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Research Article

Cichorium intybus an Anti-Fungal Drug: A Prospective Study in Tertiary Care Hospital of Kashmir Valley

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Abstract

Aims and Objectives: Fungal infections are the emerging threat in the hospitals. Candida infections are major cause of morbidity and mortality in immunocompromised hosts such as neonates. Most neonatal fungal infections are due to candida species. The diagnosis of candidiasis can be made definitely only by recovering the organism from blood and other body fluids. The study aimed at identifying the risk factors associated with fungal sepsis. Candida can infect almost all body tissues (skin, eyes, lungs, heart, nails, gastro intestinal tract, urinary tract, joints etc), the survivors of invasive Candidemia are at risk of multiple deformities and ailments and they need surgical and other corrective procedures. The objective of this study was to evaluate the extract's antifungal effects on different Candida species in a hospital environment

Keywords: Neonates; Sepsis; Morbidity; Mortality; Candidiasis

Introduction

Cichorium intybus. (chicory) species belongs to Asteraceae family. Cichory includes many hundred genera and species of which some are used as salads and vegetables [1]. This crop is widely cultivated in many regions around the world including Europe, south africa, Russia, Asia, and also found in Egypt and North America [2].

In traditional Indian medicine, chicory has been used to treat fatigue, diarrhea, after child birth as tonic to ladies, spleen infections, jaundice, liver enlargement, gout, and rheumatic arthritis [3,4]. This plant is also used to treat other dangerous infections like, cancer, HIV and AIDS, diabetes, dysmenorragia, impotence, insomnia, minor heart ailments, colilithiasis, gastroenteritis, sinusitis, and cuts and abrasions. it is valued for its tonic effects upon the gastro intestinal tract, and liver tonic. In Germany, chicory (especially the flower) is used as a traditional medicine for everyday ailments. The roasted roots are used as coffee substitute with no caffeine and less well known as grazed fibers for cows, buffalos etc. [5].

C. intybus is a plant has great economic value due to high concentrations of fructooligosaccharide (FOS) a polysaccharide, known as inulin, in its roots, and is used in place of sugar and fat. Inulin is a carbohydrate consisting of a chain of fructose units with a terminal glucose unit. Vegetables such as asparagus, onion, garlic, dahlia, and chicory are the main source for inulin [6]. Inulin is particularly used in place of fat in low-fat or fat-free products, such as chocolate, confectionery, cheese, and ice cream, as it has a creamy form, gelling capacity and good texture, Raftiline and raftilose are used as fiber in foods, having the additional advantages of being used in place of fat and sugar in foods [7,8].

The present review has been written as chicory is gaining increasing interests because it can be used as salads and as vegetables, it has a high nutritional value and can be used as medicine. Hence, the plant was studied for its uses.

Materials and Methods

Chicory extract preparation method

To prepare the chicory extract, *C. intybus* leaves were dried according to the standard condition. After being dried completely, the leaves were grained; then, 1,000 gm of grained powder was drenched in a water and ethanol composition for 72 hours. Then, the solvent was passed through a Whatman paper filter; then, with

the use of a Heidolph Rotary Evaporator, the water was vaporized slowly, and a concentrated liquid was obtained. Then, the liquid was frozen and kept in a freezer below 20°C up to the time of use.

This study was carried out at the Department of microbiology GMC srinagar, all the patients suspected to blood borne infections have been studied in the laboratory from last 2 years from (Feb 2017 to Feb 2019). With all sterile precautions, concerning 1–2 MI of blood is drawn from every patient. Blood culture samples were incubated in BacTAlert 3D automated machine-driven blood culture system. One ml of blood was inoculated in theculture bottles (red and yellow color coded) for adult and pediatric use with all aseptic conditions and shaken well. The culture bottles were loaded into the instrument and incubated. Positive samples were examined by microscopy of Gram-stained preparations and sub cultured on Sabouraud dextrose agar slant in aerobic atmosphere. The identification was done by colony morphology on SDA, chromogenic media, germ tube test, and by carbohydrate fermentation and other tests [20].

Identification of the organism was confirmed with automated Vitek 2 using Vitek 2 cards. The Vitek ID and AST cards were chosen per the results of the Gram staining.

Figure of positive blood culture bottles

Figure 1: Bac t alert positive blood bottle.

Figure 2: Positive conventional blood bottle.

In a prospective analysis blood samples from clinically suspected cases of septicemia, collected aseptically, were cultured to look for Candida spp. Candida isolates were speciated by Hi-CHROME agar, germ tube tests tests and vitek using standard protocol.

Figure 3: Candida Hichrome Media with different Candida Species.

In this research, to evaluate the antifungal effect and the minimal inhibitory concentration (MIC) determination of chicory extract, the Clinical and Laboratory Standards Institute (CLSI) was used. Candida funguses were procured. Also for further assurance about the macrodilution method reality, the agar well diffusion method was used.

Results

The MIC for the chicory extract was 50 µg/mL for *C. krusei* and 100 µg/mL for *C. glabrata*. and low effects for other candida On the contrary, in the evaluation of different concentrations of the chicory extract by the agar well diffusion method, *C. krusei's* lack of growth in similar concentrations was greater than that of *C. glabrata.* And other candida. As a result, the findings related to both the methods of agar well diffusion and MIC prevention concentration maximization proved that *C. krusei* sensitivity to the chicory extract is more compared with the sensitivity of other candida.

Figure 4: Different solvent extract concentrations of *C. Intybus* against *Candida Krusei* and *Candida Glabrata*.

Discussion

In this study we test for antifungal effect of the chicory plant extract against different types of candida - *C. glabrata, C. albicans, C. famata, C. tropicalis* and *C. krusei*—was evaluated and the results obtained showed that the chicory extract was effective on *C. glabrata* and *C. krusei*, the results showed that, *C. krusei* was more sensitive to the chicory extract than that of the sensitivity of *C. glabrata*, as the diameter of zone of inhibition against chicory extract was more of *C. krusei* than that of *C. glabrata*, *C. albicans* was least sensitive against the extract.

The antibiotic resistance due to wide range of antibiotics, anti fungals and other drugs increased the rate of fungal infections especially *C. glabrata* and *C. krusei,* as compared with the past. In addition to the side effects and resistance of commonly used antifungal drugs, the previous studies showed that antifungal drugs against candida infections did not work at all the growing resistance against the thiazole (like fluconazole) in long-term usage, especially in immunocompromised patients in two types of candidas (*C. glabrata* and *C. krusei*) [9-11].

In recent years, many studies have been performed; these results have shown that few medicinal plants have the same antifungal effects as medical drugs. *Cichorium intybus* a plant from the Asteraceae family has same effects as certain drugs even more than them and its compositions has been considered in many studies and treatments in the medical field recently. Studies have shown that chicory extract is used against bacteria and malaria, as anti-inflammatory, analgesic, in cancer, diabetese, GIT infections, and as liver tonic.

Some studies evaluated that chicory extract was effective against some gram positive and some gram negative bacteria such as *Bacillus subtilis, Staphylococcus aureus, Staphylococcus epidermidis* and *Micrococcus luteus* and the Gram-negative pathogenic bacteria such as *Escherichia coli*, *pseudomonas aeroginosa*, and *Salmonella typhi* etc. [12-15]. The results of these studies proved that the chicory extract has a stronger anti microbial effect on the Gram-positive bacteria compared with the Gram-negative types. Chicory is also used as coffee and has been proven active against Streptococcus mutans that is found in dental plaque and is responsible for dental caries. As the coffee didn't allow the bacteria to adhere to the dental surfaces which leads to reduce the bacteria to stick to surfaces and forming biofilms [14]. Furthermore, chicory has features against certain viruses eg adenovirus and subcategories of the herpes virus [15].

- The part of the chicory plant
- The chicory
- The type of solvent used for preparing the chicory extract

The type of alcoholic solvent extract of chicory used could have more effects than other solvents to prepare the chicory extract and it presents the chicory extract's antimicrobial features better than others 18,26,32 of their medical resistance: For example, there are different types of candidas and the medical resistance of common candidas is different in various conditions 34. As there is no side effects, low cost of Cichorium extract, and the antimicrobial effects of this extract on funguses, *C. krusei* and *C. glabrata*, it is hoped that chicory extract can be used as substitute for chemical drugs in treatment for fungal infection in future years.

Conclusion

Chicory extract has the benefits of low price, easy accessibility, and antifungal. It also has fewer side effects, and after a clinical test, it could be considered a proper drug as an antifungal against infections caused by *C. krusei* and *C. glabrata*.

Clinical Significance

The results obtained from this research have shown that chicory extract has antifungal features and is the best choice as an antifungal drug because of its low price, easy accessibility, and lesser side effects.

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