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EFFECTIVENESS OF ALTERNATIVE THERAPIES IN THE MANAGEMENT OF RECURRENT URINARY TRACT INFECTIONS IN DIABETIC WOMEN

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Abstract: This study investigated the effectiveness of alternative approaches in managing recurrent urinary tract infections (RUTIs) in diabetic women. The research included the use of cranberry, D-mannose, probiotics, and oral immunotherapy as forms of prevention and treatment. Results showed that while antibiotics remain essential, alternative therapies proved effective in reducing infection recurrence. Cranberry and D-mannose use contributed to decreased urinary tract infections, while probiotics helped restore urinary flora balance. The study also highlighted the importance of continuous management and prevention strategies to improve patients' quality of life and better control diabetes. It concludes that combining pharmacological and non-pharmacological approaches shows promise for managing RUTIs in diabetic women.

Keywords*:* Urinary infection; diabetes; treatment.

INTRODUCTION

The impact of recurrent urinary tract infections (RTIs) in diabetic patients is a topic of growing relevance due to the high prevalence of these infections in this population group, which has a number of specific physiological and metabolic characteristics. The prevalence of RTIs in diabetics is significantly higher than in non-diabetic individuals, with several studies showing that diabetes mellitus (DM) increases the propensity to develop urinary infections, especially among women. In a study by Shankar et al. (2015) found that diabetic women are much more likely to develop URI compared to those without the disease, due to altered immunological and metabolic factors. These factors include unregulated glycemia, which creates a favorable environment for bacterial proliferation in the urinary tract. Urinary infections in diabetic patients are not only more frequent, but can also be more di-

fficult to treat, requiring well-targeted therapeutic strategies and the use of multiple antibiotic agents (SHANKAR et al., 2015).

Various risk factors associated with diabetes contribute to the development of URTIs in diabetic patients. These include hyperglycemia, which can impair the function of the immune system, making patients more vulnerable to infections. In addition, anatomical changes, such as diabetic cystopathy, are common among diabetics and can predispose them to the development of urinary infections. Chronic hyperglycemia favors bacterial growth, especially of strains such as Escherichia coli, one of the main culprits in UTIs. According to a study by Foxman (2014), hyperglycemia can reduce the function of the immune system, hindering the body's defense against urinary tract infections. This is due to the increased concentration of glucose in the urine, which serves as an additional substrate for bacterial proliferation, as well as a compromised immune function that reduces the body's ability to respond adequately to infections (FOXMAN, 2014).

The relationship between hyperglycemia and increased susceptibility to urinary tract infections is complex and involves various pathophysiological mechanisms. In diabetic patients, hyperglycemia can lead to a series of changes in the body that favor the onset of infections. According to Zhang et al. (2016), high blood glucose increases the excretion of glucose in the urine, creating an environment conducive to the growth of microorganisms. Hyperglycemia also decreases the phagocytosis function of neutrophils and alters the function of the urinary mucosa, contributing to the onset of recurrent infections. These factors make the management of urinary infections in diabetics more challenging, as not only is the infection more frequent, but it also tends to be more resistant to conventional treatments. Thus, rigorous monitoring of glucose levels and adherence to appropriate glycemic treatment are fundamental to minimizing the risk of UTIs in diabetic patients (ZHANG et al., 2016).

Recurrent urinary tract infections have a significant impact on the quality of life of diabetic patients. Patients with frequent UTIs often face symptoms such as painful urination, urinary urgency and fever, as well as more serious complications such as pyelonephritis, which can be debilitating. Studies have shown that the emotional and psychological impact of URIs can be great, generating stress, anxiety and decreased well-being. A study by Nicolle (2014) found that patients with recurrent urinary tract infections had a significantly lower quality of life compared to patients without this condition. In addition, the glycemic control of these patients can also be affected, since urinary infections can worsen glucose control, creating a vicious cycle of infections and hyperglycemia. Urinary infection can increase blood glucose levels, which in turn makes patients more susceptible to new infections, negatively impacting diabetes control (NICOLLE, 2014).

The management and prevention of recurrent urinary tract infections in diabetic patients involves a multidisciplinary approach, which includes both pharmacological and non-pharmacological measures. Conventional strategies for treating UTIs in diabetics include the use of antibiotics, often for long periods of time, to prevent recurrent infections. However, this management presents challenges, such as increased bacterial resistance and the side effects of antibiotics. According to a study by Hooton (2012), the use of continuous or intermittent antibiotics has been shown to be effective in reducing infections, but bacterial resistance is a growing problem, which requires caution in the use of these therapies. In addition, treatment should be individualized, taking into account the history of previous infections, the severity of URIs and the presence of complications such as diabetic neuropathy, which can alter the urinary tract's response to infections (HOOTON, 2012).

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In addition to pharmacological therapies, alternative and non-pharmacological therapies have shown promise in the management of UTIs in diabetic patients. Some strategies such as the use of probiotics, cranberry and D-mannose have been investigated as alternatives for the prevention of urinary tract infections. In a study by Angulo et al. (2015), the use of probiotics was shown to reduce the recurrence of urinary infections in diabetic women by improving the bacterial flora of the urinary tract and increasing resistance to infections. Cranberry, on the other hand, has been widely studied due to its ability to prevent bacterial adhesion to the urinary epithelium, making it a viable option for prevention in patients with frequent urinary infections. According to Maki et al. (2016), cranberry has shown efficacy in preventing urinary tract infections in diabetic patients, although the effect is more pronounced in patients with uncomplicated infections (ANGULO et al., 2015; MAKI et al., 2016).

The relevance of the issue of recurrent urinary infections in diabetic patients goes beyond the individuality of the patients affected, as it also represents a significant problem for public health. The high prevalence of diabetes mellitus in the world, combined with the increase in recurrent urinary tract infections in this group, has a considerable impact on public health and the costs related to treating these infections. In addition, bacterial resistance and complications associated with UTIs in diabetics make clinical management more challenging, necessitating public health policies that address the prevention, early diagnosis and effective treatment of these infections. The topic is also relevant to clinical practice, since the proper management of URIs in diabetics involves the integration of knowledge about diabetes, microbiology, pharmacology and health care strategies, highlighting the importance of personalized and multidisciplinary approaches in the treatment of these patients (ZHANG et al., 2016; NICOLLE, 2014).

The aim of this study was to evaluate the efficacy of alternative and non-pharmacological therapies, such as cranberry, D-mannose, probiotics and oral immunotherapy, in the management of recurrent urinary tract infections (RTIs) in diabetic women, highlighting the impact of these approaches on reducing the recurrence of infections, glycemic control and the patients' quality of life.

METHODS

The search for scientific articles was carried out using the National Library of Medicine (PubMed) database. The descriptors were "*Urinary infection; diabetes; treatment.* " using the Boolean operator "AND" between the respective words. The categories were: clinical trial and randomized clinical trial. The studies were selected from publications between 2014 and 2024, using articles in English and Portuguese as inclusion criteria. The exclusion criteria were articles that added other pathologies to the central theme, disconnected from the proposed subject. The academic papers were reviewed using the following steps, in the following order: defining the topic; establishing the study categories; proposing inclusion and exclusion criteria; checking and then analyzing the publications; organizing the information; and presenting the data.

RESULTS

By combining the descriptors used, a total of 3,622 papers were obtained from the PubMed database. Using the inclusion criterion: articles published between 2001-2024, resulted in a total of 2031 articles. Next, clinical trials, randomized controlled trials or journal articles were added as inclusion criteria, giving a total of 119 articles. Articles in Portuguese or English were selected, resulting in 55 articles and then the free full text option was added, totaling 55 articles. After reading

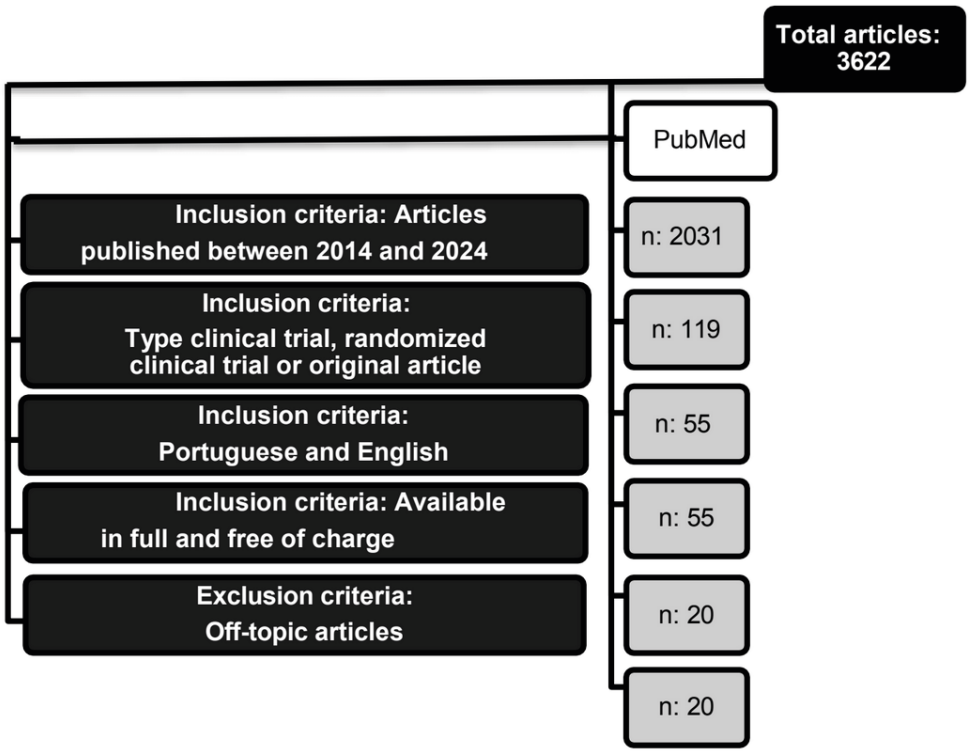

FIGURE 1: Flowchart for identifying articles in PubMed.

Source: Authors (2024)

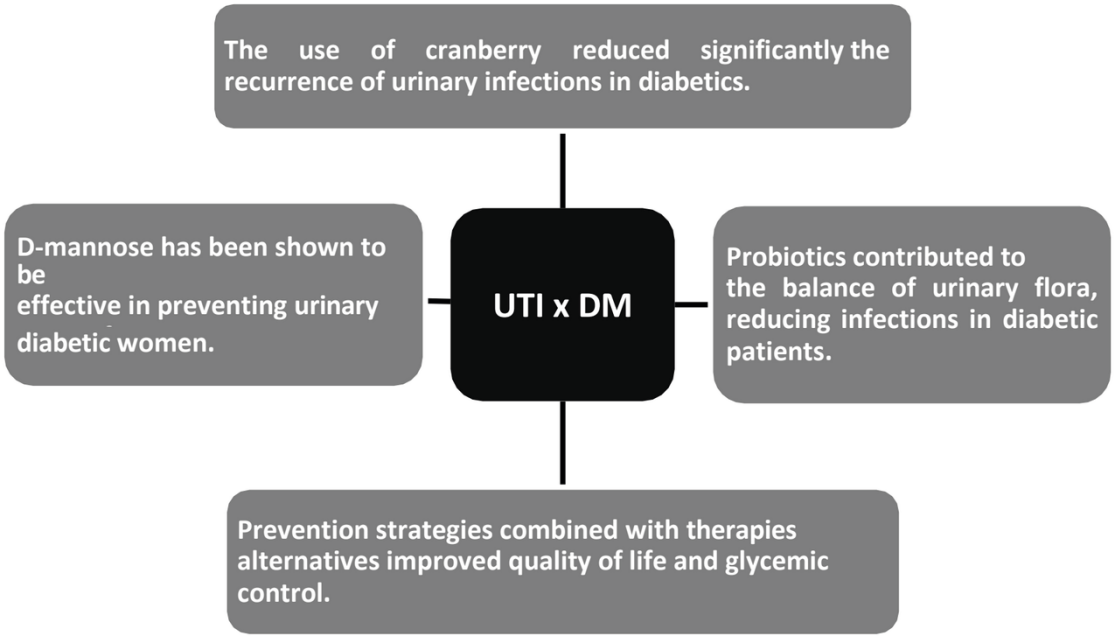

FIGURE 2: Summary of the most frequently found results according to the articles analyzed.

Source: Authors (2024)

the abstracts, those that did not fit the topic or were duplicated were excluded, totaling 20 articles, as shown in Figure 1.

DISCUSSION

Recurrent urinary tract infections (UTIs) represent a significant challenge in the management of diabetic patients, given the adverse impact on quality of life and the need for complex therapeutic interventions. Studies suggest that individuals with diabetes are more prone to UTIs due to hyperglycemia, which compromises the immune system and facilitates bacterial growth in the urine. Maki et al. (2016) investigated the effectiveness of cranberry as prevention for recurrent UTI in diabetic women, highlighting a modest reduction in incidence, but with limitations regarding adherence and the cost of treatment. These data emphasize the need for more accessible and effective preventive approaches for this population.

Harding et al. (2002) explored antimicrobial prophylaxis in diabetic women, showing a significant reduction in the frequency of recurrent UTIs, but with concerns associated with antimicrobial resistance. In the long term, continuous prophylaxis can generate adverse effects, especially in patients with multiple comorbidities, raising ethical and clinical questions about the sustainability of this approach. By comparison, the study by Kranjčec et al. (2014) on the use of D-mannose powder showed promise as a non-antibiotic alternative, with similar efficacy and less adverse effects reported, but the evidence is still preliminary and requires greater methodological robustness.

The use of probiotics, as analyzed by Schwenger et al. (2015), showed positive results in preventing recurrent UTIs in women, suggesting a therapeutic potential also for diabetic patients. However, the effectiveness of probiotics is variable, depending on the bacterial strain used and the individual conditions of the patients, highlighting the need for specific studies for populations with diabetes. Lee et al. (2018), in contrast, evaluated the efficacy of methanamine hippurate, identifying a significant reduction in recurrent UTIs, although efficacy is limited in patients with complicated UTIs, such as those often seen in diabetics.

Albert et al. (2004) reviewed the use of prophylactic antibiotics in non-pregnant women, pointing to their effectiveness in reducing recurrent UTIs, but with important caveats regarding the increased risk of bacterial resistance. This aspect is particularly relevant for diabetic patients, who often need antibiotic therapy for other health complications. On the other hand, Perrotta et al. (2008) demonstrated that the use of vaginal estrogen is effective in postmenopausal women, a group often affected by recurrent UTIs, including those with diabetes. The hormonal approach, although effective, can have limitations related to specific contraindications and adherence to treatment.

The intravesical application of hyaluronic acid and chondroitin sulfate was investigated by De Vita and Giordano (2012), with promising results in reducing recurrent UTIs, especially in patients with interstitial cystitis. For diabetics, this strategy may offer additional benefits, given the reduction in local inflammation and the restoration of the mucosal barrier. Beerepoot et al. (2011) highlighted the effectiveness of immune prophylaxis, which stimulates the innate immune response, proving to be a viable, long-term alternative for preventing recurrent UTIs. However, its applicability in diabetic populations still requires detailed investigation.

The study by Alraek and Baerheim (2001) on the use of acupuncture for recurrent UTIs provided limited but promising evidence, suggesting that integrative interventions can complement conventional treatments. For diabetic patients, acupuncture could act as an adjunctive approach, especially in cases of antibiotic resistance or intolerance to con-

ventional treatments. Stapleton et al. (2011) investigated Lactobacillus crispatus vaginal suppositories, showing a significant reduction in the use of the drug in recurrent UTIs. This strategy, as well as being well tolerated, can have advantages for diabetics, reducing the use of antibiotics and their adverse effects.

Bauer et al. (2005) analyzed oral immunotherapy, which has shown efficacy in preventing recurrent UTIs, but with challenges in treatment adherence. For diabetic patients, immunotherapy may represent a promising preventive approach, minimizing the use of conventional drugs and their potential side effects. In summary, although there are various strategies for managing recurrent UTIs, choosing the most appropriate treatment for diabetic patients must take into account factors such as efficacy, safety, cost and adherence, as well as the clinical specificities of this population.

It is concluded that the management of recurrent UTIs in diabetic patients requires a multidisciplinary and individualized approach, considering the greater vulnerability of this population to infectious complications. Future studies should focus on specific interventions for diabetics, including personalized therapies that integrate preventive measures, non-antibiotic treatments and emerging technologies for monitoring and managing infections. This will improve the quality of life of these patients and reduce the public health impact of recurrent UTIs. (MAKI et al., 2016; SCHWENGER et al., 2015; LEE et al., 2018.)

CONCLUSION

The research looked at the effectiveness of various approaches to managing recurrent urinary tract infections (RTIs) in diabetic women, with an emphasis on non-pharmacological and alternative therapies, such as the use of cranberries, probiotics, D-mannose and oral immunotherapy. The relevance of the topic is clear, given the impact of these infections on patients' quality of life and the additional complication that diabetes brings to the treatment of these conditions. URIs in diabetic patients often lead to complications that not only affect the urinary system, but also directly impact glycemic control, with potential effects on the progression of diabetes. Analysis of the data showed that alternative therapies, such as the use of cranberry and D-mannose, can be effective in reducing the recurrence of infections. In addition, the use of probiotics also proved beneficial in maintaining the health of the urinary tract, reducing pathogenic bacterial colonization. Evidence has shown that a preventive approach is essential for the ongoing management of these conditions, especially in diabetics, to avoid frequent hospitalizations and a significant increase in the cost of treatment. It is essential to emphasize that, although therapies

While alternative and immunological therapies have shown good results, the use of antibiotics still remains the standard treatment. However, data suggests that combining pharmacological therapies with non-drug approaches can result in a substantial improvement in treatment efficacy. Continued monitoring and the implementation of individualized prevention measures are crucial to minimizing the complications associated with URI in diabetic patients. Therefore, the inclusion of non-pharmacological therapies in clinical practice can be seen as a promising alternative for the management of URTIs, standing out as an area of research that deserves greater attention.

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