URBANORUM SPP. in municipalities in the metropolitan region of Vale do Paraíba - SP, Brazil: determination of the epidemiological profile

ABSTRACT

Aim: The present study aims to define the epidemiological profile of *Urbanorum* spp. in cities of the Vale do Paraíba metropolitan region.

Study design:This is a retrospective study whose data were collected in a private laboratory serving the region.

Materials and Methods: 2777 coproparasitological results were obtained using the technique based on the Hoffman, Pons & Janner protocol, in which 252 samples presented *Urbanorum* spp.

Results: The results showed that the city with the highest incidence is Guaratinguetá, 15.3% followed by Pindamonhangaba 10.2% and Taubaté 9.9%. Regarding the epidemiological profile, there was a predominance of positive samples of *Urbanorum* in female sex, with 61.9% of the total positives and in the age group between 41 and 59 years, accounting for 34.5% of the samples.

Conclusion: It is concluded that there is a high incidence of *Urbanorum* spp. in the Vale do Paraíba region, being more relevant in adult women, aged between 41 and 50 years, with uniform distribution among the municipalities evaluated, but with greater occurrence in the municipality of Guaratinguetá.

KEYWORDS: *Urbanorum* spp., protozoa, epidemiological profile.

1. INTRODUCTION

Intestinal parasitosis are diseases of high persistence, as they are based on a nutritional dependence of the parasite on the host, according to which the parasite cannot radically damage its host, since its obtaining of food is exclusively from the host and the damage or even the death of the same, would not be advantageous. Over thousands of years, some parasitic relationships have evolved into symbiosis, a relationship without causing any harm to the host, but the pattern for most species leads to manifestations such as anemia, irritability, sleep disturbances, nausea, vomiting, and diarrhea. In children, it can cause more serious cases, such as the development or worsening of malnutrition, cognitive and physiological delay, hepatosplenomegaly, anorexia, rectal prolapse, bowel and intestinal obstruction [1-3].

Currently, it is estimated that 3.5 billion people worldwide are affected by parasites. Family income, food, housing, basic sanitation, access to drinking water and health education are factors closely related to these diseases, so these diseases are closely linked to social imbalances, since the cause It is not exclusively the etiological agent, but also nutritional status and hygiene and sanitation conditions [2,4].

Population growth linked to socio-environmental issues can not only maximize the appearance of parasitic diseases, but also allows the creation of ecosystems favorable to the appearance of new species of parasites. In this

sense, in 1991, the professor of parasitology Francisco Tirado Santamaria, from the Industrial University of Santander (UIS), in the city of Bucaramanga in Colombia, observed in a patient a correlation between clinical signs and symptoms with the presence of a possible species of the protozoan, then called *Urbanorum* spp and after years of study, in 1994 the professor published the first case report of the infection [5].

Urbanorum spp, which is classified as belonging to the Phylum Sarcomastigophora, has an exoskeleton covered by a double membrane, consisting of one or two exit pores, through which its pseudopods are released, which help in its movement. Its size can vary from 80 to 100 microns, being considered large compared to other protozoa such as Entaboeba coli, Endolimax nana and Giardia lamblia, which are commonly found in the laboratory routine of the region. It has a round hyaline structure that is stained with Lugol. Patients affected by the protozoan may present symptoms such as secretory, liquid diarrhea with an acidic pH, without mucus, blood and leukocytes, as well as colic in the lower right hypochondrium, suggesting an infectious process derived from the colon [5,6].

The treatment of patients affected by this protozoosis is through the use of commonly indicated antimicrobial drugs such as metronidazole and secnidazole. It is not yet known, but its probable reproduction is by endodiogenesis, in which daughter cells are formed within the stem cells, by asexual division. The hypothetical evolutionary cycle of the parasite is produced by the ingestion of water or food contaminated with fecal matter that contains mature cysts, which, in contact with the digestive juice, are released, releasing the trophozoites that invade the colon causing diarrhoea. Some trophozoites become cysts again, and both are passed in the feces. In between, the trophozoites are destroyed and only the cysts, resistant to the environment and can continue the cycle contaminating water and / or food [5-7].

One of the complications related to the parasitism caused by the protozoan studied is the Acute Diarrheal Syndrome that causes an increase in the number of stools, with watery stools, which may be accompanied by vomiting, fever and abdominal pain. Such disease can be considered as a risk factor capable of triggering malnutrition and dehydration, especially in children and population with nutritional gap, so prevention is of the utmost importance. [8].

The epidemiological triad of *Urbanorum* spp is described by Díaz and Perlaza [9] and Bermeo and Sánchez [10], which encompasses three factors, the first being the agent: the protozoan directly attacks the large intestine. The second factor is the environment: feces find the soil, spreading its transmission through contaminated and poorly sanitized food, untreated water and direct contact with contaminated feces. And the third factor is the host, which, depending on its health status, can develop acute diarrheal syndrome, commonly observed in patients infected by this protozoan

Studies report that in the city of Barrancabermeja in Colombia, the prevalence of *Urbanorum* spp was between 10 and 16% of the samples analyzed. But other countries have also reported the appearance of the protozoan [5,6]. In Peru, a study by Villafuerte et al. (2016) shows images of the parasite, found in a 67-year-old woman, a resident of San Juan de Lurigancho, in Lima, who presented abdominal pain and dyspepsia for 9 months [6].

The first case report in Brazil occurred in 2017, in the city of Buriti in Maranhão. The 41-year-old patient weighed between 55 and 60 kg, lived in a rural area, without basic sanitation or treated water. She referred constant abdominal cramps and fever, being diagnosed with acute diarrhea due to symptoms. Laboratory tests were requested, including the coproparasitological examination, performed according to the Hoffman, Pons and Janer (HPJ) protocol, identifying the parasite. Due to the similarity with *Entamoeba*, metronidazole 500-750 mg, 3 times a day for 5 to 10 days, was prescribed. After 14 days from the start of treatment, the patient reported to the health team that her clinical condition improved [11].

In 2018, the second case report in Brazil was published in the city of Livramento, Rio Grande do Sul, a 72-year-old patient with Sjögren's syndrome. The patient had gone to the doctor for postprandial abdominal pain in the left flank. She did not present diarrhoea, signs of melena, hematochezia or enterorrhagia. The presence of *Urbanorum* spp was confirmed by the parasitological examination of feces, performed by the HPJ protocol. Claiming to live in an urban area, with basic sanitation and treated water, work as a housewife and not have traveled in the last year, suggests native contamination. Metronidazole 250 mg 3 times daily for 8 days was prescribed. After treatment, a new stool parasitological examination was performed, demonstrating the absence of parasites and reporting clinical improvement of the patient [12].

In the same year, two other patients were diagnosed with *Urbanorum* spp. in Brazil as follows: J.L.F., a 60-year-old male patient with abdominal pain and progressive worsening, without changes in bowel habits [13]. And the patient, CB, an 84-year-old patient, who in the last 3 months alternated between diarrhea and constipation, in addition to pain in the right hypochondrium, both were diagnosed with the possible protozoan and received treatment with the anti-amoebic. Metronidazole [14].

Finally, the most recent case report in Brazil occurred in São José dos Pinhais-Paraná, being a 56-year-old male patient who used metformin for the treatment of diabetes, sought medical care for abdominal colic mainly in Brazil. Left hypochondrium, pain on evacuation and tenesmus. He reported that he worked in the field and stated that he performed the function of cleaning water reservoirs, but that he used personal protective equipment (PPE). Physical examinations did not show alterations, some laboratory tests were requested, including coproparasitological examination, through which the presence of *Urbanorum* spp. The chosen treatment was Nitazoxanide 500 mg every 12 hours for 3 days and a parasitological control test. After treatment, a complete improvement of the condition and a negative parasitological examination were reported [15].

Studies have described clinical and laboratory findings of *Urbanorum* spp. from different regions of Brazil, where 5,786 samples were analyzed and 84 positive, of which 43% were from the Midwest and 57% from Greater São Paulo. There was a wide age variation in the positives, from 8 months to 91 years. Among these, 10 patients, three children and seven adults, were invited for clinical analysis, and only five were submitted to a questionnaire, being totally asymptomatic and living in the same region [16].

Being an emerging disease, the lack of information on this probable parasite raises the need to design surveys that aim to better understand its

epidemiological profile, so in this study we seek to evidence the occurrence of *Urbanorum* spp., in the results. of coproparasitological examinations of a clinical analysis laboratory, which serves residents of different localities in the metropolitan region of Vale do Paraíba - SP, Brazil, and to verify the profile of the temporal and spatial distribution of the parasite in question, as well as its profile distribution per person, taking into account the sex and age of the patients.

2. MATERIALS AND METHODS

This is a descriptive study, in which retrospective information was used from the results of coproparasitological examinations, carried out in a clinical analysis laboratory located in the municipality of Taubaté, which analyzes samples of patients from several municipalities in the metropolitan region of Vale do Paraíba, SP - Brazil, and which, for the analysis of the samples, uses the spontaneous sedimentation method, based on the Hoffman, Pons and Janer protocol, being a method commonly used in the laboratory. The main sample is 2,777 results of coproparasitological examinations of patients from the municipalities of Taubaté, Pindamonhangaba, Caçapava, São José dos Campos, Jacareí, Guaratinguetá and Campos do Jordão. Images of the parasite were obtained by making sample slides that were preserved in formalin and stored refrigerated in the laboratory.

The study used results of examinations carried out from February to August 2020. The data was analyzed in epidemiological terms, correlating the results with data regarding age, sex and municipality of origin. Statistical analyzes were performed using bioestat 5.0 software as a support tool.

4. RESULTS AND DISCUSSION

A study of the presence of *Urbanorum* spp. through a retrospective analysis of 2,777 reports of coproparasitological examinations, from a clinical analysis laboratory that serves clients from different cities in the metropolitan region of Vale do Paraíba, SP - Brazil.

The decision to make the positive diagnosis for *Urbanorum* spp. it was based on the morphological identification of structures compatible with the species (figure 1) and the comparative visual analysis with the findings of other researchers (figure 2).

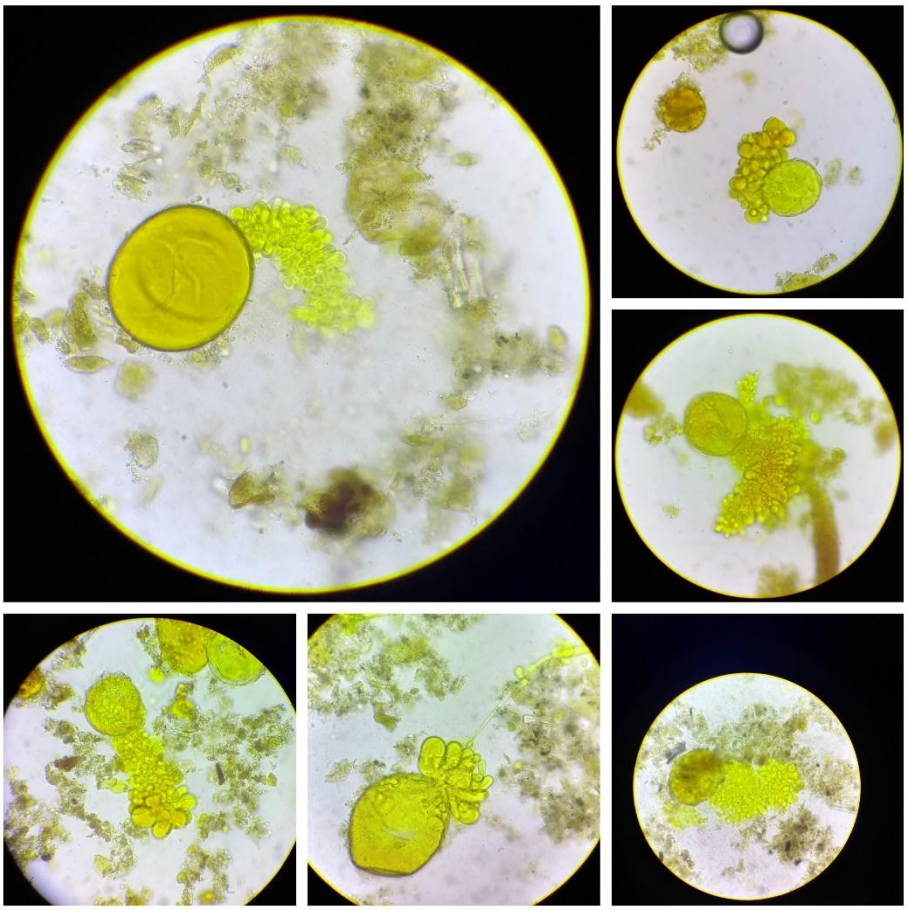


Figure 1. Sampling of evolutionary forms compatible with *Urbanorum* spp., identified in this study..

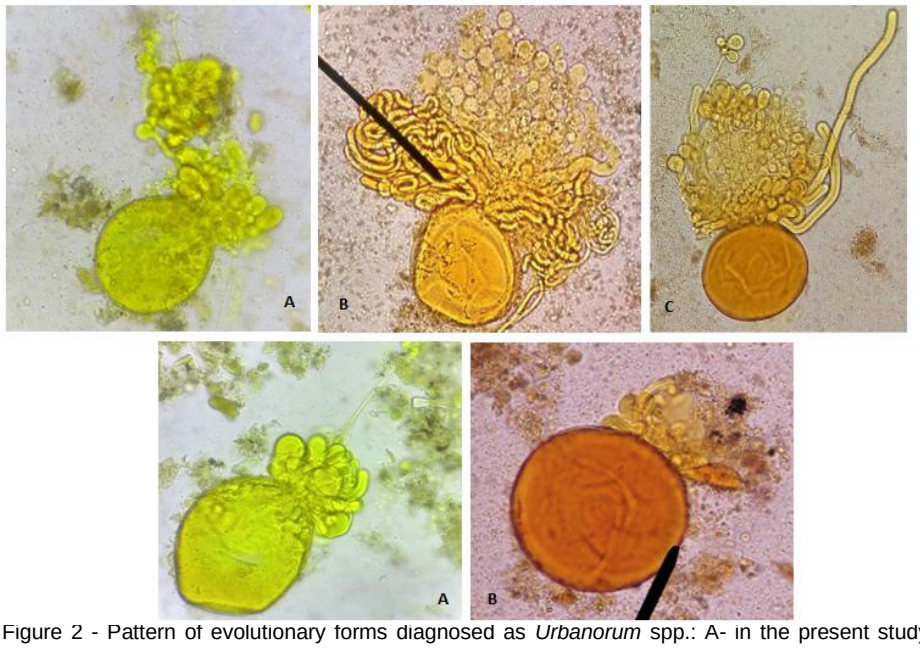


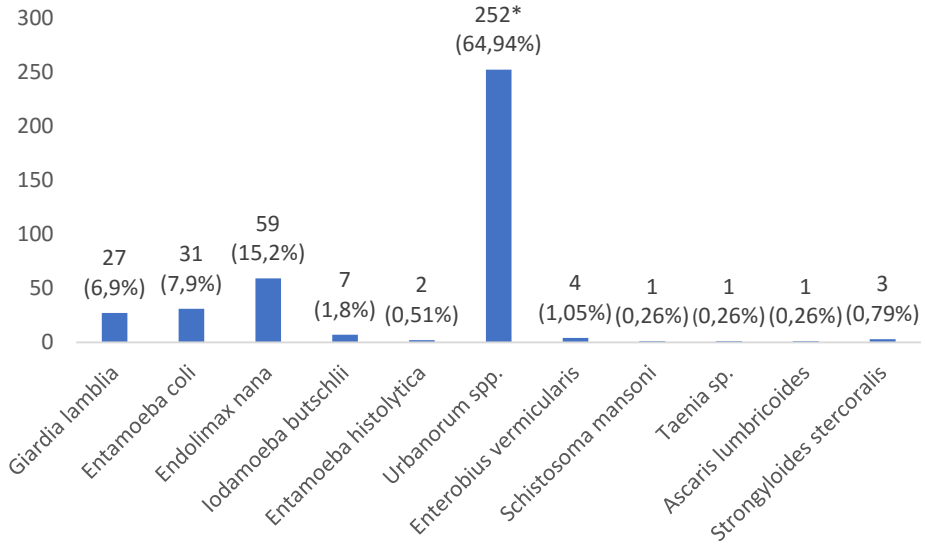
Figure 2 - Pattern of evolutionary forms diagnosed as *Urbanorum* spp.: A- in the present study; B- in the findings of Villafuerte et al. [6] and C- in the findings of Casarin et al. [20].

The investigation was carried out based on the results obtained in the period from February to August 2020. It was observed that 13.97% of the samples were positive for some evolutionary form of helminths or protozoa, which represents a low positivity. These results corroborate those presented by several researchers [17,18]. Among which Barbosa et al. [17] who evaluated

the occurrence of coproparasitological test results from clinical analysis laboratories, which serve patients in the Midwest region of Minas Gerais, in the cities of Pará de Minas and São Gonçalo do Pará, and observed low positivity in 2014 (24%), possibly reflecting adequate socioeconomic and sanitary conditions and, consequently, less exposure to risk factors for the transmission of enteroparasitosis in this region.

Through the qualitative evaluation of the results obtained, with respect to the proportional distribution of the diagnosed species in relation to the total number of positives, it was observed that there was a significant predominance ($p < 0.0001$, chi-square) of positive samples for protozoa, with 378 (97.4%) positive reports, compared to only 2.5% positive samples for helminths.

Urbanorum spp. presented the highest incidence coefficient in the period in which the study was carried out, representing 9.0% (252 positive samples, of a total of 2,777 samples evaluated, and 64,94% of the positive samples, being significantly higher ($p < 0.0001$, chi-square) than the coefficients off the other species identified, as can be observed in figure 3.

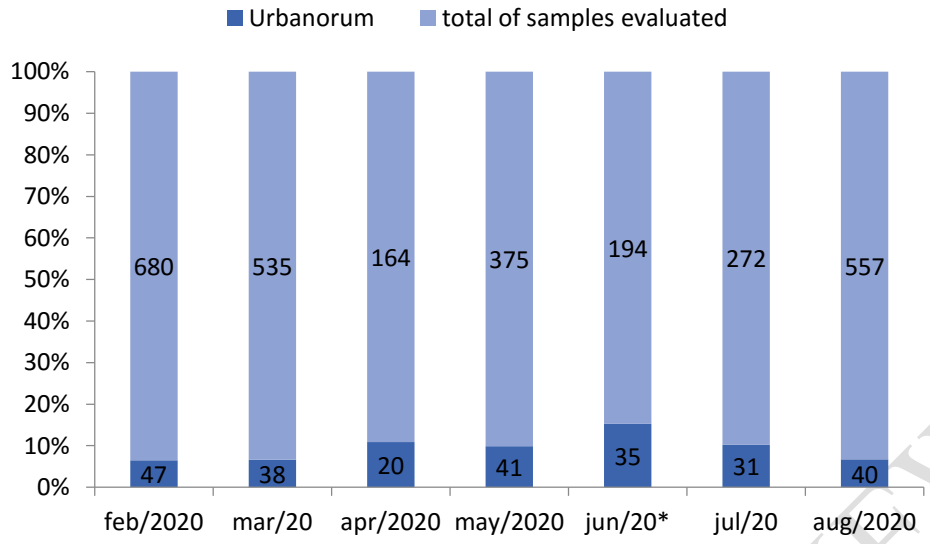


*Significant difference ($p < 0.0001$ - chi-square) in relation to the other species diagnosed

Figure 3. Incidence of intestinal protozoa and helminths detected in relation to the total number of positive samples in Vale do Paraíba, SP – Brazil (2021).

The low positivity for helminths has been observed in several surveys and is possibly linked not only to health improvements, but also to the practice of antiparasitic treatment in the routine of doctors who attend the Unified Health System - SUS, in Brazil [17- 19]. According to Belo et al. [19] the free distribution of Albendazole and its indiscriminate use when purchased in pharmacies, which does not occur for specific drugs for protozoa, are factors that contribute to a selective decrease in the occurrence of helminths.

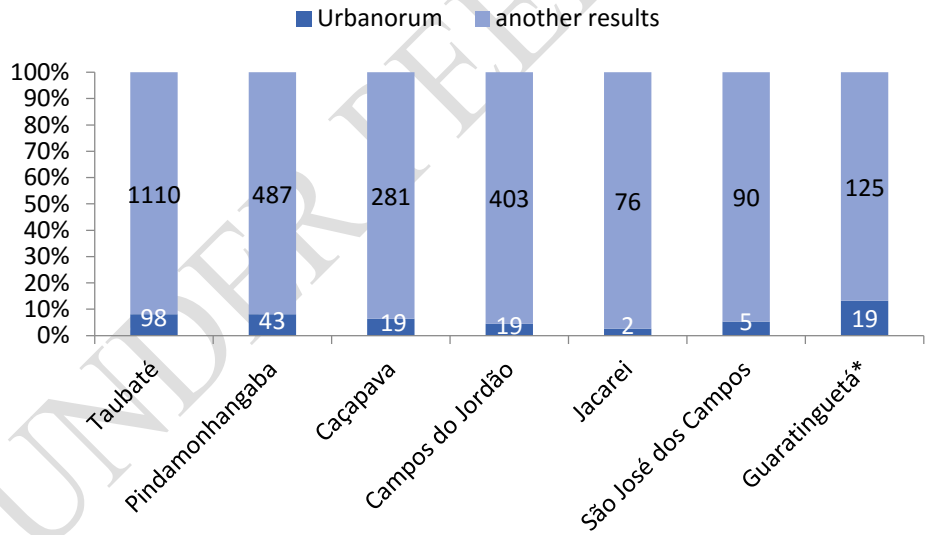
Specifically in relation to the protozoan *Urbanorum* spp. a higher incidence was observed in the month of June, which was significantly higher ($p < 0.0001$) than that observed in the months of February, March and August, as shown in figure 4.



* Significantly higher value (p <0.0001 - chi-square) than that observed in February, March and August.

Figure 4. Temporal distribution of the incidence of *Urbanorum* spp. in municipalities of the Paraíba Valley, SP - Brazil (2020)

Regarding the spatial distribution of *Urbanorum* spp. in the period between February and August 2020, it was possible to detect a significantly higher incidence (p < 0.05 - chi-square) in the municipality of Guaratinguetá, compared to the values observed in the municipalities of Campos do Jordão, Jacareí and São José dos Campos, as shown in figure 5.

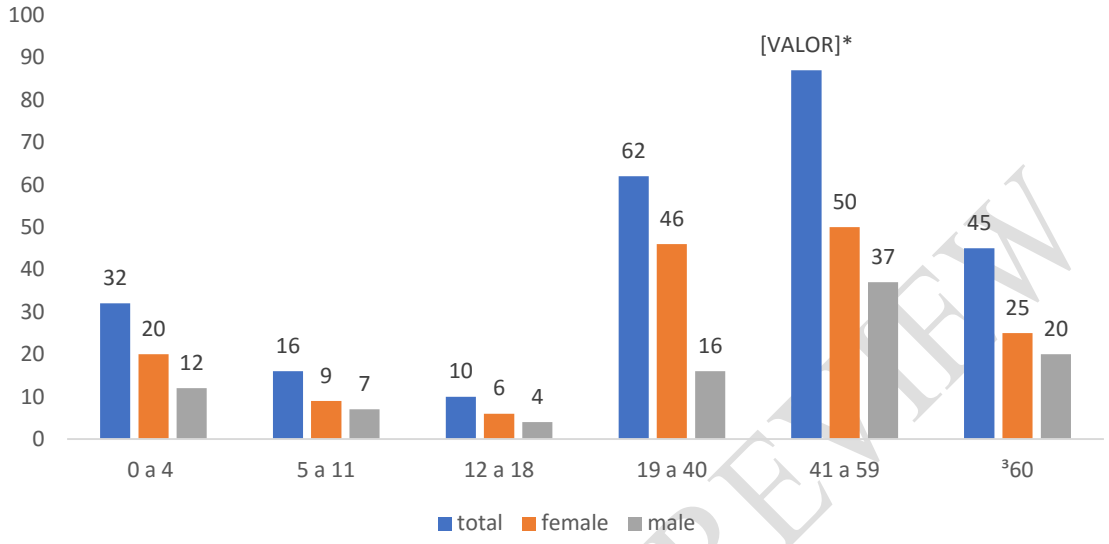


* significant difference (p <0.05- Chi-square) in relation to the municipalities of Campos do Jordão, Jacareí and São José dos Campos.

Figure 5. Spatial distribution of the incidence of *Urbanorum* spp. in municipalities of Vale de Paraíba, SP - Brazil (2021)

Regarding the distribution by sex, it was observed that of the total positive samples for *Urbanorum* spp., 96 were from male patients (38.1%) and 156 from female patients (61.9%), with a significant predominance of women P (<0 .0001 - Chi-square), corroborating with Casarin et al. (2019), who detected a predominance in the female sex, in the proportion of 1: 11.5 in relation to the male sex [20].

The age range of affected patients was wide, from 10 months to 91 years. The age group that was most abundantly positive was that of adults between 41 and 59 years, totaling 87 positive samples (34.5%), of which 50 samples belonged to female patients (57.5%) and 37 women to males (42.5%). The other data related to the distribution of incidence by sex and age group are shown in figure 6.



* significant difference (p <0.0001- Chi-square) in relation to the rest of the age groups, except for the range between 19 and 40 years.

Figure 6. Distribution by sex and age of the incidence of *Urbanorum* spp. in reports of coproparasitological examinations of patients treated in a clinical analysis laboratory in Vale do Paraíba, SP - Brazil (2021).

The distribution by age groups observed in the present study also agrees with the results obtained by Casarin et al. (2019), who conducted an epidemiological survey to determine the occurrence of this species, and with similarity of the present study, identified a predominance of positive results in adult patients. Regarding the distribution by gender, it was observed that there was no significant difference in the different age groups, with the exception of the age group of 19 to 40 years, in which a predominance of Urbanorum spp. significantly higher (p <0.0001-Chi-square) in female patients [20].

Regarding the concomitant occurrence with other species, only in four reports it was positive for more than one species together with *Urbanorum* spp., being 3 samples with *Endolimax nana* and 1 with *Entamoeba coli*, species of protozoa that despite not being pathogenic, may possibly help in a better understanding of the mechanisms involved in the transmission of the protozoan in question, since such protozoa are transmitted primarily by ingestion of water or food contaminated by feces.

Finally, it should be inferred that, despite the unpublished nature of the results presented here, which may be useful for a better understanding of the epidemiological aspects related to *Urbanorum* spp., it is of fundamental importance that advanced tools be used, in order to test the biological condition of this. According to Díaz and Perlaza [9], research related to the standardization of biological culture, analysis of cell structure and molecular and genetic analysis, are of fundamental importance to determine its biological

veracity, as well as to inspire studies that better determine its pathology, epidemiological and therapeutic aspects.

5. CONCLUSION

It is concluded that there is a high incidence of Urbanorum spp. in the Vale do Paraíba region, being more relevant in adult women, between 41 and 50 years old, with uniform distribution among the evaluated municipalities, but with greater occurrence in the municipality of Guaratinguetá.

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