



Green areas in cities mitigate cases of obesity: Case study from Espírito Santo do Pinhal-SP

Áreas verdes das cidades mitigam casos de obesidade: Estudo de caso de Espírito Santo do Pinhal-SP

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ABSTRACT

Obesity has been treated as a worldwide epidemic, and the number of obese people in Brazilian cities is increasing. In most cases, obesity is related to the intake of high-calorie foods and a lack of physical activity. Thus, the objective of this study was to portray how the green areas of the municipality of Espírito Santo do Pinhal-SP favor the reduction of numerous diseases, among them, obesity, characterized as a public health problem. A survey of areas in the municipality was carried out, and the existence of outdoor gyms, arboreal vegetation and structure for the practice of physical activities was observed. In the research, five green areas used by the population in the practice of physical activities were inspected, and it was observed that the places that had walking tracks, courts and outdoor gyms are more frequented by the population compared to the places that had only an outdoor gym. Thus, green areas positively interfere in people's lives, favoring the practice of physical activities and greater social interaction, being a factor for reducing cases of obesity and other cardiovascular comorbidities.

Keywords: Obesity, Green areas, Hiking, Espírito Santo do Pinhal.

INTRODUCTION

Nowadays, obesity is defined as a nutritional and metabolic disorder of multifactorial origin, where the person has an increased body fat percentage due to an imbalance between energy intake and expenditure. Among the multifactorial origin, genetic factors, people's lifestyle, and emotional factors are directly related to their genesis or maintenance (Ministry of Health, 2017).

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Obesity is considered a public health problem, so it is necessary for each country to have a general overview of how obesity develops in the population and thus outline ways to intervene in order to control it (Ferrari, 2009). Overweight and obesity, in 2020, affected about 38% of the population worldwide, almost 2.6 billion people. And future perspectives estimate that by 2035, around 4 billion people will be affected (WHO, 2023).

Tassian et. al. (2008), describe that the accumulation of body fat is a risk factor for possible diseases such as diabetes, cardiovascular diseases, certain types of cancer, inflammatory diseases, metabolic disorders, hypertension, among others (Hoffman et al., 2021). Experts draw attention to an increasingly young obese number of people around the world. The factors that lead people to become increasingly predisposed to obesity are more related to behavioral issues than biological ones. The safest strategy for the treatment of obesity or overweight is through lifestyle changes, adherence to a low-calorie diet, regular physical activity, as well as better sleep quality (Silva et al., 2024).

In this sense, cities have been growing in a disorderly way, drastically transforming the natural environment into the built environment (Martelli and Delbim, 2022), favoring climate change to the detriment of the quality of life of populations (Oliveira et al., 2013). Currently, the presence of tree units and other vegetation within urban centers has become of paramount importance, especially in people's quality of life, as it breaks the artificiality of the environment and benefits the surrounding environment (Bonametti, 2001). The importance of the tree in cities gains greater relevance, especially when the concentrations of these areas increase and consecutively increase the number of dwellings (Martelli; Barbosa Junior, 2010).

Nicodemo and Primavesi (2009) portray the importance of this vegetation for human well-being with greater socialization among people, reduction of stress generated by intense daily activities such as family care, studies, work, among others, reduction of blood pressure and heart rate and improvement of other physiological and social indicators. Paradoxically, the greater the investments in rolling lanes and other structures that favor the circulation of automobiles, the greater the fraction of the population of that locality that will opt for the use of vehicles as a form of transportation. On the other hand, wooded areas favor people's active mobility and thus reduce the risk of cardiovascular diseases, including obesity (Martelli and Delbim, 2022).

In view of these points and taking into account the importance of green areas in urban centers for health, physical activity and quality of life of the population, this study aimed to survey the green areas used by the population of the municipality of Espirito Santo do Pinhal-SP



and their influence on the reduction of the risk of numerous diseases. Among them, obesity, characterized as a public health problem.

METHODOLOGY

CHARACTERIZATION OF THE MUNICIPALITY OF ESPIRITO SANTO DO PINHAL

The Municipality of Espírito Santo do Pinhal is part of the Administrative Region of Campinas. It is at an altitude of 870 meters and its population, according to the latest IBGE census of 2023, is 39,816 inhabitants, resulting in a population density of 102.29 inhabitants/km². It has an area of 389,235 km², with a sanitary sewage of 92.80%, afforestation of public roads with an estimate of 57.6% (IBGE, 2023). According to the Köppen classification, the climate of Espírito Santo do Pinhal falls into the Kwa type, that is, mesothermic (subtropical and temperate), with hot and rainy summers, with the average temperature of the hottest month above 22°C.

According to the Center for Meteorological and Climate Research Applied to Agriculture (CEPAGRI), the municipality is characterized by an average annual temperature of 20°C, oscillating between an average minimum of 13.7°C and an average maximum of 26.2°C. The average annual rainfall is 1,541mm (PMISB, 2014).

Rainfall is usually well distributed throughout the year, with a slight reduction in winter. According to data from the 2020 Forest Inventory published by the DataGeo System (2021), the domain of the composition of the regional flora is from the Atlantic Forest biome and transition with the Cerrado, being largely composed of Seasonal Semideciduous Forest.

AREAS OF STUDY

The growth of cities, often without planning, has caused serious damage to the environmental condition, as well as considerable economic and social damage, often compromising people's health and quality of life. Knowing the benefits of green areas in urban centers is of fundamental importance for the development of actions and projects consistent with other places in the municipality, favoring the health of its residents.

Expeditionary Square – Centennial Village

	Raised area	Address
01	Municipal Lake with walking trail and outdoor gym	Av. Maria Joaquina, 364-642 – Parque do Lago.
02	Lago da Dinda with walking track and outdoor gym	Rua João Camilo B Peçanha, 17-29 - Jardim Lelia.
03	Faculty Square with indoor tracks, sports court and outdoor gym	Rua Lindolfo de Souza Leite – Jardim Universitário
04	Outdoor gym	Praça Armador Bueno Florence – Largo São João.
05	Outdoor gym	Praça dos Expedicionários – Vila Centenário

Subsequently, on-site visits were carried out for environmental analysis and the existing vegetation in these places, observation if the place is frequented by people and if it had a structure for the practice of physical activities, and each place was covered through a walk for these analyses. The collected data were recorded in a specific spreadsheet for tabulation.

RESULTS AND DISCUSSION

In the urban environment, the tree is considered the most characteristic plant form, which, throughout history, has been incorporated in close relation with the architecture of urban centers. It is very well established in the literature that urban afforestation contributes to the achievement of a pleasant urban environment and has a decisive influence on the quality of life of residents in urban centers and, therefore, on the health of the population (Ribeiro, 2009). Robba and Macedo (2002) and Martelli and Delbim, (2022) describe that green areas, such as squares and gardens, have always been celebrated as a space for coexistence among visitors and leisure, factors that induce people's well-being.

As described in Table 1, the five green areas established in this study were analyzed with local surveys. Area 1 called Municipal Lake was considered the main green area of the municipality, where the largest number of people practicing physical activity was observed, an action that is directly related to the mitigation of obesity cases, and this place is considered a tourist spot in the municipality.

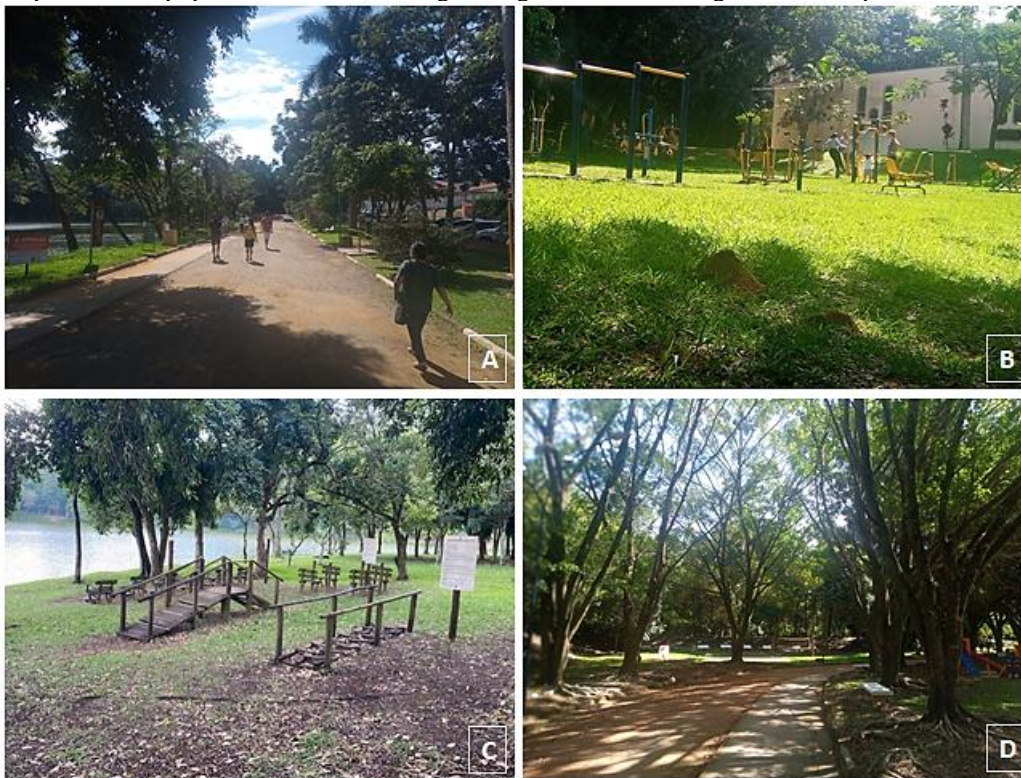
The venue has a *playground*, a concrete bike path called Lázara Aparecida Cassino de Oliveira, with distance demarcation where a complete lap corresponds to 830m and a track for visitors to walk and run Figure 1A, being observed in the visits, many people walking, running, among other sports practices.

An open-air gym with numerous pieces of equipment for physical exercise was also observed Figure 1B. On the shores of the lake in the area, a place called the Elderly Square was observed, with treated wood structures, where this public can exercise, favoring the improvement

of balance, strengthening of the muscles and facilitation of displacement, thus avoiding falls that are frequent at this age Figure 1C. In environmental issues, many native tree species were found to have formed forest fragments Figure 1D, among them, the Araucaria, a tree that is the symbol of the municipality. A research carried out by Martelli (2022) found that this species is spread throughout squares in the central region and other green areas in this municipality.

Amato-Lourenço et al. (2016) report that proximity to green areas is associated with lower risks of obesity, lower likelihood of developing cardiovascular diseases, mental illnesses, and better birth outcomes, among others. In addition to the environmental services provided by green areas, it is believed that contact with green reduces stress and favors the practice of physical activity (Martelli and Delbim, 2022).

Figure 1. Municipal Lake. In A, bike lane and walking track; B, outdoor gym for the practice of resistance exercises; C, Elderly Square with equipment for muscle strengthening and in D, existing trees in this place



Continuing the analyses, we have area 2 known in the municipality as Lago da Dinda. The place also has a lake and an exuberant forest, which favors a local microclimate with a reduction in temperature and an increase in the relative humidity of the air, factors that favor the practice of physical activities, increase of body metabolism and reduction of obesity in many cases.

A walking track was observed with several people practicing, an outdoor gym with equipment in good condition and used by the local population, and these structures can be observed in Figures 2A and 2B, respectively.

Studies in environmental epidemiology have observed benefits of exposure to green spaces for mental health, increased physical activity, and reduced morbidity and mortality from general and specific causes, such as cardiovascular diseases, including obesity (Silveira; Junger, 2018).

Figure 2. Dinda Lake. In A, hiking trail; B outdoor gym.



Subsequently, and according to Table 1, the next area analyzed was the Faculty Square, located after the UniPinhal building, and it was observed that the place has a good maintenance of its vegetation and equipment, an excellent afforestation occupying the space and an open-air gym Figure 3A. Inside, an uncovered sports court was observed, which during the visits always had people using this space and internal paths used by local residents for the practice of walking, Figure 3B.

Figure 3. Faculty Square. In A, general view of the area, with a good tree and outdoor gym; B, multi-sport court and indoor tracks used for hiking



In the last two places analyzed in this research, there were areas where the Government carried out the installation of outdoor gyms, one installed in Praça Armador Bueno Florence, Largo São João Figure 4A and the other in Praça dos Expedicionários, Jardim Centenário Figura 4B. In these places it was possible to observe that the equipment is in good condition, the places have a medium afforestation, however, in the visits it was observed that this equipment is little used by the local population, requiring a greater incentive from the government and/or other institutions. In one of the visits, waste was observed in the gym of the Praça dos Expedicionários, irregularly disposed by the population in the internal area of this square.

Figure 4. Outdoor gym in public areas of the municipality. in A, Praça Armador Bueno Florence, Largo São João; B, Expeditionary Square, Centennial Garden



Not everyone can afford a private gym, with a high prevalence of physical inactivity in one in five people in Brazil and in the world, being predominant in urbanized countries, with the elderly and women being more vulnerable (Polisseni and Ribeiro, 2014). In this sense, enjoying public spaces for physical activities favors a higher quality of life and, in parallel, the prevention of various pathologies, including obesity, greater socialization among people, and sensitivity to environmental issues (Pierone et al., 2016).

A study conducted by Londe and Mendes (2014) describes that the practice of physical activities in these public spaces and in green areas favors practitioners with numerous benefits, such as normal levels of adrenaline and noradrenaline, blood glucose levels, improved sleep quality, reduction in the incidence of musculoskeletal, cardiovascular diseases such as systemic arterial hypertension and metabolic diseases such as diabetes.

A survey conducted by Barreto et al. (2017) with physical education students in the municipality of Mogi Guaçu-SP, when asked about the possibility of teaching physical education classes in wooded areas, 53 students - 93% of the sample, reported being in favor of this



practice. Matavelli et al., (2014) report in their research that the regular practice of physical activities is essential in the non-pharmacological conducts of prevention and treatment of numerous chronic non-communicable diseases related to sedentary lifestyle, such as hypertension and obesity.

In addition to all the environmental services provided by green areas, it is believed that contact with vegetation can decrease stress, increase social cohesion and the level of physical activity and many cities around the world have invested in afforestation programs as a way to improve urban health (Amato-Lourenço et al., 2016).

Martelli (2019) portrays that for a long time, society accepted the degradation of green areas and today we are reaping the fruits of these actions with several diseases that have once again affected people's health. Thus, an urban area adequate to the needs of the population is a decisive factor for a better quality of life and health of the population and numerous studies have shown that living in less artificial environments positively influences people's self-perception of health and a lower risk of comorbidities (Maas et al., 2008).

FINAL THOUGHTS

In this study, it was verified that green areas benefit a greater beautification of the city, contributing to the thermal and environmental comfort of the population, taking into account a lower temperature and an increased relative humidity, favoring quality of life for the residents of these urban centers. The places addressed in this research have a good afforestation, mostly with native species of the biome and equipment that favors the practice of physical activities by the population, bringing quality of life to the visitors and reducing risks of obesity, hypertension and other cardiovascular comorbidities.

It was possible to observe that the area of Lago de Pinhal and Praça da Dinda are the places most frequented by the population because they have a bike lane, walking track, outdoor gym, benches for greater socialization between people and structure such as bathrooms in relation to places that only have an outdoor gym. We emphasize that there should be a greater incentive for the use of these areas that are rarely frequented by people through the benefits of physical activity. Future studies are needed for a deeper investigation of wooded green areas, the practice of physical activities and reduction of the risks of cardiovascular diseases, including obesity.



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