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ORIGINAL ARTICLE

Effects of Contaminated Drinking Water with Microcystins Toxins on Buffalos Liver and Chemical Treatment of toxins

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ABSTRACT
In the present study, it is explored that toxins presence in the drinking water samples causing of the microbe's significance activities. Toxins have very *harmful health effects on both humans and animals but especially their effects are appearing on liver functions that can be disturbed seriously. kidneys and Liver problems are showing in cows and buffalos that have a major economical impacts on the milk and beef processing industry. That is only reason the business which related to good health. A liver disease can shrunk the body size that can also affect the animal performance badly. For this purpose, it is drawn the blood samples from both buffaloes and cows for conducting the medical tests as RFTs (renal function tests) and LFTs (liver function tests). For this study we have selected the cows and buffaloes with showing the hepatic symptoms, it is collected the 116 blood samples of cows and 116 of buffaloes. We find the results as finally as 82.2% and 87.93 % as positive range for microcystins presence, respectively. Ferric Chloride is found as effective chemical that is cheap and effective in drinking water treatment. Finally, it is proved 0.5 mg/l recommended dose for removing the microcystins in drinking water after this experimental study.*
KEY WORDS: *Toxins, Liver Functions, Microcystins, Health, Filtrations*

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INTRODUCTION

Pakistani population is the world's fastest increasing population and it may exceed to 180 million is observed by now; it is still growing with an alarming speed about 2.8% yearly. Current century gives a revolution for improvement in utilization of water and food. We must need to change our cultivation method and life living styles. Concurrently the water quality of underground and surface is poor, further it is deteriorating for the reason is unchecked disposal of untreated industrial and municipal wastes mix in natural sources. [1]

The role of liver is very important to detoxifying the hazards chemicals and toxin normally observed in both humans and animals blood system. Various common factors effect on hepatic deficiency includes microbial infections, intoxications and blood circulatory as well as metabolic disorders. Liver or Hepatic illnesses in humans and animals are important and fast meanings about poisoning and toxic organic chemicals accumulation in living organism body [2].

The Toxins accumulation in the blood was made a great cause for damaging end-organs. Some factors may be appeared due to changes of situations in the cellular component of blood. But many of these effects are occurred that may cause by the changes of the humoral components of the circulating blood system. According to literature, the toxins may arise due to a consequence of a failure of normal hepatic functions or simple liver disease [3]. The toxic components in the blood stream can also be affected the functions of many organ systems such as portal vasculature and the brain, as well as the liver specially. The actual and exact nature of this toxins is not known, that may different for causing the damage for each organ system. Aromatic amino-acids, Ammonia, indoles, mercaptans, endogenous benzodiazepines and tryptophan are

very much involved in the development of hepatic diseases [4].
It is the mostly used chemicals that help to treat the drinking water process include chlorides of aluminium or ferrous. Recently some new synthetic organic polymers are introduced for better treatment of drinking water. These chemicals are the very effective for removing the cyanobacteria cells as it is possible to remove the soluble microcystins by using the strong chemical coagulants like as alum and ferric sulphate, polyaluminium chloride. But the effectiveness process is depend on water treatment coagulation doses, but it should be avoided the high dose because it can be produced algae or fungus [5].
The present study in based on assessment of the toxins that can effect on liver's functions of buffaloes caused by polluted drinking water as we are identifying the toxins in drinking water and blood and then removing from drinking water.

MATERIALS AND METHODS

Collection of Water samples

Three types of drinking water samples (ground water, canal water and upper water storage tanks) are Collected as randomly as frequency of samples as (n= 116)are used. When collect the samples, The temperature was 27 ^{0}C. The samples were collected in sterilized PVC bottles as filled 100 % by volume capacity.
The ELISA test kit had 98 test facilities for each toxin like shiga, botulinum and microcystins. Toxins are basically pure organic compound with covalent bond and Elisa method is developed on base to detection of single Covent bond presence. Water temperature was varied from 11 to 20◦C during sampling for our study, such changes temperature are characteristic for this area.

Animal Blood sampling

It was collected the random animal blood samples from Distrect Sheikhupura but these animals that were used for meat and milk. The frequency of samples as (n= 116). It was collected all the samples by using sterilized syringe in the blood vessel with capacity 5 ml at working temperature 16 ^{0}C.

Microbiological and Biochemical Methods

Standards analytical and microbiological methods used for isolation of C. Botulinum, E. Coli, Cyanobacteria and algae and estimating their metabolites toxins as Microcystin Toxin, Shiga Toxin and Botulinum Toxin [6]. Performing the liver functions tests of buffaloes as Protein, Aspartate amino- transferase (AST), Alanine amino transferase (ALT), G-glutamyl transferase (GGT), Alkaline phosphatase(ALP), Total Bilirubin, Direct bilirubin [7, 15].

RESULTS

Toxins Analysis of Blood

Cows have more immunity of detoxification of toxins as compare to buffaloes and that is why buffalo's s blood samples with more toxins values as observed in table-1. The results of 116 blood samples as 85.5% and 88.7 % seen positive as presence of the microcystins toxins. These results were showing that toxins values too much high in these samples of Buffaloes.

Table 1- (Mean±S.D) values of Blood Samples Analysis of Buffalos

Animal Blood Samples	Microcystin (Toxin)	
	Mean±S.D	Range
Buffalos (mg/l)	8.6±1	6-10

Effect of toxins Accumulation in Body on Liver Functions Performance

It is confirmed by the literature that liver performance or function is upset due to increasing the toxins values in the mammal's body. Because the function of the liver is worked to detoxify the toxins or other harmful substances. But if the toxin load is increased liver functions values automatically changed towards bad health.
ALT is a medical test for work function of a liver that depends on blood purifications and liver hotness, its values indicate towards increasing the blood has high level of toxin concentrations present. The animals were also infected due to their SGPT values come in range of 77-83. Which is not a good sign for milk producing animals as similarly high value of SGOT. If the liver status is not good, these effects may see in meat and milk production. Presence and Identification of toxins in the blood samples were showed that toxins may travel in food chain as this was a serious threat to all living things.
The medical results of complete LFTs testing of blood are indicating that all animals have the liver enzymes infected as GGT (17.80 ± 4.30) and ALT (78.50 ± 3.90) that were not normal values in buffalo

given in table -2. While both AST and ALP were also not existed within normal reference range for all the examined animals as (AST: 80 ±1, ALP: 416±1).

Same things are seen in table-2, it is clearly showed that cattle's liver enzymes showing in abnormal form as observing values in rising order due to the castles have to use canal water as for drinking purposes. Some economic reasons are highlighted under our brief surveys that high cost of medicines is not use to spreading those diseases. Previous we were discussed the results of canal water quality as given in figure-1.

However, unsafe drinking water has been playing a special role of Liver damage that is a very serious health issue in the world. Liver function tests are very well known for liver performance of detoxification function as usual. That is the reliable indicator for the liver's enzymatic activity. Liver functions are helped out to synthesis of enzymes and their low levels indicate that the enzymatic inhibition. Liver enzymes like amylase ALT, GPT and GOT were high in the blood samples, as it was showing in this case as acute liver damage (hepatitis) and all of these enzymes had been showing dysenzymia or hypocondition.

Table-2 Live Function Clinical Test of Animals (Buffaloes**)**

Blood Parameters Unit		Buffaloes blood samples		
		Mean±SD	Range	Reference Range
SGPT (ALT)	U/L	78±50	78-82	5.0-40
SGOT (AST)	U/L	80±1	80-87	5.0-42
Alkaline Phosphatase (ALP)	U/L	416±1	410-420	98-279
GGT	U/L	17.7±1.6	15-18	6.0-8.5
Total Proteins	g/dl	20±2.2	18-22	12-64
Globulin	g/dl	11±0.9	10-12	1.2-3.2
Bilirubin Total	mg/dl	10±0.7	8-12	0.2-1.2

Effect of Coagulant Ferric Chloride on Removing of Toxins Dissolved in Drinking Water

The toxins are a basically organic molecule that has low electrical change, as it comes to close with high polar atom. Then it attracts by high charge inorganic molecule automatically, this reason is very strong for removing the toxins that exist in drinking water samples. In Fig-3, it was clearly seen that effective removal possible using Ferric Chloride at dose of 8 mg/l. Most important use of $FeCl_3$ was coagulation process as its strong chemical reaction. Because $FeCl_3$ inorganic molecule has strong change density and it is able to donate the electrons pairs in this chemical reaction. As low concentration of $FeCl_3$ was used as compare to Aluminium salt in this research. This situation is much favorable towards that the residues of $FeCl_3$ less make in quantity than Aluminium salt as shown in figure-3.

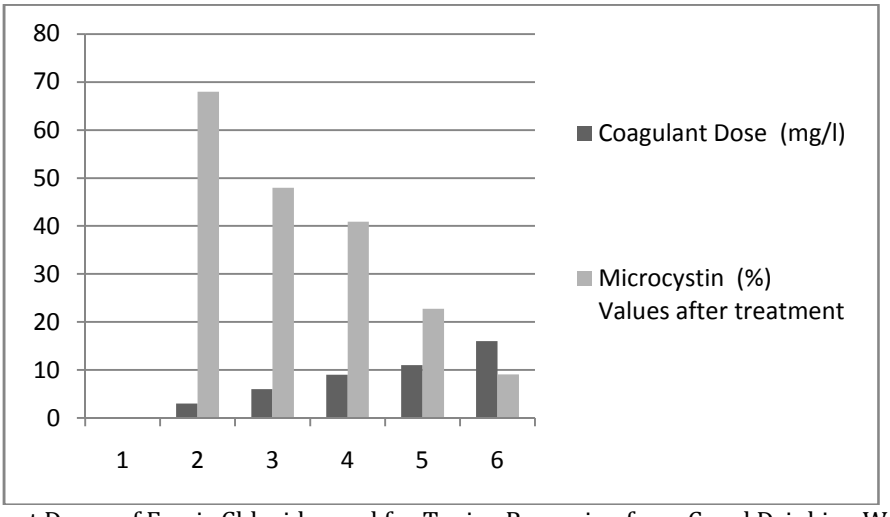

Fig. 1-Different Doses of Ferric Chloride used for Toxins Removing from Canal Drinking Water Source Samples Used for Animals

DISCUSSIONS

Biological Toxins that are derived from biological source such as microbes cyanbectria, E.coli and C. botulinum is produced their metabolites like microcystin, shiga and botulinum toxins. Absorption of these toxins by human is made some complexities that are indicated by medical tests of blood for working

level of major organ of human as liver and kidneys functions. Sign and symptoms of hepatitis are showed by patients that are confirmed by liver functions tests which are not in normal range [8].

The isolation of waterborne bacterial pathogens at such a high percentage is a meaningful concern because contaminated water plays crucial role in the prevalence of waterborne and water related bacterial diseases outbreaks in the rural population of city Sheikhupura.

Qualitative and quantitative composition within bacterial pathogens and their metabolites toxins in samples of drinking water of canal, ground and water storage tanks were probably due to contamination of sources of drinking water by human or animal excreta. The major problem in the country in rural as well as urban areas is bacteriological contamination in drinking water due to lack of management [9, 10].

However, hyperglobulinaemia and Hypoalbuminaemia was reported in the similar situation where toxins wre found in drinking water that came under study. The liver enzymes (GGT, ALP, ALT and AST) and renal function parameters as like creatinine and blood urea were not existed in normal range in this study due to unsafe drinking water. Mostly, liver function and hematology medical tests are generally reliable indicators of liver abscesses and specific blood disease. The techniques were very usefulness for the diagnosis of the liver abnormalities like abscesses in all type of animals [11, 12].

In USA, the death rate due to typhoid illness are twenty or more people per hundred thousand of population was measured common, the ratio was 58.7in Minneapolis, in London the rate was only 3.3 per hundred thousand. World Health Organization (WHO) was assessed that 1 billion people had not internationally access on the safe drinking water sources. But 2.5 billion people that are suffering from poor sanitation internationally. The Diseases were causes by using the unsafe water for drinking, poor sanitation and hygiene. These conditions are creating the results as 1.7 million deaths as per annual basis. [13, 14].

The parameter like taste, small and colour was used as needle of the organic substances that in relative with coagulation and reactivity with chlorine process. Toxins values reduced as 0.1 mg/l in the results figure to present the organic molecules of low molecular weight.

CONCLUSION

Microcystins are very toxic compounds and their presence may cause of serious acute or chronic toxicity in any level of animals. Microcystins toxicity can damage the buffaloes' liver easily that can be observed in kidneys functions tests. Kidneys functions tests are also important tools for observing on the filtration process of animals kidneys. High values of Rfts are indicated that kidneys s filtrations process not be normal along losing of animal's weight and healthy habits. Filtration process that given in this paper is the only solution for treatment of drinking water for removing the toxins. Next need to make filtration process more economical and feasible for drinking water treatment purposes.

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