was 20 minutes. The system of electron ionization with ionization energy about 70 eV had applied for detecting. The temperature of ion source was setting at 230°C, while 250°C was setting as an interface temperature; the voltage of detector was 2kV. Mass spectrum had gained in scan mode at 0.98 scan/second at mass ranges of 20-800amu. The measures was carrying out twice for every specimen with solvent detain for two minutes [33].

2-2: Collecting of *E. vermicularis* pinworm.

Adult pinworms have been directly collected at midnight from the children anus region, that live in Hilla city, province of Babylon, Iraq. After that, pinworms was washed using distilled water and the worms were putted in petri-dishes contain phosphate buffer saline (PBS) in an incubator at 37°C until the experiment get started [43].

2-2-1: Microscopic examination:

The pinworms were aggregated or collected from infected children and light microscope using for diagnosed; the wet mount method was performed for detection the adult or eggs in microbiology Laboratory/ pharmacy college, University of Babylon.

2-3: Impacts of *Capsicum annum* extracts on *E. vermicularis*

In vitro experiment was done to examine the effectiveness of *Capsicum annum* extract on the availability of *E. vermicularis*; the stock solutions of cold and hot extracts of Capsicum annum fruits was prepared by the melting 6g of dehydrated extract with 100ml of distilled water; Stock solutions are utilized for the concentrations prepared: 20mg/ml, 40mg/ml along with 60mg/ml, the controls was prepared from only phosphate buffer saline. Effectiveness of examined extracts had compared with praziquantel medication by a selfsame concentrations. Pinworms were divided into 4 groups, 5 worms that contained in each one, control group was prepared from one of them , each group was treated with the request concentration from both water and drug extracts, and were recording the period or the time at which the entire palsy and death.

Extrinsic stimuli were also performed to confirm the time of palsy. The time required for pinworm to become immovable was recorded as palsy time, the lethal time had confirmed by death of paralyzed pinworm followed-up by failing of body color [44].

2-3-1: Testing the extracts on worms in *vitro*.

The pinworms have been assembled in petri-dishes contain PBS (about 1ml) and placed in an incubator, an hour later, 1ml of each concentration of both water extracts of *Capsicum annum* fruits have been added-up to the petri-dishes each on its own. While an identical concentrations of praziquantel drug had added in a further petri-dishes [45].

2-3-2: The Impact of palmitic acid on *E. vermicularis*.

In vitro experiment also was performed to examine the impact of Palmitic acid on adult *E. vermicularis*. Stock solution of Palmitic acid (FedEx company, China) was prepared by dissolving

6g of Palmitic acid powder to 100ml of distilled water, (thus stock solution has 60mg/ml concentration) and from its' other concentrations 20mg/ml, 40mg/ml, 60mg/ml were prepared; after that, 1ml from each concentrations have been taken and added-up to a petri-dishes containing pinworms each on its own [46].

2-3-4: Estimation the Viability *E. vermicularis*.

Paralyzed or dead pinworms were observed visually, so the diagnosis and identification of paralyzed or dead pinworms was made easy [45].

3-Statistically analysis:

Factorial experiments with completely randomized has been applied to analyze the data employing least significance differences (LSD) at ($P \leq 0.05$) level via using SPSS statistics system, version 26.

4-The results

Results of this research shows or demonstrates the activity of extracts on this parasite as appears in figure 1,2,3.

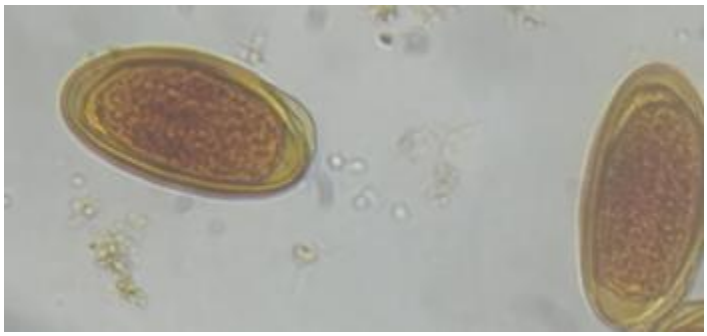

Figure (1) *Enterobius vermicularis* eggs (400x).

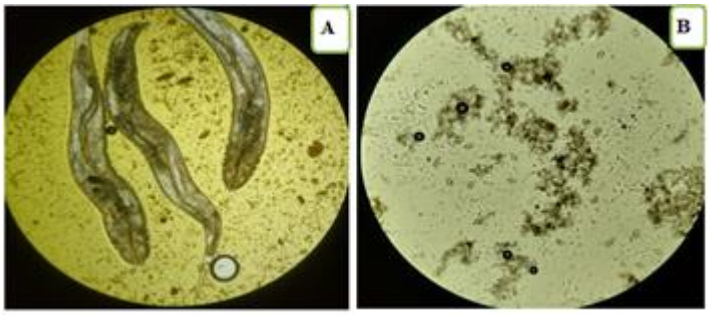

Figure (2) Adult female of *Enterobius vermicularis* in extract (A,10x); Eggs of *Enterobius vermicularis* (B,40x).

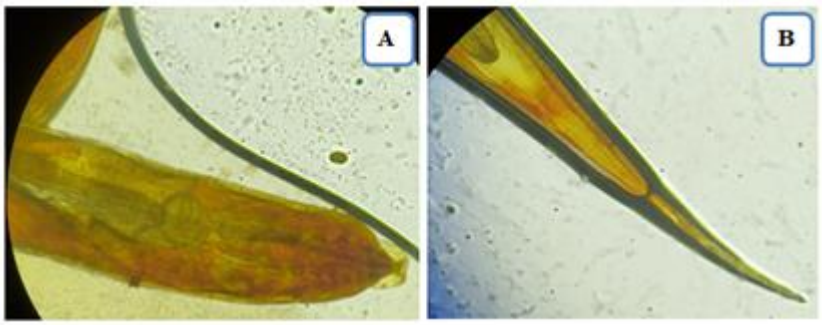

Figure (3) Front portion of *Enterobius vermicularis* (A,20x);End portion of *Enterobius vermicularis* (B,20x).

Table (1): The impacts of cold and hot water extracts of *Capsicum annuum* on palsy and death of *E. vermicularis*

Extract type	Time/ minute for palsy Mean± S.D.	Time/minute for death Mean± S.D.
Cold extract	474.34± 126.98	619.58 ± 164.07
Hot extract	577.58 ±108.61	773.50 ± 140.48
LSD at probality level 0.05	188	1.5

Table (2): The impacts of cold and hot water extracts concentrations overlapping of *Capsicum annuum* on palsy and death of *E. vermicularis*

Capsicum annuum plant	Extract type	concentration mg/ml	Time/ minute for palsy	Time/minute for death
			Mean± S.D.	Mean± S.D.
	cold extract	125	148.00±0.57	200.00± 1.155
		75	215.00±0.57	305.00±0.57
		50	342.00±0.57	421.00±0.57
		Control	1192.33±36.88872	1552.33±1.453
	Hot extract	125	252.33±0.88192	365.00±0.57
		75	362.00±0.57	484.00 ± 1.155
		50	516.00±0.57	690.00±0.57
		Control	1180.00±7.50	1555.00±1.528
LSD at probality level 0.05			39.9	3.1

Table (3): The impacts of Secondary compounds for *Capsicum annuum* on palsy and death of *E. vermicularis*

Secondary compound	Time/minute for palsy Mean± S.D.	Time/minute for death Mean± S.D.
Phenolics	312.50 ± 148.80	417.33 ± 197.82
Alkaloids	465.75 ± 123.01	621.17 ± 163.71
Terpenoids	335.75 ± 145.66	446.25 ±192.60
LSD at probality level 0.05	1.7	1

Table (4): The Interference impact of Secondary Compound Concentrations for *Capsicum annuum* on palsy and death of *E. vermicularis*

Secondary compound	concentration mg/ml	Time/minute for palsy Mean± S.D.	Time/minute for death Mean± S.D.
Phenolics compounds	125	10.00±0.57	15.00±0. .577
	75	24.00±0.57	35.00±0. .577
	50	49.00±0.57	66.00±0. .577
	Control	1167.00±0.57	1553.33±.882
Alkaloids compounds	125	174.00±0.57	232.00±0.57
	75	220.00±0.57	294.00±0.57
	50	301.00±0.57	403.00±0.57
	Control	1168.00±0.57	1555.67±0.882

Terpinoidscompounds	125	30.00±0.57	41.00±0.57
	75	68.00±0.57	92.00±0.57
	50	73.0±0.57	100.00±0.57
	Control	1172.00±3.6	1552.00±0.882
LSD at probality level 0.05		3.4	1.8

Table (5): The impacts of mebendazole drug on palsy and death of *E. vermicularis*

Concentration (mg/ml)	Time/minute for palsy Mean± S.D.	Time/minute for death Mean± S.D.
125	235.00 ± 0.57	314.00 ± 0.57
75	421.00 ± 0.57	562.00 ± 0.57
50	568.00 ± 0.57	786.00 ± 0.57
Control	1156.00 ± 0.57	1560.00 ± 2.08167
LSD	1.88	3.7

Table (6): GC-MS analyzes of bioactive compounds in the essentials oil of *Capsicum annuum*

Peak Number	**compound Name**	**Retention Time / min Of Iraqi Capsicum annuum type**	**Retention Time / min Of Capsicum annuum plant in library GCMS**
1	1 Propane, 1,1-dipropoxy-	9.487	9.488
2	1 Thymine	20.017	20.016
3	1 4H-Pyran-4-one, 2,3-dihydro-3,5-...	23.257	23.256
4	1 2-Methoxy-4-vinylphenol	31.163	31.161
5	1 Thionin, 2,3,4,5,6,7-hexahydro-	34.927	34.927
6	1 2-Ethyl-oxetane	36.867	36.865
7	1 l-[-]-4-Hydroxy-1-methylproline	39.268	39.265
8	1 1,3,4,5-TETRAHYDROXYCYCLOHEXANEC	44.360	44.357
9	1 Ethyl tridecanoate	46.612	46.615
10	1 Myristic acid	49.139	49.141
11	1 3-Oxabicyclo[3.2.0]heptane, 6,7-...	54.192	54.193
12	1 Hexadecanoic acid (palmitic acid), methyl ester	54.739	54.742
13	1 n-Hexadecanoic acid (palmitic acid)	56.010	56.011
14	1 9-Octadecenal , (Z)-	56.558	56.560
15	1 9,12-Octadecadienoic acid(stearic acid) (Z,Z)-...	60.094	60.092
16	1 cis-13-Octadecenoic acid (stearic acid), methyl	60.311	60.309
17	1 9,17-Octadecadienal, (Z)-	60.483	60.480
18	1 Octadecanoic acid (stearic acid), methyl ester	61.105	61.103
19	1 9,12-Octadecadienoic acid (stearic	61.412	61.412

	acid), (Z,Z)-		
20	1 Oleic Acid	61. 627	61.629
21	1 1-Heptadecanecarboxylic acid	62.264	62.263

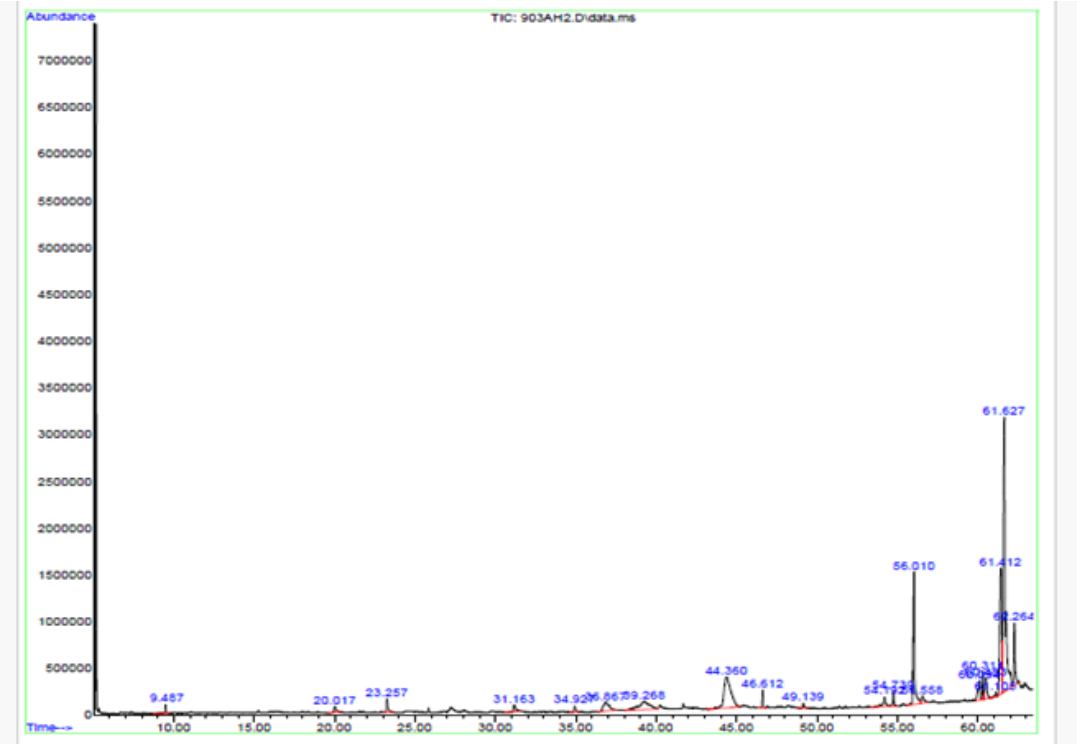

Figure (4): Chromatogram of the essentials oil of *Capsicum annuum*

Table (7): The impacts of palmitic acid of *Capsicum annuum* on palsy and death of *E. vermicularis*

Concentration (mg/ml)	Time/minute for palsy Mean± S.D.	Time/minute for death Mean± S.D.
125	10.00±0.57	15.00±0.57
75	36.00±0.57	42.00±0.57
50	56.00±0.57	74.00±0.57
Control	1170.6667± 4.17665	1572.00±8.62
LSD	7.0	14.2

5-Discussion:

E. vermicularis is the most common parasitic helminths infected human (2), The number of people infected with this parasitic type of pinworm is estimated at about 200 million in the world, with children aged 5-10 years representing more than thirty percent of this cases (2,47). Drug discovery in the past often resulted from observations of the effects of plant extracts or individual chemicals on animals or humans, drugs were selected based on effect, with no understanding of mechanism (9).

Findings of current research appear that cold extract has a higher effectiveness than hot extracts of *Capsicum annuum* on palsy and death of *E. vermicularis* pinworm as in table one. It is clear from the results of the current research that the cold water extract had a high effectiveness and ability to destroy pinworms, and it seems that this great effectiveness is due to this extract containing polyphenols, which are known for their ability to change the pH environment of the pinworms, leading to its death. Also, these phenols dissolved in water can stick to the cells of the worm's tegument and thus stop their effectiveness (18,48 and 49). Pepper fruits are a rich source of phenols, the importance of which is well known in protecting against a wide range of diseases

(50). A previous research accomplished by (51) revealed that polyphenol could be a prospective source of plant nutraceutical, a substances have a great health-promoting and preventive impacts (24).The effective effect of the cold extract of *Capsicum annuum* shown by the current study can also be attributed to the active components known to decompose quickly. They may maintain their bond and concentration in cold water compared to boiling water, which leads to damage to the bonds between these components, which makes them lose their effectiveness against pinworms.

Statics analysis of this research demonstrates the concentrations interferences for both aqueous extract; the concentration of 125mg/ml has a substantial and effectual impacts on palsy as well as death of *E. vermicularis* than others concentrations as mention in table two, These impacts can be attributed to the fact that *Capsicum annuum* plant fruit extract possesses invaluable sources of medicinally and bio-actively compounds [52] .

The efficacy of secondary compounds in palsy and die of pinworm in current investigation is known by this experiments where study proven that phenolics compound of *C. annuum* plant have greater impact compared with other secondary compounds as available in table 3 and 4 , it causes palsy and death in a relatively short period of time as compared with other secondary compounds, present finding shows that phenolic compounds may exert this effective impact through their action as antioxidants and neutralization of many free radicals, where the mechanisms action of antioxidants are numerous and may include: hydrogen atom transfer, single electron transfer, sequent proton loss, and chelation of transition; also the effective impacts of cold extract could attributed to effects of palmitic acid (hexadecanoic acid) that were exanimated to ensure the antimicrobial, anti-inflammation, antioxidant, anticancer and other protective roles [53].

Findings of our investigation demonstrated that alkaloid compounds have anti-helminthic action on palsy along with death of *E. vermicularis* pinworm, this impacts seems to be attributed to that capsaicinoids that effects on condense of ions in vivo and in vitro of organisms body because it affects or it may work on a group of ion channels recognized as a transient receptor potential channel [54,55 and 56].

From a pharmacological perspective, capsaicinoids, especially capsaicin, possess a variety of in vitro physiological functions; thus, they take action as antioxidants, triggers of energetic metabolism, fat accumulation inhibitors, anti-inflammatory, neuro-stimulants and apoptosis-alleviate factors in neurodegenerative defects. [57,58 and 59].

In addition, alkaloid compounds could deactivate action of an enzyme, receptors and others proteins by formation a hydrogen bonds with it [60] ,such as capsaicin, homocapsaicin, dihydrocapsaicin, nordihydrocapsaicin, and homodihydrocapsaicin alkaloids [61], Alkaloids can also act similarly to detergents that disintegrate outer-membrane of microorganisms [62].

Alkaloids contain a variety of pharmacological characteristics, such as antimalarial action, stimulants of central nervous system, anticholinergic factors, oxytocic and vasoconstrictor action , and anti-inflammatory [60,63], where the anti-inflammatory action of alkaloid compound inclusive the suppression or control of a principle inflammatory mediators [63]. In humans, the pharmacologically action of capsaicin is restricted to intravenous or intraperitoneal injections, or direct applied of capsaicin to exposed nerves [64]. . However, species of Capsicum are assumptive as a powerful local stimulants in the circulation [65].

The impacts of terpenoid compounds may be attributed to a existence of terpenoid derivatives or components as Hydroxypivalic acid, Cyclohexene-1-carboxaldehyde,2,6,6-trimethyl [66]. Hydroxypivalic acid (is a metabolite product of adefovir dipivoxil) could esterify the free carnitine and thus leads to lessen levels of it [67] ; or terpinoids' effect may be due to dissolve of lipids of epidermis cells of worm by the presence of 3,3- dihydroxy-2- (hydroxymethyl) -2-methylpropanoic acid, 3-hydroxy-2, 2dimethylpropanoic acid and tetra-methylheptadec-15-enoic acid that may be effect on lipids, the impact of terpenoid seems to attributed for the reaction among components, which are presume to be take place as a results of emission of terpenoid [68],

terpenoid have been exceedingly deem as therapeutic agent with a great power [10] ,also its as crucial bioactive components of essential oil [10,69] .

Through statics analysis of interference impacts of mebendazole drug concentrations, it is clear that the drug mebendazole has high effectiveness against pinworms particularly with 125 mg\ml, where its cause palsy and death in extremely short period of time as found in table five.

The present findings are consistent with investigation of [70]. , who estimated the efficacy and performance of mebendazole (500 mg) for curing of Ascariasis, Trichuriasis along with hookworm infections in a samples of children; where in infections with hookworms, the mebendazole contributed in significant cure with percent of 7.6% as well as depletion of eggs with percent 52.1%, also amalgamated of mebendazole with levamisole had a cure percent about 26.1% as well as depletion of eggs with percent 88.7%.

Also, results of the present investigation were consistent with study of [71]. who indicated the effectiveness of the drug mebendazole in reducing the number of eggs in the stool for a very large study population of school children that included several countries, the results appears that activity of mebendazole was highest for roundworms (97.6%) followed by hookworm (79.6%). The significant impacts of mebendazole It appears that this is due to the ability of this drug to inhibit important enzymes in carbohydrate metabolism for parasites, which leads to their death (72). Also, the deadly impact against the parasites can be attributed to the ability of this drug to destroy the intestinal cells of parasites as a result of its ability to inhibit microtubules production throughout binding to colchicine binding-site of β-tubulin, thus blocking polymerization of tubulin dimers [7]. As a consequence, many pathways are disrupted, including glucose absorption, digestion, and the ability to reproduce, leading to palsy, obstacle of egg production, and gradual death of the parasite. On the other hand, mebendazole is badly absorbed by digestive tract, making it an effectual medication for controlling intestinal worms infections with extremely few side effects [9].

The findings of GC-MS technique confirmed that extracts of Iraqi *C. annuum* contain palmitic acid compounds, with a retention time about 56.010minutes, that was very similar to that time of stander palmitic acid in a library report of GC-MS device this results clearance in table 6 .

Present results was identical to those of [73] in Craiova, they are utilized gas chromatography equipped with mass spectrometry detector to inquire into the components of *C. annuum* fruit phenolic compounds, The results of their study demonstrated that *C. annuum* fruit contain palmitic acid and which is the most common compound in *C. annuum* phenolic compounds,

Furthermore, results of present work agreed with study of [38], they are used the Pulps and seeds from six varieties of the genus Capsicum plant and evaluated their contents from fatty acids through principal component analysis of pepper by using GC (gas chromatography), they were found that palmitic acid is the mostly common fatty acids (16:0) in all peppers types in the Brazil.

GC-MS, is a fast and credible platform for analyzing the essential oil in a quantitative and qualitative level [33]; it is a hyphenate system and a highly consistent technique that mostly abundant applied for the purpose of recognition and quantification [34]. It is a device with excellent selectivity and high sensitivity that requisite for natural essential oil as they are generally composed of numerous different constituent [33].

Their applications involving evolution of novel drugs and analyzes of their purity, revelation about chemical warfare factors and explosives, Examining athletes' urine samples to detect the presence of performance-enhancing stimulants whose use is prohibited, as well as being applied to examine Martian soil samples [74]. And because GC-MS is an optimal technique in present analytical chemistry [34;74] , many GC columns separate compounds at boiling point, due to the least-boiling material proceed faster along with have a lower retention time compared to materials with a higher boiling point.

According to our findings, it is clear that the GC-MS technique is a very accurate technique for separating and detecting the presence of secondary compounds. The outcomes of our study also appear that palmitic acid is the principal compound of Iraqi *C. annuum* fruit. Palmitic acid compound led to palsy and die of pinworm in vitro, particularly with concentration of 125mg /ml, its led to a palsy and killing of pinworms with huge efficiency that was 10.00 minutes for palsy and 15.00 minutes for die of worm as present in table 7 , these results indicates that palmitic acid has curative capability against E. vermicularis. These capability of palmitic acid compound seem to be ascribed to that palmitic acid compound stimulates the programmed cells death via the mitochondrial pathway which had facilitated by boosting of intracellular ROSs production or disrupting with the cell cycle, mainly in G1 phase of cell cycle. What's more, palmitic acid enhances programmed cell autophagy, hinders cells migration, invasion, along with angiogenesis, and synergistically boosts the potency of chemotherapy medications while lessen unfavorable reactions [75] , palmitic acid compound may be effects on worm by dissolve the wall lipids of teguments or increased the acidity that could influence the enzymes of metabolism of the parasite.

Modern pharma investigations revealed that palmitic acid possess an anti-inflammatory ,antioxidant as well as immune-boosting impacts, also it deem as a prospective future anti-tumor drug with proven effectiveness against different malignancies involving gastric cancer, cervical cancer, breast cancer, colorectal cancer, and liver cancer, these anti-tumor impacts stimulate the apoptosis of tumor cells, and suppressing cell proliferation, inhibition metastasis as well as inhibition invasion, boosting sensitivity to chemotherapy, and enhancing the immunological functions (76).

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The conclusion:

Cold aqueous extract of *C. annuum* has high impacts on palsy and death of *E. vermicularis* compared with hot ones, In Vitro. Terpenoid of *C. annuum* with 300mg/ml concentration has great impacts on palsy as well as death of *E. vermicularis*, followed by alkaloids. Present study conducted that *C. annuum* has very valuable activity against adults of *E. vermicularis In Vitro*.

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