



Comparative Study of the Effect of Different Aqueous Solutions on the Physicochemical Elements of Solid Medical Waste in Nouakchott Case of the Amitie Hospital.

Mohamed Bouna Ammar^{1,2}, Brahim Ahmed Dick^{2,3}, Yahya Maham Ould Sid², Et Mohamed Fekhaoui¹.

Corresponding Author: Mohamed Bouna Ammar

¹Geo-biodiversity and natural patrimony laboratory, Scientific institute, Mohamed V University in Rabat.

²Laboratory of the Water, Pollution, Environment, FST research unit, University of Nouakchott Al-Aasrya - Mauritania.

³ National Laboratory for the Quality Control of Medicines (LNCQM) in Mauritania.



Abstract

The management of hospital waste in health structures is of vital importance because this waste poses a real public health problem.

A comparative study of the treatment of solid waste by different aqueous media such as drinking water, distilled water and alcoholic distilled water is carried out during the period from August to December 2019. This study has shown that the Physico-chemical composition of solid waste discharges from the Nouakchott Friendship Hospital in Mauritania has high pollutant loads, and has also demonstrated that these discharges are very rich in organic, mineral and particulate substances.

The physico-chemical parameters analyzed are: pH, Temperature, Conductivity, and MES.

All the analysis parameters meet the standards for wastewater, except the MES.

Keywords: wastewater, solid waste, physico-chemical parameters, Hospital Nouakchott.

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Introduction

Today it is no longer possible to neglect the effects of pollution from hospital waste on the environment and human health [1]. The impact of pollution on the environment and the harmful repercussions of the contaminated environment on health are known, especially with the increase in the number of health establishments that are potential producers of biomedical waste [2]. This waste contains microorganisms and is responsible for environmental and atmospheric pollution. Poor management of hospital waste promotes the

spread of infections beyond hospitals, which can be linked to poor knowledge of hygiene practices [3]. This high prevalence is largely due to the poor quality of hospital hygiene, as well as poor handling and disposal of biomedical waste. In 2002, the results of an assessment conducted by WHO in 22 developing countries showed that the proportion of health facilities that do not apply appropriate waste disposal methods ranged from 60% to 64% [4]. In Mauritania, the estimate of the quantities produced updated in 2016 and made

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from data directly related to the production of waste would be 2 340 234 kg including 468 047 kg (20%) of medical waste. The Nouakchott region alone produces nearly a third (32%) with a daily production of 2 024kg/day [5]. Liquid medical waste is among the greatest risk to the health of the population [6].

Presentation of the Study Site

The Hospital of Amitie in Nouakchott was created by decree n ° 2010-229 of 31/10/2010 and set up as a public administrative establishment, endowed with legal personality and financial autonomy, placed under the supervision of the Ministry of Health [7].

The hospital and consultation services are each in charge of the exercise of a medical or surgical discipline. In this establishment, there are nine departments and are distributed as follows: Surgery Department, Internal Medicine Department, Pediatrics Department, Gyneco-Obstetrics Department, Emergency Department, ORL Department, Ophthalmology Department, Anesthesia Department, Resuscitation and Outpatient Department. The hospital has a capacity of 91 beds.

Methodology

After sampling the solid waste at the hospital level, the weight of the collected samples was measured. The samples are then sorted, then impregnated for three days in three different media (drinking water, distilled water and alcoholic distilled water). The solutions resulting from this operation are then collected in clean polyethylene bottles with a capacity of 1.5L, to determine the physicochemical parameters according to the standard protocol for wastewater analyzes.

The physicochemical parameters analyzed are: pH, Temperature, Conductivity (Cnd), and Suspended Matter (MES).

Results

The results obtained from samples of waste treated by different media have shown that the physicochemical composition of these releases has high pollutant loads, as well as an abundance of organic, mineral and particulate substances.

The values of the various physicochemical parameters obtained after treatment are given in Table 1.

Table 1: Results of physico-chemical parameters obtained in waste at the hospital of amitie in Nouakchott after treatment with different media.

Media	pH	Temperature (°C)	MES (mg/L)	Conductivity (mS/cm)
Drinking water	6.740	27.600	1000.000	5340.000
Distilled water	6.880	27.200	600.000	5820.000
Alcoholic distilled water	6.700	24.500	600.000	3550.000
Mean value	6.770	26.43	733.333	4903.33

Table 2. Describes the mean values for different parameters with maximum, minimum and specifications.

Parameters	Mean	Specification	Min – Max
pH	6.773	6.000 – 9.000	6.700– 6.880
Temperature (°C)	26.433	≤30.000° C	24.500 – 27.600
MES (mg/l)	733.333	≤ 30.000	600.000 – 1000.000
Conductivité (mS/cm)	4903.333	----	3550.000 – 5820.000

Discussion

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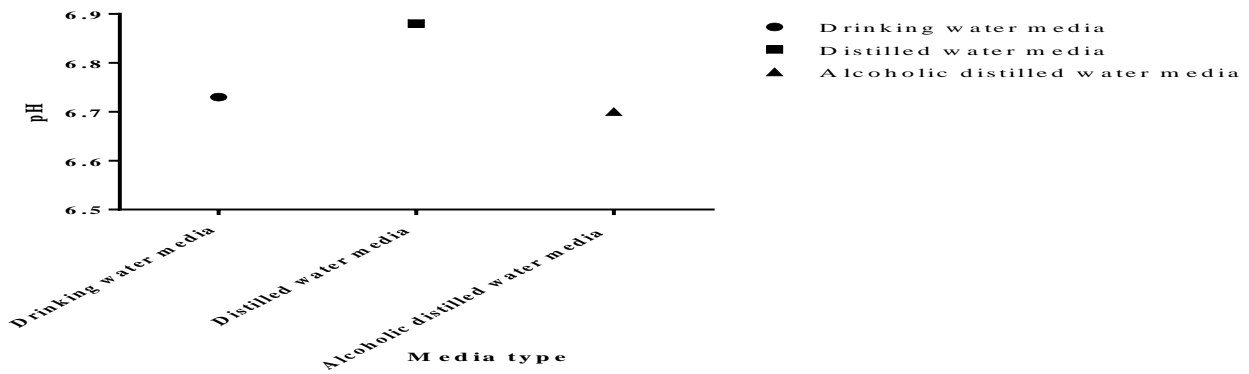


Figure 1: Describes the evaluation du pH according to different media.

The results of the analyze show that the pH of all the samples is between 6.700 and 6.880 with an average value of 6.770 this pH value approaches neutrality. Note that the highest value recorded is

for samples treated with distilled water (6.880). Those results are like of those obtained by [8] and lower than those obtained by [9].

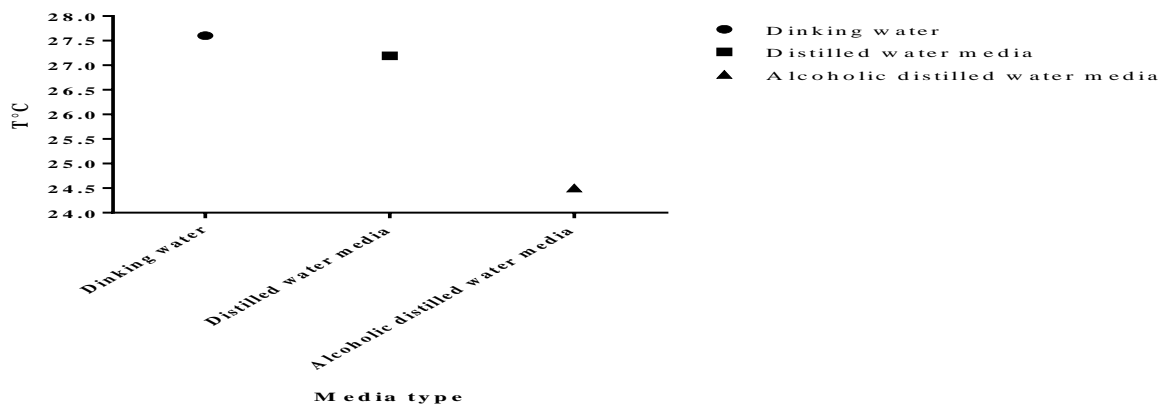


Figure2: Describes the evaluation of temperature in Celsius degree according to different media.

The results of the temperature analyze show that all the samples are between 24.500°C and 27.600°C with an average value of 26.430°C.

Note that the highest value is recorded for samples treated with drinking water (27.600°C). The results are similar to those found by [10] and superior to those obtained by [8].

Conductivity

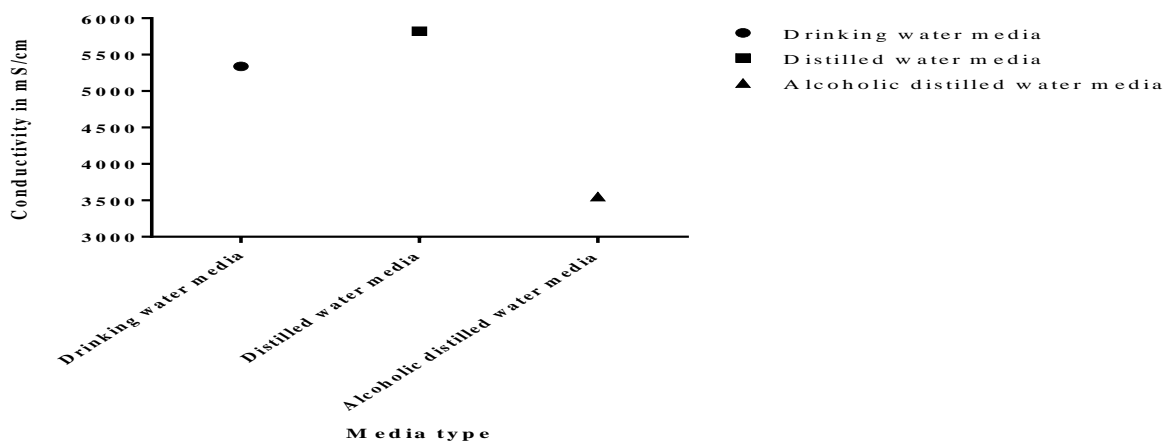


Figure 3: Describes the evaluation on conductivity in mS/cm according to different media.

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The results of the conductivity analyze show that the values are between 3550.000mS/cm and 5820.000mS/cm with an average value of 4903.330mS/cm. Results of conductivity recorded during the study varied. Note that the highest

value is obtained for samples treated with distilled water (5820.000mS/cm). The values of the Conductivity found are higher than those obtained by [8] and [10].

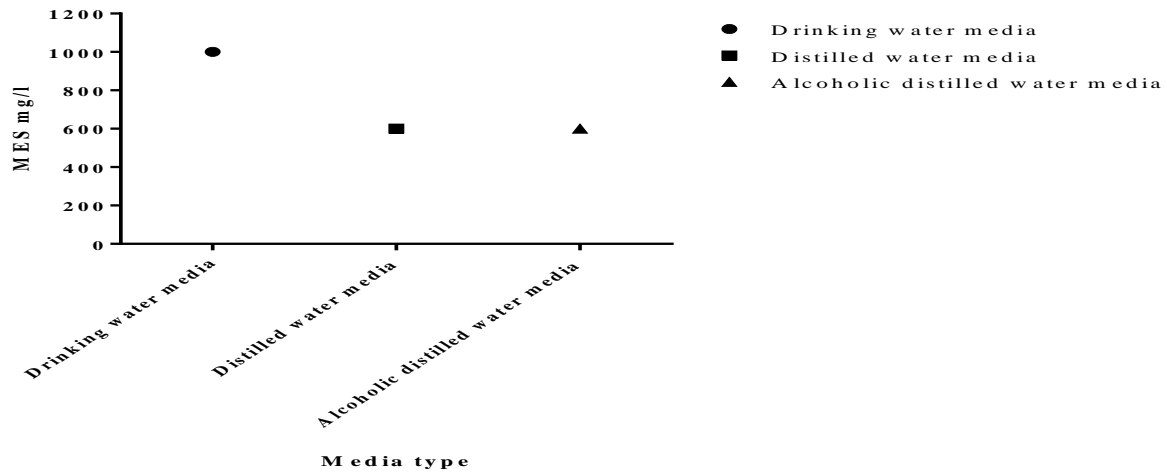


Figure 4: Describes the evaluation for suspended matter (MES) in mg/l according to different media.

The results for suspended matter show that all sample values are between 600.000mg/l and 1000.000mg/l with an average value of 733.333mg/l. note that the highest value is recorded for samples treated with drinking water (1000.000mg/l).

The results are similar to those found by [8] and superior to those obtained by [11].

Conclusion

The study carried out with a view to contributing to the management of solid hospital waste treated with various aqueous solutions such as drinking water, distilled water and alcoholic distilled water, made it possible to assess and then estimate the degree of pollution by the envisaged system. Solid waste from Hospital of Amitie in Nouakchott has significant loads of organic pollutants.

The results of the physicochemical parameters during the study show that the pH values meet the standard, but the pH value of the distilled water medium is closest to neutral compared to other media.

The results of the temperature during the study show that all recorded values meet the standard. But we notice that the temperature value of the medium of alcoholic distilled water is the lowest compared to other media.

MES results during the study show that all recorded MES values exceed the standard.

The conductivity results during the study show that all the samples measured are very salty water but also we notice that the highest value is recorded at the level of the samples treated with distilled water.

In general, the results of the physicochemical parameters of solid waste from the Friendship Hospital of Nouakchott treated with different aqueous media (pH, temperature, conductivity) meet wastewater standards, except MES.

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