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Physico-Chemical Study of Waste Water Drained by Hospital of Patna

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Abstract – Wastewaters generated from hospitals contain pharmaceuticals residues, pathogens, chemical reagents, radionuclide, and other harmful matter. The wastewater characteristics, quantity, and handling methods have not only variations among Indian cities but also with in Patna. Certain hazardous waste-water (HWW's) substances may be controlled and treatment accordingly, whereas other substances have characteristics similar to domestic waste-water. Guidelines on care of these HWWs are available at a global level. Hospitals play an important role in human well-being and other advances in medical science. Various units and service centres, depending on the operations taking place in hospitals, require large quantities of water and produce large amounts of waste water. Size (number and type of wards / units), services (kitchenette, laundry and air conditioning), management policy and institutional understanding influence both the quantity and characteristics of the hospital wastewater (HWW).

Key Words: Hospital Wastewater, Treatment, Pharmaceutical, Guidelines

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INTRODUCTION

In general, characteristics of the wastewater provided by hospitals are generally similar to the domestic wastewater, there are harmful, non-biodegradable / infectious contaminants in a proportion of the HWW[3,10, 12]. Hospital effluents contain a range of medical, laboratory and research-related substances and include patient excreta [2,3,13,14]. These waste products include medicine and their metabolites such as antibiotics, lipid regulators, antidepressants, antiepileptics, antineoplastics, antipyretics, antirheumatics, estrogens, organic materials, radionuclides, solvents, metal products, disinfectants, cytostatic agents, endoscope and others products, radioactive products. Conservants metals in platinum, mercury, rare earth elements (gadolinium, indium, osmium), and iodinated x-ray controst media are present as preservatives.

These insoluble / soluble organic / inorganic contaminants have an adverse toxic effect even at very low concentration for humans and marine animals and are referred to as biological active substances. These effluents also contain pathogenic microorganisms such as viruses , bacteria , fungi, protozoans and helminths, which induce rapid adjustment pressure in the innate microorganisms to adapt to these conditions via genome reorganisation. This gene exchange produces a pathogens resistance. Hospital wastewater is mostly pumped into urban wastewater systems in developed countries and often dumped into water systems without any treatment to mitigate public health hazards. Determined by the variety of pollutants, both the inherent toxicity of hospital effluents and the possible inhibition of the activated sludge of wastewasser treatment plants have shown to be times higher than an urban effluent [1,14]. HWW and healthcare waste are also one of the main problems facing healthcare facilities, in order to minimising future threats for local communities. Increasing evidence indicates that HWW therapy systems lead to the dissemination into the environment of antibiotic resistant bacteria[10]. The mobilisation and reintroduction of pollutants in the food or beverage chain increases the risk of organisms being exposed to hazardous substances that pose greater risks to the environment in the long term. The comparison between average range of parameters which hospital effluents can bring to the municipal sewage system in Patna such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), total kjeldahl nitrogen, total phosphorus (TP), and coliforms.

CHARACTERIZATION OF HOSPITAL WASTEWATER

WHO has characterized these hospital wastes in following ways in World Health Organization's (WHO's) health and environment lexicon.

i. Black water (sewage) contains mainly fecal matter and urine.

ii. Grey water (sullage) contains residues from washing, bathing, laboratory processes, laundry, and other technical processes such as cooling water or the rinsing of X-ray films, potentially loaded with a genotoxic or cytotoxic agent.

iii. Storm water contains rainfall collected from roofs, grounds, yards and paved surfaces, water used for irrigating hospital grounds, toilet flushing, and other general washing purposes which may be lost to drains and watercourses and as groundwater recharge.

In addition, discharges are called domestic discharges from the kitchen, laundries and toilets. Wastewater produced by research and laboratory activities are called unique waste dumps, including acids, alkaline, solvents, benzene, hydrocarbons and dyes, disinfectants, drug residues, infectious excreta, radiation elements and chemicals. HWW may have a significant source of toxic elements such as Cd, Cu, Fe, Ni , Pb and Zn, for example, mercury, platinum and other heavy metals. Dental amalgam and medical devices are used by dental hospitals to transfer dental traces of mercury, silver, tin, copper and zinc to bodies of water.

HOSPITAL WASTEWATER TREATMENT IN PATNA

A working group comprising nurses, medical professionals, hospital engineers and administrators has concluded that HWW care in Patna needs understanding, separation and waste pre-treatment. In the majority of cities in India, the distinction between waste water from hospitals and urban areas was inadequate. In general, potential dangerous loads of these effluents are pumped directly into the public sewage system without prior toxicity detection. The rules contradict Patna's position as an implementer. For example, WHO Directives have listed mercury of dangerous substances with the allowable limit of up to 5% in discharge from effluent of hospital wastewater treatment plants (HWWTPs).

STATUS OF HOSPITAL WASTEWATER MANAGEMENT IN INDIA

In India, wastewater coming from hospitals is generally discharged to municipal sewer without any treatment [13]. When combined with the wastewater of traditional WWTPs, these direct disloaders pose a possible environmental risk because the WWTPs are not suited to the HWW pollutants. In India this activity has induced a disproportionately high concentration of pain killers and contraceptive hormones to extinguish certain white-rumped sharks and genetically modify man's fish into women in India[12]. The Biomedical Waste (Management and Management) Rules were granted in India in 1998 and updated in 2016. The above law sets out how hospital waste and waste waters are processed, transferred and disposed of. In spite of this law, much of India's medical waste is discarded freely and obtained from general waste. The Indian press, sadly, also reports that hospitals have been shut down or do not comply with waste disposal law. HWW management activities in India vary from state to state according to the World Bank. For example, HWW is disinfected on site in Bihar, Patna, Punjab and Karnataka, and then discharged to drainage pipes under the "Bio-Medical Waste (Management and Handling) Regulations, 1998" while HWW is stored in leak residue boards in the Maharashtra region and neutralised, and then sent to drains. Researchers also report that highly polluted heavy metals are the sediments from most river streams receiving the HWWs directly without treatment[11]. The on-site processing of HWWs has now been focused on as the issue of dilution and spreading of pathogens from their discharge to the municipal sewage system can be resolved. In addition to settled solids before discharge to MWWTP, this on site treatment can include sedimentation or coagulation, filtration followed by FeCl3 / UV disinfection, and typical digestion[14]. The sewage slot contains high helminth and other pathogens which must be carefully handled. A few studies have addressed how egg helminths or other biologically active pathogens are present and harmful to humans. India produces revenue of USD 45 billion per year and is worldwide one of the top five of 250300 pharmaceutical enterprises. Every third pill in the world in India can be assumed to be made. According to some studies, 10% of the intake of medication is excreted from the human body as a parent, while the remainder is metabolised or conjugated. The high development rate is also recognised. If these raw and conjugated metabolites enter the MWTP and ultimately the groundwater, some aquatic species, ARBs and antibiotic resistance genes (ARGs), can be extremely dangerous. The proper sewage treatment plants (STPs) are shorter around the world and most study in the world focuses primarily on parents' medicinal products despite the high rates of productive harmful pathogens. The concentration ranges of metabolites released into the atmosphere must therefore be decreased.

CONCLUSION

There is a significant notoriously weak with regard to the exact ways of separating / separating sources for HWWs and the potential effects of direct or indirect environmental discharges in Patna. The local / central authorities and hospital management in Patna should deal urgently with these aspects of human and environmental health. The proper preparation and application of regulations should be carried out and the appropriate legislative actions guaranteed to institutions that do not comply with the rules. Aerobic / anaerobic digestion / composting should be properly processed before disposal for hospital sewages sleeve with high helminthes concentrated and other pathogens. For the mineralization and conversion to soil the dewatered sludge could be put in the top layers of the root. In order to eliminate more risk from radioactive contamination from waste, toilet discharges of patients receiving radioactive therapy should be isolated and collected separately. Nomix technology will better extract urine from the source and then transfer it to the treatment facility where essential nutrients can be retrieved. Application of MBR along with activated sludge processes is now generally appropriate for HWW therapy, as bacteria and antibiotics are highly extracted. However, the MBR process is comparatively higher than other traditional wastewater treatments for installation, service and maintenance costs. To develop an efficient and cost-effective approach, technical and economic issues of HWW treatment plants should be discussed. Work should concentrate on the advancement of risk-based approaches to treatment technologies known as the best HWW treatment technology.

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