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Research Article

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Study the Effect of the Duration Exposure for Lethal and Sub-Lethal Concentrations of Organophosphorus Chlorpyrifos Pesticide for Freshwater Fish Common Carp (*Cyprinus carpio*) (Linn) and *Liza abu* (Haeckel) Fishes

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ABSTRACT

The present study was carried out to investigated the duration exposure time and toxicity on survival effects for two freshwater fish Common C. carpio an Liza abu to different concentration of Chlorpyrifos o-phenylphenol, chlorothalonil, metalaxyl pesticide (2,4,6,8 and 10 mg/L) for acute exposure (24,48. 72 and 96 hour) and (0.1,0.3,0.5,0.7,0.9 and 1.0 mg/L) to sub lethal exposure for period (5,10 and 15 days), during 96 h and LC50 values at 96 h (3.54 mg/) for C. carpio and (2.15 mg/L) for Liza abu with 95% confidence limit, these differences in the LC50 value between two fish Liza abu more sensitive than C. carpio, whereas in Sub-lethal effects LT50 values at 96 h are indicated (21.87 h and 17.78 h) respectively for two fishes, and noticed the behavioral changes fish appeared irregular, erratic and darting movements with imbalanced swimming activity and attempt to jump out of the toxic medium were observed increase the secretion of mucus and accumulated on the fish body to open the operculum with rapid movements to increase the speed of breathing.

Keywords: sub-lethal; *Liza abu*; pesticide; *C. carpio*; Chlorpyrifos; LC50

INTRODUCTION

Water system is the source and the basis of vital water is in turn the basis element for all living organisms. The water is present in the cell living in all fruit and vegetables that any water is present in everything come alive. The importance of water to human live, but the survival of the purity of water is impossible because many pollutants are dispersed in the environment, therefore water pollution reflected the negative its impact on living organisms and contaminated water are considered when installed or change their status[1], so that it is appropriate to lower the use of multiple uses including the change in the physical, chemical and biological properties add to leak chemicals used in the fields through the water of these fields, using some of the waters of these waters of these agricultural fields around the exchange of rivers and beaches [2] as well as operate these substance to stimulate the growth of algae and weeds, this use many represent of chemicals, including pesticides on the most important and the most serious problems in the production of fish. [3] all over the world it have been negative ecological consequences on biota and the environment In another side pesticides also have been instrumental in controlling many insect-borne human diseases such as malaria, encephalitis, and bubonic plague. And can aid in more efficient food production and help reduce malnutrition and starvation of humans and animals and also control pests, including insects, water weeds and plant diseases. [4,5]. Pesticides reach the aquatic environment in a variety of ways: runoffs or drainage from treated agricultural lands Which can cause damage to the aquatic system, which is known as aquatic toxicology is the study of the effects of environmental contaminants on aquatic organisms, such as the effect of pesticides on the health of fish or other aquatic organisms. The danger of pesticides is easy dissolved in water and transferred to irrigation water, where these pesticides concentrated on the grass and microorganisms then transfer them to fish directly from water and human feed on the contaminated fish, which is known food chain. [6]. A pesticide's capacity to harm fish and aquatic animals is largely a function of its (1) toxicity, (2) exposure time, (3) dose rate, and (4) persistence in the environment [7], so the toxicity of the pesticide refers to how poisonous it is. Some pesticides are extremely toxic, whereas others are relatively nontoxic [8]. Exposure refers to the length of time the animal is in contact with the pesticide. A brief exposure to some chemicals may have little effect on fish, whereas longer exposure may cause harm exposure of fish and other aquatic animals to a pesticide depends on its biological availability (bioavailability), bio concentration, bio magnification, and persistence in the environment. Bioavailability refers to the amount of pesticide in the environment available to fish and wildlife [9] some pesticides rapidly breakdown after application. Some bind tightly to soil particles suspended in the water column or to stream bottoms, thereby reducing their availability. Some are quickly diluted in water or rapidly volatize into the air and are less available to aquatic life [10]. The dose rate refers to the quantity of pesticide to which an animal is exposed. [11]. A small dose of a more toxic chemical may be more damaging than a large dose of a less toxic chemical. Dosages can be measured as the weight of toxicant per unit (kilogram) of body weight (expressed as mg pesticide/kg of body weight) or as the concentration of toxicant in the water or food supply (usually expressed as parts per million, ppm or parts per billion, pp [12].

A lethal dose is the amount of pesticide necessary to cause death. Because not all animals of a species die at the same dose (some are more tolerant than others), a standard toxicity dose measurement, called a Lethal Concentration 50 (LC50), is used. This is the concentration of a pesticide that kills 50% of a test population of animals within a set period of time, usually 24 to 96 hours. [13]. Not all pesticide poisonings result in the immediate death of an animal. Small "sub lethal" doses of some pesticides can lead to changes in behavior, weight loss, impaired reproduction, inability to avoid predators, and lowered tolerance to extreme temperatures. sub lethal effects exposure to certain pesticides can result in reduced fish egg production and hatching, nest and brood abandonment, lower resistance to disease, decreased body weight, hormonal changes [14]. The overall consequences of sub lethal doses of pesticides can be reduced adult survival and lowered population abundance. Fish and aquatic animals are exposed to pesticides in three primary ways as dermally, direct absorption through the skin by swimming in pesticide-contaminated waters, breathing, by direct uptake of pesticides through the gills during respiration, and orally, by drinking pesticide-contaminated water or feeding on pesticide-contaminated prey. Poisoning by consuming another animal that has been poisoned by a pesticide is termed "secondary poisoning." For example, fish feeding on dying insects poisoned by insecticides may themselves be killed if the insects they consume contain large quantities of pesticides or their toxic byproducts [15]. However there have been studies where exposure time has been evaluated as a quantifiable variable of toxicity [16] and the relationship between exposure time and dose has been evaluated [17], But in these studies the exposure time is relatively short. While studies based on longer exposure time are important, particularly in the field of risk assessment with environmental contaminants where the exposure time is relatively long and the exposure level is often low. Information regarding the long term effects of exposure time with environment. Al chemicals is scarce [18]. There is a difference in type and severity of effects depending on how rapidly the dose is received (duration) and how often the dose is received (frequency). Acute exposures are usually single incidents of relatively short duration--a minute to a few days. The acute and chronic effects of pesticides in particular, and of chemical contaminants in general which produce by many industries use insecticides in their processes and the effluents from such factories contain large amounts of Organophosphates' insecticides such as Chlorpyrifos, have a clear effect on the survival of fish due to is acute effects [19]. and in other side the sub-lethal effects on behavioral of water, tried to jump out of the water, loss of equilibrium, erratic and darting swimming movements, rapid gill movement, vertical hanging, fading of their body color, increased opercula movements [20].
Physiological and metabolic activates, these effects have taken a wide range of time pesticides on the fish physiological, biochemical and behavioral changes in relation to chronic effects, where the effects slowly shown on metabolic events. Many researches have studied the effect of sub lethal concentrations on blood parameters, during his study [21] of cat fish, he confirmed a decrease in blood corpuscles and hemoglobin values [22,23], also noted when he studied the biochemical content during exposure of Labeo rothita fish note the reduction in the protein content, lipid, glycogen, cholesterol and glucose f these values for their natural values.

EXPERIMENTAL SECTION

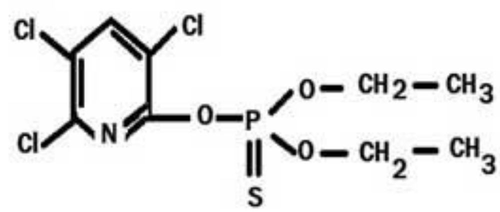
Materials and Methods

Test animals

Live specimen of *C. carpio* and *Liza abu* were collected from Basra River, with 12.5±1.5 cm length and 14.5±0.5 gm. in weight for *C. carpio* and 10 ±1.7 cm length and 12. ± 0.5 gm in weight for Liaz Abu. The fishes were transferred to laboratory in order to acclimatized for two weeks in a large plastic tank of 400 L capacity containing dechlorinated tap water, during acclimatization period, fishes were feed with dry algae on every day, and cleaning contains by renewed water.

Preparation of solutions and exposure test

Chlorpyrifos, stock solution were prepared by dissolving 1 g of pesticides in 100 ml of water and after that, pull out the amount from stock solution as much as needed for the concentrations of 1 mg/L that are prepared. The fish were separated into six groups including control, each set containing 10 individuals to complete the experiments and measurer the mean lethal concentration LC50 allocated to measure the acute toxicity effects, and attended the concentrations of pesticides depending on the mitigation equation (C1V1=C2V2) and the percentage of the active ingredient installed on a container of pesticides and chemical composition as follows:



Effective pesticide Chlorpyrifos 20% of the material

Chlorpyrifos *o-phenylphenol, chlorothalonil, metalaxyl*

Acute toxicity test

To study the acute toxicity of the Chlorpyrifos pesticides by conducting the static bioassay. The fish were exposed to a series of dilute concentrations (0. 2,0.4,0.6,0.8 mg/L) to calculate median lethal concentration LC50 of the pesticides during a period of exposure of 24, 48, 72, 96, h. And LT50 for each period of exposure, then remove mortality fish from each period from test solution, death of each animal was recorded

Sub lethal toxicity test

For Sub lethal Test, the fishes separated into three replicates for each concentrations and each one had 10 animals as well as the control group. No feed during the test period, fish exposed to sub –lethal concentration of the Chlorpyrifos pesticides (0, 0.03, 0.05, 0.07, 0.09, 0.1) mg/L for exposer period (5, 10 and 15 days) of the experiment for two species of fish.

Statistical analysis

Data on % mortality were used to calculate the (24, 48, 72 and 96 h) (5, 10 and 15 days) LC50 and LT50 by Probit analysis [24]. Data obtained from sub lethal tests were subjected to repeated measures analysis of variance to detect the significant difference ($p \leq 0.05$) and using spss for the purpose of comparison between the exposure period and the concentration of the pesticide, the focus has been the correlation coefficient calculation (r).

RESULTS AND DISCUSSION

Acute Test

Percentage and Probit mortality calculated for two types of freshwater fish *C. carpio* and *Liza abu*, the fish were exposed for two periods of time, 24-96 hours were for acute concentrations (2,4,6,8 and 10) mg/L of the Organic phosphorous chlorophyll pesticide, during the experiment, the death of fish were removed from the test jars. Tables 1, 2 show that the mortality varies according to the concentration The concentrations has low mortality percent, as in the 2.4 mg/L where the concentration 2 mg/L was 4% in 24 hours during the exposure of *C. carpio* and 15%in the same period for *Liza abu* fish, either in the concentration of 4 mg/L, the mortality percent was 10% during the exposure *C. carpio* and also recorded 20%of the fish *Liza abu* either high concentrations alter mortality percent was high and the concentration 10 mg/L highest mortality percent of 100% during the period of 96 hours of exposure and both fish, and control did not record any of death.

Table 1 : Effect of lethal concentrations of Chlorpyrifos pesticide on survival of *c. carpio* for different exposure periods

Concentrations		24 h		48 h		72 h		96 h	
Concentration (mg/l)	Log Concentration	Mortality Percentage	Mortality Probity	Mortality Percentage	Mortality Probity	Mortality Percentage	Mortality Probity	Mortality Percentage	Mortality Probity
control	0	0	0	0	0	0	0	0	0
2	0.30	4	3.25	10	3.72	15	3.96	20	4.16
4	0.60	10	3.72	30	4.48	37	4.07	40	4.75
6	0.77	20	4.16	35	4.61	40	4.75	60	5.25
8	0.90	40	4.75	60	5.25	70	5.52	80	5.84
10	1	50	5.00	80	5.84	90	6.28	100	8.09

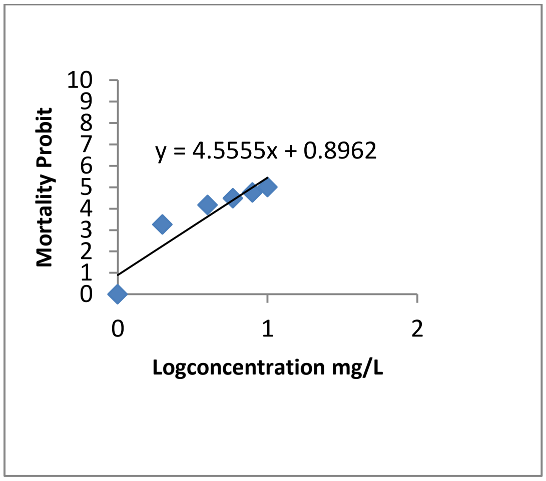
Table 2: Effect of lethal concentrations Chlorpyrifos pesticide on survival of *Liza abu* for different exposure periods

Liza abu		24 h		48 h		72 h		96 h	
Concentration (mg/l)	Log Concentration	Mortality Percentage	Mortality Probity	Mortality Percentage	Mortality Probity	Mortality Percentage	Mortality Probity	Mortality Percentage	Mortality Probity
control	0	0	0	0	0	0	0	0	0
2	0.30	15	3.69	20	4.16	30	4.48	40	4.75
4	0.60	20	4.16	35	4.61	47	4.92	50	5.00
6	0.77	30	4.48	45	4.87	55	5.13	80	5.48
8	0.90	50	5.0	60	5.25	75	5.67	85	6.04
10	1	60	5.25	70	5.52	93	6.48	100	8.09

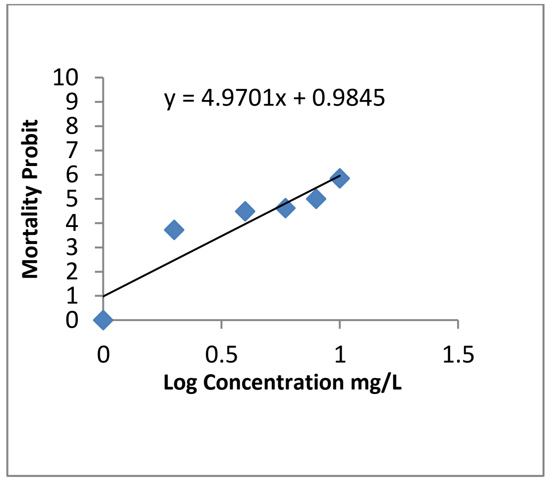
The Median Lethal Concentration LC50

The mortality Probit of LC50 values was calculated for the lethal concentration of Chlorpyrifos pesticide during acute exposure periods.

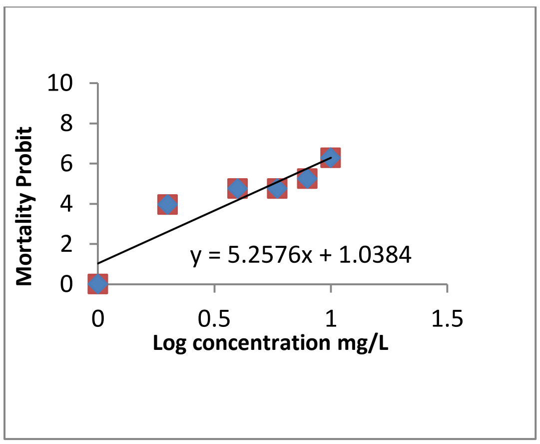
24 h



48 h



72 h



96 h

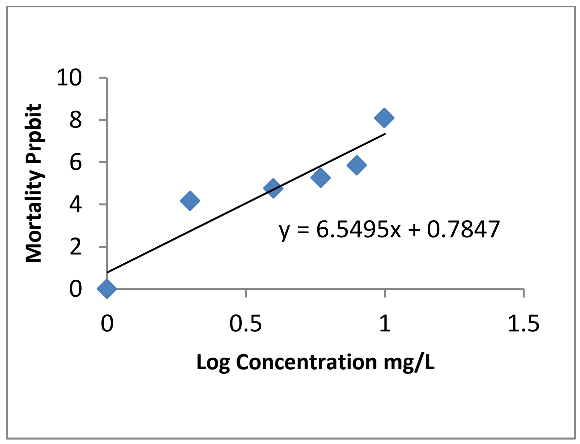


Figure 1: Regression line for log concentration mg/L and mortality probit values of Chlorpyrifos pesticide of *C. carpio* for difference exposure time

Tabel 3: Values LC50 at different periods of exposure and coloration coefficient factor

C. carpio		**Coloration**	**Liz Abu**	**Coloration**
Period h.	**LC0 value mg/L**	**Factor (R)**	**LC50 value mg/L**	**Factor (R)**
24	7.94	0.866	3.71	0.929
48	6.02	0.916	3. 63	0.993
72	5.61	0.930	3.46	0.996
96	3.54	0.938	2.15	0.997

Figure 1 indicates the LC50 with regression line to show the difference of LC50 value among 24-96 h. of exposure, Table 3 Shows a clear gradation in the values of LC50, which show a decrease with the increase in exposure time is accompanied with a decrease LC50. The intervals of 24 hours and 96 hours different in the values of LC50 of the pesticides for both fish, where the *C. carpio* fish recorded the highest value 7.94 LC50 of the lethal periods compared with 3.71 LC50 for *Liza abu*, while in 96 hours the value of the LC50 recorded by the *C. carpio* 3.54 LC50 is different from the value recorded by the *Liza abu* where it was 2.15 LC50, thus the correlation coefficient are very high and strong between the period of time and mortality percent and the highest value was in the period 96 hourrs and this correlation is significant evidence that when increased period of exposure increased mortality. In addition the correlation values were significant correlated within the time intervals and LC50 values. The median lethal time LT50 The values of LT50 were found to increase with a decrease in the concentration level. Therefore, the lowest value was 17.78 hours for the highest concentration of 10 mg/L and at concentration 2 mg/L the LT50 was 81.28 hours. Table 4 shows the Antilog values convert the values obtain from regression line to calculate the LT50 values for both fish, adding to the existence of an inverse relationship between the concentration level and The values of LT50 thus the correlation coefficient recorded this inverse relationship as shown at Table 4.

Table 4: The LT50 values for all concentration for Chlorpyrifos pesticide of two fishes

Fish	Concentration mg/l	Antilog	LT50 Values	R Values
Carp carpio	2 mg/L	1.91	81.28 h	0.788
	4 mg/L	1.73	63.09 h	0.823
	6 mg/L	1.61	40.73 h	0.835
	8 mg/L	1.54	34.67 h	0.851
	10 mg/L	1.34	21.87 h	0.895
Liza abu	2 mg/L	1.86	72.44 h	0.896
	4 mg/	1.76	57.54 h	0.901
	6 mg/L	1.53	33.88 h	0.923
	8 mg/L	1.43	26.911 h	0.928
	10 mg/L	1.25	17.78 h	0.934

Sub-Lethal Test

The Common *C. carpio* and *Liza abu* were exposed to sub-lethal concentrations (0.3, 0.5, 0.7, 0.9,1.0) mg/L of the Chlorpyrifos pesticide and for periods ranging (5, 10 and 15) days. Tables 5 and 6 show all the statistical calculations of the proportions and Probability of death and log of concentrations, where deaths were recorded for each time period and for all concentrations. 1.0 mg/L recorded the highest mortality percent for both sexes and for all periods, while the other concentrations were different in the mortality percent, especially in the *C. carpio* fish. The concentration was 0.3 mg/L mortality percent (13.3%) while the same concentrations and period recorded the fish of *Liza abu* mortality (33.3%). In addition, the exposure period was (15 days) higher mortality percent compared with period (5 and 10 days) for both fish and it is worth noting that the period of 5 days more affected in the *Liza abu* compared to *C. carpio*, and the concentration was (0.9 mg/L) at the *Liza abu* fish, this confirms that the *Liza abu* fish more sensitive than the *C. carpio* fish, the later fish which appear to be more resistance, and the mortality associated with the concentration toxicity and length of time period. Table 5 and 6 shows that *C. carpio* is affected with (15 days) period compared to other days. Where the effect is gradually according to the time period. Therefore, the *Liza abu* fish showed more influence than the *C. carpio* fish for all periods of exposure. This is confirm by correlation coefficient, where the correlation factor was (0.93) for the *C. carpio* fish. The *Liza abu* fish has correlation factor was (0.95) indicating that the length of the time had significant value and there is mortality found in control test.

Table 5: Effect of sub-lethal concentrations of Chlorpyrifos pesticide for *C. carpio* exposed to different periods of days

5 days			10 days		15 days	
Concentration (mg/l)	**Percentage of Mortality**	**Mortality Probability**	**Percentage of Mortality**	**Mortality Probability**	**Percentage of Mortality**	**Mortality Probability**
Control	3	3.12	5	3.36	6	3.45
0.3	13.3	3.87	20	4.16	33.3	4.56
0.5	20	4.16	35	4. 61	40	4.76
0.7	30	4.48	45	4.87	60	5.25
0.9	70	5.52	80	5.84	95	6.04
1.0	93.3	6.48	100	8.09	100	8.09

Table 6: Effect of sub-lethal concentrations of Chlorpyrifos pesticide for *Liza abu* exposed to different periods of days

5 days			10 days		15 days	
Concentration (mg/l)	**Percentage of Mortality**	**Mortality Probability**	**Percentage of Mortality**	**Mortality Probability**	**Percentage of Mortality**	**Mortality Probability**
Control	3	3.87	10	3.72	23	4.26
0.3	33.3	4.56	43.3	4.82	50	5.0
0.5	50	5.0	60	5.25	70	5.52
0.7	60	5.52	75	5.07	95	6.04
0.9	80	5.84	87	6.13	100	8.09
1.0	100	8.09	100	8.09	100	8.09

And the LC50 values were (6.30 mg/L) in the period of 5 days for *C. carpio* fish and the lowest value was (2.95 mg/L) LC50 in a period of (15 days) of the *Liza abu* fish, where the reduction of the period of exposure as shown in the following figures correlation coefficients are high for both fishes and also increase with an increase in the time period which has a very high correlation between the time period, mortality and the toxicity of pesticide. Table 7A shows that correlation coefficients are higher in *Liza abu* than in *C. carpio* Fishes, and this is another indicator of the sensitivity of the *Liza abu* Characteristic than the *C. carpio* and positive strong in R^2 as shown in Table 7A.

Table 7A: Shows theLC50 values and coloration factor during 3 periods of exposure-B-T50 values for three concentrations of Chlorpyrifos pesticide for two fish type

A B

C. carpio		**R^2**	***L. Abu***	**R^2**	***C. carpio***		***L. Abu***
Time of Exposure Days	**LC50 mg/L**	**Value**	**LC50 Value**	**LT50 Values**	**Concentrations Mg/L**	**LT50 Values**	**LT50 Values**
5	6.30	0.807	3.16	0.989	0.3	15.48	10 day
10	3.25	0.889	3.09	0.994	0.7	12.28	7.9 day
15	3.16	0.913	2.95	0.995	0.9	10.0 h	5,0 day

Median lethal time LT50, Table 7 indicated values of LT50 of the concentrations and for all time periods. The study showed three different concentrations to illustrate the values of LT50 where the concentration of (0.3 mg/L) for both fish was higher than in the two concentrations (0.7 and 0.9 mg/L) was the lowest value for a period of time for both fish as well as the values were high in the *C. carp*, which is in the LT50 values of the *Liza abu* fish, here is a clear indication of the influence in the toxicity of fish as shown in Table 7B.

Behavioral Changes

During the current study, it was observed that the *C. carpio* and *Liza abu* fishes exposed to different concentration of Chlorpyrifos pesticide and among the periods of acute and sub-lethal exposure to behavioral changes, fish appeared especially in high concentration to loss of movement control and swimming in a random way and emotional movement especially at the beginning of exposure as well as increase the secretion of mucus on the body as well, the fish jumped out the pesticide media and so on bottom to, fish try to open the operculum with rapid movements to increase the speed of breathing and taking the dissolved oxygen, as the fish make a great efforts to move, but cannot therefore to be closed to death and the operculum and mouth remains open so the fishes face pressure on the environment as result of these toxic pollutants. Chemical pesticides are specific and effective, their impact on the environment is mostly deleterious. Thus toxicity can be defined as the relative ability of a substance to cause adverse effects in living organisms this relative ability is dependent upon several conditions. And the quantity or the concentrations determines whether the effects of the chemical are toxic, other factors may also influence the toxicity of the compound such as the route of entry, duration of exposure, Variation between different species and variation among members of the same species [25].

Chlorpyrifos is a widely used organophosphate pesticide, second largest used in many control for more than a decade to control pests on cotton, paddy fields, pasture and vegetable crops [26] Its extensive use may increase the toxicity load to aquatic environment, causing adverse effects on non-target organism, fish. Acute and chronic toxic effects of Chlorpyrifos in different fish species were extensively studied [27]. The results of the current study on the effect of acute and sub-lethal concentration of pesticide on the survival and behavior of the *C. carp* and *Liza abu*, Mortality response to relation of selected fish to various concentrations of pesticide are presented in Tables 1 and 2 show that the exposure period has a close relationship with the mortality percent and the concentration of the toxic substance effectively in raising the mortality percent based on the time period [28], it is clear that the mortality percent increases as concentration and the higher comparison in the mortality percent are almost the same, Difference and comparison to fish, therefore, we find that the *C. carp* fish was more resistance than the *Liza abu* fish, where the mortality percent in concentration of 4 mg/L as far the Liza was mortality percent in the same concentration and the same time period. When concentrations, time period of exposure, toxicity of polluted substance and the type of fishes vary, it is normal of death because of these effects, the effects of the pesticide caused impact on the health of the animal where it caused suffocation in the breathing and difficulty of getting oxygen, where the blood cells become inefficient transporting oxygen therefore undergo behavioral movements in addition to other induced on the nervous and immune system, so fishes are sensitive to aquatic contamination although the sensitivity of parrgassus spp found to be lower than other species.[29]. Estimation Median Lethal ConcentrationLC50 The short term toxicity of a chemical, is measure using LC50 value. An LC50 is measured of how much product is required to kill 50% of the test population over a period of time [30] Median Lethal Concentration of Chlorpyrifos pesticide at (24.48.72 and 96) hours were observed in *C. carpio* and *Liza abu* fishes as shown in Table 3. There were significant differences ($p<0.05$) among LC50 values obtained at different times of exposure. The current study showed that the median values of the lethal concentration decreased by increasing the exposure time (Figure 1). These values differed according to the type of pesticide and species of fish. Acute toxicity studies are generally this done by many studies and research employed to compare the sensitivities of different species to different potencies of the chemicals and to derive, by using LC50 values, environmental concentration of chemicals which could be considered LC50 values for Catla Catla fish exposed to carbofuran pesticide at (24 h and 96 h) were estimated as (2.4 mg/L) (1.76-3.30) and 0.99 mg/L (0.73-1.35), respectively [31 -33] reported about the LC50 values of monocrotophos for 24, 48, 72 and 96 hours were (0.0041, 0.0039, 0.0037 and 0.0036) ppm respectively, whereas the LC50 value of lambda cyhalothrin for (24, 48, 72 and 96) hours were (0.0026, 0.0024, 0.0022 and 0.0021) ppm, respectively. And show a decrease in LC50 values with increasing the exposure time. LC50 values of different pesticides to the fish for different periods of exposure reveals the occurrence of a wide differences pesticide toxicity due to differences in the chemical composition of the active substance and speed of dissolved in water, duration of exposure and types of fishes [34-36]. The *Liza abu* fish in the current study was more sensitive than the *C. carp* fish and this applies to the finding of the [36] in *C. carp* fish, which was LC50 2,2 mg/L of its lethal concentration. Estimation Median Lethal Time LT50 was observed from the results of the present study that can impact of pesticide vary according to the concentration intensity and the type of fish as the study showed that the LT50 f the mortality decrease with increase the period of time And here emphasizes the high toxicity of the pesticide and the severity of the impact of fish where the high concentration to be mortality increase in the shortest period of time, but this is enhanced by correlation coefficients where gradual decrease in observed in values is observed and here is what has been mentioned in many studies on the differences in these values [37] reported about LT50 were (3.119 and 1.804) h for tilapia mosambica at (0.50 and 0.550) ppb concentrations to *C. carpio* and (10.0, 13.933 h) for abamectin at (8.0 and 9.0 ppb) concentration to tilapia mosambica a, respectively. In this study shows the high LT50 values in the low concentration. this clearly indicated that the response of time between fishes comparison of Lt50 values of fish shows that the value are vary between period of time, which has the LT50 value of fish *C. carp* (21.78 h) higher than (17.87 h) *Liza abu* the explanation of this variation is that may be bioaccumulation of pesticide The correlation factor (R). between mortality and exposure time are presented in Table 4. Generally strong positive correlation were. During the measurement of LC50 for the long – term time periods, these were indicated during the exposure period of (5. 10 and 15 days) that the lowest values were LC50 (2.95 mg/L) at period of (15 days) for the *Liza abu* and the largest value LC50 (6.30 mg/L) for the time period 5 days in the *C. carpio* as presented in Table 7 also [38] reported deltamethrin in toxicity to Poecilia reticulata as the most toxic of the pyrethroids studied: LC50=0.016 ppm. In this study the positive correlation between period of exposure and LC50 values. Thus, in the periods of the long –term exposure of the three period where calculated three periods (5,10.15 days) were selected to investigated the differences in LT50 values Table 7. The time length played an important part in reducing the valued of LT50 The median lethal times (LT50) and concentrations increased with a decrease in exposure time and concentrations, respectively, [39,40]) and increase the mortality rate, this expansion is also by study of [41], As for the median lethal time indicated values of LT50 by concentrations and for all time periods. The study showed three different concentrations to illustrate the values of LT50, where the concentration of (0.3 mg/L) for both of fish was higher than in two (0.7 and 0.9 mg/L) concentration was the lowest value period of time and also the values were increase in the *C. Carpio*, which is decrease in the value LT50 of the *Liza abu*, while noted the LT50 values for fingerlings were 48,10 and

7.77 h for concentrations 250 and 325 µL-¹ respectively [42]. It is noted from Table 7 that there is mortality in the control group at chronic exposure this death may be due to stress over length of time and also there is a positive correlation coefficient between the period's, and the increase in the exposure period caused may be a decrease in the level of acetylcholinesterase enzyme and the effect of organic phosphorus pesticide is the inhibition of the of enzyme added that the death may be caused by stress because of effect of poisoning of pesticide on tissues or damaged tissue gills and accumulation in the brain tissues. This report is supported by the study of [43] who found different bioaccumulation modes of pesticides in zebra fish.

Behavioral changes:-During the current study, it was observed that the *C. carpio* and *Liza abu* fishes exposed to different concentration of Chlorpyriofs pesticide and within the periods of acute and sub-lethal exposure to behavioral changes, fish appeared irregular, erratic and darting movements with imbalanced swimming activity and attempt to jump out of the toxic medium were observed and also indicated by observed by[44], when freshwater fish C. mrigala exposed to cypermenthrin.. Similar behavior patterns were observed in fish, *L. rohita* ed exposed to malathion [45] increase the secretion of mucus and accumulated on the gill this agreement which finding by [46-49] increased opercula movements and mucous secretion all over the body were observed in Heteropneustes fossilis after exposure to chlorpyrifos pesticides. to open the operculum with rapid movements to increase the speed of breathing and taking the dissolved oxygen similar finding were observed in Clarias batrachus exposed to herbicide, The rapid opercula movements may be due to accumulation of mucous over gill due to the toxicant, as the fish make a great efforts to move, but cannot therefore to be closed to death and the operculum and mouth remains open so the fishes face pressure on the environment as result of these toxic pollutants reported by as a strong indicator of stress when fish were exposed to toxicants. Have shown initial increases in the respiratory rate of fish exposed to Malathion, this was soon followed by a decreased in respiratory rate. The change of body color, behavioral changes such as irregular swimming movements, loss of equilibrium, restlessness and excess secretion of mucous suggest that *C. carpio*, *Liza abu* have s undergone chemical stress when exposed to pesticide and the present study could be taken as an indicator of aquatic pollution. The behavioral changes are considered directly related to complex physiological responses and have often been used as a sensitive indicator of stress. The result of the present study indicates that Chlorpyrifos sever toxic effect on fish and rapidly response to these toxic in lethal and sub lethal effects and duration of exposure increase the response of fish toxic substance. What was found during the exposure fish to series of time ranged from short to long term in this study and even varied bioassay such as LC50, LT50 and confirms that duration time exposure is accompanied by a lot of changes in physiological and behavioral effects are reflected negatively on the food chain by the end of which human being.

CONCLUSION

The current study indicates the comparison between the period of short and long term of time and exposure of these fishes under study to high and low concentrations of the contaminates of the environment, including pesticides, which is considered a danger to the health through its transmission through the food chain as well as its impact on aquatic organisms, which are the main source of vitality of the aquatic environment and its recovery, in addition affect the population of these.

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