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THE ROLE OF NUTRITION IN SUPERFICIAL FUNGAL INFECTIONS

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Abstract

Introduction: Fungal Infections in the hair, mucosa, nails, and epidermis are caused by a pathogenic fungus come under superficial fungal infections. The prognosis is not good if not treated well and early. These fungal infections are important due to their worldwide distribution, increase in the rate of transmission, and morbidity. It is common to see superficial fungal infections or mycoses in everyday clinical practice, even though they can present differently in immunocompromised patients. The main conditions caused by the Malassezia of Pityriasis versicolor are superficial candidiasis that affects skin, mouth, or genitalia, ringworm disease, or the dermatophyte. Although anti-fungals are available, there is a need of making the whole management of anti-fungal treatment more efficient.

This current study explored the role of nutrition in the management of anti-fungal conditions.

Aims and Objectives: This study intends to find the additive role of nutrition in managing fungal infection.

Materials and Methods: This Retrospective study considered 40 patients of superficial fungal infection and classified them into 2 groups based on whether they have consumed healthy nutrition. Those had good nutritional foods during the anti-fungal treatments were allotted to Nutrition group and others were allotted to Non-Nutrition group.

Results: The study found out that the Nutrition group recovered from the fungal infection much earlier than that of Non-Nutrition group. The figures and boxplot diagram showed the details of the findings.

Conclusion: The study concluded that the nutrition should be considered as an adjuvant to anti-fungal drugs in the management of superficial fungal infection.

Keywords: nutrition, fungal, infection, adjuvant

Introduction

Fungal Infections that are restricted to the hair, mucosa, nails, and epidermis that are caused by a pathogenic fungus come under superficial fungal infections. They are life-threatening infections. These fungal infections are important due to their worldwide distribution, increase in the rate of transmission, and morbidity [1]. It is common to see superficial fungal infections or mycoses in everyday clinical practice, even though they can present differently in immunocompromised patients. The main conditions caused by the Malassezia of Pityriasis versicolor are superficial candidiasis that affects skin, mouth, or genitalia, ringworm disease, or the dermatophyte[2].

All of them present with the same clinical features, so they can be diagnosed using cultures of the samples, or by direct microscopy. The conditions are treated by using topical antifungals in short courses or on a long-term basis, it depends on the severity and site of the infection present[2]. The superficial fungal infections grow on moist and dark surfaces and infest various body parts. The management of the infections is easy in immunocompetent individuals, but the difficulty arises when treating the immunocompromised individuals where potent antifungals are to be used. Topical, oral, and systemic antifungals are used in treating these infections[3]. The most common superficial fungal infections have a worldwide distribution that includes dermatophytes like tinea corporis, tinea capitis, tinea manuum, tinea faciei, tinea pedis, and non-dermatophytes like candidiasis, black piedra, pityriasis Versicolor, tinea nigra, and white piedra[4].

The most commonly found superficial fungal infections in the pediatric population are tinea corporis, tinea capitis, and pityriasis Versicolor. The most common superficial fungal infection that has a worldwide distribution is tinea capitis. It can be easily diagnosed by the clinical features alone and is treated by using systemic antifungals.[5]

The most common fungal infection affecting skin, nails, and hair is tinea which has distinct clinical features affecting individuals of all ages. Systemic and topical antifungals are available for treating tinea based on its severity and subtypes if untreated it can cause ulcers on feet, cellulitis, and alopecia.[6]

The risk of infection with total parenteral nutrition has been particularly high, and disseminated fungal infections have

been particularly dangerous. A survey has been conducted by the center for disease control which indicated that there is a substantial decrease in the rate of infections if proper control measures are practiced, accordingly some guidelines are developed by the center's hospital infections section.[7]

A common assumption is that the lipid emulsions in parenteral nutrition are associated with fungal infections. This may result in patients who are benefitting from parenteral nutrition discontinuing its use. The main purpose of this study is to describe the factors that are in association with parenteral nutrition in these patients and help in the management of this condition, but recent studies state that factors in association of fungal infections with parenteral nutrition are weak.[8]

Both bacterial and fungal central venous catheter-related bloodstream infections are believed to be increased by parenteral nutrition containing lipid emulsion.[9]

Several metrics in this concept are erroneous: reports from an era when parenteral nutrition admixtures were prepared without stringent quality control, when techniques for infusion, insertion, and maintenance of vascular access devices, and delivery systems were not well identified or standardized. A higher glucose level was also accepted as a part of glucose homeostasis.[9]

This study intends to find the additive role of nutrition in managing fungal infections. The study considers that nutrition contributes to the recovery of fungal infection effectively while given in combination with anti-fungal drug treatment.

Materials and Methods

The study was conducted retrospectively and included patients who visited Dermatology Outpatient Department in our institution between May 2021 and September 2021. In total, 40 patients were considered. The patients who visited our department with superficial fungal infection and continued the treatment till the remission were only considered. All of the patients were given anti-fungal drugs based on the same protocols. The patients who did not report about their recovery were excluded from this study.

After finalizing the study patients (40 in number), they were divided into 2 groups, namely, Non-Nutrition and Nutrition. This division was based on their nutritional consumption during the time they had a fungal infection and were under our treatment. The patients who had consumed healthy nutrition during the treatment was allotted to the Nutrition group while the patients who did not consume healthy nutrition were allotted to the Non-Nutrition group.

Results

The following chart (Figure 1) shows the age distribution of age of the study subjects.

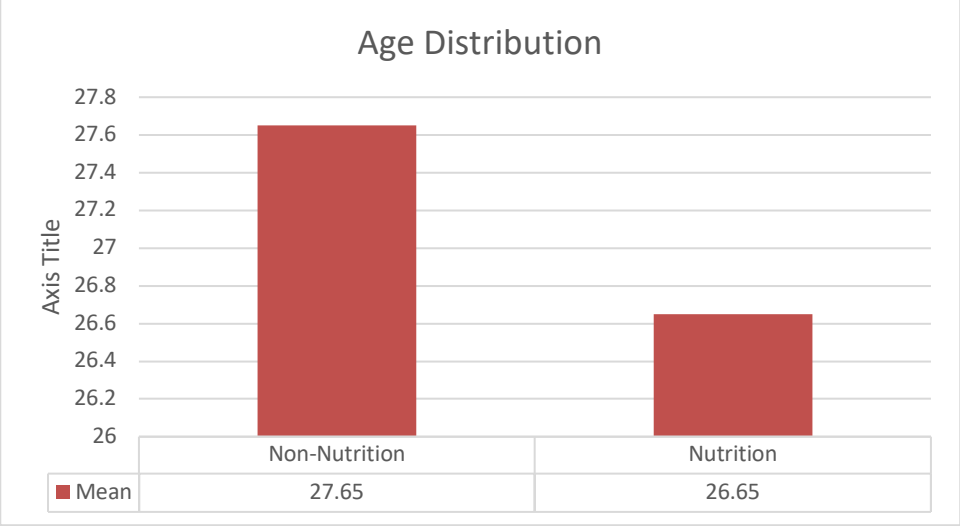

Figure 1: The mean of the ages of the patients in each group

Although the study subjects allocation to the groups was purely based on the nutritional consumption during their treatment days, the gender distribution was found to be similar in both the groups. Figure 2 shows the gender distribution of the patients in this study.

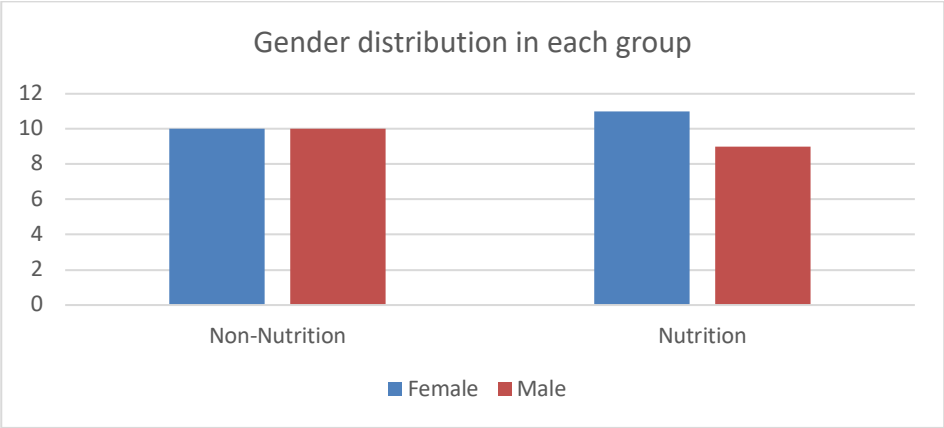

Figure 2: The number of males and females in each group

The follow-up recording of each patient showed that the patients who had healthy nutrition (Nutrition group) during the treatment days along with the anti-fungal drugs, were recovered from the fungal infection significantly before the patient who did not maintain nutritional requirements. The following figure (Figure 3) shows that the patients who maintain good nutrition (Nutrition group) recovered from the fungal infection in around 15.05 days while for the Non-Nutrition group, the recovering time was found to be 23.7 days.

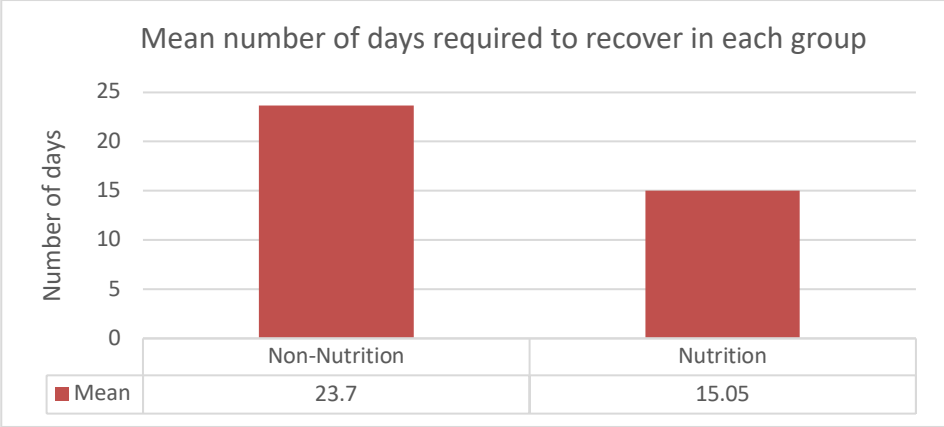

Figure 3: The mean number of days in which patients in each group recovered from infection

The following figure (Figure 4) shows boxplot diagram plotted with the number of day each patient took, to recover from fungal infection, in both the groups.

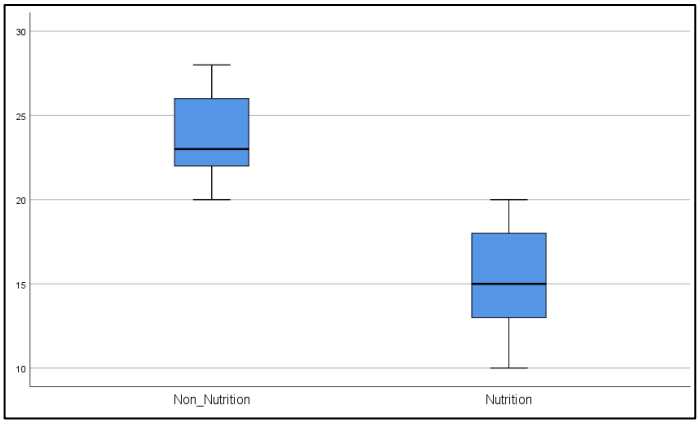

Figure 4: The Boxplot diagram showing the number of days taken by patients in each group

Discussion

The superficial fungal infections are common in everyday medical practice that includes ringworm which is caused by tinea capitis or tinea pedis which has become an increasing problem in the city. Superficial candidal infections are seen most commonly in immunosuppressive individuals. Seborrheic dermatitis caused by Malassezia causes inflammation of the skin and scalp these can be managed by the use of antifungal drugs[10].

Infections with cutaneous dermatophytes occur only on the epidermis. There are a number of dermatophytes causing superficial infections in tropical and subtropical regions of the world due to their warm and humid climates[11]. The fungal infections affecting the skin, hair, and nails are most commonly seen worldwide with an increase in their incidence. Dermatophytes are the main agents causing the infections and they have varied geographical distribution. There is a change in their epidemiology due to varied lifestyles, migration, socio-economic status, and drug therapy[12]. Keeping all these epidemiological changes in mind the infectious disease society of America has proposed some specific practice guidelines in treating fungal infections in addition to antifungal therapy also an attempt has been made in choosing the antifungals according to the epidemiological changes[13]. Individuals with tuberculosis, respiratory disease, diabetes pose a high risk for fungal infections. Published data of Pakistan stated that among 184,500,00 people 3,280,549 individuals have serious fungal infections. When compared with other countries the cases with candidaemia and mucormycosis are high. Due to high TB cases, pulmonary aspergillosis infections are high[14]. When the H&E stained sections of the fungi are examined fluorescence of many fungi are noted which is helpful in the diagnosis of disseminated and cutaneous fungal infections, 76 cases of deep and superficial infections and 3 cases of protothecosis were studied[11,15]. The studies stated that most of the fluorescence was noted in most of the cases and it has no correlation with the age of the specimen in most of the cases the stained organisms were easily identified under routine microscopy than under fluorescent microscopy. The study concluded that fluorescent microscopy was of little benefit in identifying the microorganism[13-15]. As the fungi are a part of the natural environment they also play a major role concerning food. Some of the fungi are used in producing food, some are used as food, some spoil the food which can be also fatal to human health. The non-infectious mycotoxins have been characterized but their extent of infection is not identified[16].

A review was conducted in identifying invasive fungal infections that are caused by food, and 11 publications were found which stated that these invasive fungal infections were mold infections and some of them associated with dairy products are yeasts, they occur predominantly in immunocompromised individuals. Various guidelines suggest avoiding food with high levels of fungi[13,15-16]. Over the last three decades, fungus infections in humans and animals have received a great deal of research attention. Almost every specialty now includes discussions of mycoses in scientific programs and publications, whereas only dermatologists and a few pathologists shared the botanist's interest in fungus diseases 20 years ago[17]. Sodium bicarbonate has many medical and domestic uses. The main aim of this study is to investigate the use of sodium bicarbonate as an antifungal agent causing infections mainly to the skin and nails. The study stated that 10% od sodium bicarbonate is helpful in inhibiting 80% of fungal growth in test conducted on sabouraud dextrose agar[18]. The most commonly found infection nowadays in dermatological practice is fungal infections whose treatment can be best done on diagnosing the pathogen of the infection. History of the infection, examination of the patient clinically, and diagnostic procedures are done to diagnose the patient. The most widely used antifungals nowadays are tested and observed on a long-term basis [19]. In tinea, one of three fungi genera may be infected: Epidermophyton, microsporum, and Trichophyton. These fungi are collectively known as dermatophytes. Infections caused by these bacteria are one of the most common diseases in the world and cause serious chronic conditions. Almost all endemic conditions of tinea capitis (scalp infection) were eradicated by griseofulvin treatment and school screening programs in the 1950s. However, it rearose as a public health problem in the UK by the 1990s, with at least 12% of schoolchildren infected[20].

Conclusion

The study finally concludes that nutrition is an essential part of the whole fungal infection management as it plays a role as an adjuvant in the management of fungal infection. The authors also suggest carrying out larger studies with varied diseases. This current study brought forward an important addition to the scheduled protocol of fungal diseases.

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