LED THERAPY AND PHOTOTHERAPY IN THE TREATMENT OF CANDIDA ALBICANS INFECTIONS: A LITERATURE REVIEW

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ABSTRACT

Introduction: Resistant infections represent a global crisis and make it necessary to search for new therapeutic technologies. The cytotoxic properties of photodynamic therapy have proven to be promising in combating drug-resistant infections. *Candida albicans* is a microorganism naturally present in the human body but is associated with different types of infections and the development of drug resistance. **Objective**: To analyze the effect of photodynamic therapy on infections caused by *Candida albicans*. **Method**: Articles published since 2019 were collected through PubMed and the Virtual Health Library (BVS), using the terms “antimicrobial blue light” and “Candida albicans.” The most relevant studies were selected, resulting in 10 articles. **Results**: Favorable cytotoxic effects of phototherapy were observed in combating infections, with the most promising light frequencies ranging between 405 nm and 470 nm. However, higher frequencies such as 660 nm also showed positive results. Different outcomes were observed depending on the exposed species, with *C. albicans* demonstrating favorable responses. Conclusion: A potent cytotoxic effect was observed between 405 nm and 470 nm against *C. albicans*.

Keywords: phototherapy; *Candida albicans*; sterilization.

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INTRODUCTION

Resistant infections are of great global relevance, as resistant strains cause high morbidity and mortality rates due to the elevated incidence of reinfection. Therefore, the development of new technologies capable of acting as an alternative or complement to antibiotic and antifungal therapies is necessary, such as photodynamic therapy. This treatment is based on the cytotoxic properties of light, which, when applied to the target tissue, with or without photosensitizing molecules, can reduce tumor cells or pathogenic microorganisms.[2,3].

noteworthy. In particular, *Candida albicans* is frequently associated with infections resistant to antibiotics in several sites of the organism, making its treatment

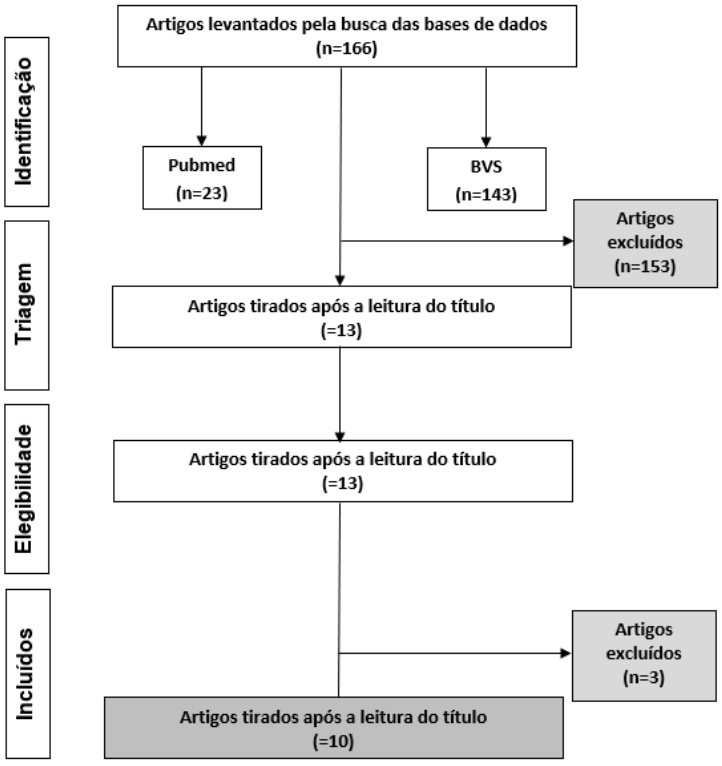
challenging. This scenario highlights the importance of exploring new technologies capable of reducing the rate of reinfection and the development of antifungal resistance. [1,4]. The present study aims to analyze the effect of photodynamic therapy in the treatment of *Candida albicans* infections.

METHODOLOGY

In this expanded review, PubMed and the Virtual Health Library (BVS) were used as electronic databases. The descriptors “antimicrobial blue light” and “Candida albicans” were combined using the Boolean operator “AND.” The following inclusion criteria were applied: full-text articles, in English, Spanish, or Portuguese, available for free, and published from 2019 onward.

Figure 1 shows the methodological flowchart. Titles and abstracts were initially analyzed, excluding articles irrelevant to this review. Subsequently, studies that did not address the guiding question were also excluded.

Figure 1. Methodological flowchart



RESULTS

Photodynamic therapy is promising and has a cytotoxic effect through the application of light on target sites. This light activates photosensitive molecules that release reactive oxygen species, leading to a cytotoxic effect and microorganism death.[5].

Several variables influence the outcomes of these studies. One of these variables is light frequency, as different wavelengths have distinct efficacy in eliminating microorganisms of interest. [6]. According to the literature, high-intensity wavelengths (405 nm – 470 nm) demonstrated proven antimicrobial activity. [7-9]. However, other light frequencies, such as 660 nm and 650 nm, also proved effective against pathogenic organisms.[10,11].

Another variable to consider is the pathogen being studied. Evidence indicated that organisms such as *C. albicans* and *E. coli* showed greater susceptibility to phototherapy [12], with additional capacity to inhibit biofilm formation. [13]. In contrast, organisms such as *S. aureus* demonstrated higher resistance to the therapy. [14].

CONCLUSION

A favorable cytotoxic effect was observed when *Candida albicans* was exposed to phototherapy with light frequencies between 405 nm and 470 nm. Further studies are necessary to develop protocols aimed at increasing decontamination efficiency and subsequently implementing this approach as a common clinical practice.

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