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LIMNOBIOLOGICAL STATUS OF HOSPITAL WASTE-FED POND WITHIN THE BURDWAN MEDICAL COLLEGE AND HOSPITAL PREMISES AT BURDWAN TOWN, W.B.

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ABSTRACT

This study depicts the influence of the hospital wastes on the limnobilogical parameters of the pond located within the premises of Burdwan Medical College and Hospital, Burdwan after comparing with a control pond, Krishna Sayer adjacent to it and MoEF Standard (1998). Comparative study reveals that water is alkaline (pH 8.0 – 8.1) and DO is low (3.21 – 3.70 mg/L), whereas, other parameters are showing significantly high values like EC (601 – 674 μS/cm), TDS (422 – 474 mg/L), TSS (452 – 469 mg/L), salinity (291 – 325 mg/L), total hardness (153 – 177 mg/L), BOD (18.75 – 23.10 mg/L), COD (548 – 587 mg/L), ammonia-nitrogen (0.06 – 0.07 mg/L), nitrate-nitrogen (0.01 – 0.02 mg/L) and total iron (0.09 – 0.12 mg/L) as compared to Krishna Sayer. Sediment pH of Hospital pond is also slightly alkaline (pH 7.2 – 7.4), but the sediment nutrient like, available nitrogen (28.10 – 28.47 kg/ha), available phosphate (51.23 – 54.56 kg/ha) and available potassium (347 – 367 kg/ha) are high and organic carbon percentage is also higher (2.93 – 2.98 %) than Krishna Sayer (1.90 – 1.92 %). MPN count of coliform bacteria and zooplankton load are significantly lower in the Hospital pond 20.00 to 31.34 MPN/100 mL and 9.33 – 17.00 MPN/100 ml respectively than the Krishna Sayer.

KEY WORDS
Hospital wastes
Limnobiological parameters
Soil sediment
Coliform count, Zooplankton load.

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INTRODUCTION

Water pollution by the pharmaceutical products became a serious threat to aquatic environment (Emmanuel *et al*., 2002; Nikolaou *et al*., 2007; Zuccato *et al*., 2001; Kümmerer, 2001; Jones *et al*., 2001; Brown, 2004; Giri and Pal, 2012; Panda *et al*., 2012; Maalah and ALAzzawi, 2014). Generally, hospital wastewater contains various types of toxic pollutants such as radioactive chemicals, antibiotics, residual medicines, infectious microbes, different types of inorganic and organic chemicals, and blood and bloody products etc. *In vitro* genotoxicity test of the hospital wastewater has been reported by several workers (Abdel-Massih *et al*., 2013; Jolibois and Guerbet, 2005; Giuliani *et al*., 1996; Jolibois *et al*., 2003). Pharmaceutical products recently attracted much attention as endocrine disrupting chemicals to the international research community (Nikolaou *et al*., 2007). In India, it was reported that 15% to 35% of the total amount of hospital waste is infective or hazardous (Agarwal, 1998). Effect of sewage or industrial wastewater on the aquatic ecosystem is well documented, but the study on impact of hospital wastewater is still less, particularly in India. So, the objective of this study is to determine the status of limlobiological parameters of the pond which is regularly receiving a huge amount of hospital wastes from the Burdwan Medical College and Hospital at Burdwan.

MATERIALS AND METHODS

Burdwan Medical College and Hospital (BMCH) is providing major medical facility not only the people of Burdwan District, but also to the people of adjacent districts like Hooghly, Birbhum, Murshidabad sometimes of Bihar, Jharkhand states. For comparison, an old control pond named as Krishna Sayer of 1691 and MoEF (1998) Standard for hospital wastewater values were considered side-by-side. Geographical position of the Hospital pond and Krishna Sayer is 23º14'53.09" N and 87º51'06.35" E, and 23º14'43.27" N and 87º50'57.55" E respectively (Fig. 1).

Water samples were collected regularly from both the two ponds in winter, summer and monsoon during the period of 2011 - '12. Temperature, pH, and electrical conductivity were recorded in the sampling spots by Tstr-multiparameter electrode. For the other limnological, microbiological and planktonic parameters, samples were collected and analysed as per APHA (2005). pH and conductivity of sediment samples were measured as per method of Saxena (1998). Available nitrogen,

available phosphate, available potassium and organic carbon percentage in sediment were analysed by Subbiah and Asija (1956), Olsen *et al*. (1954), Black (1965) and Walkley and Black (1934) respectively. For MPN count, samples were collected in sterilized bottle and analysed as per CPCB (2011). To study the zooplanktonic load 40 liter of water samples were passed through the plankton net, and then they were preserved and indentified (Michael and Sharma, 1998 Sehgal, 1983; Sharma, 1999).

RESULTS

Average temperature in the Hospital pond and control pond, Krishna Sayer were 28.2 (± 0.153), 27.1 (± 0.208), 27.8 (± 0.153) and 28.7 (± 0.230), 24.5 (± 0.300), 28.1 (± 0.443) ºC during winter, summer and monsoon season respectively showing very little or significant change even seasonally in both the cases (Table 1). Average pH values showed alkaline in both the ponds without any significant variations. pH values were 8.0 (± 0.021), 8.0 (± 0.012) and 8.1 (± 0.079) in Hospital pond, and in Krishna Sayer also were 8.4 (± 0.098), 8.3 (± 0.094) and 8.2 (± 0.119) during winter, summer and monsoon seasons respectively (Table 1). In the Hospital pond, average values of electrical conductivity were very high, 601.33 (± 0.623), 644.67 (± 0.210) and 674.67 (± 0.341) μS/cm, but in Krishna Sayer were 398.50 (± 9.256), 416.75 (± 3.957) and 486.70 (± 6.577) μS/cm during winter, summer and monsoon seasons respectively (Table 1). Total dissolved solids (TDS) concentrations also showing higher trends in Hospital pond, 425.00 (± 2.646), 422.00 (± 1.00) and 474.33 (± 1.528) mg/l than Krishna Sayer pond, 283.50 (± 6.351), 386.75 (± 5.852) and 345.00 (± 0.816) mg/l, during the winter, summer and monsoon seasons respectively (Table 1). Total suspended solids (TSS) concentrations were also higher In Hospital pond, 453.00 (± 7.00), 469.67 (± 4.619) and 452.33 (± 2.517) mg/l than Krishna Sayer pond, 297.50 (± 2.082), 357.60 (± 5.447) and 298.25 (± 1.258) mg/l in winter, summer and monsoon seasons respectively (Table 1). Salinity of Hospital pond was significantly high 291.33 (± 4.229), 305.33 (± 6.686) and 325.67 (± 5.271) mg/L than the Krishna Sayer, 191.50 (± 5.392), 215.50 (± 2.422) and 235.50 (± 6.163) mg/l during winter, summer and monsoon seasons respectively (Table 1). Average values of total alkalinity were not significantly different even in respect to different seasons, 196.00 (± 5.292), 176.67 (± 11.547) and 180.00 (± 10.00) mg/L in Hospital pond, and 178.50 (± 9.147), 172.50 (± 15.00) and 180.00 (± 8.165) mg/L in Krishna Sayer in winter, summer and monsoon seasons respectively (Table 1). In Hospital pond, total hardness values were comparatively high, 175.00 (± 0.577), 153.33 (± 2.887) and 177.00 (± 2.646) mg/l than in Krishna Sayer 169.50 (± 4.203), 140.00 (± 3.742) and 165.75 (± 7.228) mg/L in winter, summer and monsoon seasons respectively (Table 1). Dissolved oxygen (DO) concentrations in Hospital pond were 3.42 (± 0.078), 3.21 (± 0.083) and 3.70 (± 0.053) mg/L which were very low in comparison to Krishna Sayer *i.e.*, 6.90 (± 0.082), 8.70 (± 0.096) and 7.28 (± 0.054) mg/L as per seasonal records in winter, summer and monsoon respectively (Table 1). Acute depletion of DO may cause a serious threat to aquatic organisms. The values of biochemical oxygen demand (BOD)

Table 1: Seasonal variation of the water quality of Hospital pond and Krishna Sayer pond

	Hospital pond			Krishna Sayer pond			Hospital Wastewater standard Limit(EPA, 1998)
	Winter	Summer	Monsoon	Winter	Summer	Monsoon	
Temperature(ºC)	28.17(±0.153)	27.13(±0.208)	27.77(±0.153)	28.65(± 0.230)	24.52(±0.300)	28.05(±0.443)	-
pH	8(±0.021)	8.01(±0.012)	8.09(±0.079)	8.38(±0.098)	8.29(±0.094)	8.17(±0.119)	6.5-9.0
Conductivity (μS/cm)	601.33(±0.623)	644.67(±0.210)	674.67(±0.341)	398.5(±9.256)	416.75(±3.957)	486.7(±6.577)	-
TDS(mg/L)	425(±2.646)	422(±1.000)	474.33(±1.528)	283.5(±6.351)	386.75(±5.852)	345(±0.816)	-
TSS(mg/L)	453(±7.000)	469.67(±4.619)	452.33(±2.517)	297.5(±2.082)	357.6(±5.447)	298.25(±1.258)	100
Salinity (mg/L)	291.33(±4.229)	305.33(±6.686)	325.67(±5.271)	191.5(±5.392)	215.5(±2.422)	235.5(±6.163)	-
Total Alkalinity (mg/L)	196(±5.292)	176.67(±11.547)	180(±10.000)	178.5(±9.147)	172.5(±15.000)	180(±8.165)	-
Total Hardness (mg/L)	175(±0.577)	153.33(±2.887)	177(±2.646)	169.5(±4.203)	140(±3.742)	165.75(±7.228)	-
DO(mg/L)	3.42(±0.078)	3.21(±0.083)	3.7(±0.053)	6.9(±0.082)	8.7(±0.096)	7.28(±0.054)	-
BOD(mg/L)	23.1(±1.100)	18.75(±0.932)	20.08(±1.284)	7.26(±0.236)	7.74(±0.192)	7.73(±0.074)	30
COD(mg/L)	548.67(±11.015)	587(±7.043)	567.33(±9.577)	216.5(±9.849)	254.75(±6.076)	250(±11.343)	250
Ammonia-nitrogen (mg/L)	0.07(±0.015)	0.06(±0.010)	0.07(±0.013)	0.023(±0.005)	0.016(±0.002)	0.021(±0.002)	-
Nitrate-nitrogen (mg/L)	0.01(±0.002)	0.02(±0.006)	0.012(±0.002)	0.002(±0.001)	0.005(±0.001)	0.004(±0.001)	-
Total iron(mg/L)	0.12(±0.012)	0.11(±0.010)	0.09(±0.049)	0.038(±0.013)	0.03(±0.014)	0.04(±0.013)	-
Phosphate(mg/L)	0.04(±0.010)	0.04(±0.012)	0.03(±0.016)	0.03(±0.005)	0.05(±0.005)	0.04(±0.008)	-

Table 2: Seasonal variation of the sediment quality of Hospital pond and Krishna Sayer pond

	Hospital Pond			Krishna Sayer pond		
	Winter	Summer	Monsoon	Winter	Summer	Monsoon
pH	7.410(±0.208)	7.300(±0.115)	7.230(±0.153)	7.910(±0.208)	7.520(±0.216)	7.450(±0.171)
Conductivity(μS/cm)	549.211(±90.185)	566.532(±49.329)	599.182(±100.664)	398.726(±90.185)	376.653(±55.603)	478.824(±28.868)
Available Nitrogen(kg/ha)	28.470(±4.155)	28.170(±4.528)	28.100(±6.000)	22.059(±6.155)	20.516(±5.258)	20.246(±6.957)
Available Phosphate(kg/ha)	54.560(±5.095)	52.630(±5.460)	51.230(±7.301)	45.346(±10.095)	36.946(±7.283)	36.076(±11.413)
Available Potassium(kg/ha)	367.330(±34.479)	354.190(±27.182)	347.380(±33.476)	306.614(±34.479)	211.194(±41.118)	283.374(±42.132)
Organic Carbon(%)	2.980(±0.058)	2.960(±0.153)	2.930(±0.115)	1.920(±0.058)	1.910(±0.100)	1.900(±0.082)

were quite high in Hospital pond, 23.10 (± 1.100), 18.75 (± 0.932) and 20.08 (± 1.284) mg/l than in Krishna Sayer 7.26 (± 0.236), 7.74 (± 0.192) and 7.73 (± 0.074) mg/l in winter, summer and monsoon seasons respectively (Table 1). The amount of chemical oxygen demand (COD) also showed higher trends in Hospital pond, 548.67 (± 11.015), 587.00 (± 7.043) and 567.33 (± 9.577) mg/L, than Krishna Sayer pond, 216.50 (± 9.849), 254.75 (± 6.076) and 250.00 (± 11.343) mg/L in winter, summer and monsoon seasons respectively (Table 1). In Hospital pond, total iron concentrations were 0.12 (± 0.012), 0.11 (± 0.010) and 0.09 (± 0.049) mg/l which were quite higher than Krishna Sayer pond, 0.038 (± 0.013), 0.03 (± 0.014) and 0.04 (± 0.013) mg/l during winter, summer and monsoon seasons respectively (Table 1). Average concentrations of ammonia-nitrogen and nitrate-nitrogen were showing similar higher trends than Krishna Sayer pond like 0.07 (± 0.015), 0.06 (± 0.010), 0.07 (± 0.013); 0.023 (± 0.005), 0.016 (± 0.002), 0.021 (± 0.002) mg/L and 0.01 (± 0.002), 0.02 (± 0.006), 0.012 (± 0.002); 0.002 (± 0.001), 0.005 (± 0.001), 0.004 (± 0.001) mg/L respectively (Table 1). In case of phosphate concentrations, there were no such significant differences between Hospital pond and Kirshna Sayer pond as 0.04 (± 0.010), 0.04 (± 0.012), 0.03 (± 0.016), and 0.03 (± 0.005), 0.05 (± 0.005) and 0.04 (± 0.008) mg/l even in winter, summer and monsoon seasons respectively (Table 1).

Soil sediment pH of both Hospital pond and Krishna Sayer was slightly alkaline in nature. Average pH values in Hospital pond and Krishnya Sayer pond were 7.4 (± 0.208), 7.3 (±0.115) and 7.2 (± 0.153), and 7.9 (± 0.208), 7.5 (± 0.216) and 7.5 (± 0.171) in winter, summer and monsoon season respectively (Table 2). Electrical conductivity values were comparatively higher in the Hospital pond 549.21 (± 90.185), 566.53 (± 49.329) and 599.18 (± 100.664) μS/cm, but in the Krishna Sayer pond it were 398.73 (± 90.185), 376.65 (± 55.603) and 478.82 (± 28.868) μS/cm in winter, summer and monsoon seasons respectively (Table 2). Average values of available nitrogen were also slightly higher in Hospital pond 28.47 (± 4.155), 28.17 (± 4.528), 28.10 (± 6.000), than Krishna Sayer pond 22.059 (± 6.155), 20.516 (± 5.258), 20.246 (± 6.957) kg/ha in winter, summer and monsoon seasons respectively (Table 2). Concentrations of available phosphate in Hospital pond were 54.56 (± 5.095), 52.63 (± 5.460) and 51.23 (± 7.301) kg/ha which were significantly higher than Krishna Sayer *i.e.*, 45.35 (± 10.095), 36.95 (± 7.283) and 36.08 (± 11.413) kg/ha in winter, summer and monsoon season respectively (Table 2). Available potassium concentrations were also higher in Hospital pond, 367.33 (± 34.479), 354.19 (± 27.182) and 347.38 (± 33.476) kg/ha than in Krishna Sayer pond, 306.61 (± 34.479), 211.19 (± 41.118) and 283.37 (± 42.132) kg/ha in winter, summer and monsoon season respectively (Table 2). Organic carbon content were significantly different in the two ponds like, 2.98 (± 0.058), 2.96 (± 0.153) and 2.93 (0.115) % in Hospital pond, and 1.92 (± 0.058), 1.91 (± 0.100) and 1.90 (± 0.082) % in Krishna Sayer in winter, summer and monsoon seasons respectively (Table 2).

The most probable numbers (MPN) count of coliforms in the water of Hospital pond were significantly lower, 40.00 (± 9.646), 44.67 (± 10.309) and 51.34 (± 14.859) MPN/100 ml, but in Krishna Sayer pond it was quite high as 380.00 (± 111.654), 1430.00 (± 340.00) and 825.00 (± 190.00) MPN/100 ml in winter, summer and monsoon season respectively (Fig 2).

Among the three groups of zooplankton community, *viz.*, Cladocera, Copepod and Rotifer the most abundant species in Hospital pond, were *Alona* sp., *Daphnia* sp., *Diaphanosoma* sp., *Moina* sp., *Cyclops* sp., *Diaptomus* sp., *Brachionus* sp., *Philodina* sp., *Notholca* sp., *Trichocerca* sp., *Polyarthra* sp., *Filinia* sp. and *Epiphanes* sp., whereas, in the Krishna Sayer, the species like *Bosmina* sp., *Daphnia* sp., *Moina* sp., *Cyclops* sp., *Diaptomus* sp., *Brachionus* sp., *Keratella* sp., *Philodina* sp., *Monostyla* sp. and *Filinia* sp. were prevalent (Table 3). The total number of zooplankton was 9.333 (± 1.528), 12.67 (± 0.577), and 17.00 (± 1.00) unit/l in Hospital pond which is drastically less, whereas, in Krishna Sayer it was 39.25 (± 1.841), 34.75 (± 2.217) and 45.00 (± 3.367) unit/l in winter, summer and monsoon seasons respectively (Fig 3). The total number of zooplankton of different groups during different seasons also showed lower in Hospital pond than in Krishna Sayer (Fig. 4).

DISCUSSION

This present work showed that the hospital wastes/effluents influenced the physicochemical parameters, coliform count and composition of biotic community of zooplankton of the water body. Although, the water of both the Krishna Sayer and Hospital pond showed alkaline in nature, this may be due to discharge of hospital effluents which are mostly alkaline in nature (Emmanuel *et al*., 2002; Ekhaise and Omavwoya, 2008;

Table 3: Diversity of zooplankton of Krishna Sayer and Hospital pond

Group	Species	Hospital pond			Krishna Sayer pond		
		Winter	Summer	Monsoon	Winter	Summer	Monsoon
Cladocera	*Alona* sp.	-	+	+	-	-	-
	Bosmina sp.	-	-	-	+	+	+
	Daphnia sp.	-	+	+	+	+	+
	Diaphanosoma sp.	+	-	-	-	-	-
	Moina sp.	+	+	+	+	+	+
Copepod	*Cyclops* sp.	+	+	+	+	+	+
	Diaptomus sp.	+	+	+	+	+	+
Rotifer	*Brachionus* sp.	+	-	+	+	-	+
	Keratella sp.	-	-	-	+	+	+
	Philodina sp.	-	+	-	+	+	+
	Notholca sp.	+	-	-	-	-	-
	Trichocerca sp.	+	-	+	-	-	-
	Polyarthra sp.	+	-	-	-	-	-
	Monostyla sp.	-	-	-	-	+	+
	Filinia sp.	-	-	+	-	+	-
	Epiphanes sp.	-	+	+	-	-	-

Mahmoudkhani *et al*., 2012; Ojo and Adeniyi, 2012). Electrical conductivity as well as total dissolved solids (TDS) concentration was high in the Hospital pond compared to Krishna Sayer which indicated the presence of different ions and dissolved materials in the water of Hospital pond. Similar type of result was observed by Ojo and Adeniyi (2012) in the receiving Elekete stream water body at Ile-Ife, Southwestern Nigeria affected by hospital effluent discharge. In the Hospital pond, high concentration of total suspended solids (TSS) also found which may affect the photosynthetic activity of the plants due to low penetration of light. TSS may be increased due to presence of wastes such as clot blood, discarded cotton, powder detergents and medicines and colloidal pathogens. Alkalinity of the Hospital pond was observed comparatively slightly high than Krishna Sayer may be due to presence of highly alkali bearing ions in the hospital effluents (Ojo and Adeniyi, 2012). High amount of total hardness in Hospital pond than in Krishna Sayer may be due to discharge of high amount of calcium and magnesium ions through hospital effluents (Ojo and Adeniyi, 2012). Dissolved oxygen (DO) concentration in the Hospital pond was comparatively lower than the Krishna Sayer. This may be occurred due to high TDS value, low penetration of sun light and less stretch of surface area of Hospital pond compared to wide open stretch of Krishna Sayer pond. Usually, stretched water surface enhances the mixing process of air with water. Biochemical oxygen demand (BOD) is a measure of oxygen requirement for the aerobic oxidation of organic compounds by microorganisms. High BOD indicates the presence of high amount of organic materials and/or aerobic microorganisms. In the Hospital pond, higher BOD value was observed than Krishna Sayer. It may be occurred due to presence of high amount of organic compounds in the hospital effluents. Chemical oxygen demand determines the oxygen requirement for the oxidation of all types of pollutants by chemical process. It indicates the total pollution load in the water. Comparatively high COD value was measured in the Hospital pond than Krishna Sayer. It is due to input of high amount of different chemicals like pharmaceutical drugs, medicine *etc*., through the hospital effluents. Some workers also recorded the high values of BOD and COD in the Hospital wastewater and their impact in the water body (Emmanuel *et al*., 2002; Ekhaise and Omavwoya, 2008; Mahmoudkhani *et al*., 2012; Ojo and Adeniyi, 2012). Total iron, ammonia-nitrogen and nitrate-nitrogen concentrations were comparatively high in Hospital pond. Human excretion is the major source point of it. Although, there was no such difference in phosphate concentration between Hospital pond and Krishna Sayer. The hospital waste-fed pond had higher concentration of TSS and COD in comparison to MoEF Standard.

Pollutants present in the water settled down due to gravitational force, and are absorbed in the bottom sediment. So, sediment quality of a water body can be changed due to discharge of any types of wastewater. This study showed that the sediment of hospital pond had lower pH; higher electrical conductivity, available nitrogen, available phosphate, available potassium and organic carbon percentage than Krishna Sayer pond sediment. Change in pH of the Hospital pond sediment water may be due to discharge of hospital wastewater which was generally neutral to slightly alkaline in nature as reported by several workers (Ekhaise and Omavwoya, 2008; Mahmoudkhani *et al*., 2012; Panda *et al*., 2012). The available nitrogen and potassium may be increased in the Hospital pond due to discharge of urine from toilet, and bacterial decomposition of nitrogenous compounds, because human excreta contain nitrogen, phosphorus and potassium (Höglund, 2001). Use of soap and detergent may also increase the available phosphate concentration. Organic carbon can be increased due to decomposition of discarded materials and surgically amputated and dissected body parts *etc*.

Coliform count is ordinarily commensals intestinal bacteria (Olayemi and Opaleye, 1990). Hospital wastewater contains different types of antibiotic and others pharmaceutical drugs which may deteriorate the normal growth of bacterial population before getting resistance. In this study, less number of coliform was observed in the Hospital pond than the Krishna Sayer. It can be assumed that the bacterial growth had been

Figure 1: Map showing location of Hospital pond (HP) and Krishna Sayer pond (KSP)

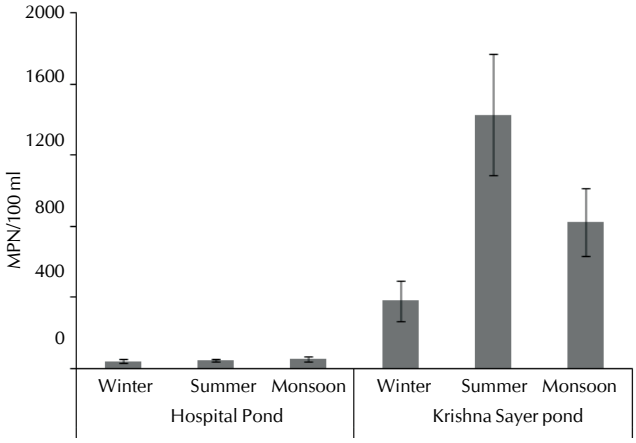

Figure 2: Showing MPN count of bacterial colony in Hospital pond and Krishna Sayer pond

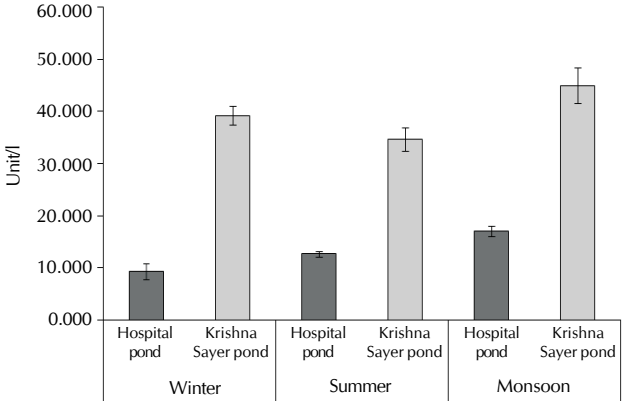

Figure 3: Showing zooplanktonic load in Hospital pond and Krishna Sayer pond

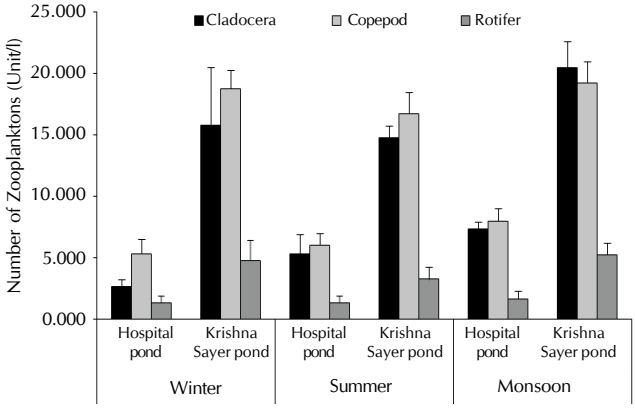

Figure 4: Showing abundance of zooplankton in Hospital pond and Krishna Sayer pond

restricted by the antibiotics coming through the hospital wastewater.

Zooplankton community plays an important role in the aquatic ecosystem.Their (Thirupathaiah *et al*., 2011) recorded their diversity, abundance and seasonal variation to establish them as an intermediate group in the food web of an aquatic ecosystem. Pharmaceutical drugs have a serious potentiality to cause the adverse effects on the ecosystem (Emmanuel *et al*., 2002; Nikolaou *et al*., 2007; Watkinson *et al*., 2009; Escher *et al*., 2011; Panda *et al*., 2012). Several workers reported the pharmaceutical toxicity on zooplankton community (Wollenberger *et al*., 2000; Emmanuel *et al*., 2002; Flaherty and Dodson, 2005; Richards *et al*., 2004; Richards *et al*., 2008; El-Bassat *et al*., 2012). In this study, total zooplankton count in Hospital pond showed very low than in Krishna Sayer. Species wise abundance was significantly lower in Hospital pond than in Krishna Sayer. This is an indication of presence of toxic drugs or medicines in hospital wastewater which have produced toxic effects on the zooplankton community.

In conclusion, the present study revealed the status of the hospital waste-fed water as compared to control pond and hospital wastewater standard of MoEF, (1998) with subsequent influence on pond limnobiology. Study showed that electrical conductivity, TDS, TSS, salinity, total hardness, BOD and COD were significantly higher in the Hospital pond due to different sources of hospital wastewater discharge. Concentration of ammonia-nitrogen and nitrate-nitrogen was also high in this pond. Water and soil sediment pH are alkaline in nature. All the soil nutrients like, available nitrogen, available phosphate and available potassium were significantly higher. Percentage of organic carbon showed high in the Hospital pond sediment. But, the coliform count and zooplankton in this pond were less because of the presence of many pharmaceutical drugs, antibiotics, toxic chemicals *etc*. So, this study disclosed that necessary treatment process is required for hospital wastewater before discharge into the aquatic environment to reduce the ecological risk as well as to conserve the water resources because scarcity of water is becoming the major environmental threat for the present and future generations. So, conservation of water resources and maintenance of water quality parameters for ecological equilibrium between aquatic organisms must be taken care of.

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