

# Onychomycosis in a Community of Garbage Collectors in Northeast Brazil

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## Abstract

Onychomycosis is a fungal infection of the nails that can cause an important adverse impact on the quality of the affected individual's life. This study aimed to evaluate the prevalence and to identify the predominant pathogens of onychomycosis among a population of Garbage Collectors. A clinical sample of the nail abnormal was submitted to direct mycological exam (NaOH) and culture in Sabouraud's agar and Mycosel medium. Of the 80 garbage collectors examined, 45 were male and 35 female. Among examined individuals, 24 (30%) presented nails with abnormal aspects. Direct exam was positive in 20 samples. Culture was positive in 23 samples. The etiologic prevalence of onychomycosis was: 12 (50%) *Trichophyton rubrum*, 08 (33.3%) *Candida* spp., 03 (12.5%) *Trichosporon beigeli*. This study demonstrated the high prevalence of onychomycosis among garbage collectors. The main agents causing onychomycosis in this population was *T. rubrum*, *Candida* spp and *T. beigeli*.

## INTRODUCTION

Onychomycosis, fungal infection of the nail, is a common medical problem of adults that can cause an important adverse impact on the quality of the affected individual's life, leading to reduced self-esteem and possibly affecting work potential.<sup>1,2</sup> It is an infection usually caused by dermatophytes, yeast, and non-dermatophytic moulds.<sup>3</sup>

Recently, it has been reported that about 20% of persons between 40 and 60 years of age have onychomycosis, and it represents around 30% of all superficial mycotic infection and 50% of nail disorders.<sup>1,3,4</sup> Frequent exposure to fungus, damage by trauma or disease, irrational use of antibiotics, HIV infection and immunosuppressive drug therapy are some predisposing factors for onychomycosis.<sup>1</sup>

The importance of the study of onychomycosis lies in the increase of its prevalence. In the United States of America, it is estimated at between 2% and 13% present onychomycosis, again the more elderly individuals presenting this infection in a percentile that varies from 15% to 20% and can reach as much as 50%.<sup>2</sup> This study aimed to evaluate the prevalence and to identify the predominant pathogens of onychomycosis among a population of Garbage Collectors.

## MATERIALS AND METHODS

## PARTICIPANTS (GARBAGE COLLECTORS)

Over a period of three months (March 2008 - May 2008), residents in a community of garbage collectors, living around the landfill of Itabuna's city, northeast Brazil, were briefed about the aims of the study and invited to participate. All participants signed the informed consent form. The research protocol was approved by the Ethical Committee of State University of Santa Cruz. The clinical specimens collected were sent to the Microbiology Laboratory of State University of Santa Cruz for mycological analysis.

## SPECIMEN COLLECTION AND PROCESSING

The participants were examined and the nails of hands and feet were classified as normal or abnormal. The specimens, obtained from clinically abnormal nails, were cleaned with 70% alcohol and a nail dust samples were taken from the nail bed after subungual scraping from the most proximal part of the lesion. In the case of onycholysis, the nail was cut back and material was scraped off the underside of the nail and from the nail bed.

Classification of the onychomycosis was based on the four specific clinical types of alteration presented, according to the method of Roberts and colleagues (1990).<sup>5</sup>

- Distal and lateral subungual onychomycosis.
- White superficial onychomycosis

- Proximal subungual infection
- Total dystrophic onychomycosis

The samples of each patient were placed in separate sterile Petri dish and transported to Microbiology Laboratory. Scales scraped from the nails were analyzed for fungal elements, such as hyphae or blastoconidia, by direct microscopy examination, in NaOH (30%). For fungal cultures, all samples were inoculated on each of two isolation media (i) Sabouraud glucose agar (SGA; Difco Laboratories, Detroit, MI) and (ii) Mycosel agar (Sanofi, France). The culture tubes were incubated at 28°C and examined daily for one month. Specimens from the lesions were repeatedly collected three times when it was observed growth of a nondermatophyte alone from a specimen that has tested positive for fungi on direct microscopy.

To determine yeast micromorphology, cornmeal-Tween 80 agar plates were streaked and stabbed with a 48-h-old yeast colony, covered with a sterile cover slip, incubated at room temperature for 3 to 5 days. Dermatophyte identification was based on micromorphological aspects on slide culture in agar potato block. The identification of nondermatophyte species was performed by following micro and macroscopic evaluations of the primary cultures and slide culture in agar potato block.

## STATISTICAL ANALYSES

SPSS for Windows version 9.0 was used to complete all data analyses. Differences were evaluated using the Chi-square test with the Yates correction. A “P” value of <0.05 was considered statistically significant.

## RESULTS

Of the 80 garbage collectors examined, 45 were male (Age mean: 23.8; Median: 23.0; Range: 62) and 35 female (Age mean: 19.7; Median: 15.0; Range: 63). Among examined individuals, 24 (30%) presented nails with abnormal aspects, of these 15 were male and 9 were female. Mycological exam confirmed Onychomycosis in all 24 specimens collected. About clinical types of onychomycosis was observed: 15 (62.5%) with Distal and lateral subungual onychomycosis; 01 (4.2%) with White superficial onychomycosis; 05 (20.8%) with Proximal subungual infection and 03 (12.5%) with Total dystrophic onychomycosis (date not show).

Table 1 shows the results of laboratory analysis. Presented positive direct exam 20 collected samples (25% of the total individuals, 83.3% of the ungual abnormality and 82.6 of the

positive culture). The culture was positive in 23 samples (28.75% of the total individuals, 95.8% of the ungual abnormality and 100% of the positive direct exam). Only 1 sample was positive direct exam and negative culture.

**Figure 1**

Table 1. Direct Microscopy versus Culture

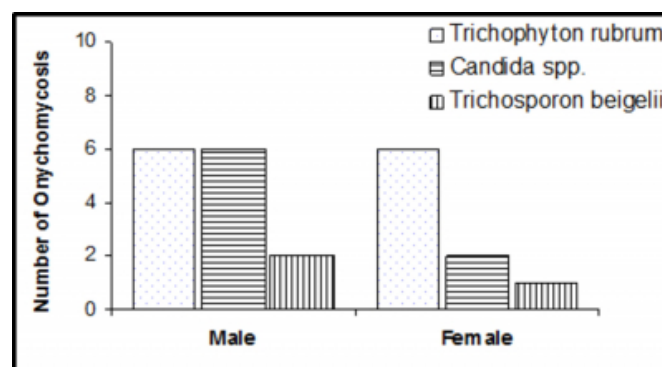
Direct Examination	Culture		
	Positive (%)	Negative (%)	Total (%)
Positive	20 (83.3)	00 (0.0)	20 (83.3)
Negative	03 (12.5)	01 (4.2)	04 (16.7)
Total	23 (95.8)	01 (4.2)	24 (100)

The prevalence of onychomycosis and the etiologic agent between different age groups was not statistically significant  $p=0.384$  and  $p=0.293$ , respectively.

Figure 1 shows the etiologic agents isolated by culture between genders. The etiologic prevalence of onychomycosis was: 12 (50%) *Trichophyton rubrum*, 08 (33.3%) *Candida* spp., 03 (12.5%) *Trichosporon beigeli*. The etiologic agent was not identified in 01 (4.17%) sample. The onychomycosis etiology was not different statistically between gender ( $p=0.661$ ).

**Figure 2**

Figure 1. Etiologic Agent of Onychomycosis between genders.



## DISCUSSION AND CONCLUSION

In the present study, onychomycosis was found to be commonest among garbage collectors. This population work collecting garbage to recycle without any protection equipments, they have a poor socioeconomic status and live around the landfill.

Onychomycosis is the most common nail disease in adults. In various studies the prevalence ranged from 2.7% to 13%.<sup>6</sup> Recently the prevalence of onychomycosis in North America

has been estimated to be from 6.8% to 13.4%.<sup>7</sup> Many studies point that the onychomycosis prevalence increase with advancing age, due to a reduced rate of nail growth and increased trauma of nails compared to the younger age group, thereby providing the fungal organism with more opportunity to cause nail bed disease and nail plate invasion.<sup>2,6</sup> Unlike our study, the prevalence of onychomycosis between different age groups was not statistically significant ( $p=0.384$ ).

The onychomycosis was found in 24 (30%) of examined individuals. Our results are similar to other studies from Brazil, Spain, Tunis and Colombia.<sup>2,6,8,9,10</sup> About clinical types of onychomycosis was observed: 15 (62.5%) with Distal and lateral subungual onychomycosis; 01 (4.2%) with White superficial onychomycosis; 05 (20.8%) with Proximal subungual infection and 03 (12.5%) with Total dystrophic onychomycosis. These findings are accorded to Araujo and colleagues (2003).<sup>2</sup>

We observed similar results between direct exam (NaOH) and culture, also found in others studies.<sup>11</sup> Of a 24 specimens collected, 20 were positive by direct exam and 23 by culture. Only 1 sample was positive by direct exam and negative by culture (Table 1). A study in Rio de Janeiro showed NaOH positive with positive culture in 219 cases and NaOH positive with negative culture in 346 cases.<sup>2</sup> Brilhante and colleagues (2005)<sup>3</sup> didn't find good accordance between direct exam and culture.

The etiologic prevalence of onychomycosis was: 12 (50%) *Trichophyton rubrum*, 08 (33.3%) *Candida* spp., 03 (12.5%) *Trichosporon beigelii* (Figure 1). The etiologic agent was not identified in 01 (4.17%) sample. The onychomycosis etiology was not different statistically between gender ( $p=0.661$ ). Araujo and colleagues (2003)<sup>2</sup> examined patients with presumption of onychomycosis and found in toenails dermatophytes (64.7%), *Candida* spp (30.1%) and non-dermatophytes and others (5.2%), when examined fingernails found dermatophytes (5.6%), *Candida* spp (88.8%) and non-dermatophytes and others (5.6%). Godoy and colleagues (2009)<sup>6</sup> revealed the yeasts as the most frequent agents in fingernail onychomycosis (38.3%) and *C. albicans* 18.3%, *C. parapsilosis* 13.8% were the most frequent species. The dermatophytes did have a major role in fungal infection of toenails onychomycosis (31.6%). The authors suggest that the higher proportion could be the result of more traumas and the greater use of occlusive footwear in

male and tight fitting shoes with high heels in females. *Trichophyton rubrum* in 33.2% followed by *T. mentagrophytes* in 6.3% were the most frequent species in toenail onychomycosis. The non-dermatophytic fungi were etiologic agent in 7.4% of cases. A similar result was found in different states of Brasil.<sup>11,12,13</sup>

In conclusion, this study demonstrated the high prevalence of onychomycosis among garbage collectors what could be best evaluated for health public departments. The mains agents causing onychomycosis in this population was *T. rubrum*, *Candida* spp and *T. beigelii*.

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