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Original Research Paper

Microbiology

STUDY THE ANTHROPOGENIC PRESSURE IN AN AROUND THE WATER OF SHILABATI RIVER NEAR GHATAL, PASCHIM MIDNAPUR, WEST BENGAL, INDIA.

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ABSTRACT The Shilabati River near Ghatal, Paschim Midnapur, acts as an important role in local society, as a source of irrigation, drinking water and domestic utility. Present study was intended to ascertain the quality of river water for public consumption, recreation and other purposes. To keeping the importance of utility of river water, we determine the spatial and temporal variation of different physicochemical parameters like Dissolved oxygen (DO), Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Total Alkalinity (TA), Hardness, temperature, pH, Electrical Conductivity (EC), heavy metals and coliform, fecal coliform at five sampling sites from March- 2017 to March- 2018. Present result indicate that water quality of all studied area are good and can used directly in domestic purpose but not good for directly drinking purpose because of presence of fecal coliform in all sampling stations. So, this result in formed that proper treatment is required before water consumption otherwise may also trigger outbreak of waterborne disease.

KEYWORDS :

Introduction

The Silabati River is situated at the south-western part of Bengal basin, at the outskirts of the Chhotonagpur plateau. The River Silabati or Silai was originated near Lapara village of Puncha Block of Purulia district, West Bengal and flows southeasterly before it meets Dwarakeswar River near Ghatal of West Midnapore District, West Bengal. The Silabati River has flows in an almost southeasterly direction through the districts of Bankura and West Midnapore. The total watershed of Silabati River were covers approximately 4249 sq km. area between 22°32' N to 23°15' N latitude and 86°40' E to 87°46' E longitude. Purulia, Bankura and West Midnapore districts of West Bengal and block Headquarters like Taldangra, Simlapal of Bankura district, and Garbeta, Salboni, Chandrokona of West Midnapore district are the main towns within the Silabati basin area. Both the districts climatologically face very hot summer and cold winter. The temperature at the winter season is 6 to 10°C (December-January) and 40 to 50°C in the summer month (May-June). The area suffers rainfall during the period of the monsoon (June-September). The average rainfall in that area is 150cm/year. In other season, weather is mainly dry with average relative humidity 60 to 65%. The topography of the area is undulating with occurrence of isolated hillocks at the higher altitude. The height of such hillocks ranges within 150 metre from the mean sea level (msl). In the lower altitude of the basin, the hillock is gradually replaced by isolated high land with maximum height 40 to 50 metre and at the lowest altitude, the topography is panplained. The general slope of the basin is towards southeast. The soil properties of the area are lateritic in nature and red colour of the soil which have higher percentage of iron in the upper and middle part i.e. Bankura districts of the river basin. In the lower part, the soil is represented by recent alluvial soil which is carried and deposited by the principal river system and its tributaries. The soil nature, particularly in the upper reaches of the basin does not permit the flourish of agriculture, but there are some sporadic paddy fields and some agricultural land to harvest seasonal vegetables like cabbage, cauliflower and mustard. In the lower part of the river especially in the Ghatal region are suitable for agriculture like different crops and also suitable for vegetables. With increase the growth of population and gradual urbanization in this agriculture based region, the demand for utilization of subsurface ground water is gradually increases. Such rising trend of utilization of groundwater is intimately related to the future planning of socio-economic development of the agriculture based area. To cope up with the ongoing demands of surface water, it is essential to study the proper evaluation of present surface water resources and future planning of surface water exploitation, development and management of the study area. According to WHO (1984), the occurrence of pathogens or indicator organisms in ground or surface water mainly depends on the range of human activities and animal sources that release pathogens to the environment. In this context, the present study is an approach to find out the quality of hydrogeological parameters and microbial load of the Silabati river water.

Materials and Methods

Study area : The present study was conducted around the Ghatal area which is situated in the Paschim Midnapur district of West Bengal. It is located at 22°32' N to 23°15' N latitude and 86°40' E to 87°46' E longitude. We have taken five water samples for our present study. The distance between intra sample points was near about 3km (Fig.1 and 2).

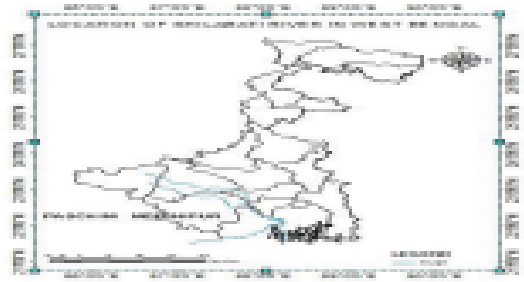

Fig.1 Location of Shilabati River in West Bengal

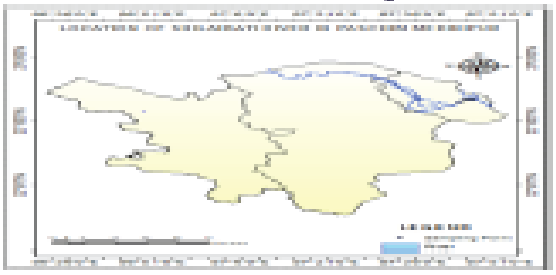

Fig.2 Location of Shilabati River in Paschim Medinipur

Sampling

The water sample was collected from different area of the Silabati River around the Ghatal region. The water samples were collected from all the five selected stations between 8 a.m to 10 a.m of 10 cm below the water surface during March-2017 to March-2018. Samples were collected in plastic bottles for physico-chemical analysis. Temperature and pH of the water were measured at the sampling sites. The anthropogenic stress of the selected station are tabulated below –

Table 1: The anthropogenic pressure at the different selected station

Sample Point	Name of Place	Latitude & Longitude	General Characteristics
1	Pratappur	22 °40'03 "N 87 °46'32 "E	This river side place has been used as a ferry ghat for long time. People are mainly using this place for communication purpose. Human intervention is high of that place. This station is agriculture area.

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Copper(II) and cobalt(II) complexes of 5-methyl pyrazole-3-carboxylic acid: synthesis, X-ray crystallography, thermal analysis and *in vitro* antimicrobial activity

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ABSTRACT

The coordination behavior of 5-methylpyrazole-3-carboxylic acid (Hmpca) has been demonstrated by the solid state isolation and characterization of $[Cu(mpca)_2(H_2O)]\cdot 3H_2O$ (**1**) $[Cu(mpca)_2]\cdot H_2O$ (**2**) and $[Co(mpca)_2(H_2O)_2]$ (**3**). The new compounds are characterized by X-ray crystallography, thermogravimetric analysis and DFT study. The redox properties of the complexes are examined by cyclic voltammetric analysis. The antibacterial and antifungal activities of the compounds against eight bacteria (*Escherichia coli, Enterococcus faecalis, Bacillus subtilis, Klebsiella pneumoniae, Proteus vulgaris, Staphylococcus aureus, Pseudomonas aeruginosa* and *Salmonella typhi*) and two fungi (*Aspergillus flavus* and *Candida albicans*) are screened using modified agar well diffusion method. The metal complexes demonstrate better inhibition on all bacteria and fungi than the ligand. The high lipophilicity of the complexes accounts for good inhibitory action toward microbes. Among the reported complexes, **3** emerges as an excellent antifungal agent and a better antibiotic than standard fluconazole. The structure and activity relationship indicate that complexes having sufficient Jahn–Teller distortion with high *logP* values, cross the cell membrane of the microbes creating intercellular damage.

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Pyrazolyl; inner-metallic; thermogravimetry; antibacterial–antifungal; mono/polymeric

1. Introduction

Heterocyclic compounds containing nitrogen, sulfur and oxygen and their metal complexes are biologically active materials toward bacteria, fungi and viruses [1–5]. Heterocyclic compounds containing pyrazole rings have interest due to their applications in the pharmaceutical and agrochemical industries [6]. Pyrazole derivatives have wide range of applications such as anti-hyperglycemic [7], analgesic [8], anti-inflammatory [9], antipyretic [10], antibacterial [11], hypoglycaemic [12] and sedative – hypnotic

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Induced apoptosis against U937 cancer cells by Fe(II), Co(III) and Ni(II) complexes with a pyrazine-thiazole ligand: Synthesis, structure and biological evaluation

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ABSTRACT

Complexes of iron(II), cobalt(III) and nickel(II) with 4-(4-methoxyphenyl)-2-{2-[1-(pyrazin-2yl)ethylidene]hydrazinyl}thiazole (PyztH) have been synthesized and characterized by elemental analyses, spectroscopic methods, CV measurements and a DFT study. The crystal and molecular structures were determined by the X-ray diffraction method. The complexes have the compositions $[Fe(Pyzt)_2]Br_2$ (**1**), $[Co(Pyzt)_2]PF_6$ (**2**) and $[Ni(Pyzt)(PyztH)]ClO_4$ (**3**), with an approximate octahedral environment around the metal centre with NNN donor atoms from the two coordinating ligands. The complexes belong to the triclinic crystal system and crystallize in the space group *P*-1. Complex **1** is stabilized by strong hydrogen bonds, whereas the stability of complexes **2** and **3** is associated to π–π stacking interactions. The chemical reactivity, frontier orbital picture and energies of the HOMO and LUMO of the complexes have been estimated by a DFT study. The complexes are redox active species and respond with a quasi-reversible redox process. The cytotoxicity of the complexes was tested against U-937 human monocytic cells and shows IC50 values of 132 (for **1**), 45 (for **2**) and 162 μM (for **3**). A LDH release assay indicates that **2** and **3** show apoptosis in the tumour cell. Complex **2** induces apoptosis by disrupting the mitochondrial membrane potential and homeostasis leading to cytotoxicity, as envisaged by PARP cleavage. Complexes **1**, **2** and **3** show high binding constants ($2.01 \times 10^6\ M^{-1}$ for **1**, $1.18 \times 10^7\ M^{-1}$ for **2** and $2.90 \times 10^7\ M^{-1}$ for **3**) with CtDNA which attest the groove binding nature of the complexes with DNA. The compounds also exhibit a remarkable zone of inhibition against specific tested bacterial and fungal strains. Based on the results, the cobalt complex (**2**) shows the best antitumor and antimicrobial activity among the complexes under investigation.

1. Introduction

Nitrogen and sulfur containing heterocyclic compounds occur in nature in the form of alkaloids, vitamins, pigment and as constituents of animal and plant cells. Thiazole is a well known stable nitrogen and sulfur containing heterocyclic aromatic compound, having a Bird's Index of Aromaticity value of 79 [1]. It possesses both an electron-accepting function (i.e., –C=N–) and an electron donating atom (–S–) [2]. The presence of an acidic proton at the C2 atom is responsible for the high reactivity of the thiazole ring [2]. Various new biochemical entities have been generated using the thiazole moiety as a synthon. Different groups substituted on the thiazoles rings at various positions (Fig. 1) lead to a variety of thiazoles containing compounds which have wide applications in biology and pharmacy [3–6].

Biological activities, like antihypertensive, anti-inflammatory, antibacterial, antiHIV, antitumor and cytotoxic activities, were reported for thiazole lead compounds [7–11]. Some synthetic drugs, like fanetizole (anti-inflammatory agent), tiazofurin (antineoplastic agent), penicillin (potent antibiotic), sulfatiazol (antimicrobial) and abafungin (antifungal), possess thiazole rings [12–14]. Penicillin is a known naturally occurring antibiotic where thiazolidine is the core unit [15]. Thiazole and thiophen based heterocyclic compounds were reported as antitumor agents towards

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