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Physico-chemical and microbiological study of samples of human placenta from 4 clinical hospital of the city of Kenitra

Boutaina Laâssili[1], Hassan Ait Si Baha[2], Sultana Inekach[1], El Hassan Berny[1], Mohammed Ouhssine[1]*

[1]Laboratory of Biotechnology, Environment and Quality (LABEQ), Department of Biology, Faculty of Sciences, University Ibn Tufail, BP 133, 14000 Kenitra, (MOROCCO)

[2]Company Salawi Bea, (MOROCCO)

E-mail: ouhssineunivit@gmail.com

ABSTRACT

The purpose of this study was to evaluate the microbiological and physico-chemical quality of the Placenta. The analyzes were performed in our laboratory at the Faculty of Sciences of Kenitra. We evaluated the microbial load of the Placenta by determining the FMAT (Total Aerobic Mesophilic Flora) Coliforms (total and fecal), fecal streptococci and staphylococci. The results showed that the abundance in FMAT in all samples ranged from 0 to 5,16.10 ^{6} cfu / ml. The burden of faecal streptococci varies between 4,82.10 1,64.10 $^{3\ 5}$ u cfu / ml. The Fecal Coliforms (FC) can be found in our samples with an abundance ranging from 00 to 3,08.10 ^{5} cfu / ml. Total Coliforms (TC) vary between 1,42.10 $^{4\ 5}$ and 4,8.10 cfu / ml. In terms of Staphylococci, we conducted several counts, and each time, we note the total absence of its colonies. The physicochemical analyzes of the pH and acidity, showed average values of 6.97 for the average values of pH and acidity of the order of 0.0315 ° D.

In conclusion, we can say that the placenta is indeed a hospital waste polluted with the opportunity to be a vector of infectious diseases.

KEYWORDS

Placenta;
Hospital waste;
Physico-chemical analysis;
Microbial abundance.

INTRODUCTION

Care institutions can protect health, cure patients and protect human lives. In parallel, they produce large amounts of waste with very different natures, of which 20% represent a traumatic or infectious radioactive, toxic risk[1]. Waste treatment activities are defined as "waste from diagnostic activities, monitoring and preventive, curative or palliative in the fields of human and veterinary medicine"[2]. These wastes are generated by major sources such as hospitals, clinics, laboratories, research centers or other

minor sources such as dental clinics, ambulance services and home care. It has been estimated that a portion (12-25%) of waste produced by medical care in an institution, is waste with a potential risk of human or environmental contamination. The largest volume being substantially similar to the garbage produced by the administrative and hotel ac-

tivities[3]. Hospital effluents are often considered similar to domestic waste (Emmanuel et al., 2003). However, hazardous wastes are classified into several categories - infectious, chemical, cutting, piercing, high pressure, containing heavy metals and radioactive - and these constitute a small part of the whole[4].

In Morocco, in a hospital, produces 1 kg of waste 3 bed / day[5]. This represents a very high figure compared to France which produces only 1 kg of waste per bed per day, or about 370 kg of waste per bed / year. Given the diversity and importance of these medical activities, waste management becomes a major problem, because the methods of disposal or destruction are poorly controlled, even worse, several healthcare facilities discharge their waste without any treatment.

It is exactly in this context that our study, we chose to evaluate the physico-chemical and microbiological quality of the Placenta as an example of hospital waste.

MATERIALS AND METHODS

Sampling

4 clinics in the city of Kenitra, we collected 12 samples for analysis Placenta. Clinics are located in several areas of the city of Kenitra. Analyses are done every Tuesday at 11:00. The sampling period extended from April 2013 to February 2014. The total number of samples was 12. Samples Placenta, in our study, we have taken every week among women in labor. The samples were then transported to the laboratory to conduct the necessary analyzes. The stock solution to be analyzed is obtained from weighing 90 grams crude Placenta in 1 liter of saline. This basic solution is refrigerated to return within 24 hours after its preparation for analysis.

Physico-chemical and microbiological

Physico-chemical

It focuses on the evaluation of two parameters: pH and acidity.

- pH: concentration of H3O + ions measured by a pH meter (multi-parameter) CONSORT Type C831 instruments previously calibrated with buffer solutions pH 4, 7 and 10.
- Acidity: To determine the acidity of the sample of placenta, 10 ml of placenta were transferred into 100 ml beaker 1. The titration is performed with a solution of NaOH (0.1 N) and continued until pH 8. The test is repeated three times.

1. The number of equivalents of NaOH = the number of lactic acid or equivalent:

NaOH = (LV90) / Pe with

- N: normality of NaOH
- V: volume of poured soda
- Pe: test sample in ml lactic
- 90: Molecular weight of lactic acid

Acidity-paid = Volume of NaOH

Or: 0.1 g / l D equals 1, therefore the acidity in °D = 10V (V = volume of NaOH paid)

Microbiological characterization

For microbiological analyzes Placenta, we are interested in counting the FMAT (Total Aerobic Mesophilic Flora), fecal streptococci (FS), total coliforms (TC), fecal coliforms (FC) and staphylococci. For the latter, we have noted the appearance of no bacterial colonies, and we stopped counting after 5 counts nothingness.

Preparation of samples

To prepare our mother solution, we proceed by mixing 90 grams of raw placenta in 100 ml of physiological saline (0.9% NaCl). Once our mother solution, we perform a series of serial dilutions in sterile saline from the stock solution and dilution from 10^{-1} to 10^{-6} dilution. Note that these dilutions are obtained from 1 ml of mother solution and 9 ml of sterile physiological saline in test tubes of 16x160 mm. To each dilution was deposited in a 1 ml Petri dish of 9cm in diameter and then poured 20 ml of agar medium previously sterilized at 120°C for 15 minutes under a pressure of 1 bar, and cooled to 45°C. The box is then homogenized by manual shaking and incubated in an oven. All dishes are incubated at 37°C except for the boxes containing faecal coliforms which were incubated at 44.5°C. Only boxes with the number of clonic seizures is between 30 and 300 are used for counting. The tests are repeated three times; and these results are given after the averaging.

TABLE 1 : Results of microbiological counts samples (No. of microorganisms / ml)

	Sampl 1	Sampl 2	Sampl 3	Sampl 4	Sampl 5	Sampl 6	Sampl 7	Sampl 8	Sampl 9	Sampl 10	Sampl 11	Sampl 12
FMAT	5,16.106	00	8,6.10³	1,52.104	6,4.104	1,54.105	4,5.105	5,68.104	3,26.105	3,24.104	5,94.10³	5,46.105
Strept	3,1.104	4,12.104	3,4.104	1,64.105	5,46.10³	1,02.105	4,6.104	5,92.10³	4,82.10³	5,76.10³	1,48.104	4,82.10³
CT	4,4.105	5,6.104	1,42.104	2,86.104	3,66.105	4,8.105	5,12.104	4,88.104	4,64.104	4,18.104	5,78.104	1,46.104
CF	00	2,9.104	4,44.10³	2,44.104	4,92.104	3,08.105	4,8.104	5,56.10³	2,32.104	4,5.10³	4,86.104	8,4.10³

1 The enumeration of the FMAT has been done on the Nutritive Agar, the FMAT gives us an estimate on the overall microbial load, incubated for 24 hours at 37 ° C.

2 Total Coliforms and Faecal are indicators of fecal contamination. Their count is performed on the brilliant green agar, after 24 hours at 37°C for total coliforms and 44.5°C for fecal coliforms.

3 streptococci were counted on Litsky environment. They are also indicators of faecal contamination. The dishes were incubated at 37°C for 24 hours.

4 Staphylococci are also important indicators of the safety of the sample, they are detected on Chapman medium after 24 hours of incubation at 37 ° C on Chapman medium.

RESULTS AND DISCUSSION

Physicochemical characterization

The placenta is a hospital waste which is characterized by a very foul odor that increases more over time. The placenta is red to dark brown. It has a neutral to basic pH with values between 6.8 and 7.2 (8). This is confirmed by the results of pH obtained in our study, because we found values of 6.7, 6.8 and 7.2. With regard to the acidity, we found values of 0.027 ° and 0.036 ° DD.

The acidity of the placenta can be modified according to the shelf life.

Microbiological characterization of the placenta

We are interested, in this study, the enumeration of different types of bacteria may exist in the placenta, as an example of hospital waste. The presence of these bacteria in the placenta gives us a clear idea about the degree of pollution in our sample and, therefore, the need for treatment before any contact with the surrounding environment.

The following table gives the results of the enumeration of microorganisms present in our 12 samples analyzed.

Total Aerobic Mesophilic Flora (FMAT): microbial load varies from 00 to 5,16.10 ^{6} cfu / ml. This was the first time that such work has been done to analyze the placenta as medical waste and not as physiological body, so unfortunately we could not make a comparison with other previous work. However, in view of microbial abundance recorded, we can therefore argue that the placenta is certainly a highly polluted waste.

Total and faecal coliforms and faecal streptococci: bacteria that are indicators of fecal contamination, their presence causes problems in the environment. From TABLE 1, the CF have a bioburden from 00 to 3,08.10 ^{5} cfu / ml, the abundance of CT varies 1,42.10 ^{4} ^{5} to 4,8.10 cfu / ml. And finally the abundance of SF varies 4,82.10 1,64.10 ^{3} ^{5} cfu / ml. The presence of these organisms may be explained by the pH of the medium (placenta) corresponding to the optimum growth pH (7.5) (http://www.listehygiene.org/arcthermot.html).

CONCLUSION

The placenta, according to the results of our present study, is a very harmful hospital waste can cause serious problems to human health and the natural environment, especially, it is, in most cases, dismissed without no treatment. We were able, through this study, clarify several points remained obscure

until now, particularly with regard to the physico-chemical and microbiological characterization of the placenta. Which would push us, thereafter, to explore opportunities to enhance the waste, its processing, the effect of converting not only a harmless waste, but also a product of commercial value certain.

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[3] Author (s): Margaret W.Gerbase, EWA Mariéthoz, Daniel O.Slosman Marika Bakonyi-Moeschler; Department of internal medicine, University hospitals of geneva, 24 rue Micheli-du-Crest, 1211 Geneva 11, Switzerland, University centre human ecology and environmental Sciences, University of Geneva, 40, bd du Pont d'Arve, 1211 Geneva 4 Switzerland, division of nuclear medicine, University hospitals of Geneva, 24 rue Micheli-du-Crest, 1211 Geneva 11, Switzerland, Mr. Bakonyi-Moeschler.

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