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A Study on Biochemical and Haematological Properties of Common Carp *(Channa Punctatus)* of Ami River

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AB S T R A C A T

Water is the most important resource for life or survival on earth . It is essence of life on our earth. The growth of mills and industries have caused overall economic development of the world. But we cannot deny or ignored this fact that after industrial development not only cut the work pool on humans , but also they have caused harmful effect on health of people as well as unicellular and multicellular organism . Let us educate ourselves about water and water pollution .Two third of our earth surface is covered known about water is everywhere and all around the earth surface .Water pollution is the contamination of water bodies usually caused due to the human beings activities. water pollution may be change major or minor in the physical ,chemical ,and biological Properties of water that eventually leads to detrimental consequences of any living organism.. The sources of water pollution are mostly anthropogenic in origin. The polluted water have undesirable harmful chemical contents, turbidity, toxicant, heay metals, pesticides, industrial wastes product, and other physicochemical parameter not in reference range assigned by world health organization (WHO) and central pollution control board (CPCB). water is essential for the life , we known about it very well the water sinks in to the surface and also collect in lakes and rivers as well as oceans . it evaporate again and continue the cycle . organic matter and nutrients causes an increases in aerobic algae and depletes oxygen from the water column this causes suffocation of fish and other aquatic organism . Algal bloom can reduce the availability of fish and other aquatic life to find food chain and causes entire population to leave an area or even die. Now a day's became hot topic for the discussion and debates. Aquatic animals specially the fishes are most susceptible according aquatic pollution .And it also used as stress biomarker.

Keywords: - Industrial effluents , physiological and biochemical Alteration, hematology, Genotoxicity.

INTRODUCTION:

Water is absolutely necessary for all forms of life . because of its ubiquitous nature ,the pollution of water bodies poses a potential threat to public health and aquatic ecosystem [1] All type of water pollution affects organism that lives in the water bodies and in almost all causes the effect is damping not only to the individual species and pollutants but also to our rich aquatic biodiversity communities The polluted water passes a potential threat to living individuals life and public health .Toxic contaminants end up in our water bodies in different ways [2] .Industrial and municipal discharges , agricultural particles can all put harmful substances in water bodies over 1 million marine animals including mammals ,fishes , sharks turtles , and some aquatic birds are killed every year due to the plastic debris on the oceans [3] .Aquatic animals like fishes are important resource for human ,worldwide especially as food fish and fisheries product present a valuable source of nutrients of fundamental importance for diversified and healthy die[4] the fishes are rich source of vitamin A , B , D and some minerals like Fe , I , Zn , and S , along with polysaturated omega3 - fatty acid , water pollution has became a global problem of environment in recent days [5] .Fish play a distinguishable role in our economy. Tropic food chain serves as an excellent role in the form of indicator. During the passage of time, increases incidence of mass mortality caused by aquatic pollution has increased. These fishes play important role in carrier of toxicant and pathogen leading to gradually a significant decline in their population[6].It is reported that the stress is a major problem in aquatic Environment. The fishes are most susceptible to stress up on the surrounding environment [7] .Fishes are considered as excellent bioindicator for the evaluation of environmental quality of xenobiotic compound in a ecosystem and the aquatic ecosystem. But the presence of xenobiotic compounds in a segment of an aquatic ecosystem bioaccumulated in does not by itself , indicate injurious effects [8] .in water system the correct balance of physical and chemical properties should be maintained for the natural growth survival and reproduction of fishes and other organism . the physicochemical properties include Bio Chemical oxygen demand (BOD),chemical oxygen demand (COD) , total suspended solid (TSS) , total dissolve solid (TDS) dissolve oxygen (DO) ,temperature, ph , colour , of inhabiting water bodies [9] .All these type of physicochemical parameter of water produce effect on aquatic lif. These factors are produce stress. Some stress are manmade as fishing, netting, handling, shipping transporting, etc. the stress are also biological or environmental like pathogens , starvation , crowding , vaccination , pollution etc. It disturb the normal life of aquatic individuals so as consequences of stress brain get hyper sensitize and hypothalamus induce the secretion of stress hormone such as cortisal and catecholamine's [10] both the cartisal and catecholamine's are commonly release at the time of unusual situation. which result in alteration of metabolism , hematological parameter hydro minerals and immune response[11] . In aquatic media physicochemical properties due to the toxicants exerts its adverse effect on fish physiology

and also effect directly or indirectly on Human health through the food . It affects the water quality as well as the microbial and aquatic flora. with competing demands on limited water resources awareness of the issues involved in water pollution has to considerable public debate about the effect of pollution on environment[12].Industrial effluent is characterized by their abnormal turbidity ,and conductivity. industrial waste containing high concentration of microbial nutrients waste water from textiles, brewery ,food and bakery , paper mill believed to give a broad outlines of industrial waste as well as disposal problem ..it has been demonstrated that persistence of low oxygen level for long reduces metabolic rates in fishes, alters gill morphology and hematology characters [13] .Release of heavy metals , pesticides , fertilizers ,radioactive substances , and industrial wastes in to atmosphere has resulted in fishes ovary is highly affected via contamination of heavy metal pollution and it increase the incidence of follicular atresia[14] .The fish acts as the very important tools for the studying water pollution because it changes in their surrounding directly or indirectly affect their overall change in behavior ,morphology, biochemistry ,and other hematological properties of the body. The environment (aquatic) change can be easily measured by the fishes because the fish are very sensitive to the environmental stress and second , they integrate the adverse effect of complex and varied stress on other component of aquatic ecosystem [15] The heavy metal concentration in fish tissues reflects post exposure via water and food . it can demonstrate the current situation of the animal before the toxicity effect the ecological balance of population in the aquatic environment [16] The aquatic environment is severally affected by the different type of chemicals which are toxic to the aquatic organism. the paper industries has been one of the major source of aquatic pollution in India . paper and pulp effluent is serving threat of aquatic life because their effluent is one of the important reasons for the elimination of fish fauna from the river .paper mills effluent consist a variety of toxic component such as chlorophenols ,fatty acid and resin acid are main , actually toxic and bioaccumulating compounds in bleached Kraft mills effluent (BKME)[17]. .

The heavy metals are must be categorized as biologically essentials or non essentials ,aluminum (Al),cadmium , (Cd). mercury (Hg) , tin (Sn) and lead(Pb) have no important for biological function of any individual gradual contamination of any aquatic Ecosystem the these all chemicals are also called xenobiotics or forgein element and their toxicity is reported with high concentration or increasing under the body [18] The essential metals like cupper (Cu) , zinc (Zn) , chromium (Cr) ,nikel (Ni), cobalt (Co) , molybdenum (Mo) and iron (Fe) ,on the other hand have a known important .it is imperative to realize the importance of water in our life quality because the water problem is not only confined to the quality of water available , but also the quality of available water . water quality is important often a trigger for conflict in a water shed , simply because degraded water quality means that desired uses are not possible or not safe for the individual

IMPACT OF POLLUTANTS ON LIFE:-

A large amount of industrial effluentand sewage are very serious problem of environment . Which has been increased day by day A group of chemical that have been continue to be greatest environmental concern .Throughout the world maximum amount of aquatic pollutants are came from industries and agricultural runoff [20]. In aquatic ecosystem huge amount of pollutants continuously loaded which generally anthropogenic in Origin. they include a diverse set of high volume production compounds that are intentionally produce as well as compounds that are form as accidental byproduct of a variety of combustion processes a compound commonly classified as a POP if it exhibits various characteristics like that persistence in the environment , which means chemical , photochemical , and biological transformation processes do not lead to significant removal of the compound in any type of environmental [21].The next one is a common impact that bioaccumulate through the food web and toxic to the living individual life including humans and other wild animals .The toxic chemical pollutants are responsible to destroyed the aquatic flora and fauna. The effluents consist different typeof toxic compounds[22]. many of the toxic substances are lipophilic and were not adversely affected easily able to penetrate to all cell membranes and frequently passes high bioaccumulation factors. Various disadvantage reported by effluent[23]. since may effluents not treated properly and discharged on ground or in water bodies Pollution of the aquatic ecosystem are recognized as potentia threat to all living individual, It is produced by man himself. Therefore pollution and its effects are considered a man greatest Crime against himself [24].these pollutants are affecting the stages of food chain, which may lead to disturbance of whole aquatic ecosystem as well as terrestrial ecosystem. Interrelationship of physiochemical and biological condition has been investigated in various aquatic habitat by a number of workers[25]. The effluent release from industrial , agricultural , sewage waste (house hold waste) etc directly drainage in to water bodies without any treatment . they constitute biohazard to man and other living individual , such as aquatic individual because type of toxic substances come in the animal's body and detrimental to serious effect on health[27]. Fishes serves as important bioindicator for aquatic environment contamination to access the changes caused by human activities, effectively and reliable monitoring biosystem to recognize and predict hazard effect of pollutants .

POINT SOURCES:-

Land based sources of pollutants , other than point sources from which substances enters in the environment as a result of land runoff ,precipitation, atmospheric deposition ,drainage hydrologic modification or destruction of habituates . The point sources of pollution which enters a river sources at a specific site such as pipe discharged ,diffuse pollution occur when potentially polluting substances leach in the surface water as a result of rainfall and surface runoff[27].Recent example of such emerging pollutants that are under consideration to beaded are the polybrominated diphynyl ethers (PBDE s) . It should be pointed out that many emerging pollutants may have already been present in the environment for decades but were not detected because of analytical limitations from a toxicological point of view . POPs may threaten the health of both humans and wild life because of their various adverse effect , including disruption of the endocrine system , reproductive system and other than immune response . as well as their ability to cause behavioral problems, cancer ,

dibities and thyroid problem[28] The effluent are main source of aquatic pollution which present in different form in our environment The kinds of pollutants are produce adverse effect of life of an individual

MORPHOLOGICAL AND BEHAVIOURAL CHANGES:-

The effluent discharge in water medium and causes different type of changes or alteration in the body of aquatic individual . Morphological and behavioral changes consider through effluents discharge in aquatic media . According to these alteration they were in stress condition and tried to resist in changing water environment and reducing frequent surfacing. Other noticeable characters which implied a true picture of stress on the affected fish were muscular spam , more secretion of saliva ,changes in breathing , loss of balancing[29]. The decreases in the opercular movement and the rate of oxygen consumption in fish Since the potential of respiration altered. The nature and rapidity of the behavioral response towards any stimulus indicates that varied type of different industrial mill effluents contains some amount of neurotoxin substances, which might be active at the neuromuscular junction of the exposed animals[30] It is clear that the heavy metals induce an early response in fish as evidenced by alteration both at the structural and functional level of different organs include enzymatic and genetic effects .The biomarker can offer additional biologically and ecologically relevant information a valuable tool for the establishment of guidelines for effective environmental management. So it can be stated that the fish biomarkers are necessary for the monitoring of any alteration .

he harmful effect of effluents . Exposure to effluent in fishes included initial hyper activity rapid opercular movement,

HARMONAL CHANGES:-

The regulatory system of the vertebrates body is stated that an endocrine system. Hormone are the secretion of different endocrineglands. the mill effluent and industrial effluent can direct adverse effect on the endocrine glands and tissues ,or their effect can be indirect through alteration of homeostasis mechanism and non endocrine organ [31]. The corticosteroid hormone , which together with the catecholamine's epinephrine and nor epinephrine ,are the type of important corticosteroid in teleosts fish . these synthesize and secreted by the internal tissues situated in the head , kidney , and pronephrons . the main stimulant of cortisal secretion by steroidogenic or steroidal . inter renal cells is adrenocorticotrophic hormone (ACTH) released with the anterior part of pituitary or adenohypophysis[32]. The polishing treatment of waste water effluent has the advantage for the aquatic environment including water resources is protected from human pharmaceuticals and endocrine disrupting compound.The activity of pituitary corticotrophs. cells that synthesize (ACTH) , regulated by corticotrophin releasing hormone(C R H) and other hypophysial peptides[33]. photoperiod and temperature are some of the environmental causes that modulate the activity of HPI axis in fish . a negative feedback effect exerted by cortisal at the level of hypothalamus . cortisal and corticosteron are synthesized from cholesterol , the precursor of all steroid harmones .

PHYSIOLOGICAL AND BIOCHEMICAL ALTERATION:-

In aquatic individuals the gills are main organ for gaseous exchanger ionic regulation , acid base balance , and nitrogenous wastes excretion it play important role or vital function for the each aquatic individuals . a wide variety of aquatic pollutants are appear symptoms of toxic effects on fishes gills[34]. A variety of aquatic pollutants such as organochlorenes , petroleum compound , organophasphate carbomates , miscellaneous herbicides acidification , nitrogenous compound ,heavy metals ,salts and chemotheraptic agent . environmental stress such as contaminants can causes different types of biological responses in fish ranging the biomolecular and biochemical to population and community level effects [35].The growth of fishes are influenced by the some principal ecological factors in the environment they inhabit competition and food availability . the blood glucose level of fish is determines the physical size of fish . the larger fish body require more energy for the supporting life system as a result usually higher secretion of glucose . the total length and weight of fish body not only influenced by hyperglycemia condition but also condition or quality of habitats[36]. low dissolved oxygen concentration any toxic gases such as ammonia gas high level of ammonia can cause damage to tissues of gills. where the gill plates swell down so that the respiratory system will be disturb. Oxygen deficiency causes the death of living individual of any ecosystem. The suspended solid also produce direct effect on the gill tissues of fishes. So the oxygen enters in the body is induced due to gills that are covered with solids And the fish need more energy to survive [37].

The high biological oxygen demand indicates that the amount of oxygen needed microorganism to oxidize organic matter in the water is high . it means that the water is already in a deficit of oxygen . there for BOD is always indirectly associated with livels of organic matter in the water bodies . The garbage's is heavily stagnant on the beach and some area drowned in the bottom such as baby diapers this can affect the physical condition of water domastic wastes also contains with high organic matters , which will cause the decreases of dissolved oxygen . it can cause disturbances in respiration of fishes . High level of ammonia also can tissues damage in fish body .In conclusion the increase in level blood glucose in fish indicates that sea water , where were fish inhibits , were contaminated by pollutants[38]. The activity of transaminase enzyme S GOT / AST (serum glutamate oxalo- acetate transaminase / aspirate aminotransferase) and S GPT / ALT (serum glutamateprivate transaminase / alanine amino transferees) Indicate the impact of pollutants on fish health. These enzymes are disturb the cells of vital organs such as liver kidney , heart gill etc . as enzyme acetylcholine esterase serve as important biomarker to asses the pollution status it vital for the regulation of neurotransmitters and neuromuscular system of fish and other organism

.Its main function is to break the Acetylcholeneesterase impulse transition from one to next one [39].Protein play important role physiological and biochemical function of the body . enzymes which facilitate the speed and velocity of metabolic reaction and it is chemically protein . protein are a important constituents of the body and play significant role tissues formation . pollution causes declinement in protein due to catabolism of protein in to aminoacid to cope up with the hostile environment due to effluent stress . the reduction of protein content indicates protein under goes proteolysis which results in the production of aminoacid

HEMATOLOGICAL CHANGES:-

Any study of the blood parameter are considerd as good physiological indicators of the whole body condition and there fore it can be used as diagnosis the structural and functional status of fish exposed to toxicants [40].The blood of fish is most susceptible to both externsal As well as internal environmental fluctuation. because any type of pollutants enter under the body via blood circulatory system . or main pathway of entry of toxicants is blood vessels . hemoglobin content , number of red blood cells , white blood cells and other hematological parameter such as mean corpuscular hemoglobin concentration (MCHC), mean crepuscular hemoglobin (MCH) , hemoglobin percentage (Hb) are the indicator of the toxicity with wide potential for use in toxicity studies [41].The physiological stress response to endogenous and exogenous change in fish indicates through the hematological parameters to exposed a complex mixture of available pesticides / pollutants in water bodies .The reduction in hemoglobin content in a fish exposed to toxicant could be due to the inhibitory effect of those substances on the enzyme system responsible for the synthesis of hemoglobin[42] . The high hemoglobin concentration and packed cell volume or hematocrit values is related to the large anaerobic metabolic capacity of the species and its preferred Environmental condition and contamination caused by pesticides pollution because of the intensive structure dominant mixture of contamination could be occurring because of the intensive structure dominant a confluence of both urban and agricultural pollutant [43].The hematological parameter study is helpful to known about the relationship of blood characteristics of the first habit and adaptability of the species in environment . It was seen that significant increase in the number of leucocytes (leucocytosis) in fish which was directly relative to the stress condition . According to Pamelia et al.The reduction in hemoglobin content in fish exposed to toxicant could be due to the inhibitory effect of those substances on **the** enzyme system responsible for synthesis of hemoglobin .Hematological parameter consider as blood parameter alteration in it causes serious problem in human body as well as other individual also.

GENOTOXIC AND MOLECULAR ANAMALIES:-

In India a number of natural and manmade water reservoir used for various purposes, mainly drinking and agricultural water bodies may be contaminated by various means that may chemical or biological the aquatic environment are specially affected by different type of chemical which are toxic to the aquatic organism .the water pollution affect not only a particular species but also the natural biological communities . each community are seriously affected by pollutants [44].The exposure of aquatic organism to a variety of toxic chemical raises the question about the potential effects of exposure on the health status of both current and the future aquatic population. The Genotoxicity test in aquatic environments is perform by micronuclei (MN) . micronuclei arise from chromosomal fragment or whole chromosome that are not incorporated in to daughter nuclei at mitosis and could be easily visualized in peripheral erythrocytes .A molecular hallmark of apoptosis is degraded of nuclear DNA in fragment with the size of an oligonucleosome, as a result of activation of endogenous endonucleases , recognized as a DNA ladder on conventional agrose gel electrophoresis .

* **OBJECTIVES HAVE TAKEN .**

***** selection of sites on the basis of effluent discharge .

* collection of water sample from different site for measurement of -

*** PHYSICOCHEMICAL PARAMETERS**

Temperature , ph, dissolve oxygen (DO) ,biological(Bio Chemical) oxygen demand (BOD) , chemical oxygen demand (COD), total suspended solids (TSS) , total dissolve solid (TDS) etc .

***collection of fish sample from each sites for the measurement of pollution effect on hematological parameter,**

Haemoglobin ,Red blood cells , white blood cells , platelets , mean carpuscular volume , mean carpuscular haemoglobin , mean carpuscular haemoglobin concentration etc .

*** BIOCHEMICAL PARAMETER**

total protein ,total free amino acid, glycogen , glucose, acid alkaline phosphate activity, GOT ,GPT , Acetylcholine esterase , Transaminase , etc .

* **GENOTOXICITY ANALYSIS**

* Micronuclei test, commet assay .

CONCLUSION:-

In eastern Uttar Pradesh (India) , river Ami is a important tributary tributary of river Rapti , flowing through the Khalilabad city and it is clear from above study that river Ami get polluted due to different effluents discharge and this pollution has been adversely affected the flora and fauna as well as community . people in surrounding areas economically depends on this river for fishing and agricultural purpose , how ever the seriousness and importance of this problem has been realized recently and not much work has been done on the toxic effect of different kind of industrial effluent on the water quality of river Ami above fish . hence , an attempt was made to assess the toxic impact these effluent on physicochemical parameter of river Ami and biochemical parameter of fish .The effect of industrial waste discharge is also seen at different location of river Ami .A glance at BOD ,and COD data reflect that the river is facing a high load of organic pollution beyond its dilution and self purification capacity disposal of industrial waste water by industries is serious problem .Most pesticides have capacity to alter biochemical , and enzymatic pathways , by the alteration in carbohydrate , and protein .metabolism . formation of micronuclei and chromosomal aberration in fish inhabit in the natural water bodies.

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