

Dermatophytoses in patients attended from a private clinical analysis laboratory in João Pessoa-PB, between 2015 to 2019

Dermatofitoses em pacientes atendidos em um laboratório privado de João Pessoa-PB, entre 2015 a 2019

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Abstract

Introduction: dermatophytoses or “tinea” are characterized by being mycoses caused by fungi of the genera *Epidermophyton*, *Trichophyton* and *Microsporum*. These mycotic infections can present themselves as a form of lesions that affect the skin, hair and nails of individuals of both genders and all ages. **Objective:** to elucidate the epidemiological profile of dermatophytoses in patients examined by a private clinical analysis laboratory in João Pessoa-PB, between 2015 and 2019. **Methodology:** this is an epidemiological, analytical, retrospective and documentary study, in which data collection took place at the Clinical Pathology Laboratory – “HEMATO”, located in João Pessoa – PB. **Results:** the profile of those affected was predominantly female (58.5%), 18 to 59 years old (38.4%), white (53.6%) and with lesions, mainly in skin glabrous (38.5%), feet (33.3%) and nails (12.8%). When relating the age group to the injury site, it was noticed that injuries on glabrous skin, feet and nails, were more frequent in individuals aged 18 to 59 years, while injuries to the scalp were mostly found in individuals younger than 18 years old. The most prevalent species were *M. canis* (31.9%) and *T. rubrum* (31.9%). When correlating the fungal species with the lesion site, it was noted that *M. canis* was the main agent responsible for lesions in glabrous skin, scalp and hands, while *T. rubrum* was predominantly observed in nails and *T. mentagrophytes* in feet. **Conclusion:** it is concluded that the data present in this research can promote the development of indicators and public policies for the population most susceptible to dermatophytosis.

Keywords: Dermatophytes. Tinea. Filamentous Fungi.

Resumo

Introdução: dermatofitoses ou tineas se caracterizam por serem micoses causadas por fungos dos gêneros *Epidermophyton*, *Trichophyton* e *Microsporum*. Essas infecções micóticas podem se apresentar na forma de lesões que acometem pele, pelo e unhas de indivíduos de ambos os gêneros e todas as idades. **Objetivo:** elucidar o perfil epidemiológico de dermatofitoses de pacientes atendidos por um laboratório privado de análises clínicas em João Pessoa-PB, entre 2015 a 2019. **Metodologia:** trata-se de um estudo epidemiológico, analítico, retrospectivo e documental, em que a coleta de dados ocorreu no Laboratório de Patologia Clínica – HEMATO, localizado em João Pessoa – PB. **Resultados:** o perfil de acometidos foi predominantemente de indivíduos do sexo feminino (58,5%), com 18 a 59 anos de idade (38,4%), brancos (53,6%) e com lesões, principalmente, em pele glabra (38,5%), pés (33,3%) e unhas (12,8%). Ao relacionar a faixa etária com o local da lesão, percebeu-se que lesões em pele glabra, pés e unhas, foram mais frequentes em indivíduos de 18 a 59 anos, enquanto que lesões no couro cabeludo foram majoritariamente encontradas em indivíduos menos de 18 anos. As espécies mais prevalentes foram *M. canis* (31,9%) e *T. rubrum* (31,9%). Ao correlacionar a espécie fúngica com o local da lesão, notou-se que *M. canis* foi o principal agente responsável por lesões em pele glabra, couro cabeludo e mãos, enquanto *T. rubrum* foi predominantemente observado em unhas e *T. mentagrophytes* em pés. **Conclusão:** os dados obtidos nesta pesquisa podem fomentar o desenvolvimento de indicadores e políticas públicas para a população mais susceptível às dermatofitoses.

Palavras-chave: Dermatofitos. Tinea. Fungos Filamentosos.

INTRODUCTION

Fungi are single-celled (yeast-like) or pluricellular (filamentous) microorganisms, ubiquitous and causing various

diseases, such as allergies, mycotoxicoses and mycoses, in which the latter can be classified into: superficial, sub-cutaneous or systemic mycosis (ANDRADE JÚNIOR et al., 2018; NÓBREGA JÚNIOR et al., 2018; SILVA; MALTA, 2016).

*Dermatophytoses or tineas, in turn, are superficial mycotic and zoonotic infections, caused by fungi of the genus *Epidermophyton*, *Trichophyton* and *Microsporum*,*

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commonly called dermatophytes (LANA et al., 2016; ILYAS; SHARMA, 2017; PERES et al., 2010).

These fungi are filamentous, keratinolytic and keratinophilic, being, therefore, capable of parasitizing skin, hair and nails, in which the form of contamination can be anthropophilic, zoophilic or geophilic (ILYAS; SHARMA, 2017; LANA et al., 2016; MEDEIROS; CREPALDI; TOGNOLI, 2009; PERES et al., 2010).

In order to have an infectious process in humans, dermatophytes first adhere to the stratum corneum, which has an acidic pH. Then, there is the release of acidic proteases and keratinases, which will allow to cleave and metabolize proteins, with the microenvironment becoming alkalized. This change in pH causes the production of alkaline proteases and keratinases that will once again cause protein cleavage and metabolization, allowing fungal nutrition and the development of hyphae and arthroconidia. This results in a successful invasion of the stratum corneum and the beginning of the infectious process (ANDRADE JÚNIOR et al., 2020; PERES et al., 2010).

From an immunological point of view, there is the recognition of molecules present in the fungal wall, mainly β -(1,3)-glycans. These carbohydrates are recognized by dectin-1, dectin-2 and Toll-like receptors (TLR) type 2 and 4, causing activation of the nuclear factor kappa B (NF- κ B) pathway, allowing the production of pro-cytokines. inflammatory diseases, such as IL-1, IL-6 and TNF- α (ANDRADE JÚNIOR et al., 2020; LIU et al., 2017).

Once the tissue is parasitized by a dermatophyte, the type of tinea can be classified according to its anatomical location in: tinea capitis (scalp), tinea pedis (foot), tinea corporis (body), tinea cruris (inguinal region) e tinea unguium (nails) (LANA et al., 2016).

The affected individual usually presents lesions, flaking and itching, however the clinical signs and symptoms is not the only parameter that must be analyzed, since it is important to identify the genus or species for the development of a more appropriate pharmacotherapy. Thus, laboratory diagnosis is essential and is performed mainly through microscopy using potassium hydroxide (KOH) to elucidate fungal structures. (LANA et al., 2016).

Pharmacological treatment can be carried out using allylamines, azoles and griseofulvin. However, preventive measures are essential, such as good personal hygiene and the use of appropriate clothing in changing rooms, gyms and swimming pools (LANA et al., 2016; NENOFF et al., 2014; SOCIEDADE BRASILEIRA DE DERMATOLOGIA, 2017).

T. rubrum is the most prevalent species, being responsible for up to 70% of dermatophytoses, especially onychomycosis. *T. mentagrophytes*, in turn, is the second most commonly observed dermatophyte. *M. canis*, on the other hand, causes about 15% of dermatophyte infections, the most detected in the scalp, in states such as Rio de Janeiro, Rio Grande do Sul, Espírito Santos and São Paulo (LANA et al., 2016, KHALED et al., 2015;). However, the prevalence of dermatophytoses caused by different species can vary according to geographic location, climate, age group and tourism (LANA et al., 2016).

Thus, it is important to develop epidemiological studies to better characterize different populations, especially in places where there is a shortage of current research, such as João Pessoa – PB.

Given the above, the present study aimed to elucidate the epidemiological profile of dermatophytoses in patients examined by a private clinical analysis laboratory in João Pessoa-PB, between 2015 and 2019.

METHODOLOGY

Study classification

It was an epidemiological, descriptive, retrospective and analytical study (HOCHMAN et al., 2005), in which an investigation was carried out about the epidemiological profile in individuals with clinical suspicion for dermatophytosis, between the years 2015 to 2019, examined at the Clinical Pathology Laboratory – HEMATO, João Pessoa – PB. The study was approved by the Research Ethics Committee of the Health Sciences Center, UFPB, with the approval number: 3,770,492.

Data collect

Data collection took place between December 2019 and January 2020. These are secondary data from mycological tests that were present in the database of the Clinical Pathology Laboratory – HEMATO.

Sample inclusion and exclusion criteria

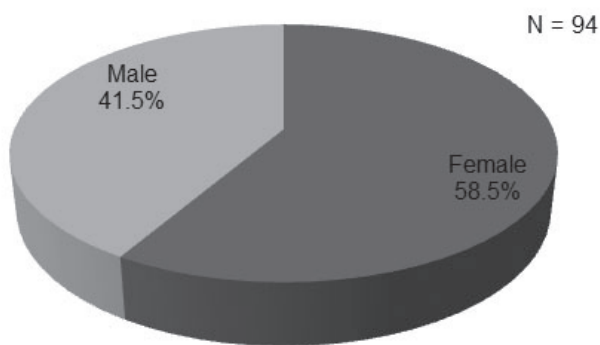
The results of the reports of the mycological examinations carried out between January 2015 and December 2019 were included, which were fully completed and which presented as identified etiologic agents, members of the genera *Epidermophyton*, *Trichophyton* and / or *Microsporium*. Reports that were incomplete, strikethrough, that were outside the stipulated period or that had fungi of other genera, as etiologic agents, were excluded.

Statistical analysis of epidemiological data

The data were analyzed using the Statistical Package for Social Science (SPSS) software, version 13.0. The calculation of simple and absolute frequency was performed for the variables gender, ethnicity, age group, location of the lesion and species. In addition, the gender was associated with age, ethnicity and location of the injury, the location of the injury with the age group and the location of the injury with the species. The Chi-Square test was applied and associations were considered statistically significant when $p < 0.05$ for the rejection of nullity hypotheses.

RESULTS

Between the years 2015 to 2019, 1055 suspected mycoses were analyzed, however, there were only 94 cases of dermatophytosis with a predominance of female patients (Figure 1).

Figure 1 – Percentage of gender affected by dermatophytes in João Pessoa – PB, between the years 2015 to 2019.

Source: Own authorship

Table 1 shows the statistical association between gender and the personal and clinical data of people affected by dermatophytes.

Tabela 1 – Statistical association between gender and the personal and clinical data of people affected by dermatophytes in João Pessoa – PB between the years 2015 to 2019.

Personal and clinical data	Female		Male		P
	N	%	N	%	
Age range					
0 to 17 years	09	16.4	12	30.8	
18 to 59 years	33	60.0	15	38.4	0,099
From 60 years	13	23.6	12	30.8	
Total	55	100	39	100	
Ethnicity					
White	29	52.7	21	53.8	
Mulatto	25	45.5	18	46.2	*
Black	01	1.8	00	0.0	
Total	55	100	39	100	
Injury site					
Foot	15	27.3	13	33.3	
Glabrous skin	18	32.7	15	38.5	
Scalp	10	18.2	03	7.7	*
Nails	12	21.8	05	12.8	
Hands	00	0.0	03	7.7	
Total	55	100	39	100	

p – Chi-Square Test; * Inapplicability of the Chi-Square test.

Source: Research data, 2020.

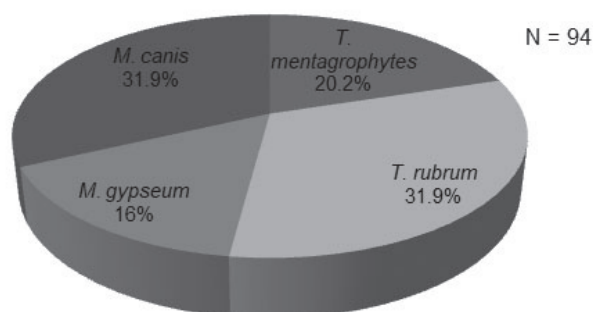
Table 2 shows the association between the injury site and age group.

Table 2 – Association between the injury site and the age group of people affected by dermatophytoses in João Pessoa – PB between the years 2015 to 2019.

Injury site	0 to 17 years old		18 to 59 years old		From 60 years	
	N	%	N	%	N	%
Foot	02	9.5	14	29.2	12	48.0
Glabrous skin	10	47.6	18	37.5	05	20.0
Scalp	07	33.3	05	10.4	01	4.0
Nails	01	4.8	10	20.8	06	24.0
Hands	01	4.8	01	2.1	01	4.0
Total	21	100	48	100	25	100

Source: Research data, 2020.

Then, it is possible to observe the percentage of dermatophytes identified.

Figura 2 – Percentage of different species of dermatophytes identified in affected by dermatofitoses in a private laboratory in João Pessoa – PB, between the years 2015 to 2019.

Source: Own authorship

Table 3 shows the association between the fungal species and the injured site.

Table 3 – Association between the species of dermatophytes and the injured site of people affected by dermatophytoses in João Pessoa – PB between the years 2015 to 2019.

Injury site	M. canis		M. gypseum		T. rubrum		T. mentagrophytes	
	N	%	N	%	N	%	N	%
Foot	04	13.3	06	40.0	08	26.7	10	52.6
Glabrous skin	17	56.7	05	33.3	10	33.3	01	5.3
Scalp	06	20.0	00	0.0	05	16.7	02	10.5
Nails	00	0.0	04	26.7	07	23.3	06	31.6
Hands	03	10.0	00	0.0	00	0.0	00	0.0
Total	30	100	15	100	30	100	19	100

Source: Research data, 2020.

DISCUSSION

The female gender was also predominant in other studies carried out in Brazil, such as Fortaleza-CE, where of 534 infected with dermatophytes 57.1% were female (BRILHANTE et al., 2000). In Amazonas, among 48 af-

ected individuals, it was observed that 62% were female (CORTEZ et al., 2012). While in a research carried out in Recife-PE, the predominance for male individuals was evidenced (SILVA et al., 2018).

However, even though the female gender has presented itself as the most prevalent in this research, it is evident that the microorganisms that cause dermatophytoses do not show a gender predilection, making the development of these conditions to be associated with individual issues, such as cultural, environmental and hygienic characteristics and immunological (SILVA et al., 2019).

Regarding the age group, for both genders, there was a predominance of individuals between 18 and 59 years of age. These results partially resemble a study carried out in Recife-PE, in which individuals between 31 and 60 years of age were the most prevalent for dermatophytes (SILVA et al., 2018). While in a research carried out in Cuité-PB, it was evidenced that the average age of people affected was 31.5 years of age, therefore there is a similarity with the results found (FIGUEIREDO et al., 2015).

The age group from 18 to 59 years is the one in which there is greater work activity, being generally associated with the use of closed shoes and possible contact with chemicals, skin attackers, in addition to more intense contact with other individuals, which can facilitate the development of dermatophytoses (OLIVEIRA et al., 2006; SILVA et al., 2018).

Regarding ethnicity, there was a greater number of cases, for both genders, in individuals considered white, which is similar to a study conducted in Cuité-PB (FIGUEIREDO et al., 2015). However, there is no correlation in the literature between human skin melanin and the occurrence of dermatophytoses.

Observations on the lesion site show that glabrous skin, followed by feet and nails, were the most prevalent for dermatophytes, in both genders, similar to a study conducted in Recife-PE (SILVA et al., 2018). *Tinea corporis*, generally affects the shoulders, trunk and arms and has been associated as one of the most commonly observed dermatophytes, due to the fact that in general dermatophytosis will start on glabrous skin, and may subsequently reach hair and hair follicles (LANA et al., 2016; PERES et al., 2010). On the other hand, the high prevalence for *tinea pedis* and *tinea unguium*, in this research, may be associated, mainly, with the excessive use of closed shoes, for the development of work and/or school activities (OLIVEIRA et al., 2006; SILVA et al., 2018).

In relation to *tinea pedis*, *tinea unguium* and *tinea corporis*, they were evidenced mainly in individuals between 18 and 59 years of age, who are those of working age. In individuals between 0 and 17 years of age, it is observed that there are lower prevalences related to injuries to the feet, nails and hands, and this can be justified due to the fact that children have lower concentrations of keratin in these sites, causing this population are less susceptible to keratinolytic fungi (SILVA et al., 2018). However, *tinea capitis* was mostly observed in this age group, similar to

other studies (ARAÚJO et al., 2012; CORTEZ et al., 2012; FREITAS et al., 2008; SILVA et al., 2018). Thus, it is important to emphasize that children are within the risk group of developing *tinea capitis*, due to issues of immunological immaturity and the greater involvement with playful activities related to bathing areas, contact with soil and/or animals (JONH et al., 2018; LANA et al., 2016).

M. canis is considered a zoophilic species, so its high prevalence is related to contact with infected animals, especially dogs, cats and rodents (RODRIGUES et al., 2008; HAWKINS; SMIDT, 2014; SILVA et al., 2019), while the presence of *T. rubrum*, as one of the main agents of dermatophytosis, is also observed in other studies (FIGUEIREDO et al., 2015; SILVA et al., 2018).

The species *M. canis* was evidenced mainly in glabrous skin, followed by scalp and feet. In addition, when compared to the other dermatophytes found, *M. canis* was the main agent found in the scalp, which corroborates with other studies carried out in Rio de Janeiro, Rio Grande do Sul, Espírito Santos, São Paulo, Goiânia, Africa and the European continent (LANA et al., 2016; REBOLLO; LÓPEZ-BARCENAS; ARENAS, 2008; SCARAMPELLA et al., 2015).

M. gypseum was observed mostly in feet, followed by glabrous skin and nails. This was the species found less frequently in this research, which is similar to other studies (LANA et al., 2016; SILVA et al., 2018).

T. rubrum was mainly isolated in cases of *tinea ungueal*, *tinea pedis* and *tinea corporis*, which is justified due to the ability of these microorganisms to easily parasitize nails and skin (SILVA et al., 2018; SILVA et al., 2019). Although this species of dermatophyte is rarely able to invade the scalp (LANA et al., 2016), the presence of these fungi in this site was also observed in this study.

T. mentagrophytes was found mainly in nail and skin samples, being considered in the literature, together with *T. rubrum*, the main causes of *tinea corporis*. This microorganism is capable of infecting both humans and animals, making this pathogen more easily infect individuals who maintain greater contact with animals and/or who live in rural areas (HAWKINS; SMIDT, 2014; LANA et al., 2016).

Thus, it is evident that, in this research, *T. rubrum* and *M. canis* are the main pathogens associated with dermatophytoses. This information is especially relevant because, currently, the genus *Trichophyton* is considered the most important from a clinical and epidemiological point of view. However, the data presented show a possible change in this profile, since members of the *Microsporum* genus affected a large number of individuals and showed the ability to infect different anatomical sites.

CONCLUSIONS

Between 2015 and 2019, 1055 suspected superficial mycoses were analyzed in a private clinical analysis laboratory in João Pessoa-PB, however, only 94 cases of dermatophytosis were recorded. The predominant profile

of affected individuals was the female gender, aged 18 to 59 years, white and with lesions mainly in glabrous skin, presenting the species *M. canis* and *T. rubrum* as the most prevalent etiological agents.

When associating the age group with the injury site, it was noticed that injuries on glabrous skin, feet and nails were predominant in individuals aged 18 to 59 years, while scalp injuries were mostly found in individuals under 18 years of age. When correlating the fungal species with the lesion site, it was noted that *M. canis* was the main agent responsible for damage to glabrous skin, scalp and hands, while *T. rubrum* was predominantly observed in nails and *T. mentagrophytes* in the feet.

In view of the above, the data presented in this research are important for public health, since they can contribute to the development of public policies that seek to support the most susceptible population.

ACKNOWLEDGMENTS

To the “Conselho Nacional de Desenvolvimento Científico e Tecnológico” (CNPq) for financial assistance and to the Clinical Pathology Laboratory – Hemato, for allowing access to mycological exams.

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Submetido em: 26/03/2020

Aceito em: 28/12/2020