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ORIGINAL ARTICLE

Analysis of antifungal prescriptions in a Basic Health Unit in the Federal District

Análise de prescrições de antifúngicos em uma Unidade Básica de Saúde do Distrito Federal

Análisis de prescripciones de antifúngicos en una Unidad Básica de Salud del Distrito Federal

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ABSTRACT

Background and Objectives: the inappropriate use of antifungal agents leads to the development of resistance and a lack of treatment effectiveness, which can result in the worsening of clinical condition, persistent infections, increased hospitalization rates and prolonged hospital stays as well as deaths and higher healthcare costs. This study aimed to analyze antifungal prescriptions in a Basic Health Unit in the Federal District Southern Health Region, Brazil. **Methods:** this was a cross-sectional, descriptive, and observational study, in which the duplicate copies of prescriptions retained at the pharmacy were assessed. **Results:** a total of 69 prescriptions dispensed in October 2019 were analyzed. Concerning medication prescription according to the Brazilian Common Denomination (DCB) and the verification of the presence of antifungal agents in the Federal District's List of Essential Medications (REME-DF), rates above 90% were found in the analyzed documents. Only one prescription contained the combination of two antifungal agents. The predominant prescribing category was nursing, followed by physicians and dentists. The most prescribed antifungal agents were fluconazole and miconazole. The routes of administration present in prescriptions were oral and topical. **Conclusion:** the lack of studies on antifungal use in primary care highlights the importance of this investigation for producing specialized knowledge on the subject.

Keywords: Antifungal Agents. Primary Healthcare. Drug Utilization. Pharmacoepidemiology.

RESUMO

Justificativa e Objetivos: o uso inadequado de agentes antifúngicos acarreta o desenvolvimento de resistência e a falta de efetividade do tratamento, o que pode levar ao agravamento do quadro clínico e à persistência das infecções, ao aumento das taxas e à prolongação das internações hospitalares, além de óbitos e elevação dos custos em saúde. O presente estudo teve como objetivo analisar as prescrições de antifúngicos em uma Unidade Básica de

Saúde da Região de Saúde Sul do Distrito Federal, Brasil. **Métodos:** trata-se de estudo transversal, descritivo e observacional, no qual foram avaliadas as segundas vias das prescrições retidas na farmácia. **Resultados:** foram analisadas 69 prescrições dispensadas em outubro de 2019. Em relação à prescrição de medicamentos segundo a Denominação Comum Brasileira (DCB) e à verificação da presença dos antifúngicos na Relação de Medicamentos Essenciais do Distrito Federal (REME-DF), encontraram-se taxas superiores a 90% nos documentos analisados. Apenas uma prescrição continha a associação de dois antifúngicos. A categoria prescritora predominante foi a enfermagem, seguida por médicos e odontólogos. Os antifúngicos mais prescritos foram fluconazol e miconazol. As vias de administração presentes nas prescrições foram oral e tópica. **Conclusão:** a escassez de estudos sobre o uso de antifúngicos na atenção primária ressalta a importância desta investigação para a geração de conhecimento especializado sobre o tema.

Descritores: Antifúngicos. Atenção Primária à Saúde. Uso de Medicamentos. Farmacoepidemiologia.

RESUMEN

Justificación y Objetivos: el uso inadecuado de agentes antifúngicos provoca el desarrollo de resistencia y la falta de efectividad del tratamiento, lo que puede llevar al agravamiento del cuadro clínico, infecciones persistentes, aumento de las tasas y prolongación de las hospitalizaciones, además de muertes y mayores costos en salud. El presente estudio tuvo como objetivo analizar las prescripciones de antimicóticos en una Unidad Básica de Salud de la Región Sanitaria Sur del Distrito Federal, Brasil. **Métodos:** se trata de un estudio transversal, descriptivo y observacional, en el que se evaluaron las segundas copias de las prescripciones retenidas en la farmacia. **Resultados:** se analizaron un total de 69 prescripciones dispensadas en octubre de 2019. En cuanto a la prescripción de medicamentos según la Denominación Común Brasileña (DCB) y la verificación de la presencia de antifúngicos en la Relación de Medicamentos Esenciales del Distrito Federal (REME-DF), se encontraron tasas superiores al 90% en los documentos analizados. Solo una prescripción contenía la combinación de dos agentes antifúngicos. La categoría prescriptora predominante fue enfermería, seguida por médicos y odontólogos. Los antifúngicos más prescritos fueron fluconazol y miconazol. Las vías de administración presentes en las prescripciones fueron oral y tópica. **Conclusión:** la falta de estudios sobre el uso de antifúngicos en la atención primaria destaca la importancia de esta investigación para la producción de conocimiento especializado sobre el tema.

Palabras Clave: Antifúngicos. Atención Primaria de Salud. Utilización de Medicamentos. Farmacoepidemiología.

INTRODUCTION

The Basic Health Unit (BHU), according to Ordinance 2,436 of September 21, 2017, is any healthcare establishment that provides primary care actions and services within the Brazilian Health System (In Portuguese, *Sistema Único de Saúde* - SUS).[1]

Primary healthcare (PHC), in turn, is described as the set of individual, family and collective health actions that involve promotion, prevention, protection, diagnosis, treatment, rehabilitation, harm reduction, palliative care and health surveillance. To this end, PHC is developed through integrated care practices and qualified management, which necessarily includes multidisciplinary teamwork aimed at the population of a defined territory, over which these professionals take health responsibility.[1,2]

In addition to being the preferred gateway to the SUS, PHC also acts as the organizer of the Healthcare Networks (In Portuguese, *Redes de Atenção à Saúde* - RAS) and as the coordinator of care. Thus, it is responsible for both the chronic monitoring of users in its territory and individuals who arrive spontaneously with acute conditions. When necessary, cases that cannot be treated properly are referred to the corresponding level of healthcare.[1-7]

The PHC pharmacist carries out both technical-managerial activities, promoting the regular supply and adequate storage of medications and supplies, as well as technical-pedagogical and clinical-assistance activities, offering pharmaceutical care to users and providing health education for the multidisciplinary team and the population.[8-10]

Pharmacological treatment is the most widely used treatment to combat acute and chronic infectious diseases. Thus, antimicrobial drugs play an important role in restoring and improving users' health. However, on the other hand, their indiscriminate and inappropriate use poses a risk not only to individuals but also to society.[11,12]

Fungal infections treated in PHC in Brazil, especially superficial ones such as candidiasis, dermatophytosis and pityriasis versicolor, are prevalent, with rates that can vary between 10% and 30% in populations treated at this level of healthcare. These cases occur more frequently in vulnerable populations, such as children, older adults, immunocompromised patients and people with chronic diseases such as diabetes mellitus. The prevalence of these infections varies according to social determinants of health, such as hygiene, socioeconomic conditions and access to healthcare services and technologies, which makes primary care crucial for early diagnosis and effective treatment.[11-13]

Inappropriate use of antifungal agents leads to the development of resistance and, as a consequence, can

worsen clinical conditions and cause persistent infections, in addition to reducing quality of life, prolonging hospital stays, increasing mortality and healthcare costs.[12,13]

Drug utilization studies provide fundamental theoretical support for the planning, development and assessment of pharmaceutical care in PHC. Considering this context, the present research aimed to analyze antifungal prescriptions in a BHU in the Federal District Southern Health Region, Brazil.

METHODS

This is a cross-sectional, descriptive and observational study, in which second copies of prescriptions from the pharmacy of BHU nº 03 in Santa Maria, Federal District, Brazil were assessed.

The Federal District has 31 satellite cities. Santa Maria, one of these satellite cities, has an estimated population of 130,000 inhabitants. The city has 12 BHUs that offer primary care, including medical consultations, nursing, pharmacy services and monitoring of chronic diseases. Moreover, there is the *Hospital Regional de Santa Maria*, which provides emergency services and specialized care. BHU nº 3 in Santa Maria, where the study was conducted, assists predominantly the urban population due to its location.

To perform the analysis of prescriptions, the following inclusion criteria were adopted: documents that contained at least one drug from the antifungal class and whose drug supply by the pharmacy occurred in October 2019. The exclusion criterion for the prescriptions was illegibility of documents.

Data collection was carried out manually in the following month, i.e., in November 2019. It is important to note that the BHU pharmacy does not operate on weekends and, therefore, only the documents dispensed on weekdays were analyzed. It is estimated that a total of 1,500 prescriptions are dispensed per month at the unit.

Considering the compliance of prescriptions with the indicators of rational use of medications proposed by the World Health Organization, the criteria analyzed were: whether antifungal agents were prescribed as monotherapy or in combination; whether the Brazilian Common Denomination (In Portuguese, *Denominação Comum Brasileira* - DCB) was used; the definition of administration route; whether or not the drug is present in the Federal District's List of Essential Medications (In Portuguese, *Relação de Medicamentos Essenciais do Distrito Federal* - REME-DF); and the identification of the prescriber's professional category. REME-DF is the reference document for all services provided in the satellite cities of the Federal District. Due to the constant review of REME-DF, its latest version available on the Federal District Department of Health website was consulted.

For data organization and processing, the Office for Windows data package was used through the Excel® tool, producing descriptive statistics data. Finally, the project was submitted and approved by the Health Sciences Teaching and Research Foundation (In Portuguese,

Fundação de Ensino e Pesquisa em Ciências da Saúde) Research Ethics Committee (REC), under Opinion 3,142,346 and Certificate of Presentation of Ethical Appreciation 99335218.2.3001.5553, in accordance with guidelines proposed in the Ministry of Health Resolutions 466/2012, 510/2016 and 580/2018. Furthermore, all documents of the scientific project related to the REC approval were presented to the BHU managers and pharmacist studied before data collection.

RESULTS

In the study, 69 (5.6%) prescriptions containing antifungal agents were identified out of a total of 1,231. Most of prescribed medications belonged to REME-DF, i.e., 65 medications (94.21%). Most of medications were prescribed by DCB (97%).

As for the number of medications per prescription, 98.55% (n=68) of these documents contained only one prescribed antifungal. The only association found was between tioconazole and tinidazole. The most prescribed antifungal agents were fluconazole (52.17%) and miconazole (37.7%) (Table 1).

Table 1. Antifungal agents prescribed in a Basic Health Unit in Federal District, Brazil.

Antifungal agents	N (%)
Fluconazole	36 (52.17%)
Miconazole	26 (37.70%)
Ciclopirox olamine	3 (4.34%)
Itraconazole	2 (2.89%)
Ketoconazole	1 (1.45%)
Tioconazole + tinidazole	1 (1.45%)
Total	69 (100%)

Source: own authorship.

The main route of administration of studied drugs, considering all prescribed antifungal agents, was oral (55.07%), followed by topical (44.93%).

Regarding the provider's professional category, most prescriptions were written by nurses (53.6%), followed by physicians (45%) and, finally, dentists (1.4%).

DISCUSSION

Prescription analysis studies allow for a better assessment of the profile of medication use and provide evidence on population consumption, assisting in the planning of actions and services, in addition to revealing the priorities that should be considered strategic in healthcare and assistance qualification.[3]

According to the documents analyzed, no prescriptions were excluded due to lack of legibility, which is a positive indicator according to theoretical assumptions

of safe and rational use of medications. It is worth remembering that this result differs from that found in most studies conducted in Brazil, since the literature indicates that it is still common to find incomplete or incomprehensible prescriptions, including weaknesses in the identification of patients, professionals and the prescribed drug technology.[11]

Similar to the value found in this study, a study that aimed to analyze prescriptions of antihypertensives in a BHU in the Federal District found a rate of 91.1% of medications present in REME-DF. Prescribing medications included in the essential medications list is advantageous, as it enables access to health technologies available in the SUS.[3,14-15]

According to the theoretical arsenal of rational use of antimicrobial agents, it is essential to prioritize the use of monotherapy, as was found in most prescriptions of antifungal agents analyzed. The scientific literature highlights the importance of reserving combinations of antimicrobial agents for more complex and resistant conditions, when synergism is crucial for the treatment of infections and for cases of polymicrobial infections.[3,16,17]

Furthermore, the rational and cautious use of antifungal agents is essential to avoid clinically relevant drug interactions, prevent the development of resistance and minimize the risk of adverse effects, among other outcomes. Antifungal agents often interact with other drugs due to their influence on hepatic metabolism, especially through cytochrome P450. These interactions can alter the levels of other medications, increasing the risk of adverse effects or reducing the effectiveness of treatment, which requires careful monitoring. Therefore, avoiding overprescription of medications is crucial.[16,17]

The present investigation found rates close to 100% of antifungal agents prescribed according to DCB, which represents a positive indicator of good prescribing practices. A study that aimed to assess and compare the quality of antibiotic prescriptions dispensed in a public pharmacy and in a private pharmacy revealed that, of the 476 prescriptions in the public pharmacy, 82% of antibiotics were expressed according to DCB.[18]

Similar to the present investigation, a study that investigated prescriptions of antihypertensives in a BHU in the Federal District found a rate higher than 90% in relation to the DCB adoption indicator. Prescribing medications according to DCB is essential, as it facilitates access to medications, whether through purchase or free of charge through healthcare services.[3,19]

Similar to the data presented in Table 1, a study conducted in a hospital in Oman in 2013, through the analysis of 1,353 prescriptions, revealed that fluconazole was the most prescribed antifungal (n=715; 52.8%), followed by nystatin and voriconazole (n=233; 17.2% and n=152; 11.2%, respectively). Fluconazole is an antifungal from the azole group widely used due to its long half-life, good tolerability by users and minimal associated toxicity.[13]

A study conducted in a city in São Paulo aimed to describe the practice of prescribing, dispensing, using, adhering to and storing medications by older adults in Family Health Strategy units. Among the prescribed medications, some classes were less used, such as antilipemic drugs (62.1%), nutrients (50%), herbal medicines or medicinal herbs (28%), antimycotic and antifungal agents (25%), and antimicrobial agents (21.4%). In the group of antimycotics and antifungal agents, ketoconazole and fluconazole were identified as the prevalent medications.[14]

Fungal diseases range from superficial infections, such as cutaneous and subcutaneous infections, to systemic conditions. Scientific literature highlights that, considering the rise in resistance to antifungal agents over time, rational prescription of these drugs is crucial, even if it is topical. Furthermore, from the point of view of rational use indicators, the oral route hegemony is desirable, since this is considered a safe route when compared to parenteral routes. Therefore, considering the aforementioned administration data route, even though the routes used in the prescription of BHU antifungal agents are considered safe, such as oral and topical administration, it is necessary to use this class of drugs cautiously and consciously, mainly due to the increase in cases of resistance.[12,13,21,22]

One result that differs from this study in relation to others conducted in the PHC of the Federal District is the prescribing category, which, as observed in the results, has a higher prevalence of nursing. The supremacy of medicine in prescribing medications is evident, not only in primary care, but also in the various levels of healthcare. One possible explanation for the results found is a greater appreciation of nursing as a category of prescribing medications in PHC in recent years, not only in the Federal District, but it is a phenomenon that is also evident in other Federative Units of Brazil. Nursing prescription is a legal duty of nurses that must be carried out within the limits of their training and competency. In general, nurses can prescribe medications according to the SUS and Ministry of Health clinical protocols and therapeutic guidelines, requiring ongoing education to ensure care efficacy and effectiveness.[3,23,24]

Furthermore, still in the wake of the aforementioned discussion, to ensure the resolvability and effectiveness of actions and services, constant training on the topic of promoting the rational use of antifungal agents in favor of preventing medication errors is essential for all professional categories involved in prescribing PHC medications so that unique and contextualized educational actions are developed according to each profile of occupational assignment/performance.[25,26]

Still on the importance of continuing education in favor of the rational use of antifungal agents, it is highlighted that it is essential that healthcare professionals participate in qualifications related to laboratory tests for differential diagnosis. Diagnostic confirmation of mycological diseases is crucial to avoid inappropriate treatments, which not only compromise therapeutic effectiveness but also contribute to the development of antifungal resistance. Furthermore, many lesions caused by fungi present clinical characteristics similar to those of lesions of other etiologies, which highlights the need for a careful diagnostic approach. In this regard, training actions focused on the

use of specific tests in the diagnostic process are essential to ensure accuracy in clinical management, promoting better outcomes for patients and reducing the impacts of resistance in the context of public health.[27]

One limitation to be highlighted in this study is the time of data collection. Due to the emergence of the coronavirus disease 2019 (COVID-19) pandemic, the researcher was authorized to collect data for a reduced period to avoid crowding in the small physical space of BHU. Therefore, the investigation covered only the data generated in October 2019. As a result, the data may be underestimated, highlighting the importance of con-ducting scientific investigations with longer collection periods. Furthermore, due to its retrospective nature, the study faces limitations related to old data, which may be inaccurate, incomplete and outdated. Finally, local studies may face the limitation of the lack of generalizability of results to other populations, due to the local context's specific characteristics.

Furthermore, it is worth remembering that the scarcity of studies on the use of antifungal agents at different levels of healthcare in Brazil and worldwide makes it difficult to conduct a comparative discussion of the findings of this study with others that had a similar objective. The few studies found addressed the use of antifungal agents in hospital settings or discussed consumption data for the category of antimicrobial agents in general in primary care. Thus, the present investigation is relevant and contributes to the production of specialized knowledge on the subject.

The research highlighted a predominantly rational practice in the prescription of antifungal agents in the studied BHU. The high rate of compliance with REME-DF, the use of DCB, the prescription in monotherapy and the choice of safe administration routes suggest an effective approach to promote the safe and rational use of these drugs. The predominance of prescriptions by nurses indicates a growing appreciation of this category, although ongoing training is still needed to improve practice over time. Despite the study's temporal and contextual limitations, its value in filling a gap in research on anti-fungal agents stands out, contributing significantly to the understanding and improvement of prescribing practices in primary care.

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Rev. Epidemiol. Controle Infecç. Santa Cruz do Sul, 2024 Out-Dez;14(4):503-508. [ISSN 2238-3360]

Page 05 of 06
not for quotation

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AUTHORS' CONTRIBUTIONS

Débora Santos Lula Barros contributed to bibliographic research, abstract writing, introduction, methodology, discussion, interpretation and description of results, preparation of tables, conclusions, review and statistics. **Pedro Juan Ribeiro Calisto dos Santos** contributed to work review. **Thayanne Nara da Rocha** contributed to work review.

All authors approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.

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Page 06 of 06
not for quotation