

Evaluation of the quality of the sewage and waste selected hospitals of Rasht and Tehran

Abstract

Introduction and objectives: Hospital wastewaters are loaded with pathogenic microorganisms, laboratories and pharmaceutical remaining, pharmacy part of metabolized, radioactive elements and other toxic chemical Products, so for wastewater treatment and excretion conditions of have particular importance, Aim of this study is Evaluation of the quality of the sewage and waste selected hospitals of Rasht and Tehran.

Materials and method: Cross-sectional method was performed in 2014. In addition to the 3 several part of specialized hospitals were chosen. In order to confirmed of hospitals wastewaters, composite sampling were conducted from waste and waste points of selection hospitals wastewater plant to assessment from Chemical Oxygen Demand(COD), Biochemical Oxygen Demand (BOD5), Total Suspended Solid (TSS), Electrical conductivity (EC), pH, Phosphate (PO₄), Fical coliform (Fecal coli), Total Coliform (T. Coli) and Total Detergents (ABS).

Results: The results showed that examined indicators in waste of total hospitals have decrease after that influent, TSS, PO₄, pH, ABS, T.Coli. and Fecal Coliform at all hospitals were less than standard level. BOD and COD value was exceeded the standard restriction alone in waste of Rasol Akram hospital in Rasht, Iran, While the electrical conductivity were measured higher than standard level in the 22 Aban and Rasol Akram hospitals.

Conclusion: Studied hospitals is in suitable circumstances if the aeration system action in standard level.

Keywords: hospital, wastewater, Rasht, Tehran

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Introduction

One of the important environmental problems is the dissemination of hospital pollutants. Contaminations in hospital wastewater are more than urban sewage pollution, For this reason, it is necessary to clean up the hospital wastewater before entering the Urban sewer network. According to available statistics and research, hospitals daily use a large amount of water. Water consumption varies from 400 to 1200 liters per day per bed. And this high water consumption suggests that a huge amount of sewage will also be produced that contains high microorganisms, heavy metals, toxic chemicals and radioactive compounds, and when they enter the environment, the evolution of organisms and the ecosystem's bio-ecological relationship will undergo changes. Accordingly, hospital wastewater treatment is inevitable before entering the sewage network.¹

In developed countries and in some developing countries, due to the large amount of water used by hospitals, wastewater is diluted, and waste products from these hospitals and health centers without the need for additional treatment. Urban wastewater treatment plants are refined without causing a particular health and environmental hazard. Only under certain conditions, such as the prevalence of acute diarrhea, patients' residues should be collected and disinfected.² In countries where there is no sewage collection network, sewage (hospitals and health centres) disinfected or refined waste will inevitably lead to unavoidable hazards to the health of the community.³ The most important concern with regard to hospital wastewater that has intestinal pathogens, bacteria, viruses and parasitic agents. Another issue raised is that some of the pathogens present in hospital sewage have high drug resistance, which is why they are a serious threat to the health of

the community. In addition, some of the above microorganisms may pass their drug resistance to other pathogens, which is why it will be difficult to treat the infectious agents in the community.³

Hospital sewage can be examined from both quantitative and qualitative perspectives. In terms of the amount of sewage produced in the hospital in Iran, no comprehensive research has been carried out yet, except for some limited research activities available. By increasing the number of cities and increasing their population and expanding industries, the importance of controlling environmental pollution is increasing day by day. Currently, most of the operations and processes used in sewage treatment are widely investigated and applied from the point of view of application and implementation. As a result, a lot of changes have been made in processes and new processes and operations are being introduced, and new filtration systems and new technologies are invented.⁴ One of the important parameters in assessing the quality of sewage PH is its acidity or alkalinity. Increasing or decreasing this parameter in a type of wastewater will cause the deposition, corrosion and damage of different parts of the refinery or network and sewage ducts. It also plays an important role in the biological processes of sewage treatment.⁵

Another commonly used parameter for assessing the efficiency of sewage treatment systems is the determination of the concentration of total suspended solids of TSS in refined sewage. In this study, the average TSS of sewage in all studied hospitals will be obtained.⁶ Another important indicator of the assessment of the microbial contamination of water or sewage is bacteria belonging to the coliform family. Generally, the presence of coliforms, in particular intestinal coliforms, is a sign of water and sewage contagion with

human and animal excrements, and it is possible to have pathogens in them. According to the National Standard for the Discharge and Disposal of EPA, the total amount of total chlorophyll in the hospital wastewater outlet to the receiving sources is 1,000 per 100 ml of waste water.⁷ Due to the issues raised and the plenty of medical centres and hospitals, the need for hospital waste management is a necessary step.⁸ In recent years, the use of groundwater resources has increased to provide drinking water, and if unaccountable control of pollution will be imposed, very heavy costs will be imposed on the people and the custodian organs.^{9,10} The most important factors affecting the efficiency of biological processes in sewage treatment is the proper selection of biocentric agents.^{11,12} Determining the biocosmetic parameters of wastewater treatment will be of great help in the accurate design of wastewater treatment plants and their performance evaluation.¹³

Materials and methods

This cross-sectional study was done in 2014. Moreover 3 several and specialized hospitals were chosen. In order to confirmed of hospitals wastewaters. Composite sample were done of waste and wastewater points of selection hospitals wastewater plant for evaluation of Chemical Oxygen Demand(COD), Biochemical Oxygen Demand (BOD5), Total Suspended Solid (TSS), Electrical conductivity (EC), pH, Phosphate (PO₄), Number Detergents (ABS), Total Coliform (T. Coli) and Fecal Coliform (Fecal Coli), Based to the Standard

methods, for water and wastewater investigation, samples was moved to laboratory in 2 hours, Results were compared to the Iranian environmental standards.

Results and discussion

Features of the studied hospital multi-section. The results showed that wastewater capitation (L/b/d) in the Rasol Akram and 22 Bahman hospitals never exceeded the Hammer, Salvato and WHO according to the standards range (Table 1 shows m⁴/d discharge rate with 750 and 746 Litre/bed/day Wastewater per capita respectively, while the Aria hospital with 350 Flat, 400 m⁴/d discharge rate and 1142 Litre/bed/day Wastewater per capita, exceeded the Hammer WHO standards (Table 2)). Wastewater Quality of production of this wastewater treatment plant (WWTP) of the studied hospitals was in Table 3. TSS, PO₄, pH, ABS, T.Coli. and COD value was more the standard range alone in waste of Rasol Akram hospital, While the electrical conductivity was measured higher than standard range in the Aria a The quality of the WWTP waste production from the hospital under the influence type of technology, the flow rate of waste water, contaminants load fluctuations, and the competence of the operator. Khorsandi et al.,¹³ showed that the average value of COD, BOD and TSS in the wastewater equal to 374, 60.5 and 50 mg/L respectively. Majlesinasr showed that measurement BOD, COD and TSS in the wastewater were 113, 188 and 99 mg/L respectively (Figure 1).

Table 1 Characteristic of the studied hospitals in Giulan and Tehran province at 2013-2014

Hospital	Without of section	Governmental/ Privative	Situation	Without of flat
Alghadir Tehran	17	Governmental	specialized	250
12 Bahman Tehran	21	Governmental	specialized	125
Rasol Akram Rasht	28	Privative	specialized	10000
Aria Rasht	30	Privative	specialized	856

Table 2 Characteristic of the studied hospitals in Giulan and Tehran province due to the standards 2013-2014

Hospital	Evacuation	Wastewater capitation	WHO
Alghadir Tehran	250	250	570-945
12 Bahman Tehran	32	340	
Rasol Akram Rasht	1236	451	
Aria Rasht	852	687	

Table 3 The average values of measurement parameters in the influent of wastewater treatment plant in Giulan and Tehran province hospitals at 2013-2014

Hospital	pH	BOD	COD	TSS	PO ₄	EC	ABS I	T. Coli	Fecal coli
Alghadir Tehran	7.23	167	124	47	8.04	1472	20.14	11000	4500
12 Bahman Tehran	7.85	124	154	24	9.02	1254	25.14	11000	4600
Rasol Akram Rasht	8.5	185	201	78	6.25	1852	30.01	110000	10000
Aria Rasht	9	197	221	92	7.01	1958	32.01	111000	11000

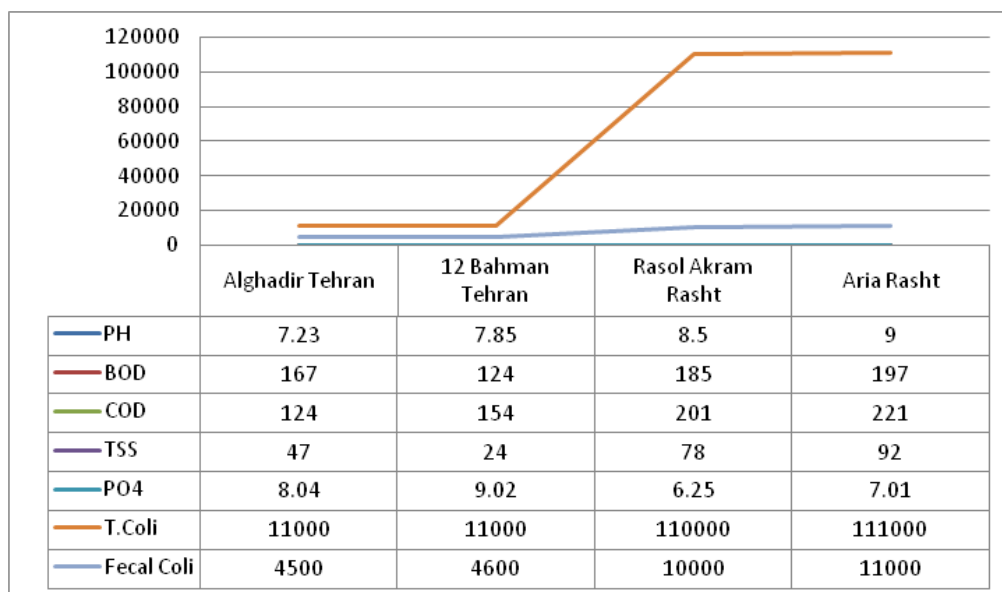


Figure 1 The average values of measurement parameters in the influent of wastewater treatment plant in Giulan and Tehran province hospitals at 2013-2014.

Conclusion

As a result, TSS, PO₄, pH, ABS, T.Coli. and Fecal Coliform in all hospitals were lower than standard level, and studied hospitals are in desirable conditions if the aerated the system to operate in standard level. According to the results of this study 12 Bahman Hospital are equipped with sewage treatment and disposal systems, which have the proper treatment and elimination of contamination. In this study, due to the desirable chlorination system, the average amount of chlorine remaining in the effluent is at the standard level of Iran's environmental organization. The average of measured parameters in the wastewater treated by the wastewater treatment plant in this hospital indicates that the hospital's purification system has a proper function and the wastewater of this treatment plant in terms of parameters PH, BOD, COD, TSS, total caloric mass, and free chlorine The remainder has the ability to dispose and use in agriculture and irrigation. One of the most important obstacles to improving and upgrading the system is the lack of experienced operators, the budget to keep the system clean and the managers' perspective. Nevertheless maintaining and improving the existing situation requires the proper operation and maintenance, the attention of managers and the use of experienced operators.

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None.

Conflicts of interest

Authors declare that there is no conflicts of interest.

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