

**66 - MICROBIOLOGICAL ANALYSIS OF FUNGI AND BACTERIA IN A PHYSICAL ACTIVITY LOCATION**

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### 1. INTRODUCTION

The outdoor environment is a source of microorganisms transmission. The particulate matter (dust), rate of ventilation and occupation, nature and degree of activity carried out by people occupying a certain physical space are some determinants of the level of contamination of the air. It is believed that the transmission of microorganisms to humans occurs through droplets generated from the union of some of these factors being recognized as bioaerosols, and it can act as carriers of microorganisms (BOECHAT; RIOS, 2013).

Relating to the practice of physical activity, especially concerning to air quality, a clean and appropriate environment is important for this practice in order to obtain better results. The level which a person is usually affected depends on the extent of exposure to the contaminants and is determined by the total exposure time and the concentration of these pollutants, whether biological or not. Observational studies have reported the influence of air pollution on the athletic performance of individuals, exposure to this major environmental problem is considered a concern for the general population, not only of physical activity practitioners, but a greater importance is must be considered to these practioners because they have a higher respiratory capacity and absorb a greater amount of oxygen, being more susceptible to high concentrations of pollutants (GARFIELD, CLARE and MEENA, 2016).

Taking into consideration the relevance of the subject to the health of outdoor physical activity practitioners, and to reveal a worldwide concern research aims to quantify the concentration of fungi and bacteria to determine the microbiological quality of the air of a space of physical activity in Mossoró city - Rio Grande do Norte state.

### 2- METHODOLOGY

#### 2.1 Type of Study:

The research is descriptive.

#### 2.2 Location:

The study was conducted in Mossoró city, Rio Grande do Norte State in a popular space of physical activity practice at Rio Branco Avenue.

#### 2.3 Collection Procedures:

The microbiological quality of the air was evaluated in a course of 1600, where the fungi and bacteria were quantified from the external air, four collection points were defined every 400 meters of distance.

The samples were collected in October and November 2016, in four consecutive weeks, on the respective days, 13/10, 18/10, 28/10 and 03/11, between 16:30 and 18:00. The quantification of mesophilic fungi and bacteria was performed by the sedimentation method on solid culture media. Petri dishes of 90 mm in diameter arranged at a meter of any obstacle, in triplicate, were used for the time of 30 minutes in benches of approximately one meter high, being characterized as passive sampling (PASQUARELLA; PITZURRA; SARNO, 2007; Pasquarella et al., 2007).

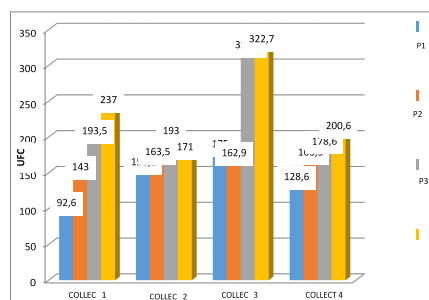
Sabouraud Dextrose Agar were used as culture media for fungal culture and Plate Count Agar for bacterial culture. After collection, the plates were packed in thermal Styrofoam boxes and were taken to the Microbiology Laboratory of the Rural University of the Semi-Arid, where they were incubated at 35-37 degrees C for 48 hours (for bacteria) and the temperature of 25-27 degrees C for 7 days (for fungi), (BRASIL, 2003). After the incubation time of the plates, colonies were counted and subsequently identified according to Pasquarella et al. (2007).

#### 2.4 Data Analysis

The data were analyzed through average amount and standard deviation of the counts of each collection performed for both bacteria and fungi, and analyzed with Excel 2013.

### 3 - RESULTS AND DISCUSSION

Graph 1: Quantification of Bacteria

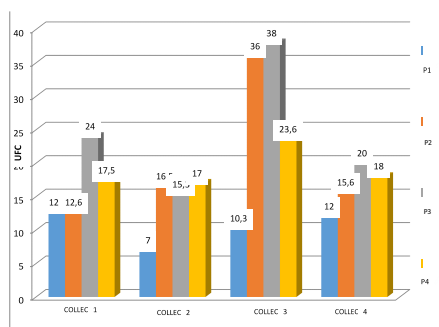


In relation to the quantification of bacteria, a higher number can be observed in the points P3 and P4, both with greater concentration of people in the place. On the other hand, point P1 obtained less quantification in 75% of the collections, the same

is characterized as a point of passage only in the practice of physical activity, since the other points, people are usually concentrated in the places practicing their activities. According to Arifin and Denan (2015), a higher amount of organic material is present, making an environment more conducive to the proliferation of microorganisms.

In relation to the identification of the bacteria, there were *Planococcus* sp, *Stomatococcus* sp and *Baccillus* sp, at the P1 point there were *Planococcus* sp, *Stomatococcus* sp and *Baccillus* sp, at the P2 point there were *Corinebacterium* sp, *Baccillus* sp and *Cellulomonas* sp, at the P3 point there were *Corinebacterium* sp, *Baccillus* sp and *Cellulomonas* sp and *Stomatococcus* sp, and at the P4 *Stomatococcus* sp, *Baccillus* sp, *Corinebacterium* sp, and *Cellulomonas* sp.

Graph II: Quantification of Fungi



The quantification of fungi in the four collections is shown in graph 2, in the first collection the points P3 and P4 obtained greater numbers, on the other hand, in the second collection the highlighted points were P2 and P4, in the third collection the highlights were points P2 and P3, and in the fourth collection the points P3 and P4 obtained greater quantification. The P3 point obtained a greater quantification in 75% of the collections, and the P1 point had a similar action to that of the bacteria, obtaining a smaller quantification of fungi in 75% of the collections.

According to the quantification of bacteria, the number of fungi is much lower, since the warm dry weather characteristic of the city is not conducive to its growth, according to Kutadeladze, Zakariashvili, and Jobava (2016) the majority of the fungi grow up in a great temperature between 20 and 30 degrees C, by suffering major influences of temperature, humidity and speed of the winds.

Concerning fungi identification, in point P1 it was found *Aspergillus* sp, *Aspergillus niger*, *Aspergillus fumigatus* and *Mucor* sp, in point P2 it was found *Aspergillus terreus*, *Aspergillus fumigatus*, *Mucor* sp and *Candidos* sp, at P3, there were *Mucor* sp, *Aspergillus penicillium*, *Aspergillus niger* and *Aspergillus* sp and P4 *Penicillium* sp, *Aspergillus niger*, *Aspergillus terreus* e *Mucor* sp.

#### 4-CONCLUSION

The microbiological quality of the space is in appropriate conditions in 100% of the collected points with a low number of microorganisms considered much lower than that standards allowed by ANVISA for indoor environments, since there is no legislation for outdoors environments this parameter was used for comparison and classification.

Therefore, it can be concluded that the microbiologically evaluated environment can be considered suitable for the practice of physical activity, since it is a clean environment and with an acceptable quantity of bioaerosols. Despite the low level of microorganisms found, both the bacteria and the fungi identified are very common in open spaces, and some can be harmful when it comes to the most vulnerable people like children, the elderly, and those with chronic diseases in general, and may influence the development of some infections.

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#### MICROBIOLOGICAL ANALYSIS OF FUNGI AND BACTERIA IN A PHYSICAL ACTIVITY LOCATION

The practice of physical activity outdoors has become increasingly common, so air quality is essential and exerts influences on the health and well being of practitioners. The study aims to quantify the concentration of fungi and bacteria to determine the microbiological quality of air. A 1600-meter route from Rio Branco Avenue in the city of Mossoró-RN was evaluated, four collection points were defined, in October and November 2016, in four consecutive weeks, between 4:30 p.m. and 6:00 p.m. . The sedimentation method was used in Petri dishes with their respective culture media, the plates were exposed for half an hour at each point, in benches approximately one meter high, simultaneously using a thermometer and a hygrometer to measure the temperature and the humidity of the air. After the collections, they were incubated in the Laboratory of Microbiology of the Rural University of the Semi-Arid, and later quantified and identified. The results showed that the number of bacteria was higher in points P3 and P4, and in relation to fungi the point P3 was highlighted with greater quantity, both points had more people. In this way it can be concluded that the evaluated environment was more quantified in the places where there were more people circulating, and in spite of the result, the evaluated points were able to practice physical activity, due to the low amount of microorganisms.

Key Words: Bacteria, Fungi, Physical Activity.

**ANALYSE MICRO-BIOLOGIQUE DES CHAMPIGNONS ET DES BACTÉRIES DANS UN ENVIRONNEMENT DE PRATIQUE DE L'ACTIVITÉ PHYSIQUE**

La pratique de l'activité physique dans des environnements ouverts est devenue de plus en plus courante, donc la qualité de l'air est essentielle et influence la santé et le bien-être des praticiens. L'objectif de cette étude est de quantifier la concentration de champignons et de bactéries pour déterminer la qualité micro-biologique de l'air. Un parcours de 1600 mètres ont été évalués dans l'avenue Rio Branco dans la ville de Mossoró-RN, quatre points de collecte ont été définis, en octobre et novembre, en 2016, pendant quatre semaines consécutives, entre 16 h 30 et 18 h. La méthode a utilisé pour la mise en culture de micro-organismes a été de sédimentation dans les boîtes de Pétri, ils ont été exposées pendant une demi-heure à chaque point, dans des bancs d'environ un mètre de hauteur, en utilisant simultanément un thermomètre et un hygromètre pour mesurer la température et l'humidité de l'air. Après les collectes, ils ont été incubés dans le laboratoire de Microbiologie de l'Université Rurale du Semi-Aride, ensuite ils ont été quantifiés et identifiés. Les résultats ont montré que le nombre de bactéries était plus élevé aux points P3 et P4, et que le point P3 se met en évidence pour avoir la plus grande quantité fongique, les deux points avaient plus de personnes. De cette façon, on peut conclure que l'environnement évalué était plus quantifié dans les endroits où il y avait plus grand nombre de personnes qui circulaient, malgré le résultat, les points évalués étaient appropriés à la pratique de l'activité physique, en raison de la baisse quantité de micro-organismes.

Mots clés: Bactéries, champignons, activité physique.

**ANÁLISIS MICROBIOLÓGICO DE FUNGOS Y BACTERIAS EN UN AMBIENTE DE PRÁCTICA DE ACTIVIDAD FÍSICA**

La práctica de actividad física en ambientes abiertos se ha vuelto cada vez más común, por tanto la cualidad del aire es esencial y ejerce influencias en la salud y bienestar de los practicantes. El objetivo de ese estudio es cuantificar la concentración de hongos y bacterias para determinar la cualidad microbiológica del aire. Fue evaluado un recorrido de 1600 metros de la Avenida Rio Branco en la ciudad de Mossoró-RN, fueron definidos cuatro puntos de recogida, en los meses de octubre y noviembre de 2016, en cuatro semanas consecutivas, en el horario entre 16h30min y 18 horas. Fue utilizado el método de sedimentación en tarjetas de Petri con sus respectivos medios de cultura, las tarjetas se quedaron expuestas por media hora en cada punto, en bancos de aproximadamente un metro de altura, simultáneamente fueron utilizados un termómetro y un higrómetro para verificar la temperatura y la humedad del aire. Tras las coletas, fueron incubadas en el Laboratorio de Microbiología de la Universidad Rural del Semi-árido, y posteriormente cuantificados e identificados. Los resultados mostraron que el número de bacterias fue más grande en los puntos P3 y P4, y en relación a los hongos el punto P3 se destacó con más grande cantidad, ambos los puntos habían más grande cantidad de personas. De esa forma se puede concluir que el ambiente evaluado hubo más grande cuantificación en los puntos donde había más grande número de personas circulando, y a pesar del resultado, los puntos evaluados se mostraron aptos para la práctica de actividad física, por la baja cantidad de microorganismos.

Palavras Chaves: Bacterias, Fungos, Actividad Física.

**ANÁLISE MICROBIOLÓGICA DE FUNGOS E BACTÉRIAS NUM AMBIENTE DE PRÁTICA DE ATIVIDADE FÍSICA**

A prática de atividade física em ambientes abertos tem se tornado cada vez mais comum, portanto a qualidade do ar é essencial e exerce influências na saúde e bem estar dos praticantes. O objetivo desse estudo é quantificar a concentração de fungos e bactérias para determinar a qualidade microbiológica do ar. Foi avaliado um percurso de 1600 metros da Avenida Rio Branco na cidade de Mossoró-RN, foram definidos quatro pontos de coleta, nos meses de outubro e novembro de 2016, em quatro semanas consecutivas, no horário entre 16:30 e 18:00 horas. Foi utilizado o método de sedimentação em placas de Petri com seus respectivos meios de cultura, as placas ficaram expostas por meia hora em cada ponto, em bancos de aproximadamente um metro de altura, simultaneamente foram utilizados um termômetro e um higrômetro para aferir a temperatura e a umidade do ar. Após as coletas, foram incubadas no Laboratório de Microbiologia da Universidade Rural do Semi-Árido, e posteriormente quantificados e identificados. Os resultados mostraram que o número de bactérias foi maior nos pontos P3 e P4, e em relação aos fungos o ponto P3 se destacou com maior quantidade, ambos os pontos haviam maior quantidade de pessoas. Dessa forma pode-se concluir que o ambiente avaliado houve maior quantificação nos pontos onde havia maior número de pessoas circulando, e apesar do resultado, os pontos avaliados se mostraram aptos para a prática de atividade física, pela baixa quantidade de microrganismos.

Palavras Chaves: Bactérias, Fungos, Atividade Física.