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ASSESSMENT OF THE PREVALENCE OF PARASITIC INFESTATION OF THE SKIN

By

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Abstract

This study was conducted from September 2023 to May 2024, and included 250 patients to assess the out-patients' skin diseases attended Dermatology, Venereology and Andrology clinics at Benha University Hospitals. A questionnaire was designed for their sociodemographic characters. Clinical examination for skin and hair was done in all cases by dermatologist. The results showed that out of total 250 patients there were 149 (59.2%) females and 101 (40.4%) males, aged from 1:60 years. Parasitic skin infestation was found in 113 cases (45.2%). Papular urticaria due to insect bite was the most frequently observed as it was found in (21.2 %) of cases followed by pediculosis capitis (16.8%), scabies (4.4%), demodicosis (2.8%) and cutaneous leshimaniasis (1.6%). Parasitic skin infestation was more in females (61.1%) than in males (38.9%), at age group 6 to18 year (53.1%), and mostly from rural areas (61.9%).

Key words: Pediculosis, Scabies, Cutaneous leishmaniasis, demodicosis, Papular urticaria.

Introduction

Skin parasites are prevalent worldwide, particularly in tropical and subtropical countries (Bernigaud *et al,* 2016). Arthropods are the most commonly parasites affect skin and subcutaneous tissues (Norgan and Pritt, 2018), as lice *(Pediculus capitis or corporis and Pthirus pubis), Sarcoptes scabei, Demodex species, myiasis*-causing fly larvae, as well as cutaneous leishmaniasis (Gharib *et al,* 2023). Most of skin parasites are transmitted by an infected vector or contag ion with infested patients (Man *et al,* 2022).

Each year, pediculosis affects hundreds of millions of people in all countries and within all socioeconomic classes. Lice are obligate host-insects transmitted direct human-to-human contact (Peterson *et al,* 2019). Infection occurs commonly in the warmer months and in areas with higher humidity (Portillo *et al*, 2018). Outbreaks of pediculosis commonly infested children, mainly preschool or school-aged girls (Çetinkaya *et al,* 2018), causing pruritus, due to hypersensitivity reaction (Veraldi *et al*, 2018).

Scabies caused by *Sarcoptes scabiei* affects all social classes (Korycińska *et al,* 2020). Children, elderly, immunocompromised individuals and overcrowded populations with low socio-economic status, are at risk of becoming infected (Mounsey *et al,* 2013). Intense pruritus particularly at night is a classic symptom of scabies. Skin lesions show a typical irregular tunnel, a few millimeters to a few centimeters long, formed by the female mite (Walton and Currie, 2007). Transmission occurs through direct contact or sexual contacts with an infected individual or indirectly through fomites (Korycińska *et al,* 2020). As the scabies is highly infective, it is essential to treat all family members and other people who have a direct contact with an infected person (Walton, 2010).

Cutaneous leishmaniasis is the most common type with 1.5 million infections annually worldwide (De Vries and Schallig, 2022). Infection is transmitted by the sand flies' bite (Traub-Cseko *et al,* 2022). A lesion starts as a papular form, a nodular plaque and then persistent ulcerative lesion (Burnett, 2015). Unless it is secondary infected, majority of cases showed itself healing (Bessat and Elshanat, 2015). Papular urticaria is a chronic relapsing allergic skin disorder (De Waal,

2023), caused by bites of fleas, mosquito, mites, scabies and bugs (Olivier *et al*, 2023). The patient commonly comes with severe itching, characterized by localized pruritic papules and papulovesicles. Scratching causes erosions and ulcerations. It is common in children at age is 2 to 10, but it may continue into adulthood (Alraddadi *et al*, 2023). Demodex mites are common ectoparasites, live in the pilosebaceous unit of mammals and human skin as a normal flora; abnormal proliferation of *Demodex* mites can cause severe inflammation (Paichitrojjana, 2022). It can cause multiple skin disorders called demodicosis which has different clinical features (Karabay and Çerman, 2020) like dry scaly and itchy, skin (Guner *et al*, 2022), burning sensation, unexplained eczema, papulopustular lesions (Douglas and Zaenglein, 2019), scalp pruritus, dandruff, *Demodex* folliculitis and *Demodex* abscess (Forton *et al*, 2019).

The study aimed to assess the prevalence of parasitic skin infestation among patients attended dermatology, venereology and andrology clinics at Benha University Hospital.

Materials and Method

Study design: This cross sectional study included 250 patients, from September 2023 to May 2024, at Benha University Hospitals. Patients of both sexes and aged from one year to sixty years with different skin diseases were chosen. Written consents were obtained from them or from their parents for children after explaining the study purpose.

Sociodemographic data: A questionnaire was designed to have sociodemographic data about the patients such as age, sex, residence, occupation, hygienic behavior such as frequency of hair washings and showering, sharing of combs and clothes, history of previous parasitic infestation (family or personal), raising pets and insect bite.

Clinical examination for skin and hair disorders **(**a visual inspection**):** Patients were clinically examined by the dermatologist. Scabies clinical diagnosis included the presence of itching that is worse at night, more than a member of the family being affected, the anatomical distribution of lesions which may be erythematous, papular, vesicular or pustular and the presence of a burrow (Hay *et al*, 2012). *Pediculus capitis* was diagnosed clinically by a visual check of the scalp and hair to determine the presence of nits, nymphs or adults (Kalari *et al*, 2019). Cutaneous leishmaniasis was diagnosed clinically by the infiltrated papule or nodule, central ulceration, and central crustation with history of insect bite and living in or traveling to an endemic area (Bilgic-Temel *et al*, 2019). Diagnosis of *Demodex* (folliculitis-like type) was based on the following clinical criteria: localized follicular pustules that look like acne or folliculitis (Helou *et al*, 2016). Diagnosis of papular urticarial lesions are symmetrically distributed on exposed areas, particularly extensor surfaces, skin lesions have a linear or triangular pattern, redness, swelling, pruritis, ecchymosis, vesicles, and bullae (De Waal, 2023).

Sample size: Size was calculated by using Epi-info software version 7.2.5.0 (Mostafa *et al*, 2012), reported 20% skin parasitic infestation. So, minimal size was 246 patients, and confidence level and error mar-gin were adjusted at 95% & 7% respectively.

Ethical approval: This study was approved by the Research Ethical Committee, Faculty of Medicine, Benha University (No. RC 35-9-2023).

Statistical analysis: Data were collected, computerized and analyzed by using SPSS v. 20.0 (Statistical Package for Social Sciences). Data were expressed as frequency and percentages. Chi squared test determined the difference and association between groups. 95% CI and Odds ratio were calculated. Accepted level of significance was at $P=0.05$, and $P<0.001$ was highly significant.

Results

A total of 113/250 patients were infested (45.2%). Insect bite papular urticaria was (21.2%) followed by *P. capitis* (16.8%), *S. scabiei* (4.4%), demodicosis (2.8%) and cutaneous leishmaniasis (1.6%). Skin infesta-

tions were more in females 149(61.1%) than in 101(38.9%) males without significant and most frequently in age group 6 to 18 year (53.1%) followed by ages 19 to 40 (29.2%), last one in ages 1-5 (8%) with significant difference 151(60.4%) them from rural areas and 99(39.6%) ones from urban ones, but without significant difference. Students had the higher infestation rate (54.9%), with associated risk of infestation history (54.9%) with significant in patient with parasitic skin infestation while hygienic behavior and raising pets were without significant.

Pediculus capitis was common among age group 6 to18 (71.4%), females (83.3%) with long hairs, and among students (73.8%), with significant difference among rural areas patients (66.7%).

Sarcoptes scabiei that causes scabiasis was common among age group 19 to 40 (72.7%), in females (63.6%), it was significant, in patient from rural areas (81.8%), but it was without significant difference.

Demodicosis was common among age group 19 to 40 (71.4%), in males (57.1%), and in patients from rural areas (57.1%), but without significant difference.

Papular urticaria was common at the age group 6-18 (50.9%), with significant difference, in females (50.9%), in rural areas patients (56.6%), among students (52.8%), but without significant.

Zoonotic cutaneous leishmaniasis was the commonest skin parasite among age group 19 to 40 (75%), all were males.

Previous infestation was statistically significant risk factor for both the scabiasis (81.8%) and papular urticaria (66%)**.**

Details were given in tables (1, 2, 3, & 4) and figures (1, 2 & 3).

Table 1: Parasitic skin diseases among outpatients (n=250):

Parasitic skin diseases	Frequency	%
Papular urticaria due to insect bite	53	21.2
Pediculosis capitis	42	16.8
Scabies	11	4.4
Demodicosis	7	2.8
Cutaneous leshimaniasis	4	1.6
Parasitic skin diseases (at least 1 parasite/ infestation)	113	45.2

Table 2: Ectoparasites among outpatients:

Socio-demographic	Outpatients (250)		Ecto-parasites (113)		P value	Odds (95% CI)
	No	%	No	%		
Age group/year: 1 to 5	19	7.6	9	8.0%	0.006**	---
6 to18	106	42.4	60	53.1%		
19 to 40	84	33.6	33	29.2%		
>40	41	16.4	11	9.7%		
Male	101	40.4	44	38.9%	0.669	0.895(0.538-1.488)
female	149	59.6	69	61.1%		
Residence: Rural	151	60.4	70	61.9%	0.650	1.125(0.676-1.874)
:Urban	99	39.6	43	56%		
Occupation: No work	62	24.8	22	19.5%	0.066	-
: Employee	43	17.2	20	17.7%		
: Student	117	46.8	62	54.9%		
: Other	28	11.2	9	8.0%		
Hygienic behavior: Yes	156	62.4	75	66.4%		
: No	94	37.6	38	33.6%	0.239	0.733(437-1.230)
Raising pets: Yes	66	26.4	33	29.2%	0.361	1.300(0.740-2.284)
: No	184	73.6	80	70.8%		
Previous infestation: Yes	88	35.2	62	54.9%	0.000**	5.190(2.949-9.135)
: No	162	64.8	51	45.1%		

Table 3: Pediculosis *capitis*, scabies and demodicosis among outpatients of Benha University's Hospitals:

Socio-demographic	*P. capitis* (42)		Scabies (11)		Demodicosis (7)		P value
	No	%	No	%	No	%	
Age group/year: 1 to 5	2	4.8%	0	0.0%	0	0.0%	P1=0.001**
6 to18	30	71.4%	2	18.2%	2	28.6%	P2=0.044*
19 to 40	7	16.7%	8	72.7%	5	71.4%	P3=0.163
>40	3	7.1%	1	9.1%	0	0.0%	
Male	7	16.7%	4	36.4%	4	57.1%	P1=0.001**
Female	35	83.3%	7	63.6%	3	42.9%	P2=1.0, P3=0.445
Residence: Rural	28	66.7%	9	81.8%	4	57.1%	P1=0.363
: Urban	14	33.3%	2	18.2%	3	42.9%	P2=0.208, P3=1.0
Occupation: No work	6	14.3%	3	27.3%	1	14.3%	P1=0.002**
: Employee	4	9.5%	3	27.3%	2	28.6%	P2=0.543
: Student	31	73.8%	3	27.3%	3	42.9%	P3=0.814
: Other	1	2.4%	2	18.2%	1	14.3%	
Hygienic behavior: Yes	12	28.6%	2	18.2%	2	28.6%	P1=0.185
: No	30	71.4%	9	81.8%	5	71.4%	P2=0.217, P3=0.714
Raising pets: Yes	10	23.8%	2	18.2%	3	42.9%	P1=0.676
: No	32	76.2%	9	81.8%	4	57.1%	P2=0.733, P3=0.385
Previous infestation: Yes	17	40.5%	9	81.8%	3	42.9%	P1=0.433
: No	25	59.5%	2	18.2%	4	57.1%	P2=0.002**, P3=0.699
Hair length: long	35	83.3%	-	-	-	-	P1=.000**
: short	7	16.7%	-	-	-	-	

Table 4: Papular urticaria and cutaneous leishmaniasis among outpatients

Socio-demographic	Papular urticaria (53)		Cutaneous leishmaniasis (4)		P value
	No	%	No	%	
Age group/year: 1 to 5	8	15.1%	0	0.0%	P1=.020*
6 to18	27	50.9%	1	25.0%	P2=0.342
19 to 40	11	20.8%	3	75.0%	
>40	7	13.2%	0	0.0%	
Male	26	49.1%	4	100.0%	P1=0.148
Female	27	50.9%	0	0.0%	P2=0.026*
Residence: Rural	30	56.6%	2	50.0%	P1=0.524
: Urban	23	43.4%	2	50.0%	P2=0.650
Occupation: No work	13	24.5%	0	0.0%	P1=0.721
: Employee	7	13.2%	4	100.0%	P2=0.000**
: Student	28	52.8%	0	0.0%	
: Other	5	9.4%	0	0.0%	
Hygienic behavior: Yes	23	43.4%	0	0.0%	P1=0.326
: no	30	56.6%	4	100.0%	P2=0.300
Raising pets: Yes	19	35.8%	0	0.0%	P1=0.079
: No	34	64.2%	4	100.0%	P2=0.576
Previous infestation: Yes	35	66.0%	1	25.0%	P1=0.000**
: No	18	34.0%	3	75.0%	P2=1.0

P<0.05= significant*, P<0.001= highly significant**.

Discussion

In the present study showed that parasitic skin infestation was (45.2%) among cases, more frequent in females (61.1%) than in males (38.9%), without significant. Papular urticaria due to insect bite was the most common picture in (21.2%) of cases followed by pediculosis capitis (16.8%), scabiasis (4.4%), demodicosis (2.8%) and then leishmaniasis (1.6%). This disagreed with Bilgili *et al. (*2013), who in Turkey reported that (1.8%) of cases had parasitic skin diseases, El-Khateeb *et al.* (2014), who in Damietta reported lower prevalence of skin parasitic infestations (16.48%) of cases, and El-Khateeb *et al.* (2011), who in Cairo reported (11.82%), parasitic infections. Also, it was low prevalence infestations rate (20.9%) reported in by Mostafa *et al.* (2012) in Sharqia Governorate. Abdel-Hafez *et al.* (2003) in the Assuit Governorate, parasitic skin infestations were (27.40%). Higher prevalence rate (62.5%) was reported by Heukelbach *et al.* (2003) in Brazil among the community-

based patients attended the primary health care centre was (55.2%). Pediculosis infestation is cosmopolitan, especially in countries with low hygiene and sanitation (Pollack *et al.* 2017). In Qalyubia Governorate vicinity, it was reported among primary school children (Morsy *et al,* 1991), and Abou-Gamra *et al.* (1992) reported that lice caused asthmatic bronchitis.

In the present study, prevalence of pediculosis capitis was (16.8%), among age group 6-18 (71.4%), in females (83.3%), among students (73.8%), which was significant, and in rural areas (66.7%), without significant, but common with long hair (83.3%) with significant difference. This agreed with Abdel-Hafez *et al.* (2003), who in Assuit Governorate reported (19.37%) pediculosis. Also, it agreed with El-Khateeb *et al.* (2014) in Cairo, who reported (16.47%) that was more in females (59.7%) in rural areas (51.1%). Also, it agreed with El-Taweel *et al*. (2018) in Qalyubia who reported (20.9%) among schoolchildren. Heukelbach *et al.* (2003) in Brazil reported higher prevalence rate in the community-based sample (43.3%), while it was (38.2%) in patients attended the primary health care center. But, the results disagreed with El-Khateeb *et al.* (2011) and Bilgili *et al*, (2013), who reported pediculosis lower rate of (2.42%) and (0.3%) respectively. The higher rate was reported by Yamamah *et al.* (2012), who showed that prevalence of pediculosis was (37.6%) in South Sinai among children. Girls are more commonly infested than boys with the ratio varied between 1-12 (Turkey) and 1-2 (Australia), which reflected sex-characteristic, whereas girls often keep long and close contacts with other girls, but boys usually have less contacts (Feldmeier, 2012). Sarkar and Kanwar (2001) reported the more infestation in age group of 3-10 years. Negi *et al.* (2001) found that the rate among girls was (35.8%) as compared to (11.2%) among boys. Al Kalash *et al.* (2023) reported a strong correlation between disease occurrence and bathing, hair washing, and nutritional status. In active head lice infestation, louse eggs are found on hair shafts, and crawling nymphs and adults were present on patient's forehead (Morsy and Al-Ghabban, 2023). Even public lice can infest eyelids and eye laches (Morsy and El-Ghazali, 1999).

Scabiasis is a skin disease increased globally over the last ten years (Azdajic *et al,* 2022). Children are most affected (Heukelbach *et al,* 2005). It causes both distress and discomfort to whole families, with global estimated of about 300 million (Hay *et al,* 2012). It is transmitted by contact from man to man to by (Feldmeier *et al,* 2009). Also, Morsy *et al.* (1994) in Cairo reported transmission from infested pet dog to his owner.

In the present study, prevalence of scabies was (4.4%). Scabies was common at age group 19:40 (72.7%), in females (63.6%), this was significant, in patient from rural areas (81.8%) but it was statistically insignificant. This agreed with Hegazy *et al.* (1999), who in Dakahlia reported prevalence of (5.4%), Abd El Havez *et al.* (2003), who reported a low prevalence of (1.72%), and also, Bilgili *et al*. (2013), who found (1.5%). But, this disagreed with El-Khateeb *et al.* (2014), who reported that (0.01%). Although El-Khateeb *et al.* (2011) among outpatient of Dermatology Clinics, Ain Shams University Hospitals found (9.26%) mainly among females. Also, El-Akhras *et al.* (1992), who in El-Tall El-Kabir detected high prevalence of (23.5%) among low socioeconomic levels. Heukelbach *et al.* (2003) reported that scabies in the community-based sample was (8.8%) and in patients attending the primary health care center was (18.8%). Gharib *et al.* (2023) reported that 30% of scabies cases were men, and 70% were women, also the mean age of scabies cases was 19 years.

Demodex is commonly found on human skin, with a symbiotic relationship between it and humans that may be beneficial for the hosts, however, these mites may also act as pathogens (Zhong *et al,* 2019), But Morsy *et al.* (2000) found that *Demodex folliculorum* caused pathological lesions especially in im-

munocompetent children.

In the present study, prevalence of demodicosis was (2.8%), common at age group 19-40 (71.4%), in males (57.1%), in rural areas (57.1%) but without significant. Skrlin *et al.* (1991) in London reported a demodicosis prevalence of (12%) both in groups with acne vulgaris and healthy skin. Also, *D. folliculorum* was found in (11.8%) of acne vulgaris cases versus none in control (Baysal *et al*, 1997). Okyay *et al.* (2006) found higher prevalence rate of *D. folliculorum* (34.8%). Morsy *et al.* (2002) in Benha, Egypt treated demodicosis with camphor oil.

Papular urticaria is a common cutaneous lesion with sign of chronic or recurring papules caused by hypersensitivity reaction to insect bites (Stibich and Schwartz, 2001), particularly in children, also immuno-compromised adults are also vulnerable (Raza *et al,* 2008). The bites of mosquitoes, fleas, and bedbugs frequently cause papular urticaria (Steen *et al,* 2004). Sanad *et al.* (2002) in Egypt reported that the ant allergy also caused papular urticaria. Moreover, bites of tick cause zoonotic tick paralysis especially in children (Mosabah and Morsy, 2012).

In the present study, the prevalence of papular urticaria was (21.2%). It was common at age group 6-18 (50.9%) showed significant differences, in females (50.9%), in rural areas (56.6%), among students (52.8%), but without significant differences. This agreed with Halpert *et al.* (2017), who in Bogotá reported that prevalence of papular urticaria was (20.3%) in children (1-6 years of age) associated with indoors fleas. But, it disagreed with El-Khateeb *et al.* (2011), who reported that papular urticaria was in (0.86%) of cases, and El-Khateeb *et al.* (2014), who reported that (1.51%) papular urticarial cases. Raza *et al*. (2008) in Karachi, reported that papular urticaria was (1.99%) in patients, common at age of 4 months to 12 years (71.8%), in males (63.6%) and (75.7%) patients came from urban or peri-urban areas. As to insect bites, El-Akhras *et al,* (1992) in the rural populations of El-Tall El-Kabir, Ismailia Governorate reported (4.6%). Abdel-Hafez *et al.* (2003) in Assuit Governorate found (6.31%) in rural areas. Morsy (2012) reported that systemic allergic reactions occurs in response to the bites of mosquitoes, several types of blood-sucking flies, fleas, kissing bugs, lice, and ticks, causing various degrees of local swelling, papular urticaria in children, and rare systemic allergic reactions, including anaphylaxis.

Leishmaniasis is classified as to the clinical pictures they cause in man into three main diseases: 1- Cutaneous leishmaniasis (CL), 2- Muco-cutaneous leishmaniasis (MCL), & 3- Visceral leishmaniasis (VL), and on the virtual morphological species identification (Morsy, 1996). Cutaneous leishmaniasis can present in different clinical forms, uncomplicated, self-healing skin lesions to debilitating, large, chronic or recurring lesions, disfiguring mucosal or muco-cutaneous lesions in mouth or nose, or diffuse cutaneous leishmaniasis (Morsy *et al,* 1997). Besides, in hot weather cutaneous leishmaniasis can predispose to human skin cancer (Morsy, 2013). The bulk of cases were concentrated in the Americas and the Eastern Mediterranean (Ruiz-Postigo *et al,* 2020). The leishmaniasis emergence was due to the immigration of non-immune individuals into endemic areas (Knight *et al,* 2023)

In the present study showed that prevalence of cutaneous leishmaniasis was (1.6%) more common at age group 19-40 (75%), but without significant differences and all cases were male employees (100%), with significant difference. Kabil *et al.* (1988) in the vicinity of Benha City isolated an abnormal infantile visceral leishmaniasis from an old farmer who underwent splenectomy incision due to chronic schistosomiasis. Also, Morsy *et al.* (1990) in Benha detected anti-leishmanial antibodies among some inhabitants who never left their governorate.
These results disagreed with El-Khateeb *et al.* (2011) and Bilgili *et al.* (2013) who reported that (0.03%) and (0.1%) of cases had cutaneous leshmaniasis respectively. Abuo-

warda *et al*. (2021) found a total of 108 zoonotic cutaneous leishmaniasis were identified in the Al-Houd Al-Marsoud Hospital in Cairo. The most affected age groups was 16 to 20 (20.4%) and 20.5 to 25 (44.4%) years. Nowadays, sandflies-vectors, reservoirs and leishmaniasis are well documented in many Egyptian peripheral foci (Abdel-Motagaly and Morsy, 2016). Higher prevalence was recorded by Alzahrani *et al*. (2023) as cutaneous leishmaniasis was (38.1%), higher among males (41.1%) than females (35.2%). De Melo *et al*. (2020) reported (54.87%) of cases had cutaneous leishmaniasis in a study done in Brazil, (69.02%) were males, youngest one was 11 years old, but oldest was 73. Bisetegn *et al*. (2020) in Ethiopia reported that cutaneous leishmaniasis incidence were (22.4%) in the population, more in males than females and was more prevalent in the age group 16-45years old. Iraqi males were 54.6% and females, 45.4% (Al-Khayat *et al*, 2018). Al-Dhafiri *et al*. (2023) in Saudi Arabia detected that (84.5%) of cutaneous leishmaniasis patients were male patients.

Globally climate changes represent risk factors for parasites spreading and vectors via ecosystems (Bezerra-Santos *et al*, 2023), causing marked increase in their incidence and prevalence (El Omari *et al*, 2020).

Conclusion

The parasitic skin diseases were more or less high in children and in females. Papular urticaria was the most prevalent skin disease followed by pediculosis *capitis*.

To control parasitic skin infestations is by healthy education, insect control by using friendly safe insecticides, and treatment is indicated.

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References

Abdel-Hafez, K, Abdel-Aty, MA, Hofny, ER M, 2003: Prevalence of skin diseases in rural areas of Assiut Governorate, Upper Egypt. Int. J. Dermatol. 42, 11:887-92.

Abdel-Motagaly, AME, Morsy, TA, 2016: Zoonotic cutaneous leishmaniasis three years fever hospital records: With general discussion. JESP 46, 3:527-32

Abou-Gamra, EM, El Shayeb, FA, Elbanna, M, Farrag, AMK, Morsy, TA, 1992: The possibility of lice allergy among Egyptian patients with asthmatic bronchitis. J. Egypt. Soc. Parasitol. 22, 1:37-50

AbuBakr, HO, Ismael, E, Shaalan, M, Mohamed, MA, *et al*, 2021: Epidemiological and genetic characteristics of asymptomatic canine leishmaniasis and implications for human *Leishmania* infections in Egypt. Zoonoses Publ. Hlth. 68:413-30.

Al-Dhafiri, M, Alhajri, A, Alwayel, ZA, Alturaiki, JA, Bu Izran, S, *et al*, 2023: Article cutaneous leishmaniasis prevalence and clinical overview: A single center study from Saudi Arab ia, Eastern Region, Al-Ahsa. Trop. Med. Infect. Dis. 8, 12:507-12.

Alkalash, SH, Gaber, MA, Kamal, AA, 2023: Prevalence of skin diseases among primary school children in Benha City, Kalubia Governorate, Egypt. Menoufia Med. J. 36, 1:21.

Al-Khayat, ZA, Agha, NF, Alharmni, KI, Khudhur, YJ, 2018: A clinico-epidemiological study on cutaneous leishmaniasis in Erbil, Iraq (2015-2017). Int. J. Res. Dermatol. 4, 1:1.

Alraddadi, M, Alnawmasi, N, Alshammari, W, Albalawi, R, Hamdi, A, *et al*, 2023: Updates in papular urticaria causes, diagnosis, and management: A Systematic Review. Inter. J. Life Sci. Pharma. Res. 13, 1: L57-65

Alzahrani, MJ, Elfaki, N, Abdalla, YH, Alkhadher, MA, Ali, MH, *et al*, 2023: Cutaneous leishmaniasis: Associated risk factors and prevention in Hubuna, Najran, Saudi Arabia. Inter. J. Gen. Med. 31:723-31.

Azdajic, MD, Beslic, I, Gasic, A, *et al*, 2022: Increased scabies incidence at the beginning of the 21st Century: What do reports from Europe and the world show? Life12. https://doi.org/10. 3390/life 12101598.

Baysal, V, Aydemir, M, Yorgancigil, B, Yildirim, M, 1997: The role of demodexes on etiology and pathogenesis of acne vulgaris. T. Parazitol. Deg. 21:265-8.

Bernigaud, C, Monsel, G, Delaunay, P, DoPham, G, Foulet, F, *et al*, 2016: Main parasitic skin disorders. Rev. Med. Inter. 38, 1:17-27.

Bessat, M, Elshanat, S, 2015: Leishmaniasis: Epidemiology, control and future perspectives with special emphasis on Egypt. J, Trop. Dis. 3, 1:DOI: 10.4172/2329-891X.1000153ISSN:2329 891X JTD.

Bezerra-Santos, MA, Dantas-Torres, F, Benelli, G, Otranto, D, 2023: Emerging parasites & vectors in a rapidly changing world: From ecology to management. Acta Trop. 238:106746.

Bilgic-Temel, A, Murrell, D F, Uzun, S, 2019: Cutaneous leishmaniasis: A neglected disfiguring disease for women. Int. J Women Dermatol. 5, 3:158-65.

Bilgili, ME, Yildiz, H, Sarici, G, 2013: Prevalence of skin diseases in a dermatology outpatient clinic in Turkey: A cross-sectional, retrospective study. J. Dermatol. Case reports. 7, 4:108-12.

Bisetegn, H, Zeleke, AJ, Gadisa, E, Shumie, G, Damte, D, *et al,* 2020: Clinical, parasitological and molecular profiles of cutaneous leishmaniasis and its associated factors among clinically suspected patients attending Borumeda Hospital, North-East Ethiopia. PLoS Negl. Trop. Dis. 14, 8:e0008507.

Burnett, MW, 2015: Cutaneous leishmaniasis. J. Spec. Oper. Med. 15, 1:128-9.

Çetinkaya, Ü, Şahin, S, Ulutabanca, RÖ, 2018: The epidemiology of scabies and pediculosis in Kayseri. Turk. Parazit. Derg. 42, 2:134-7.

DE Melo, MG, Morais, RC, Goes, TC, Silva, RP, Morais, RF, *et al,* 2020: Clinical and epidemiological profiles of patients with American cutaneous leishmaniasis from the states of Pernambuco and Amazonas, Brazil. Rev. Soc. Brasil. Med. Trop. 53:e20200083.

De Vries, HJC, Schallig, H D, 2022: Cutaneous Leishmaniasis: A 2022 updated narrative review into diagnosis and management developments. Am. J. Clin. Dermatol. 23, 6:823-40.

De Waal, PJ, 2023: Papular urticaria**:** Diagnosis and management in primary healthcare. Curr. Aller. Clin. Immunol. 36, 1:7-14.

Douglas, A, Zaenglein, AL, 2019: A case series of demodicosis in children. Pediatr. Dermatol. 36, 5:651-4.

El Omari, H, Chahlaoui, A, Talbi, Z, El Mouhdi, K, El Ouali Lalami, A, 2020: Impact of climatic factors on the seasonal fluctuation of leishmaniasis vectors in central Morocco (Meknes Prefecture). Canad. J. Infect. Dis. Med. Microbiol. 2020, 1: 6098149.

El-Akhras, A, Sonbol, O, Khattab, M, 1992: Prevalence of skin diseases in rural area. N. Egypt. J. Med. 6: 844-9.

El-Khateeb, EA, Imam, AA, Sallam, MA, 2011: Tropical medicine rounds pattern of skin diseases in Cairo, Egypt. Inter. J. Dermatol. 50: 844-53.

El-Khateeb, EA, Lotfi, RA, Abdel-Aziz, KM, El-Shiekh, SE, 2014: Prevalence of skin diseases among primary schoolchildren in Damietta, Egypt. Inter. J. Dermatol. 53, 5:609-16.

El-Taweel, A, Mustafa, AI, Elsheikh, A, 2018: Prevalence of skin diseases among schoolchildren in Qualiobia Governorate. Benha J. Appl. Sci. (BJAS) 3, 2:13-17. Online: 2356-976x

Feldmeier, H, 2012: *Pediculus capitis*: New insights into epidemiology, diagnosis and treatment. Eur. J. Clin. Microbiol. Infect. Dis. 31:2105-10.

Feldmeier, H, Jackson, A, Ariza L, *et al,* 2009: The epidemiology of scabies in an impoverished community in rural Brazil: Presence and severity of disease are associated with poor living conditions and illiteracy. J. Am. Acad. Derm. atol. 60:436-43.

Forton FM, De Maertelaer, V, 2019: Rosacea and demodicosis: Little-known diagnostic signs and symptoms. Acta Dermato-Venereol. 99, 1: 47-52.

Gharib, K, Ibrahim, S, Abdelhameed, MM, Ahmed, SE, Ali, AN, *et al,* 2023: Dermoscopic feature patterns of the parasitic skin diseases. Egypt. J. Hosp. Med. 91:4102-9.

Guner, RY, Tosun, M, Akyol, M, Hayta, SB, 2022: *Demodex* infestation as a cause of sensitive skin in a dermatology outpatient clinic. J. Cosmet. Dermatol. May 22.Online ahead of print.

Halpert, E, Borrero, E, Ibañez-Pinilla, M, Pablo Chaparro, P, Molina, J, *et al,* 2017: Prevalence of papular urticaria caused by flea bites and associated factors in children 1-6 years of age in Bogotá, DC. Wld. Aller. Orga. J.10:36-9.

Hay, RJ, Steer, AC, Engelman, D, Walton, S, 2012: Scabies in the developing world-its prevalence, complications, and management. Clin. Microbial. Infect. 18, 4:313-23.

Hegazy, A, Darwish, N, Abdel-Hamid, I, *et al,* 1999: Epidemiology and control of scabies in an Egyptian village. Int. J. Dermatol. 38: 291-5

Helou, W, Avitan, E, Bergman, R, 2016: *Demodex folliculitis* of the scalp: Clinicopathological study of an uncommon entity. Am. J. Dermat-

opathol. 38, 9:658-63.
Heukelbach, J, Van Haeff, E, Rump, B, Wilcke, T, Moura, RC, Feldmeier, H, 2003: Parasitic skin diseases: Health care-seeking in a slum in north-east Brazil. Trop. Med. Inter. Hlth. 8, 4: 368-73.
Heukelbach, J, Wilcke, T, Winter, B, *et al*, 2005: Epidemiology and morbidity of scabies and pediculosis *capitis* in resource-poor communities in Brazil. Br. J. Dermatol. 153:150-6.
Kabil, SM, Morsy, TA, Yousef, SM, Lashin, AHM, 1988: *Leishmania d. infantum* from the spleen of an adult patient with hepatosplenomegaly. J. Egypt. Soc. Parasitol. 18, 2:711-6.
Kalari, H, Soltani, A, Azizi, K, Faramarzi, H, Moemenbellah-Fard, MD, 2019: Comparative efficacy of three pediculicides to treat head lice infestation in primary school girls: A randomised controlled assessor blind trial in rural Iran. BMC Dermatol. 19:1-9.
Karabay, EA, Çerman, A A, 2020: *Demodex folliculorum* infestations in common facial derm atoses: Acne vulgaris, rosacea, seborrhea dermatitis. An. Bras. Dermatol. 95, 2:187-93.
Knight, CA, Harris, DR, Alshammari, SO, Gugssa, A, Young, T, *et al*, 2023: Leishmaniasis: Recent epidemiological studies in the Middle East. Front. Microbiol. 13:10524-78.
Korycińska, J, Dzika, E, Kloch, M, 2020: Epidemiology of scabies in relation to socio-economic and selected climatic factors in north-east Poland. Ann. Agric. Environ. Med. 27, 3:374-8.
Man, E, Price, H, Hoskins, C, 2022: Expert review: Current and future strategies against cutaneous parasites. Pharmaceut. Res. 39:631-51.
Mosabah, AAA, Morsy, TA, 2012: Tick parlaysis: First zoonosis record in Egypt. J. Egypt. Soc. Parasitol. 42, 1:71-8.
Mostafa, FF, Hassan, AA, Soliman, MI, Nassar, A, Deabes, RH, 2012: Prevalence of skin diseases among infants and children in Al Sharqia Governorate, Egypt. Egypt. Dermatol. Online J. 8, 1:4-11.
Morsy, TA, 1996: Cutaneous leishmaniasis in Egypt (review and comment). J. Egypt. Soc. Parasitol. 26, 1:105-30.
Morsy, TA, 2012: Insect bites and what is eating you? J. Egypt. Soc. Parasitol. 42, 2:291-308.
Morsy, TA, 2013: Cutaneous leishmaniasis predisposing to human skin cancer: Forty years local and regional studies. J. Egypt. Soc. Parasitol. 43, 3:629-48.
Morsy, TA, El-Ghazali, SM, 1999: A four years old girl with phthiriasis *pubis* infestation. J. Egypt. Soc. Parasitol. 29, 3:893-6.
Morsy, TA, Al-Ghabban, AJ, 2023: Human lice infestation, diagnosis and treatment: A mini-review. JESP 53, 3:503-18.
Morsy, TA, Dahesh, SMA, 2023: Spotlight on leishmaniasis, *Phlebotomus* vectors and animal reservoirs in Egypt. JESP 53, 3:585-92.
Morsy, TA, Kabil, SM, Yousef, SM, El Sadek, MM, Lashin, AH, 1990: Serological and parasitological examination of some patients with manifestations suggestive leishmaniasis. J. Egypt. Soc. Parasitol. 20, 1:35-46.
Morsy, TA, Farrag, MK, Sabry, AA, Salama, MMI, Arafa, MAS, 1991: Ecto and endoparasites in 2 primary schools in Qualyob City, Egypt. J. Egypt. Soc. Parasitol.21, 2:391-401.
Morsy, TA, Ibrahim, BB, Lashin, AH, 1997: *Leishmania major* in an Egyptian patient manifested as diffuse cutaneous leishmaniasis. J. Egypt. Soc. Parasitol. 27, 1:205-10.
Morsy, TA, Fayad, ME, Morsy, ATA, Afify, EMS, 2000: *Demodex folliculorum* causing pathological lesions in immunocompetent childrden. J. Egypt. Soc. Parasitol. 30, 3:851-4.
Morsy, TA, Morsy, GH, Sanad, EM, 2002: *Eucalyptus globulus* (Camphor oil) in treatment of human demodicidosis. J. Egypt. Soc. Parasitol. 32, 3:797-803.
Mounsey, KE, McCarthy, J, Walton, S, **2013:** Scratching the itch: New tools to advance understanding scabies. Trend. Parasitol. 29, 1:35-42.
Negi, K, Kandpal, S, Parsad, D, 2001: Pattern of skin diseases in children in Garhwal region of Uttar Pradesh. Indian Pediatr. 38, 1:77-80.
Norgan, AP. Pritt, BS, 2018: Parasitic infections of the skin and subcutaneous tissues. Adv. Anat. Pathol. 25, 2:106-23.
Okyay, P, Ertabaklar, H, Savk, E, Erfug, S, 2006: Prevalence of *Demodex folliculorum* in young adults: Relation with sociodemographic/ hygienic factors and acne vulgaris. J. Eur. Acad. Dermatol. Venereol. 20, 4:474-6.
Olivier, C E, Pinto, DG, Teixeira, APM, Santana, JLS, Brito, GS, *et al*, 2023: Papular urticaria: Insights into non-IgE-mediated hypersensitivity reactions produced by stings of *Culex* spp and *Aedes* spp in patients with intrinsic atopic dermatitis. Asian J. Immunol. 6, 1:139-47.
Paichitrojjana, A, 2022: Demodicosis imitating acne vulgaris: A case report. Clin. Cosmet. Inve-

stig. Dermatol. 4:497-501**.**

Peterson AR, Nash, E, Anderson, BJ, 2019: Infectious disease in contact sports. Sports Hlth. 11, 1:47-58.

Pollack, RJ, Engelman, D, Steer, AC, Norton, SA, 2017: Ectoparasites. In: International Encyclopedia of Public Health. Quah SR, Cockerham WC (ed.): Oxford Academic Press, Oxford.

Portillo, A, Ruiz-Arrondo, I, Oteo, JA, 2018: Arthropods as vectors of transmissible diseases in Spain. Med. Clin. (Barc). 151, 11:450-9.

Raza, N, Lodhi, MS, Ahmed, S, Dar, NR, Ali, L, 2008: Clinical study of popular urticaria. J. Coll. Physicians Surg. Pak. 18, 3:147-50.

Ruiz-Postigo, JA, Grouta, L, Jaina, S, 2020: Global leishmaniasis surveillance, 2017-2018, and first report on 5 additional indicators. Wkly. Epidemiol. Rec.95, 25:265-79.

Sanad, EM, Helmy, AZ, Morsy, TA, 2002: Ant allergy Benha District, Qualyobia Governorate, Egypt. J. Egypt. Soc. Parasitol. 32, 3:901-6.

Sarkar, R, Kanwar A, 2001: Three common dermatological disorders in children (scabies, pediculosis and dermatophytoses). Indian Pediatr. 38, 9:995-1008.

Skrlin, J, Richter, B, Basta-Juzbasić, A, Matica, B, Ivacić BA, *et al,* 1991: Demodicosis and rosacea. Lancet 23, 337:734.

Steen, CJ, Carbonaro, P, Schwartz, R, 2004: Arthropods in dermatology. J. Am. Acad. Dermatol. 50: 819-42.

Stibich, AS, Schwartz, RA, 2001: Papular urticaria. Cutis 68, 2:89-91

Traub-Csekö, YM, Ramalho-Ortigão, M, Telleria, EL, 2022: Sand flies and their interactions with *Leishmania* and other pathogens. Front. Trop. Dis. 3:882512.

Veraldi, S, Rossi, LC, Pontini, P, 2018: Head lice in African children. J. Ital. Dermatol. Venereol. 153, 4:580-1.

Walton SF, 2010: The immunology of susceptibility and resistance to scabies. Parasit. Immunol. 32, 8:532-40.

Walton, SF, Currie, BJ, 2007: Problems in diagnosing scabies, a global disease in human and animal populations. Clin. Microbiol. Rev. 20, 2: 268-79.

Yamamah, GA, Emam, HM, Abdelhamid, M F, Elsaie, M, Shehata, H, *et al*, 2012: Epidemiologic study of dermatologic disorders among children in South Sinai, Egypt. Int. J. Dermatol. 51, 10: 1180-5.

Zhong, J, Tan, Y, Li, S, Peng, L, Wang, B, *et al,* 2019: The prevalence of *Demodex folliculorum* and *Demodex brevis* in cylindrical dandruff patients. J. Ophthalmol. 1:8949683.

Explanation of figures

Fig. 1**:** Papular urticaria in 9 years old child

Fig. 2**:** Cutaneous leishmaniasis: Leg ulcer with crust, white scale, and erythema at edges in 18 years old male.

Fig. 3**:** Burrows of scabies in 12 years old child