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31. ENVIRONMENTAL HAZARDS AND ITS IMPACT ON HUMAN HEALTH – A STUDY

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ABSTRACT

In the name of progress or growth of industries, the business community has encouraged the coming up of the various industries using all sorts of chemicals mainly causing health problems to the human society. If any sensitive person raises any question about the health hazards that the science has brought in, the Government responds by various legislations, rules and regulations, guidelines and claims that these laws and rules would control and protect the health of the people. In this context, it should be emphasised here that every State in India is responsible for assuring and guaranteeing hygienic atmosphere and provide healthy environment for its citizens. Indiscriminate permissions to start polluting industries, not maintaining properly the sewerage system, disposal of solid waste, lack of facilities for storing the rain waters, disposal of waste and effluent, improper maintenance of rural lanes, bye-lanes and thickly populated urban areas are main reasons for creating health problem among the people. To make their living free from health hazards and create a peaceful atmosphere and thereby making our living peaceful and pleasurable and not painful and dreary. The Government must take it as its onerous responsibility by plucking into action rather than suggesting and taking without any practicable applicability. Serious steps should be taken, we cannot depend only on the law and State. People must come forward to help the Government. Let us unite to make our lives safe and peaceful by keeping our streets clean, atmosphere unpolluted so that health hazards can completely be prevented.

KEYWORDS: Environment; Health problems; Environmental hazards; Atmosphere; Government

INTRODUCTION

The enormous growth in population at world level has brought in several problems to the Governments of various countries. There was a time when there was no use for the term 'pollution'. The air was pure, the water was clear, the farm was green, and the sky was blue. But all these have changed today. This is mainly due to chemical, biological, physical and environmental pollution. Very recently, our country experienced very serious consequences

of the gas leak disaster in Bhopal, Madhya Pradesh. Earlier, the fair world had witnessed during the world war, the droppings of atom bombs. Today we have biological and chemical weapons that can destroy the whole world in a fraction of a second. Not only the world gets destroyed but there will be a great vacuum on the earth. Another important problem which the world faces today is the health problems faced by majority of the people due to malnutrition or spurious food stuff or irregular food habits of the people and mainly due to unauthorised manufacturing of dangerous medicines. The report shows that there has been a steady growth of cancer among the people in the world today. It is quite strange that the medical scientists have miserably failed to identify the causes and cure for cancer.

The ordinary people attribute this disease to the sins committed by them in earlier birth, subject to earlier birth being in doubt. There is what we call 'frustration amalgamated' in the world today, due to the conglomeration of pollution. The term pollution may be defined as contamination of the environment in such a way that it creates hazards or potential hazards to health and wellbeing of living and non-living. Since the expression "Pollution" is not defined legally, therefore a working definition is accepted. According to the U.S. President's Science Advisory Commission, "Pollution is the unfavourable alteration of our surroundings, through direct or indirect effects of changes in energy patterns, radiation levels, chemical and physical constitution and abundances of organisms."

ENVIRONMENTAL HAZARDS AND ITS IMPACT

In the name of progress or growth of industries, the business community has encouraged the coming up of the various industries using all sorts of chemicals mainly causing health problems to the human society. For instance, the pesticides used in agriculture something go into food chain or in water bodies and as such results in harmful health hazards. God (if there is one) in all His generosity of mind and liberality of sentiment has created a world and the people perfect, clear, healthy and beneficial. But how man has repaid the God or nature. At the initial

level, we have started questioning the existence of God and we have successfully destroyed every creation of god namely, the clear blue sky, the green earth, laughing and rippling water, fascinating flowers, extremely beautiful forms of Nature and we have called it the progress of human society. If any sensitive person raises any question about the health hazards that the science has brought in, the Government responds by various legislations, rules and regulations, guidelines and claims that these laws and rules would control and protect the health of the people. In this context, it should be emphasised here that every State in India is responsible for assuring and guaranteeing hygienic atmosphere and provide healthy environment for its citizens. Indiscriminate permissions to start polluting industries, not maintaining properly the sewerage system, disposal of solid waste, lack of facilities for storing the rain waters, disposal of waste and effluent, improper maintenance of rural lanes, bye-lanes and thickly populated urban areas are main reasons for creating health problem among the people.

LEGAL REGULATIONS IN REGARD TO ENVIRONMENTAL HAZARDS

All over the world concern has been shown to combat ever-growing menace of environmental hazards and the need to protect human health. The important objective of the environmental law is to take appropriate steps for the protection and improvement of both natural and human environment. It also aims to prevent any environmental hazards to human being, other living creatures, plants and property. Due to the decline in the environmental quality, an increase in pollution, loss of vegetal cover and biological diversity, excessive concentration of harmful chemicals in the ambient atmosphere and in the food chain. Thus, there is a growing risk of environmental degradation and accidents, and threats to all the life support system. The existing legislations relating to environmental hazards are not adequate, especially on new chemicals.

CONCLUSION

It is advised that the civic problems must be given much importance by forming groups in every locality with the citizens in the locality as members of group and suggest to the authorities the ways and reasons of keeping the city, street and State free from any kind of health hazardous and create awareness among the people that they should also involve themselves in these important social activity. To make their living free from health hazards and create a peaceful atmosphere and thereby making our living peaceful and pleasurable and not painful and

dreary. The Government must take it as its onerous responsibility by plucking into action rather than suggesting and taking without any practicable applicability. The people pay property tax, corporation tax and so many other related taxes. Yet no action is being taken particularly in the tackling mosquito menace, unhygienic water, keeping the city clean free from misuse of any park by disgrace and anti-social elements. One can see every day that most of the parks are not properly maintained and some of these parks have become den for anti-social elements like drunkards, gamblers etc. Serious steps should be taken, we cannot depend only on the law and State. People must come forward to help the Government. Let us unite to make our lives safe and peaceful by keeping our streets clean, atmosphere unpolluted so that health hazards can completely be prevented.

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32. IMPACT OF AIR POLLUTION AMONG LABOURERS IN CHIDAMBARAM BLOCK

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ABSTRACT

Air pollution stems gases and air borne particles which, in excess, are harmful to human health, buildings and ecosystems. Air pollution in developing countries is derived not only from stack emission of pollutants from relatively large industries, where inadequate pollution control measures exist and pollutants are allowed to escape to atmosphere. The kind of air pollution emitted vary from industry vary from industry to another, the concentrations of different pollutants in the atmosphere also vary widely from process to process, and from place to place with different geographic and climatic conditions.. In general, the workplace exposure levels are much higher than that the general population, because the emissions are rapidly diluted and dispersed by the wind. But the exposure duration of the general population is much longer than that of workers. Air pollution is the presence of substances in air in sufficient concentration and for sufficient time, so as to be, or threaten to be injurious to human, plant or animal life, or to property, or which reasonably interferes with the comfortable enjoyment of life and property. Air pollutants arise from both manmade and natural processes. Air pollutants arise from both manmade and natural processes. Air pollution has been considered as the one of types of pollution which causes different disease in various labourers in Chidambaram Block and this leads to increase the expenditure of sample respondents on their health care. In this context the researcher taken this title.

INTRODUCTION

The term "air pollution" is used to describe substances that are artificially introduced into the air. Air pollution stems gases and air borne particles which, in excess, are harmful to human health, buildings and ecosystems. Air pollution in developing countries is derived not only from stack emission of pollutants from relatively large industries, like iron and steel, non-ferrous metals and petroleum products industries, but also from fugitive emission of pollutants from small scale factories, such as cement mills, lead refineries, chemical fertilizer and pesticide factories and so on, where inadequate pollution control measures exist and pollutants are allowed to escape to atmosphere. Since industrial activities always involve energy generation, the combustion of fuels is a main source of air pollution in developing countries,

where coal is widely used not only for industrial, but also for domestic consumption. For instance in china, more than 70 per cent of total energy consumption relies on direct coal combustion, from which large amounts of pollutants (Suspended particulates, Sulphur dioxide, etc) are emitted under incomplete combustion and inadequate emission controls.

STATEMENT OF THE PROBLEM

The kind of air pollution emitted vary from industry vary from industry to another, the concentrations of different pollutants in the atmosphere also vary widely from process to process, and from place to place with different geographic and climatic conditions. It is difficult to estimate specific exposure levels of various pollutants from different industries to the general population in developing countries, as elsewhere. In general, the workplace exposure levels are much higher than that the general population, because the emissions are rapidly diluted and dispersed by the wind. But the exposure duration of the general population is much longer than that of workers.

AIR POLLUTION AND HUMAN HEALTH

Air pollution occurs when suspending particular matter and noxious gases occur in the the air .Smoke, ash and dust are major constituents of (Spm) sulphur and nitrogen based compound (SO₂,NO₂) and carbon monoxide, carbon dioxide is the main constituent of noxious fumes in the air. Among industrial activities thermal power stations top list of air polluters due to the high amount of discharge of smokes and ash .Chemical and fertilizer plants are also responsible for letting noxious substances in air during production.

Air pollution in India is serious issue with major sources being fuel wood and biomass burning, fuel adulteration, vehicle emissions and traffic congestion.

NEED FOR THE STUDY

Air pollution is the presence of substances in air in sufficient concentration and for sufficient time, so as to be, or threaten to be injurious to human, plant or animal life, or to property, or which reasonably interferes with the comfortable enjoyment of life and property. Air pollutants arise from both manmade and natural processes. Air pollutants arise from both manmade and natural processes. Pollutants are also defined as primary pollutants resulting from combustion of fuels and industrial operations and secondary pollutants, those

which are produced due to reaction of primary pollutants in the atmosphere. The ambient air quality may be defined by the concentration of a set of pollutants which may be present in the ambient air we breathe in. These pollutants may be called criteria pollutants. Emission standards express the allowable concentrations of a contaminant at the point of discharge before any mixing with the surrounding air.

SOURCE OF AIR POLLUTION

Air pollution enter into the atmosphere by various natural and man-made activities Such as dust storm, volcanic eruptions, industrial pollution etc. They may be present in any form viz. solid, liquid and gas. Based on the mode of generation of pollutants, the sources are classified as (i) Natural sources pollution are forest fires, volcanic eruptions, dust storms and pollen grains (ii) Man-made sources are domestic, industrial, vehicular pollutions.

Based on the origin of pollutants are classified as (i) Primary pollutants, and (ii) Secondary pollutants. Tthe chemical composition of pollutants. They are classified as (i) Organic and (ii) Inorganic pollutants.

EFFECTS OF AIR POLLUTION ON HUMAN BEINGS

Air pollution has many effects on health of persons of all categories particles including nitrates, sulphates, carbon and acid aerosols are complex group of pollutions. Airborne particles vary in size and composition depending on time and location. Adults exposed to low levels of pollution will experience symptoms such as coughing, soreness in their chests, sore throats and sometimes headaches.

Effects of Air Pollution on Plants

The response of plants to air pollutants is variable and depends on the individual genotype, age, stage of growth, proximity and concentration of pollutants and duration of them on the slaught. It affects the opening of stomata photosynthesis, water relations, respiration and enzyme system.

EFFECTS OF AIR POLLUTION ON ANIMALS

The effects of air pollution on domestic animals are similar to those observed in humans. Chronic poisoning results from the ingestion of forage contaminated with atmosphere pollutants. Among the metallic contaminants, arsenic, lead and molybdenum are important. When the forage crops contaminated by fluoride containing materials are eaten continuously in live stocks symptoms of fluorosis appear.

EFFECTS OF AIR POLLUTION ON MATERIALS

Air pollution also causes damage to property and materials. The pollutants most destructive to materials are smoke, girt, and dust and Oxide

of sulphur; oxide of sulphur causes erosion of building materials such as limestone, marble, mortar and deterioration of statues. Nitrous and Nitric acids formed by the activity of Nitrogen oxides. Precipitate down in the form of acid rains or may remain i the atmosphere in clouds and fogs. Acid rains have an erosive action on metal surfaces and caused fading of textiles and deterioration of fabrics. It also corrodes building, monuments, bridges, railings, etc. H₂S decolorizes silver and lead paints. Ozone damages textiles discolours dyes and accelerates dyes as whereas rubber cracking

AIR POLLUTION PREVENTION

Solution efforts on pollution are always a big problem. This is why prevention interventions are always a better way of controlling air pollution. These prevention methods can be either come from government (laws) or by individual actions.

Government actions

→ Governments throughout the world have already taken action against air pollution by introducing green energy. Some government are investing in wind energy and solar energy, as well as other renewable energy, to minimise burning of fossil fuels which cause heavy air pollution

→ Governments also are forcing companies to be more responsible with their manufacturing activities, so that even though they still cause pollution, they are a lot controlled.

→ Companies also building more energy efficient cars which pollute less than before.

Individual Actions

→ Encourage your family to use the bus, train or bike when commuting. If we all do this, they will be fewer cars on road and less fumes.

→ Use energy (light, water, boiler, kettle and fire woods) wisely. This is because lots of fossil fuels are burned to generate electricity, and so if we can cut down the use; we will also cut down the amount of pollution we create.

→ Recycle and re-use things. This will minimise the dependence of producing new things. Remember manufacturing industries create a lot of pollution, so if we can re-use things like shopping plastic bags clothing, paper and bottles it can help.

OBJECTIVES OF THE STUDY

- 1.To study the expenditure pattern of Labourers on their health care due to air pollution
- 2.To examine the impact of air pollution of the study population.
- 3.To study the awareness of labours to control on air pollution
- 4.To suggest some policy measures to control air pollution in the labours.

RESEARCH METHODOLOGY

The present study is carried out in Chidambaram Town. The study uses the primary data collection

from various labourers (120) such as street vendors, scavengers, stall worker, are selected and stratified random sample method were adopted to identify the sample population. A well structured questionnaire is used to collect the primary data relating to impact of air pollution on human health.

TECHNIQUES

The researcher has used the following techniques in his study:

- Documentation, Questionnaires, Interviews, Sampling

Table- 1

Classification of the Sample Respondents Affecting Air Pollution

Diseases affected by the Air Pollution	T o t a l (n=120)	Percentage
Cold	58	48.3
Respiratory problem	40	33.3
Bronchitis	36	30.0
Asthma	60	50.0
Emphysema	72	60.0
Skin disease	83	69.2
Lung or throat cancer	48	40.0
Cold and skin	73	60.8

Source: computed from the primary data

Table – 1 shows that the classification of respondents affected by disease due to air pollution: Out of 120 respondents highly affected by the skin disease (69.2%), followed by cold and skin (60.8%), emphysema (60.0%) whereas other diseases affected between 36 per cent to 60 per cent for bronchitis, respiratory problem, lung or throat cancer, cold, and asthma respectively.

Table – 2 shows Monthly average expenditure on health care of respondents. The expenditure on Physician the Means Rs. 157, the maximum is Rs. 500 and the minimum is 0, this is on the side of male whereas on the female side the mean is Rs 302, the maximum is Rs. 1500 and the minimum is 0. The expenditure on Medicine, the mean is Rs. 397, the maximum is Rs. 3000 and the minimum is 0 on the side of male and on the side of female the mean is Rs. 408, the maximum is Rs. 1000 and the minimum is 0. The expenditure of respondents on Travel, the mean is Rs.547, the maximum is Rs. 4000 and the minimum is 0, this is on the side of male and on the side of female the mean is Rs. 413, the maximum is Rs. 2000 and The minimum is 0.

Table -2 Cost of Health Care

Cost of Health Care	Male	Female
Physician		
Maximum	500	1500
Mean	157	302
Medicine		
Maximum	2000	1000
Mean	397	408
Minimum	0	100
Diagnostic		
Maximum	3000	500
Mean	232	94
Travel		
Maximum	4000	2000
Mean	547	413

Source: Computed from the primary data

Table-3 Knowledge about Air Pollution-wise Classification of the Sample Respondents

Knowledge about Air Pollution	Gender		Total	%
	Male	Female		
Much high	24	16	40	33.3
Somewhat high	18	12	30	25.0
Somewhat less	23	27	32	26.7
Much less	-	-	-	0.0
Total	65	55	120	100.0

Source: computed from the primary data

The above Table – 3 shows that 33.3 per cent respondents their knowledge is very high, 25.0 per cent Respondents their knowledge is somewhat high, 26.7 per cent Respondents the knowledge is somewhat less.

The above Table – 4 shows how the respondents gave the ranking on the source of air pollution. Out of 60 male 48 respondents and out of 60 female 45 respondents give the first rank for the sources of pollution is natural impact followed by second rank is tobacco smoking, third rank is motor vehicles, fourth rank is source of incomplete combustion of coal and wood and finally give the fifth rank is occurrence ash and dust in the study area.

Table- 4
Sources of Air Pollution-wise Ranking from the Sample Respondents

Source of Air Pollution	Male					Total	Female					Total
	Ranks						Ranks					
	1	2	3	4	5		1	2	3	4	5	
Motor vehicles	0	10	12	22	16	60	0	16	10	24	10	60
Occurrence ash and dust	6	16	12	16	10	60	0	20	17	14	9	60
Natural Impact	48	8	4	0	0	60	45	9	3	3	0	60
Source of incomplete combustion of coal and wood	6	12	20	16	6	60	9	7	18	10	16	60
Tobacco smoking	0	14	12	6	28	60	6	8	12	9	25	60

Source: computed from the primary data

CONCLUSION

Air pollution has been considered as the one of types of pollution which causes different disease in various labourers in Chidambaram Block and this leads to increase the expenditure of sample respondents on their health care. As shown by the study the most source of air pollution is motor vehicles and the most of them are affected by skin diseases in the study area.

Suggestions

- The Municipality should increase the health facilities to the labourers in order to take care of them.
- The state government should advise the company holders to pollute less through the awareness programmes and issue the materials..
- The Local authorities should make the control of old vehicle because those vehicles are more contributed to air pollution.
- The government should encourage people to use solar energy in their electronics goods.
- The government should increase the number of project against air pollution.

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33. TO DETERMINE THE ACUTE TOXICITY PESTICIDE OF MALATHION AND METABOLIC ACTIVITIES AND RESPIRATORY RESPONSES IN FRESHWATER FISH LABEO ROHITA.

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ABSTRACT

The water pollution of aquatic environment with wide array of pesticides has become a menace to the aquatic flora and fauna. The organophosphorus pesticide malathion has been widely used in agriculture for several crops such as paddy, cotton and vegetables to control serious insects and mites. These chemicals cause severe damage to aquatic ecosystem especially to fishes. The main aim and objective of present study is to evaluate the impact on protein and glycogen in fingerlings of *Labeo rohita* an economically important Indian major carp. The 96 hrs LC₅₀ value of malathion for *L.rohita* was 9.0 ml/L. No mortality was observed below the concentration of 7.5 ml/L. The changes in biochemical parameters such as protein and glycogen are important to indicate the susceptibility of organs system to pollutants by altering their function. In the present investigation the protein and glycogen contents of muscles, gills, liver, kidney and brain of *L.rohita* were analysed. Fish reared in control group registered high protein and glycogen contents when compared with malathion treated groups during 24, 48, 72 and 96 hrs respectively. The similar results were obtained in the oxygen consumption of *L.rohita* during 24, 48, 72 and 96 hrs respectively. It is concluded that malathion concentrations (low and high) is very toxic and causes alterations in vital organs of fish *L. rohita*.

KEYWORDS : water pollution, pesticides, fish, **INTRODUCTION**

The pollution of rivers and streams are caused mainly due to chemical contaminant. It has become one of the most critical environmental problems. The industrial and agricultural problems throughout the world in general and in India due to alarming rise in human population. It also caused tremendous environmental contamination. The aquatic environment is affected by various types of toxicants. Particularly pesticides used in agriculture are one of the major sources of water pollution. The

widespread use of pesticides not only brought adverse influence on agro-ecosystems but also caused alternation in physiological processes of non-target organisms. In many countries large-scale mortality of fishes has been recorded due to pesticides in water bodies as pollutants. The toxicity study is essential to find out limit and safe concentration of toxicants. Malathion is a non-systemic wide spectrum organophosphate insecticide. It was one of the organophosphate insecticides developed in 1950. Malathion is used for agricultural and non-agricultural purposes. One of the main factors causing pollution of the environment is irrational use of organophosphorous insecticides (A1-Haj et al., 2005). It is a major source of environment poisoning in developing countries (WHO,2003). Among the organophosphorous pesticides malathion is considered relatively safe for use in mammals. However, impurities in commercial formulations are potent inhibitors of carboxylesterases, allowing dramatic increase in malathion formation (Buratti et al., 2005). The present work has been carried out to study the lethal concentration of 50% (LC₅₀) of pesticides, preferably malathion on the fresh water fish *L. rohita*.

MATERIALS AND METHODS **FISH ACCLIMATIZATION**

Almost equal sized fish *L. rohita* were brought from the local fish farm, Tirunelveli district of Tamil Nadu, India, and immediately transported to laboratory. These fishes were observed for any pathological symptoms and then placed in 0.1% potassium permanganate (KMnO₄) for two minutes so as to avoid any dermal infection. Then fishes were washed with water and acclimatized to laboratory conditions for three weeks during which they were regularly fed with dried pellets of 20% protein diet. The water used was clear and unchlorinated. Salinity, temperature, pH, dissolved oxygen content and water hardness of water were averaged to 0.25±0.1 ppt, 22.5±0.5°C, 7.9±0.1, 4.71±0.15ml-1 and 179±5.10 mgCaCO₃l-1, respectively.

Active and healthy *L.rohita* (2.97g:5cm) were chosen from acclimation tank, food supply was withdrawn 25 hrs prior to experimentation. A commercial grade of pesticide malathion (50% emulsified concentration, EC) was used for bioassay test. An acute toxicity (LC50) test by static renewal bioassay method was conducted to determine the toxicity of malathion in the *L.rohita* which was exposed to various concentration of malathion for 96 hrs and the pesticide was procured from the local market at Tuticorin, Tamil Nadu, India. The required quantity of malathion was drawn directly from this emulsified concentration using a variable micropipette.

For LC50 calculation, active fish (2.97±1.50g) were chosen and sorted out into seven groups

each consisting of 10 fishes. Test animals were exposed (in circular plastic trough of 25l capacity) to 0, of malathion, mortality was recorded for every 24 hrs and dead fishes were removed when observed, every time noting the number of fish deaths at each concentration up to 96 hrs. Triplicates were maintained simultaneously. The LC50 were determined / estimated with 95% confidence limit for malathion for 96 hrs by probit analysis (FINNEY, 1971). The concentration at which 50% survival / mortality occurred in malathion treated fishes was taken as the median lethal concentration (LC50) for 96 hrs which was 9.0 ml/L. One tenth of the LC50 value (9.0 ml/L) was taken for the sub lethal studies according to S Prague (1973).

RESULTS:

The 96 hrs LC50 value of malathion for *L.rohita* was 9.0 ml/L. No mortality was observed below the concentration of 7.5 ml/L. However the concentration of 7.5ml/L and above were observed to be toxic. The upper and lower 95% confidence limits were found to be 1.96 and 1.92, respectively. The **value of slope was 1.12. (Table 1).**

Table 1: Effect of malathion concentrations on per cent mortality in *Labeo rohita* exposed for 96 hr. Lethal concentration, slope function and 95% confidence limits are expressed in (µl/L)

Concentration of malathion	Dead / tested	Mortality(%)	Lethal concentration(µl/L)			Slope function(S)	95% confidence limit	
			Slope function(S)	95% confidence limit	16%		50%	84%
7.5	1/10	10						
8.0	2/10	20						
8.5	3/10	30						
9.0	5/10	50				1.12		
9.5	7/10	70	7.8	9.0	9.8		1.92	1.96
10.0	10/10	100						

Table 2: Glycogen content in various tissues of *Labeo rohita* exposed sublethal concentrations of malathion.

Tissue	Control	Experimental Periods			
		24	48	72	96
Muscles	1.35± 0.21	1.10± 0.01	0.90± 0.06	0.43± 0.09	0.21± 0.87
Gills	0.4±00.32	0.33±0.08	0.29±0.12	0.21± 0.006	0.09±0.48
Liver	0.63±0.19	0.55±0.32	0.43±0.02	0.31±0.12	0.16±0.09
Kidney	0.60±0.14	0.54±1.04	0.43±0.009	0.31±0.23	0.19±0.11
Brain	1.02±0.42	0.98±0.54	0.76±0.06	0.45±1.07	0.28±0.10

Table 3 : Oxygen consumption *Labeo rohita* exposed sublethal concentrations of malathion

Rate of oxygen consumption (mg 2 g-1 hr-1)	Experimental Periods				
	Control	24	48	72	96
		0.20±0.02	0.29±0.22	0.47±0.05	0.53±0.04

The biochemical changes in both protein and glycogen against to the pesticides of malathion in experimental fish *L.rohita* were provided (Table 2). The changes in the biochemical constituents in the of the *L.rohita* exposed to malathion at different exposure were observed in the present study. The proteins contents were found to be significantly reduced in different tissues of malathion exposed fish. Similarly the results obtained showed that glycogen contents were found to be significantly reduced in different tissues of malathion exposed *L.rohita*, it indicates may be excess pollution which induced toxicity. In the present investigation fish reared in control group registered high protein and glycogen contents when compared with malathion treated groups. The similar results were obtained in the oxygen consumption of *L.rohita* during 24, 48, 72 and 96 hrs respectively (Table 3).

DISCUSSION

During behavioural manifestation, the *L.rohita* showed normal behavior such as well-coordinated with active movements, static equilibrium, active swimming, normal gill movement, free gulping of air at the surface water, horizontal hanging in the water with natural body color and zero mortality were observed in control group. But in the toxic environment fishes exhibited irregular, fishes frequently coming to the surface of water, loss of equilibrium, erratic and darting swimming movements, vertical hanging, increased opercular movements, rapid gill movement, fading of their body color and excess mucus secretion all over body and restlessness. Finally the fish sank to the bottom with their least opercular movement and died with their mouth open.

In the present study during acute toxicity test, the fishes exhibited several abnormal behavioural responses such as erratic and darting swimming movements and loss of equilibrium. They slowly become lethargic, hyperexcited, restless and secreted excess mucus all over their bodies. Opercular movements increased initially in all exposure periods but decreased later steadily in the sub lethal exposure periods. Borah and Yadav (1995) observed that, opercular movements are increased. loss of equilibrium, erratic swimming and jerky movement and mucous secretion all over the body were in *Heteropneustes fossilis* after exposure to rigor and endosulfan pesticides. Santhakuamr and Balaji (2000) also observed this phenomenon in *Anabas* test studies after exposure to monocrotophos. Fishes are the excellent models for monitoring environmental contamination in aquatic system. Many authors investigated that

pesticide toxicity induced respiratory distress in fishes. Natarajan (1981) found reduction in oxygen consumption in *Channa punctatus* exposed to organophosphate pesticide. Similarly Boradbury et al., (1986) stated that the rate of oxygen consumption decreased in *Cirrhinus mrigal* may be due to internal action of pesticide. Variation in oxygen consumption is an indicator of stress, which is frequently used to evaluate the changes in metabolism under environmental deterioration. Similarly Khillare and Wagh (1987) also found that rate of oxygen consumption reduced in the fish *Barbus stigma* when exposed to malathion and nuvan. In addition to Verma and Dalela (1975) observed that reduction of oxygen consumption of fish might be due to perched solids present in the effluents which cause mechanical injuries to fish and disturb the osmotic regulation. And also several authors reported that the disturbance in oxidative metabolism leads alternation in whole oxygen consumption in different species of fish exposed to pesticides.

CONCLUSION

In conclusion, the present work indicates that Malathion causes considerable changes in the intermediary metabolism of the fish *L.rohita*. The cause for these alterations appears to be the result of high energy demands in order to survive from the stressful condition from the toxicants. Hence it may leads to decrease the glycogen and protein from various tissues of the test fish.

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