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The Prevalence of Pruritus among Sudanese Patients with Diabetes Mellitus

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Abstract **Background:** *Diabetes mellitus* is a chronic disease caused by inherited and/or acquired deficiency in the production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. The skin is one of the major organ systems involved in diabetes. Almost all diabetic patients eventually develop skin complications from the long-term effects of *diabetes mellitus* on the microcirculation and skin collagen. **Objectives:** This study was aimed to detect the clinicoepidemiological prevalence of *pruritus* in diabetic patients on Jabir Abu Eliz Diabetic Centre. **Methodology:** It was observational, descriptive, cross-sectional and diabetic center-based study was conducted in the period from August to December 2014 at Jabir Abueliz Diabetes Centre (JADC), including 100 known diabetic patients (Had old and new files), from both sexes who were complaining of itching. The data were collected from patient's records by questionnaire and analyzed by computer using SPSS. **Results:** The results of this study showed that diabetic patients who were complaining of *pruritus* represented 23.3% out of total DM population of Jabir Abueliz Diabetic Center (420) patients, 100 diabetic patient detected to suffer from pruritus where males represented 42 (42.0%), and females were 58 (58.0%). The majority 67 represented (67.0%) belonged to the age group 26-60 years, followed by 32 patients (32.0%) in the age group >60 years and only 1 patient (1.0%) in the age group 14-25 years. It was noticed that 94.0% of patients had type 2 *diabetes mellitus*, while 3 patients represented 3.0% had type 1, two patients (2.0%) had gestational diabetes and 1 patient (1.0%) had secondary diabetes. It was found that 92% had years duration, while 5% had a month's duration and 3% had a duration for days. Duration of itching was months in 56%, years in 22% and days in 22%. Distribution of itching was localized in 61.0% of patients and widespread in 39% of patients. Other symptoms associated with itching were an eruption in 29.0%, dark pigmentation associated with an eruption in 10.0%, dryness, and eruption in 8.0% and dryness per se in 7.0% patients. Pruritis was common in summer 16.0%, 15 patients represented (15.0%) in winter. Aggravating factors of itching were found to be dryness 13.0%, sun exposure (9.0%) and moisture (4.0%). Relieving factors were detected in 11.0% patients, (18.0%) had lesions in lower limbs, (5.0%) in genitalia, (3.0%) in trunk, and (2.0%) in scalp, flexural areas face and neck. It was observed that 18.0% of patients had papule, vesicle, and pustule, while ten patients represented (10.0%) had papules and scales. 4 patients (4.0%) had papule and crust, 3 patients (3.0%) had scales. **Conclusion:** The prevalence of *pruritus* in diabetic patients on Jabir Abu Eliz Diabetic Centre was 23.3% (100 patients), found to be 42.0% of them were males and 58.0% were females. The clinical features of *pruritus* in diabetic patients in this study were an eruption, dark pigmentation, and dryness (29%), 3%, and 7%) respectively. Localized *pruritus* that attributed to diabetes was the most common among the study population.

Keywords DM, Pruritus, Sudan

1. Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by high blood sugar (glucose) levels that result from deficiency in insulin secretion, or its action, or both. In ancient times, diabetes mellitus, commonly known as diabetes, was identified as a disease linked to the appearance of glucose in urine and extreme muscle loss [1,2].

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There are three types of diabetes mellitus are:

- Type 1 diabetes mellitus, where there is a lack of insufficient insulin production by the body.
- Type 2 diabetes mellitus in which the cells become resistant to insulin. This type may be associated with initially normal or increased levels of circulating insulin.
- Gestational diabetes: This type is only associated with pregnancy. The prevalence of gestational diabetes is 4% of all pregnant women. It may precede the development of type 2 or rarely type 1 diabetes [3].

Pruritus or itch is defined as the urge to scratch. It is an associated with many skin diseases and is an unusual symptom of some systemic diseases. The followings are features of pruritus: local or general and acute or chronic. Chronic pruritus is a term coined for Itching lasting more than 6 weeks. Itching can be problematic and debilitating, as well as it can be a diagnostic and therapeutic challenge [4].

Itching is is associated with dermatologic and systemic disorders. Because it results in poor blood circulation, diabetes is one of the systemic disorders associated with itching, particularly in the lower limbs. Moreover, diabetic itching is often caused by dry skin, a situation easily manageable by self-care. The characteristic rash may be taken as a diagnosis of a primary dermatologic disorder. As a matter of fact, some skin diseases are associated with pruritus [4,5].

Stress is a precipitating factor in itching; its management should be a prime concern in the treatment of itching. Psychiatric help maybe the need for better management of stress., which is characteristic of this disease. Morbid disease situations associated with diabetic itching include fungal infections such as ringworm or athlete's foot and allergic reactions to medications, including insulin [6,7].

2. Objectives

General Objective:

To detect the Clinicoepidemiological prevalences of *pruritus* in diabetic patients on Jabir Abu Eliz Diabetic Centre.

Specific objectives:

- To detect the prevalence and clinical features of pruritus in diabetic patients.
- To determine the severity of pruritus among different groups of diabetic patients.

3. Results

The diabetic patients who had dermatological problems without *itching* were 429 patients. It was included 100 diabetic patients complaining of *pruritus* (23.3%), males were 42 represented (42.0%), and females were 58 (58.0%) as shown in (**Figure 1**).

Most of the study population 67 patients represented (67.0%) were belong to age group 26-60 years, followed by 32 patients (32.0%) in the age group >60 years and only 1 patient (1.0%) in the age group 14-25 years (**Table 1).**

Table 1. Showed that Age in pruritus in DM in period (August-December) 2014

Age	Prevalence	Percentage %
14-25	1	1.0
26-60	67	67.0
> 60	32	32.0
Total	100	100.0

Distribution of the study population according to tribes, 45 patients represented (45.0%) from northern tribes, 26 patients (26.0%) from western, 19 patients (19.0%) from Khartoum State, 8 patients (8.0%) from eastern, and 2 patients (2.0%) from southern tribes, (**Figure 2**).

Residence of the study population showed that, 73 patients represented (73.0%) resided Khartoum State, 11 patients (11.0%) in west, 9 patients (9.0%) in East, 5 patients (5.0%) in north and 2 patients (2.0%) in south (**Figure 3**).

Most of the study population 87 patients represented (87.0%) were married, 8 patients (8.0%) single, 3 patients (3.0%) widow and 2 patients (2.0%) were divorce (**Figure 4**).

(Figure 5), occupations of the study population, showed that 26 patients represented (26.0%) were professionals, six patients (6.0%) laborer, three patients (3.0%) animal breeder, and one patient (1.0%) student and others category was 64%.

Most of the study population 94 patients represented (94.0%) had type 2 *diabetes mellitus*, 3 patients (3.0%) had type 1, two patients (2.0%) had gestational *diabetes* and 1 patient (1.0%) had secondary *diabetes* **(Figure 6)**.

Concerning the duration of *Diabetes Mellitus* among the study population, 92 patients represented (92%) had a duration of years, five patients (5%) had a duration of months, and three patients (3%) had a duration of days (**Figure 7**).

Table 2. Showed that Investigation related to *DM* in *pruritus* in period (August-December) 2014

Investigation	Prevalence	Percentage %
Fasting blood sugar (FBS) + HBA_{1C}	72	72.0
FBS	25	25.0
HBA_{1C}	3	3.0
Total	100	100.0

Investigations related to *Diabetes Mellitus* that performed for the study population, where fasting blood sugar (FBS + HBA1c) was performed for 72 patients represented (72.0%), FBS for 25 (25.0%) and HbA1c for 3 (3.0%) as shown in (**Table 2**).

Regarding treatment received by the study population, 58 patients represented (58.0%) received treatment in form of diet + OHA, 24 patients (24.0%) diet + insulin, 16 (16.0%)

diet + OHA + insulin and 2 patients (2%) on diet control alone (**Figure 8**).

History of associated *Diabetes Mellitus* among the study population showed that 53 patients represented (53%) had no associated diseases, 38 patients (38%) had hypertension, one patient (1%) had thyroid, three patients (3%) had other diseases (**Figure 9**).

Duration of *itching* among the study population was as follow, 56 patients represented (56%) had a duration of months, 22 (22%) had a duration of years, 22 (22%) had a duration of days (**Figure 10**).

Distribution of *itching*, in 61 patients represented (61.0%) localized and in 39 (39%) patients, it was widespread (**Table 3**).

Other symptoms associated with *itching* among the study population were eruption in 29 patients represented (29.0%), dark pigmentation with eruption in 10 (10.0%) patients, dryness with eruption in 8 (8.0%) patients, dryness alone in 7 (7.0%) patients and 22 patients (22.0%) had no associated symptoms (**Table 4**).

Table 3. Showed that Distribution of itching in the patient of *DM* with *pruritus* in period (August-December) 2014

Distribution of itching	Prevalence	Percentage %
Localized	61	61.0
Widespread	39	39.0
Total	100	100.0

Table 4. Showed that Other symptoms associated with itching in the patient of *DM* with *pruritus* in period (August-December) 2014

Other symptoms associated with itching	Prevalence	Percentage %
No	22	22.0
Eruption	29	29.0
Dryness	7	7.0
Dark pigmentation	3	3.0
Swelling	4	4.0
Dryness + Dark pigmentation + Eruption	7	7.0
Pain, eruption	5	5.0
Dryness + Eruption	8	8.0
Dark pigmentation + Eruption	10	10.0
Fever, Light pigmentation	1	1.0
Swelling + eruption	3	3.0
Light pigmentation and eruption	1	1.0
Total	100	100.0

Figure 11: Showed day variations of *itching*; the majority of the study population 49 patients represented (49.0%) had all day itching, 31 (31.0%) had nocturnal itching, and 20 (20.0%) patients had diurnal itching.

Figure 12: Showed seasonal variations of itching, in the majority of the study population 65 (65.0%) had no seasonal variations, while itching increased in 16 patients (16.0%) in Summer, 15 patients (15.0%) in Winter, 3 patients (3.0%) in Autumn and 1 patient (1.0%) in spring. Aggravating factors of *itching* among the study population were dryness in 13 patients represented (13.0%), sun in 9 patients (9.0%), moisture in 4 patients (4.0%), drugs in 1 patient (1.0%) and in 70 patients (70.0%) there is no aggravating factors (**Figure 13**).

In 89 patients represented (89.0%), there were no relieving factors of *itching*, but in 11 patients (11.0%) have relieving factors, most of them (**Figure 14**).

Figure 15: Showed family history of *pruritus*, in 92 patients represented (92.0%), there is no family history in 8 patients (8.0%), 21 (21.0%) patients had history of contact with persons complaining of *itching* and no history of contact in 79 patients 79.0% **(Table 5)**.

Table 5. Showed that History of contact with persons complaining of itching in the patient of DM with pruritus in period (August-December) 2014

History of contact with persons complaining of itching	Prevalence	Percentage %
No	79	79.0
Yes	21	21.0
Total	100	100.0

Table 6. Showed that Distribution of the lesions in *pruritus* in *DM* in period (August-December) 2014

Distribution of lesions	Prevalence	Percentage %
Localized (single)	23	23.0
Localized (specific)	21	21.0
widespread (Scattered)	22	22.0
Localized (specific), Bilateral + symmetrical	11	11.0
Localized (specific + Bilateral	5	5.0
Widespread (Diffuse)	4	4.0
Localized (specific pattern) + asymmetrical	4	4.0
Generalized (Scattered) + Bilateral	3	3.0
Single, Bilateral + Symmetrical	2	2.0
Localized (specific pattern) + Bilateral + Asymmetrical	2	2.0
Localized (specific pattern), unilateral	1	1.0
Localized (specific pattern), Bilateral	1	1.0
Single, Unilateral	1	1.0
Total	100	100.0

It was noticed that three patients represented (3.0%) patients had a history of known food allergens, 2 (2.0%) patients had a history of known drug allergen and in 95 patients (95.0%) had no history of known allergen or drug as showed in **(Figure 16).**

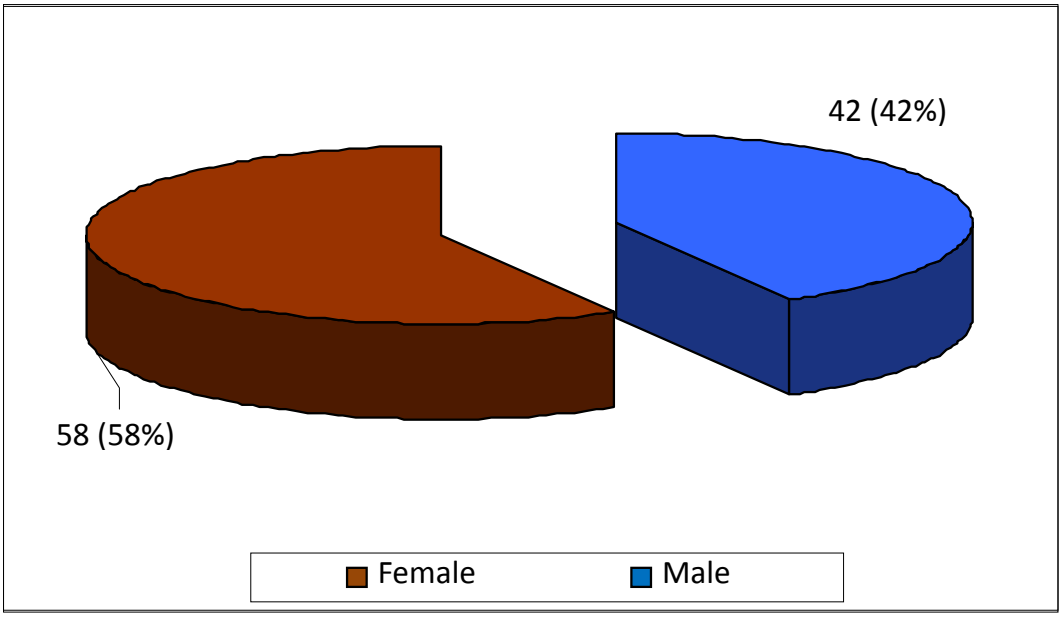

Figure 1. Showed that Gender in *pruritus* in *DM* in period (August –December) 2014

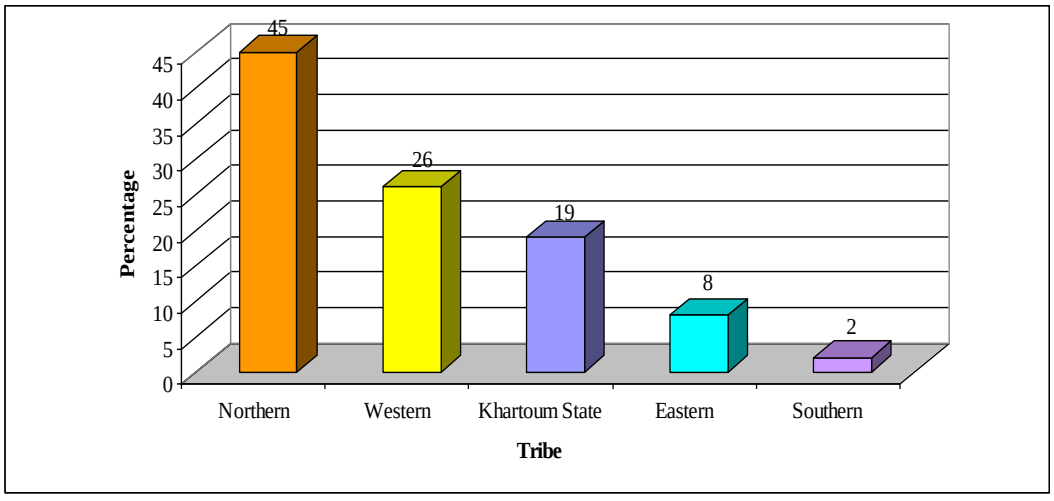

Figure 2. Showed that Tribes in *pruritus* in *DM* in period (August – December) 2014

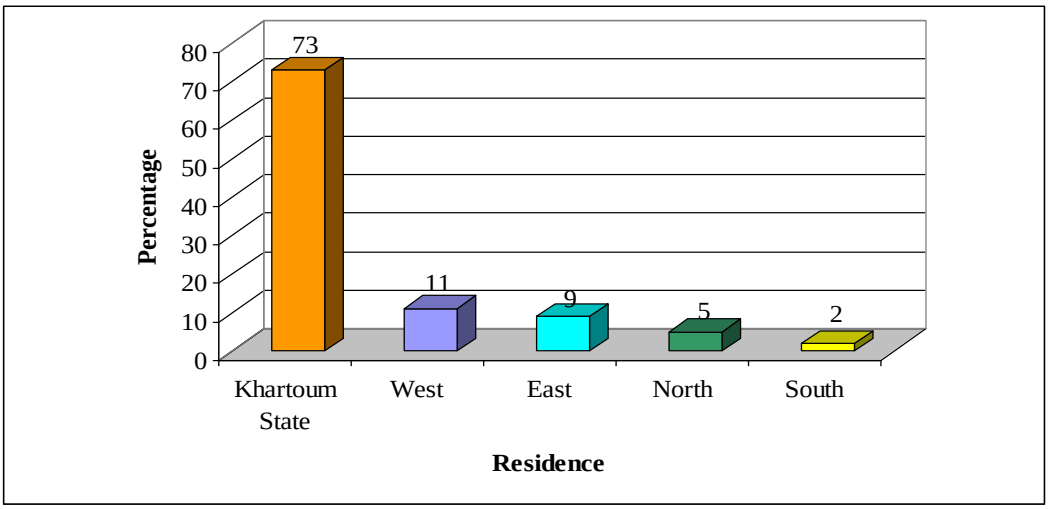

Figure 3. Showed that Residence in pruritus in DM in period (August- December) 2014

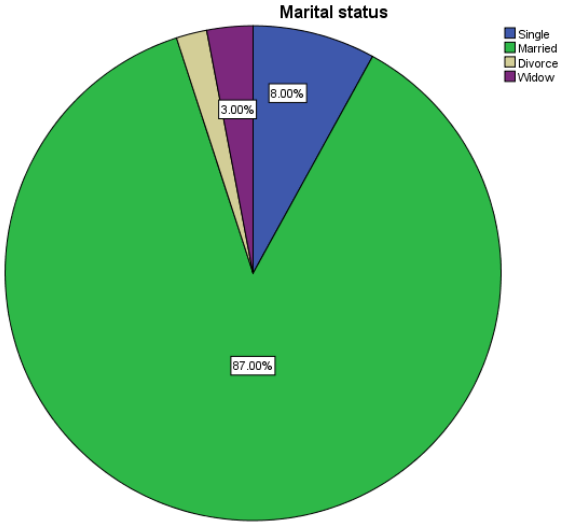

Figure 4. Showed that Marital status in pruritus in DM in period (August-December) 2014

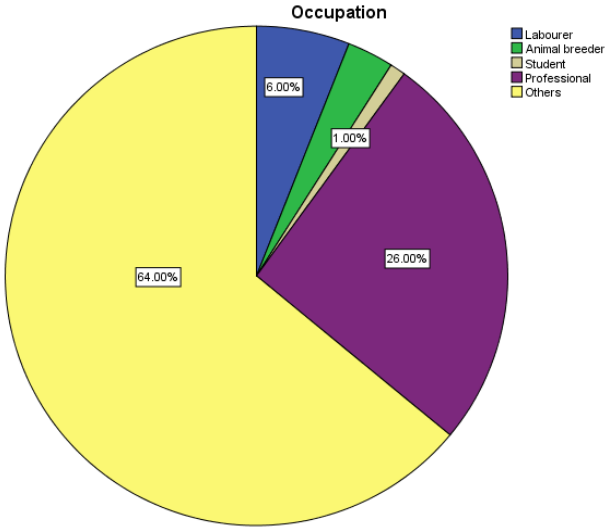

Figure 5. Showed that Occupation in pruritus in *DM* in period (August- December) 2014

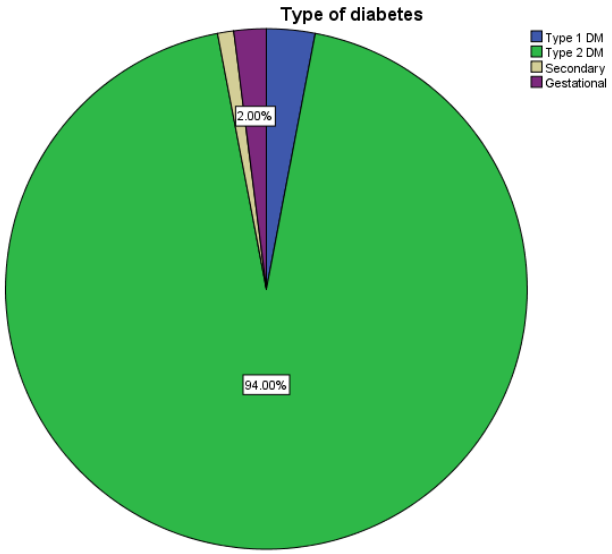

Figure 6. Showed that Types of *DM* in the patient of *pruritus* in period (August-December) 2014

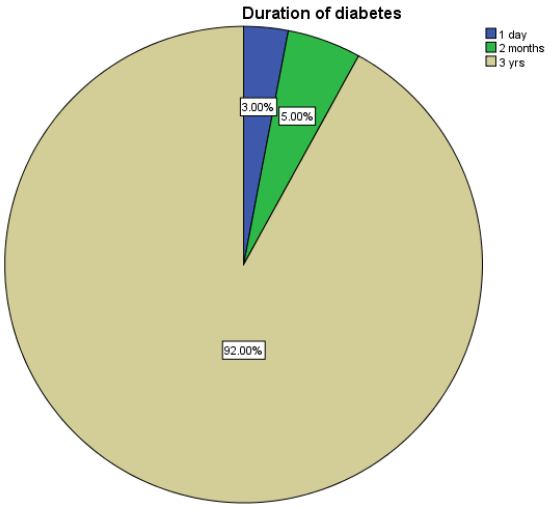

Figure 7. Showed that Duration of *DM* in the patient of *DM* with *pruritus* in period (August-December) 2014

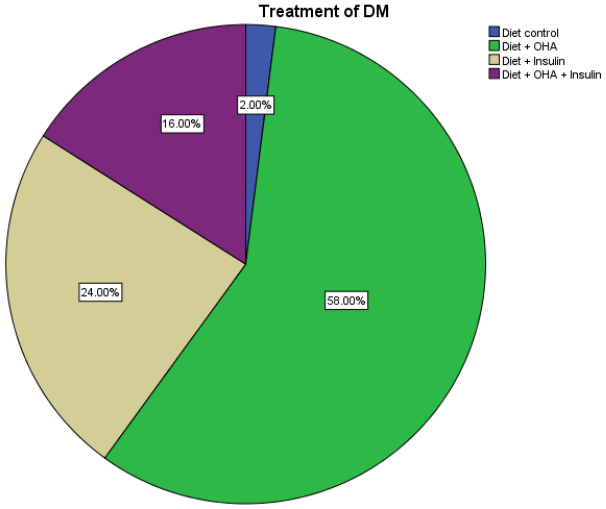

Figure 8. Showed that Treatment of *DM* in the patient of *DM* with *pruritus* in period (August-December) 2014

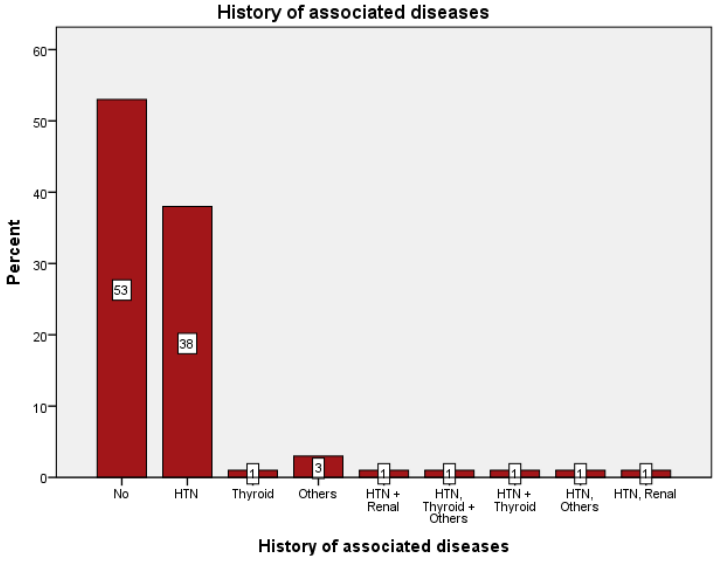

Figure 9. Showed that Associated diseases with *DM* in the patients of *DM* with pruritus in period (August-December) 2014

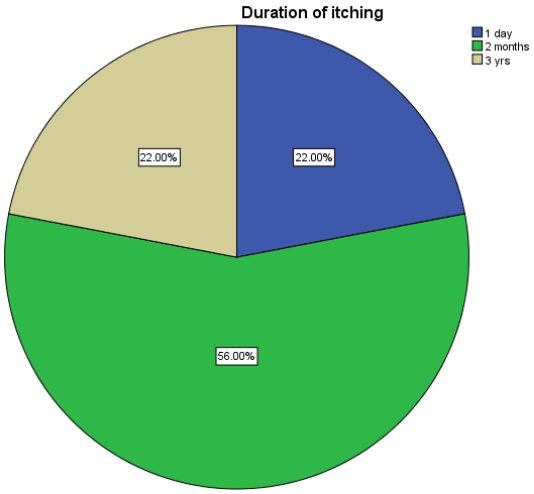

Figure 10. Showed that Duration of itching in the patient of *DM* with *pruritus* in period (August-December) 2014

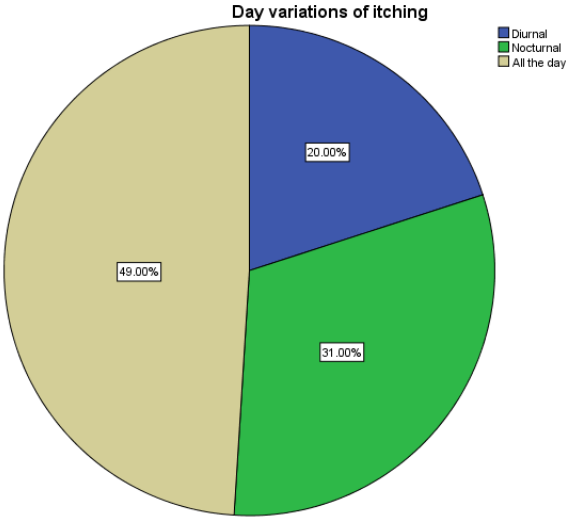

Figure 11. Showed that Day variation of itching in the patient of *DM* with *pruritus* in period (August-December) 2014

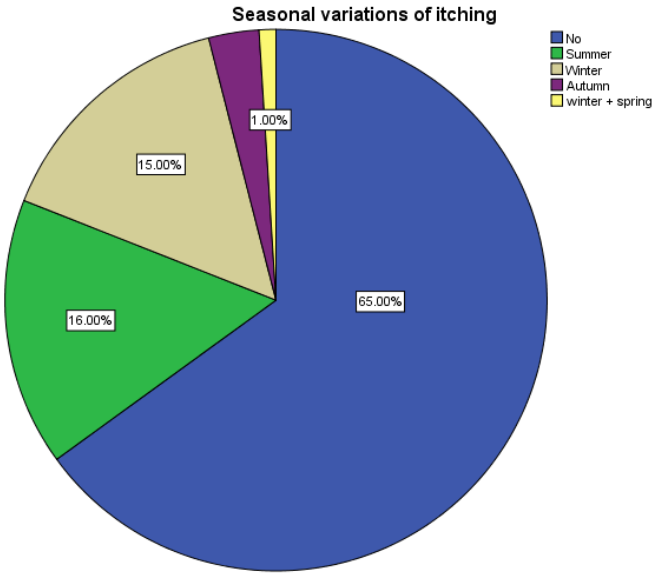

Figure 12. Showed that Seasonal variation of itching in the patient of *DM* with *pruritus* in period (August-December) 2014

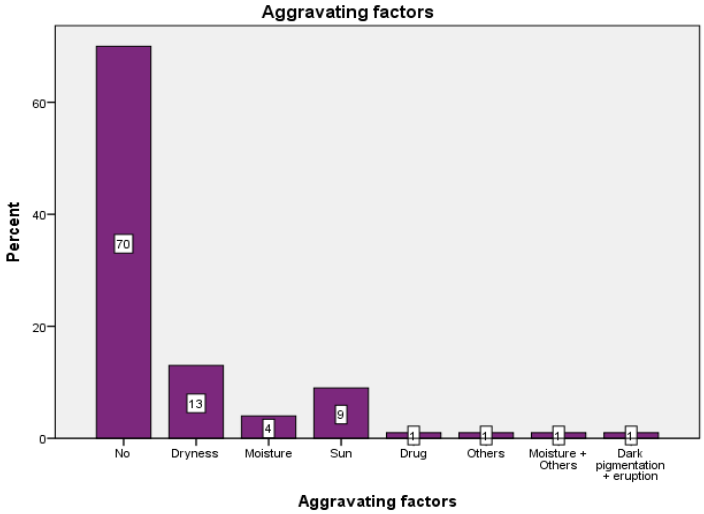

Figure 13. Showed that Aggravating factors of itching in the patient of *DM* with *pruritus* in period (August-December) 2014

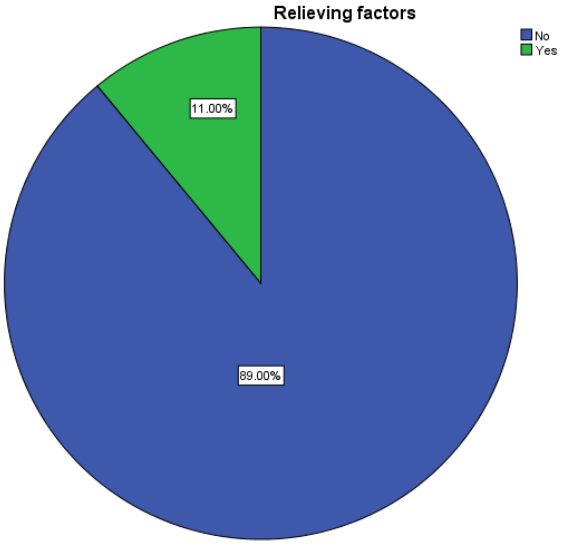

Figure 14. Showed that Relieving factors of *itching* in the patient of *DM* with *pruritus* in period (August-December) 2014

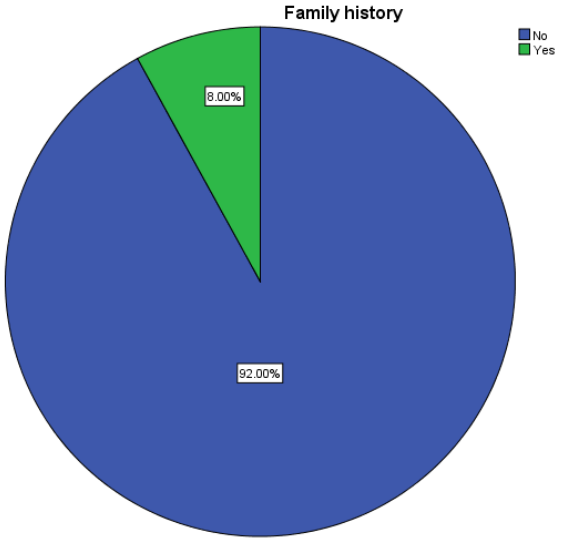

Figure 15. Showed that Family history of *pruritus* in *DM* in period (August-December) 2014

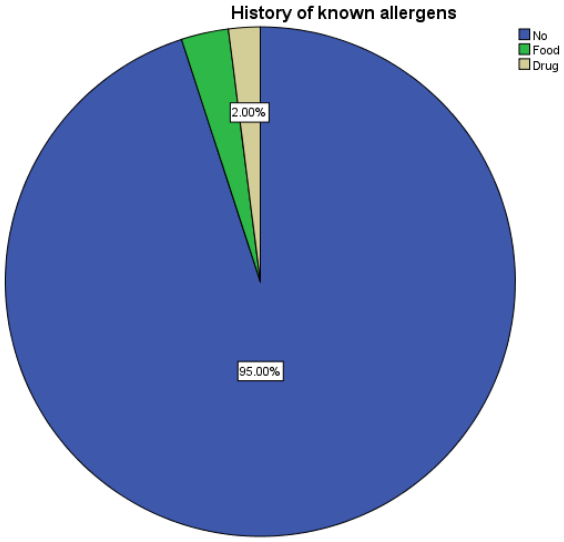

Figure 16. Showed that History of known allergens in patients of *DM* with pruritus in period (August-December) 2014

Table 7. Showed that Site of lesions in *pruritus* in *DM* in period (August-December) 2014

Site of lesions	Prevalence	Percentage %
Lower limbs	18	18.0
Scalp, Trunk, Upper limbs + Lower limbs	5	5.0
Upper limbs + Lower limbs	5	5.0
Genitalia	5	5.0
Scalp, Trunk, Upper limbs, Lower limbs, Palms, Soles, Genitalia	4	4.0
Trunk, upper limbs	4	4.0
Trunk	3	3.0
Scalp, Trunk, Upper limb, Lower limbs, Genitalia + Flexural areas	3	3.0
Scalp	2	2.0
Face	2	2.0
Neck	2	2.0
Flexural areas	2	2.0
Scalp + Others	2	2.0
Genitalia + Flexural areas	2	2.0
Scalp, Trunk, Upper limbs, Lower limbs + Others	2	2.0
Upper Limb	1	1.0
Others	1	1.0
Palms + Soles	1	1.0
Palms	1	1.0
Soles	1	1.0
Lower, Palms + Soles	1	1.0
Trunk, Upper limbs, Lower limbs, Genitalia + Flexural areas	1	1.0
Neck, Upper limbs + Flexural areas	1	1.0

Table 8. Showed that Morphology of lesions in pruritus in DM in period (August-December) 2014

Morphology of lesions	Frequency	Percentage
Papule, Vesicle + Pustule	18	18.0
Papule + Scales	10	10.0
Plaque + Scales	6	6.0
Papule + Pustule	6	6.0
Papule, Plaque + Scales	5	5.0
Papule, Plaque + Lichenification	5	5.0
Papule + Crust	4	4.0
Papule + Lichenification	4	4.0
Scales	3	3.0
Others	3	3.0
Papule + Fissures + Scales	3	3.0
Lichenification + Scales	2	2.0
Plaque, Keratosis, Lichenification + Scales	2	2.0
Keratosis, Erosions + Scales	2	2.0
Plaque	2	2.0
Macule, plaque, Lichenification	2	2.0
Papule, plaque	2	2.0
Macule + Papule	2	2.0
Lichenification	1	1.0
Plaque + Lichenification	1	1.0
Papule, plaque + atrophy	1	1.0
Papule, vesicle, Lichenification + scales	1	1.0
Papule + Bullae	1	1.0
Macule + plaque	1	1.0
Papule, Fissures + scales	1	1.0
Papule, Vesicle	3	3.0

Table 6: Showed distribution of lesions, localized in 23 patients represented (23.0%), widespread (Scattered) in 22 (22.0%) patients.

Table 7: Showed distribution of site of lesions in the study population, 18 patients represented (18.0%) had lesions in lower limbs, 5 (5.0%) had lesions in genitalia, 3 (3.0%) in

trunk, 2 (2.0%) patients had lesion in scalp, flexural areas, face, and neck.

Table 8: Showed morphology of the lesions among the study population, 18 patients represented (18.0%) patients had papule, vesicle and pustule, 10 (10.0%) patients had papule and scales. 6 patients (6.0%) had plaque with scales and plaque with pustule, 5 patients (5.0%) had papule, plaque with scales or lichenification, 4 (4.0%) patients had papule with crust or lichenification, and 3 (3.0%) patients had scales alone.

4. Discussion

In this study which aimed to detect the Clinicoepidemiological prevalence of pruritus in 100 diabetic patients at Jabir Abu Eliz Diabetic Centre, 2014; males were 42 (42.0%), and females were 58 (58.0%). This, in contrast with the previous study conducted by Harish et al., which stated that males were predominant, 88(64.7%) and 48 (35.3%) were females [8].

Most of the study population 67 (67.0%) were in the age group 26-60 years, followed by 32 patients (32.0%) in the age group >60 years. This coincided with the previous study, which reported that the maximum numbers of patients were in the age group of 51 to 60 years (32.36%) [8]. This can be explained by the fact that the increase of cutaneous involvement of *Diabetes Mellitus* may be attributed to the long duration of *diabetes* in this age group of patients.

In this study, 87 patients (87.0%) were married. According to the finding of Anna S, 2003 which is five focus interviews; who reported that vaginal dryness and pain during intercourse are problems may find in type 2 *DM*, these predisposing factors may result into injury and so vaginal thrush [9].

Twenty-six patients (26.0%) were professionals. This result on conformity with the study of Kyoko *et al.*, 2007 [10], who assessed the association between job stress and somatic symptoms and their correlation with co-morbidities like *diabetes* and they found that skin itching is one of the somatic symptoms.

Most of the study population (94.0%) had type 2 *Diabetes Mellitus*, and (3.0%) had type 1. This was like that found in a previous study [10], which showed that type 2 *DM* seen in 130 (95.6%) patients and 6 (4.4%) patients had type 1 *DM* [8].

The majority of patients in these studies (92%) had duration of *diabetes* for years, this was similar to Bhat *et al.*, 2006, Ahmed *et al.*, in their studies, this Can be explained by the fact that as the duration of *diabetes* increased, there was non-enzymatic glycosylation of dermal collagen and mucopolysaccharides, leading to various dermatological manifestations and complications included *pruritus* [11,12].

A previous study, Bhat *et al.*, showed a positive association between postprandial blood glucose and generalized pruritus and suggested that better control of postprandial glucose might be beneficial to relieve generalized *pruritus* in *diabetic* patients [11,13]. Therefore, in this study, fasting blood sugar and HbA1c was measured for (72.0%) of the study population, FBS for 25 (25.0%), also HbA1c for 3 (3.0%).

History of associated diseases among the study population showed that (38%) had hypertension, (1%) had thyroid, and (3%) had others. This coincided with previous literature of Palot *et al.*, 2008, which reported that hypothyroidism, chronic lymphocytic leukemia, hepatitis C, hepatitis B, *diabetes mellitus*, lung cancer, and uremia were associated with *pruritus* in *diabetic* patients [14].

In this study, 61% of patients had localized *pruritus*, and 39.0% had widespread *pruritus* that attributed to *diabetes*, which indicates a high rate of *pruritus* than that was reported in 10% of the *people with diabetes* by Mahajan *et al.*, 2003 [15], and in 4.5% by Nigam *et al.*, 2003 [16].

Other symptoms associated with *pruritus* among the study population were eruption (29.0%), dark pigmentation associated with an eruption in (10.0%) patients, dryness with eruption (8.0%) patients, dryness (7.0%). This online with a literature review which stated that other symptoms associated were the presence of xerotic skin, a feature which can predispose to pruritus [17]. Also, in this study, more aggravating factors of itching were dryness (13.0%).

The seasonal variations of itching, 65.0% of study population itching not associated with seasonal, while in 16 (16.0%) in summer, 15 (15.0%) in winter. This finding indicates that the onset of itching is not seasonal-dependent and may attribute to other factors like low immunity and diminished peripheral circulation in diabetic patients. In this study, *Pruritus* of the scalp was 2%, whereas Scribner, 1977 recognized it as a predominant manifestation of *diabetes* and is usually resistant to antipruritic measures [18].

In this study most of the patients had lesions in lower limbs, where these sites represent location of fungal infection like Tinea Pedis, this coincided with the local study of Bashir *et al.*, 2004 [19], but in contrast with the local study where Candidal Vulvo Vaginitis was 12%, only 5% had lesions in genitalia in this study, while the distribution of lesions was localized in 23 patients represented (23.0%) included local insulin reaction, that similar to local study of Bashir *et al.*, 2004 [19].

5. Conclusions

The prevalence of diabetic patients who were complaining of itching on Jabir Abu Eliz Diabetic Centre was 23.3% represented as 42.0% in males and 58.0% females. The main clinical features of pruritus in diabetic patients in this study were an eruption, dark pigmentation, and dryness. Localized pruritus that attributed to diabetes was common among the study population represented 23%.

6. Recommendations

- Control and intensive management of *Diabetes Mellitus* to prevent dermatological complications, specifically *pruritus*, are highly recommended.
- Rising awareness of patients and relatives about seeking treatment for *pruritus* early in order to improve the quality life of patients with *Diabetes Mellitus* and to avoid more complications.
- Availability of anti/reliving *pruritus* agents at clinics and centers of *Diabetes Mellitus* treatment is mandatory.
- Further studies are needed for assertion more about the correlation of *pruritus* as dermatological manifestations per se among *Diabetes Mellitus* patients.

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