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Original Research Article

Prevalence of metabolic syndrome among patients with superficial mycotic infections in a tertiary care hospital

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ABSTRACT

Background: Incidence of metabolic syndrome and superficial mycotic infection is progressively increasing worldwide. Skin disorders, usually neglected and frequently underdiagnosed in patients with metabolic syndrome. So, the objective of the study is to linkup between metabolic syndrome and superficial mycotic infections.
Methods: Total 300 diagnosed patients of superficial mycotic infection out of 1000 patients in a 5 months period from January 2019 to May 2019 who gave consent were chosen at random from the patients attending the OPD consultancy. Thorough clinical evaluation and routine hematological investigations, oral glucose tolerance test (OGTT), fasting lipid profile were tested and BMI and blood pressure were recorded to diagnose metabolic syndrome. Fungal infections were confirmed by KOH mount.
Results: Among 1000 patients attended in OPD consultancy, majority of the patients were female (60%). Among them 300 patients have got different superficial fungal infections (female was 223 and male 77). Among this 300-study population, age variation is significant. There were highest female patients in age group from 36 yrs- 45 yrs. Tinea corporis was the most frequent fungal infection in female (65%), *Tinea cruris* is highest in male (21%). The most alarming is that among that 300 patients 45% patients have got raised OGTT,91% patient has increased BMI, female predominant. 59.3% has raised blood pressure and increased serum cholesterol in 70.1% patients.
Conclusions: Superficial fungal infections are epidemic worldwide. In our study the new era is that presence of metabolic syndrome among patients with superficial mycotic infections. So early detection and treatment of metabolic syndrome helps in cure of superficial mycotic infections.

Keywords: Metabolic syndrome, Superficial mycotic infections, Diabetes mellitus

INTRODUCTION

Metabolic syndrome defined as the condition where individuals with hyperinsulinemia/insulin resistance are disproportionately glucose intolerance, with concomitant dyslipidemia characterized by a high plasma triglyceride (TG) and low high-density lipoprotein (HDL) concentration, and an increase in blood pressure (BP).

The IDF and the NCEP-ATP III more recently reached a common harmonized definition comprising five equal criteria: elevated waist circumference (defined according to specific population characteristics), low HDL levels, high TG levels, elevated BP, elevated fasting glucose.[1-5] Presence of at least three was necessary and sufficient for resting metabolic rate (METs) diagnosis.

Any pathophysiologic dysfunction that results in a loss of metabolic control in the body can result in cutaneous disease. There is the notion that a cascade of reactions happens when there is a single hormonal imbalance as it is the case with insulin, and this affects other organ systems.[6-8] Also several studies have shown the existence of increased numbers of oxidative stress and inflammatory markers in various skin diseases something that we observe on the metabolic syndrome as well.[9,10] Dermatophytoses are common fungal infections caused by keratinophilic fungi that are capable of invading nail, hair and superficial layers of the skin of humans and animals.[11,12] They produce keratinase enzymes that help the fungi to invade and digest keratin.[13] Forty different species of dermatophytes have been identified and approximately 20 of them are responsible for most of the infections in humans.[14] Dermatophytes are distributed worldwide and it is estimated that they cause 20–25% of superficial mycotic infections.[15] Nowadays, the increase of tourism and immigration influence the distribution of some species and quickly change the epidemiological profile in a determined geographical area.[16]

It is estimated that approximately 25% of the world's population is effected by METs with a significant subpopulation linked to inflammatory skin diseases.[17] Increased expression of proinflammatory cytokines, like interlukin-6 (IL-6), IL-1, or tumor necrosis factor alfa, can lead to downregulation of insulin activity, which then contributes to insulin resistance, endothelial dysfunction, and the development of METs.[18,19]

Overall prevalence of skin disorder in both type 1 and 2 diabetis mellitus varied from 51.1 to 97% in different regions worldwide. The high prevalence of dermatological disorder among DM patients described in literature endorses the clinical importance and high impact of this complication.[20] Most frequent disorder reported in diabetic patients, regardless of DM type, was infection- occurring in at least 20.6 % of diagnosed patients. Moreover, fungal infections were more prevalent than bacterial or viral infections, and interdigital spaces, genitalia and skin folds were the most frequent site of infection.[21]

The aim of our study was to find out age and gender variation between METs and different superficial fungal diseases and we summarize what is known about METs and its relation with superficial mycotic infections.

METHODS

It is a hospital based observational study among patients attending Dermatovenereology OPD consultancy done from 1st January, 2019 to 31st May,2019 in Chattagram Maa-O-Shishu Hospital, Chittagong, Bangladesh.

Out of 1000 patients, total 300 patient diagnosed as a case of superficial mycotic infections in a 5 months period, who gave consent were chosen at random from the patients attending the OPD consultancy.

Patients name, age, sex, occupation, height, weight, waist circumference, BMI, H/O diabetes, F/H/O blood pressure, H/O previous treatment for the presenting disease, H/O any steroid used in the presenting lesions, site of involvement was recorded in a proforma.

They were subjected to thorough clinical evaluation. routine hematological investigations were done.

OGTT, fasting lipid profile, BMI and blood pressure were recorded to diagnose Metabolic syndrome.

Dermatological examination was done including site, size, shape, number and duration of the lesions. Any atypical lesions like tinea incognito. Fungal infections were confirmed by KOH mounts.

Inclusion criteria

Age should be>15 years, patient with superficial fungal infection confirmed by KOH mounts, patient with any other associated skin disease like psoriasis, eczema, patient with P/H/O, HTN, dyslipidemia, ischemic heart disease (IHD).

Exclusion criteria

Age should be<15 years, diabetic patients with superficial fungal infection, patient without superficial fungal infections, hospitalized patients having superficial fungal infection.

All statistical data were analysed in SPSS-20 (IBM, Armonk, NY, USA).

RESULTS

Among 1000 patients attended in OPD consultancy, majority of the patients were female (60%) showing in pie (Figure 1).

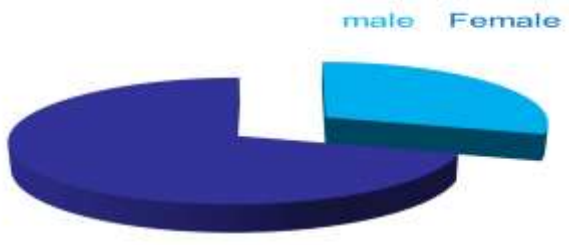

Figure 1: Gender variation in study populations.

Among them 300 (30%) patient has got different superficial fungal infections (female was 223, male-77), showing in pie (Figure 2).

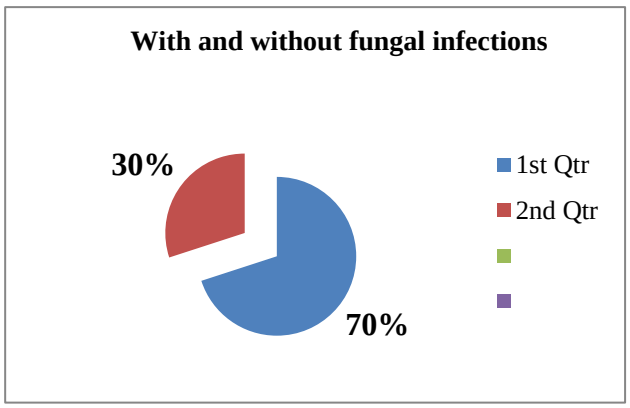

Figure 2: Subject with and without fungal infection in study populations.

Among those 300-study population, age variation was significant. There were highest female patients in age group from 36 yrs-45 yrs which were 70 (23.33%) and male patients were 18 (6%). Second common age group were 46 yrs-55 yrs where female was 67 (22.33%) and male were 15(5%). Male and female patients were almost equal in age group 26 yrs- 35 yrs, it was 20 (6.66%) male patients and 23 (7.66%) female patients. 10 (3.33%) male and 25 (8.33%) female patients were in age group 15 yrs to 25 yrs. Least patients were in age group 66 yrs to 75 yrs. In bar (Figure 3) showing age wise percentage incidence in 300 patients under study population.

The most alarming is that among these 300 patients, 45% has METs showing in Pie (Figure 4).

Among 45% patients has raised OGTT, means most of them are diabetic or pre diabetic, newly diagnosed. 91% patient has increased BMI, female predominant,59.3% has raised blood pressure and increased serum cholesterol in 70.4% patients. Hyper triglyceridemia found in 50% patients showing in bar (Figure 5).

These 300 patients were suffering from different types of superficial fungal infections where tinea corporis (65%) more in female, tineacruris (21%) more in male, tinea axillae (20%), *P. versicolor* (6%), VVC (2.5%), onychomycosis (1%) showing in bar (Figure 6).

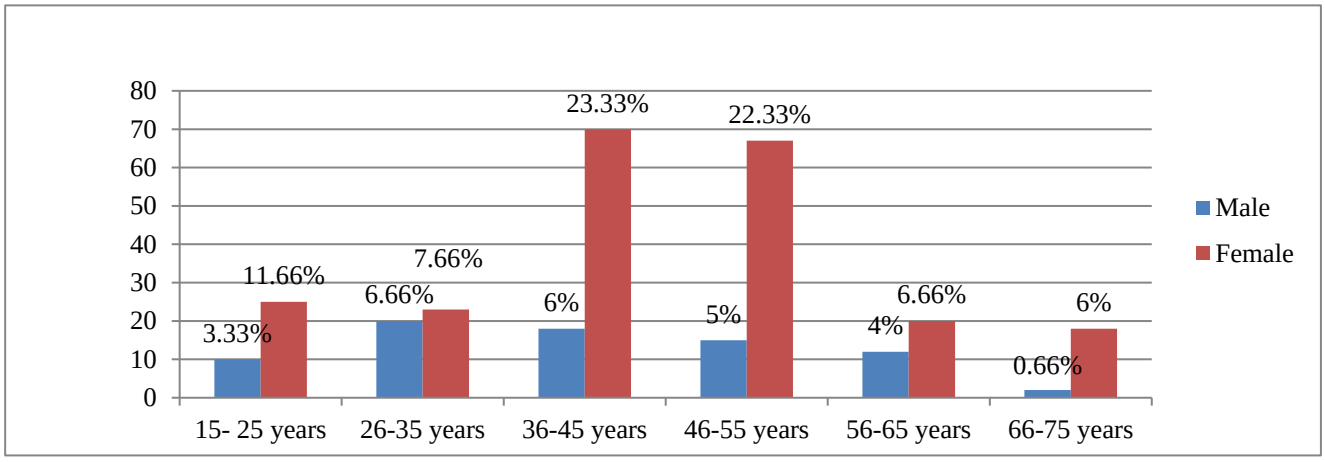

Figure 3: Age wise percentage incidence in 300 patients under study.

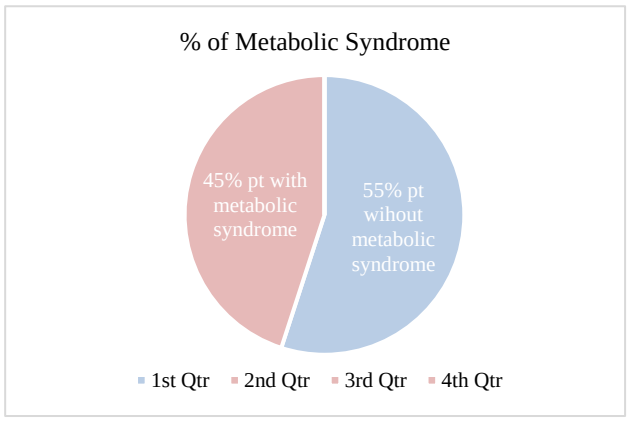

Figure 4: Percentage of metabolic syndrome.

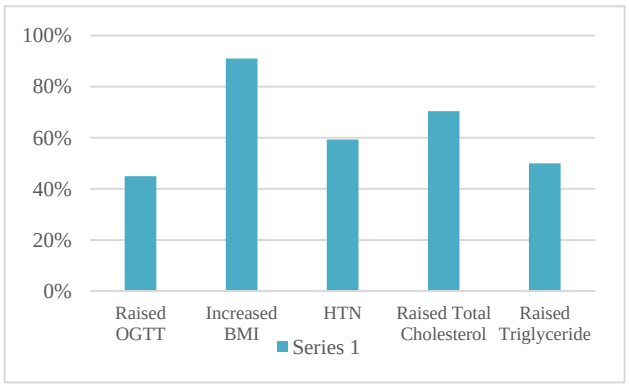

Figure 5: Pattern of components of METs present in study population.

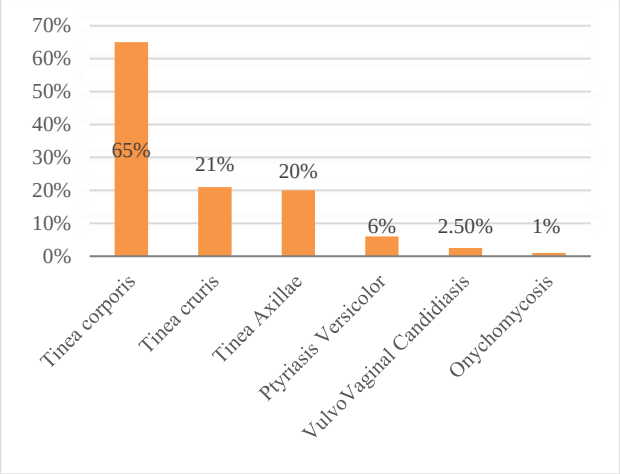

Figure 6: Pattern of different superficial mycotic infections in study population.

Figure 7: A 38 years old man presents with *Tinea corporis*.

Figure 8: Onychomycosis (fungal infection) in a 46 years old female great toe nail.

Figure 9: 18 years old boy with *Tinea faciae*.

Figure 10: 32 years old woman with *Tinea axillae*.

DISCUSSION

Out of all the patients assessed 30% had cutaneous fungal infections while 70% did not show signs of any fungal infections. This was similar with previous studies on the topic which showed prevalence rates ranging from 10% to 60%.[22-24] The present study showed that more females were affected by dermatophytes than males, with female-male ratio being 3.1:1. Earlier studies also indicated a higher prevalence of dermatophyte infections in females compared to males.[25] Meanwhile some other studies recorded a higher prevalence of dermatophyte infection in males than females.[26,27] Disparity in the prevalence rates of dermatophytosis in different studies could result from differences in the lifestyle, socioeconomic conditions, risk factors associated with study subjects, and environmental factors of study area.[28-30] All age group were vernarable to develop dermatophyte infection but in our study though the age limited from 15 years to 75 years, in this group the highest vulnerable age group was 36years to 45 years in case of female accounting for 70% and 26 years to 35 years in case of male was 6.66%. Our finding in this regard was compatible with the findings of others.[31]

The predominant clinical manifestations of dermatophytosis vary considerably in different studies reported in literature. In our study, tinea corporis was the dominant clinical manifestation involving 65% of the total cases of dermatophytosis where female patients were predominant and second most common dermatophyte infection was tinea cruris (21%), similar to many other studies like, In a study conducted in India, tinea corporis (35.4%) was the predominant clinical condition followed by tinea cruris (16.8%) and tinea capitis (16.7%).[32] Similar study conducted in Iran between March 2005 and March 2007 by Rassaie et al. revealed that tinea cruris and tinea corporis were the most common clinical manifestation.[33] Tinea axillae (20%), *P. versicolor* (6%), VVC (2.5%), onychomycosis (1%) were found in our study. No similar study was found.

In our study metabolic syndrome were prominent and alarming in that 300 patients with superficial mycotic infections.45% has metabolic syndrome which includes increase BMI, raised OGTT, increase cholesterol level, increase triglyceride level and increase blood pressure. 45% patients have raised OGTT, means most of them are diabetic or pre diabetic, newly diagnosed, patient is unaware of it for which patients are more prone to develop infections. Overall, cutaneous infection showed to be highly prevalent and important skin disorders in several studies, regardless DM type. Among cutaneous infections, fungal etiology appears to be the most common and those with bacterial origin are the less frequent.[34,35]

A study conducted in Brazil evaluated 403 patients with type 1 (n=125) and type 2 (n=278) DM assisted in the outpatient clinic from Ribeirão Preto Hospital in 2000. The study demonstrated that 81 % of patients had at least one dermatologic lesion, with a mean of 3.7 lesions per patient, being dermatophytosis the most common lesion36.Another study in Brazil, also conducted in the outpatient clinic from Ribeirão Preto Hospital from 2003 to 2004, evaluated 500 DM patients. The study demonstrated that 97% of all patients had at least one skin lesion-the highest skin disorder rate in this review-being tinea pedis (35%), candidiasis of the skin/nail (26%).[37] Other findings in our study was 91% patient has increased BMI, female predominant, though in our study female patient are more than male. It is one of the indicators of metabolic syndrome. Increased waist circumference due to increase adipose tissue plays a major role in the development of insulin resistance for which patient become more prone to develop infections. 59.3% has raised blood pressure and increased serum cholesterol in 70.4% patients, Hypertriglyceridemia found in 50% patients. Increase in triglyceride levels is a good indicator of presence of metabolic syndrome. Increase in blood pressure may be due to increased level of insulin result in increased sympathetic nervous system activity leads to development of hypertension which is a risk factor for coronary artery disease.[38] Overall METs predisposes individuals to DM or CAD. Wilson et al showed that in a group of patients with METs one-third developed CAD and half of the patients developed DM type 2 over a period of 8 years follow-up.[39]

CONCLUSION

Superficial fungal infections are epidemic worldwide. Several research and data show presence of fungal infections in diabetic patients. But in our study a new thing came out that presence of metabolic syndrome in patients with superficial mycotic infections. We found different types of superficial fungal infections were present in which tinea corporis was commonest in females. Most of the patients were obese with diabetes or prediabetic with dyslipidemia with hypertension. But patients were totally unaware of it. Patients with metabolic syndrome are more prone to develop infections, that's why patients were suffering from recurrent fungal infections and some were not responding to conventional antifungal doses and some patients needed prolong antifungal therapy to cure. So early diagnosis of metabolic syndrome and treatment will help patients to lesser development of fungal infections and early cure. To reduce incidence of metabolic syndrome, patients counselling for reduction of weight and increase physical activity is the ultimate solution may be.

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