زانکۆی سەلاحەدین - هەولێر
Salahaddin University-Erbil

Epidemiological study of some Human ectoparasites in Erbil-Iraq

Research Project
Submitted to the department of (Plant protection) in partial fulfillment of the requirements for the degree of BSc. in (Agriculture Engineering Science)

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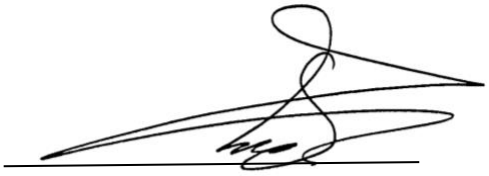
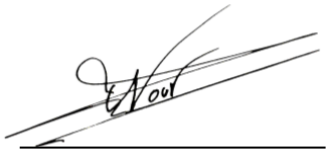
SUPERVISOR CERTIFICATE

This student research project has been written under my supervision and has been submitted for the award of the degree of BSc in Agriculture Engineering Science – Plant Protection Department.

Signature:  Name: PhD: Srwa K Hamd

Signature:  Name: Asst. lecturer Nor N Kunda

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Acknowledgment

I must first express my unending gratitude to Allah, the Ever-Magnificent, the Ever-Grateful, for His assistance and blessing.

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Last but not least, I would want to express my sincere gratitude to everyone who helped make this study endeavor a reality.

Contents:

Abstract:

This study was conducted in Ebil city to evaluate the incidence of scabies and lishmanians among patients from both sexes and different ages from one year to over 40 years visited the dermatology clinic in Shadi Hospital from January to April 2023. Other factors like residency, educational levels, number of family members, source of contact and clinical manifestations were also studied. Scabies was diagnosed in (57.3%) in male and (41.7) in female while in lishmaniasis was (15%) of males and (10%) in female. A high percentage of infestation observed on the uneducated person it was (%69.75) and the lowest percentage recorded on the educated person (%31.25) The results of this study show that scabies and Lishmanians were common in the Shadi Hospital The results of this study show that in both case males much more infested than females. The results of this study show that in both case . I recommend to conduct the same study in other provinces in the Kurdistan region.

1-Introduction

Ectoparasites are small organisms that live in the skin or outgrowths of the skin of another organism (the host) for varying lengths of time and can be harmful to the latter (Litwin et al., 2017). Ectoparasitic arthropods and nematodes are indistinguishable in the way they causing disease; that such a tiny parasitic microorganism can create skin derangements that are large enough in size that doctor or other people can easily see with unaided eye (Schmid-Hempel 2009). Eventhough the Mortality rate due to these ectoparasite is without a doubt very limited, but the effect of cumulative morbidity percentage from the direct tenderness, derangement of academic/working performance, secondary bacterial infections, and sequelae related to those ectoparasite infestations and infections (Dunn and Torchin. *et al*., 2012).

Ectoparasites are the most prevalent parasites among displaced people and refugees. The most commonest parasites found on human skin are lice are an obligate ectoparasite that have various species including: *Pediculus humanus capitis*, *Pediculus humanus corporis*, and *Phthirus pubis*. Bedbugs (*Cimex lectularius*) are bloodsucking ectoparasites (external parasites) that have negative impacts on physical health, such as allergies to bites and secondary infections, and on mental health with anxiety, insomnia, and systemic reactions and also scabies mite and ticks, which can severely affect health in addition to annoyance, irritation, skin infection, and anemia (Yadav *et al*., 2017; Ali and Hama 2018; Bartosik *et al*., 2020). The rate of infection with these parasites is due to their direct transmission, as they can be transmitted by direct skin-to-skin contact for scabies, head-to-head contact for pediculosis, physical contact, or through contact with other objects such as combs, brushes, hair accessories, and other headgear (Albonico *et al*., 1999; Burkhart and Burkhart 2007). The family income, number of family members, or mother's education and occupation have a role in the prevalence of bedbugs, Leishmaniases and head pediculosis (Gharsan *et al.*, 2016; Moradiasl *et al.*, 2018). They are diseases of overcrowding and poverty rather than poor hygiene (Bhat *et al.* 2017; Alsamarai *et al*. 2017).

The objective of this study are

1. To assess the prevalence of infestation with human ectoparasites among patients arriving the Dermatology Department of some hospital in Erbil.
2. To study the effect of some related factors on the rates of parasite infestation.

2-Literature Review

2.1 Head lice (*Pediculus humanus capitis*)

Head lice is considered as one of the most prevalent neglected ectoparasites caused by sucking lice known as *Pediculus humanus capitis*, which infest people of any race, gender, or socioeconomic status. Children ages 5–12 years were most vulnerable for head lice infestation, including refugees, migrants, and internally displaced children and considered as public health problems worldwide (Nazari et al. 2006). Head lice infestation may lead to annoyance, pruritus, sleeplessness, and (in extreme cases) anemia (Frankowski et al, 2002). Head lice can live for around one month on their host. The life cycle of head lice is short (17–18 days). Female louse consumes the blood and lays 6–10 eggs per day, which attach to hair close to the skin's surface and behind the neck and ears. They require an optimal temperature of 28–30°C and humidity of 70–90% for survival. Scalp pruritus is the chief complaint in patients with head lice. Itchy papules may develop as a result of hypersensitivity reaction against the injected saliva of lice during blood-feeding (Miller,2002). A tickling feeling and irritability are other common symptoms of head lice infestation; also, secondary bacterial infection may develop due to the scratching of sores on the scalp (Roberts, 2002). (Fig 1)

Fig (1) head lice

Classification

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: Anoplura

Family: Pediculidae

Genus: Pediculus

Species: P. humanus

Subspecies: P. h. cap

Symptoms

The adult louse is the size of a sesame seed appears tan to grayish-white. An itchy and inflamed scalp is a common symptom of lice. Although not common, persistent scratching may lead to skin irritation and even infection. (Centers for Disease Control and Prevention, 2015)(Fig 2)

(Fig 2) Sores on the head lice

2.2 Bedbugs *Cimex lectularius*

The “bedbug” is an insect that feeds nocturnally, taking a requisite blood meal from a sleeping human or other parasitized host (Kolb, *et al*, 2009.) Bed begs of the cimicid family are considered as blood-feeding insects that entirely feed on the blood of warm-blood animals. There are two species that generally feed on humans which are the common (temperate) bed bug, Cimex lectularius (Linnaeus, 1758), and the tropical bed bug, Cimex hemipterus (Fabricius, 1803).The term most commonly refers to members of the genus Cimex of which Cimex lectularius, the common bed bug, is the species best adapted to human environments. Bed bugs are small, flat, oval-shaped wingless insects (Little and West ,2008). The adult bed bug feeds one time a week under optimal environments. The major attractants appear to be human body temperature and carbon dioxide and also by certain chemicals (Tomas et al., 2004). (Fig 3)

Fig 3) bedbug

Classification

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: Hemiptera

Suborder: Heteroptera

Superfamily: Cimicoidea

Family: Cimicidae

Symptom

Blood feeders. Bed bugs consume only blood, usually feeding on a mammal (e.g., bat, human) or bird. They need at least one blood meal of adequate volume in each active life stage (instar) to develop to the next stage and to reproduce (Reinhardt and Siva-Jothy 2007, Goddard and deShazo ,2009)

(Fig 4)

(fig 4) Bedbug skin rash

2.3 Leishmaniasis

Leishmaniasis is a tropical and subtropical disease caused by an intracellular parasite transmitted to humans by the bite of a sand fly, mainly Phlebotomus and Lutzomyia (Europe, Northern Africa, the Middle East, Asia, and part of South America); exceptionally, transmission has also been reported as a laboratory accident (Vera-Izaguirre,et al ,2006). According to the World Health Organization (WHO), leishmaniasis is one of the seven most important tropical diseases and it represents a serious world health problem that presents a broad spectrum of clinical manifestations with a potentially fatal outcome (Andrade-Narváez,et al, 2001)It is found in all continents except Oceania , (Reithinger, *et al,* 2007.)and is endemic in circumscribed geographic areas in Northeastern Africa, Southern Europe, the Middle East, Southeastern Mexico, and Central and South America. The genus Lutzomyia includes 90% of the pathogenic species, most of which infect humans. Lutzomyia is present in the tropics of the New World.

They display a dorsal hump and wings with a lanceolate oval shape. Only females nourish from blood, usually from mammals but sometimes also from inferior terrestrial vertebrates. Usually they nourish at night; during the day, they hide in dark, humid places. Lutzomyia absorb sugars that may have an important role in the development of Leishmania in the vector species(Albertos-Alpuche, N, 1990)

Symptom

The sores may start out as papules (bumps) or nodules (lumps) and may end up as ulcers (like a volcano, with a raised edge and central crater) skin ulcers may be covered by scab or crust.Overall, the clinical diagnosis of VL is difficult because its presentation overlaps with other infections like typhoid fever, tuberculosis, brucellosis, malaria, or some hematologic malignancies(Safavi, *et al,* 2021) (fig 5)

Fig 5 symptoms of Leishmaniasis

Classifition

Domain: Eukaryota

Phylum: Euglenozoa

Class: Kinetoplastea

Order: Trypanosomatida

Genus: Leishmania

Prevention

No vaccines or drugs to prevent infection are available. The best way for travelers to prevent infection is to protect themselves from sand fly bites. Personal protective measures include minimizing nocturnal outdoor activities, wearing protective clothing, and applying insect repellent to exposed skin.

2.4 Scabies *Sarcoptes scabiei*

Caused by *Sarcoptes scabiei var. hominis*, is a contagious skin infestation manifested as a pimple-like rash. It is commonly found on the hands, especially the web between the fingers, skin folds of the wrist, elbow or knee, penis, and breast or shoulder (Baron, *et al*,2002). The pathognomonic sign is the burrow, characterized by a short, wavy, scaly, grey line on the skin surface (Johnston, G. and Sladden, M., 2005.). Transmission occurs through direct skin-to-skin contact for at least 15 minutes to allow the transfer of mites from one person to another (Hicks, M.I. and Elston, D.M., 2009). Crusted or Norwegian scabies, which is the severe form of scabies, may also be transmitted through fomites, such as infested clothing or bedding (Monsel, G. and Chosidow, O., 2012.). Common predisposing factors are overcrowding, migration, poor hygiene,

poor nutritional status, homelessness, dementia, and sexual contact (Hicks, M.I. and Elston, D.M., 2009). Scabies can also cause secondary bacterial skin infection or impetigo, which can lead to serious complications, such as septicemia, renal disease, and rheumatic heart disease (Romani, *et al*, 2015.). Scabies is diagnosed through the burrow ink test and dermatoscopy with a hand-held dermatoscope along with clinical judgment (Leung, V. and Miller, M., 2011). Scabies is treated with permethrin, while malathion remains an excellent topical alternative. Ivermectin is also an effective oral treatment that is useful in crusted scabies, bed-ridden patients, and in institutional outbreaks (Golant, A.K. and, Levitt, J.O., 2012). Prevention and control of scabies is achieved through observing proper personal hygiene and avoiding physical contact with infected people and their clothing (Belizario, V., delos Trinos, *et al* , 2016.). Prevalence of scabies is highest in the Pacific and Latin American regions, and is substantially higher in children than in adolescents and adults (Romani, *et al*, 2015).

Symptoms

The characteristic symptoms of a scabies infection include intense itching and superficial burrows.(Hay, R.J., 2009.) Because the host develops the symptoms as a reaction to the mites' presence over time, typically a delay of four to six weeks occurs between the onset of infestation and the onset of itching. Similarly, symptoms often persist for one to several weeks after successful eradication of the mites (fig 6)

Fig 6 \ symptoms of scabies

Classification

Kingdom: Animalia

Phylum: Arthropoda

Subphylum: Chelicerata

Class: Arachnida

Order: Sarcoptiformes

Family: Sarcoptidae

Genus: Sarcoptes

Species: S. scabiei

Prevention

Although scabies is not regarded as a deadly disease, it largely affects the patient's quality of life (Widaty, *et al*, 2022) therefore, elimination and prevention efforts are important. A way to eliminate scabies is by increasing community awareness and knowledge regarding the diseases and the preventive measures, for instance proper handling of contaminated materials (bedsheets, clothing, towel)

3 Materials and Methods

3.1 Study area and sample collection.

The study was conducted in some of selected dermatology departments in some hospitals in Erbil (Rizgari and shadi center). All the patients who present at the dermatology clinic during the period from 1 January to March 2023 were included in the study. The individuals were included

in the study that complaining of skin problems and head pediculosis who attend the dermatology clinic and health care center in Erbil for investigation and treatment. During the interviews, each participant was inspected for all ectoparasites infestation by direct visual examination and microscopic examination. Head lice infestation was checked by careful visual examination of the entire head (neck, ears, and hair), and positive infestion was classified with the presence of at least one development stage (egg, nymph, and adult) of Pediculus humanus capitis, including nits' residues, which can be seen by necked eye. To check other infestation, skin inspection specimens were taken from individuals with clinically suspicious lesions, and all specimens were examined microscopically. Demographic data was collected from the enrolled persons using a questionnaire that included several potential risk factors, including age, gender, and family size.

3.2 Statistical analyses

Statistical analyses of the data of the monthly changes were conducted using the Chi-square test in The SPSS version 21.

3.3 Study Questionnaire:

1. Age of the patient: (years)

2.Gender : Male ( ) Female ( )

3. Residence: (City :) (Village:)

4.marital status : (single :) (married:)

5. family member: ( )

6. Academic achievement: (uneducated) (educated)

7. Disease name ( )

8. Symptoms ( )

4 Result and Discussion

4.1 *Leishmania sp*

4.2 *Sarcoptes scabiei var. hominis* Human scabies mites

4.1 *Leishmania sp*

During the inspection 1013 patients who arrived at the dermatology department in Shadi Hospital, Erbil for the period from January to April (2023). The total number of infestations by leishmania was (2.46). The ratio of infestation of the study recorded among males was (15%)were higher than the females (10%) (Figure 1). This result agree with the result of (Luszir. *et al*. 1998) which In regions where leishmaniasis is endemic, clinical disease is usually reported more frequently among males than females. This difference could be due to disparate risks of exposure of males and females, but gender-related differences in the host response to infection may also play a role.

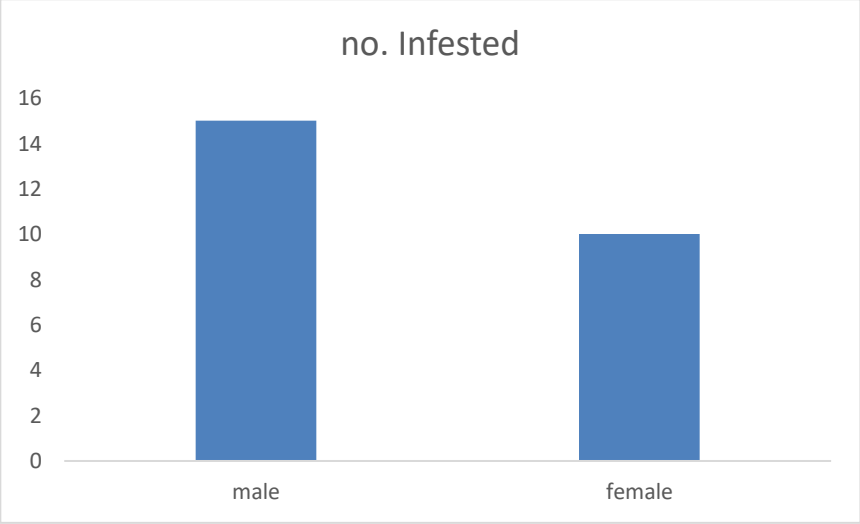

Figure 1. The ratio infestation of the *Leishmania sp* between male and female at the Shadi hospital in Erbil

Table 1 show the percentage ratio of infestation according to marital status ,the infestation ratio in single male was 32% female 28% while in married male 16% female 24%. X^2 test, P , 0.191≥ 0.05 There is no a significant relationship between sex and marital status by the *Leishmania sp*

Sex	single	%	Married	% infested
Male	8	32	7	16
Female	4	28	6	24
Total	12	60	13	40

Table 1. Number of infestations of the the *Leishmania sp* at the Shadi hospital in Erbil according to the number of family.

In table 2. shows the infestation ratio according to the body parts in infected person Lesions were found on almost all parts of the body, but lesions were more commonly located on the hand with highest infestation ratio 46% while the lowest percentage recorded in abdomen with 8% meanwhile in the face was 24% , in the legs 36% . X^2 test,22.641[a] P ≤0.05 There is a significant relationship between sex and bodyparts by the *Leishmania sp* . In this result agree with the result of (Travi *et al* .,2002 that shows the most infected area in body part was hand and face.

sex	face	%	hands	%	Legs	%	Abdomen	%
male	7	16	4	28	6	24	0	0
female	2	8	1	8	3	12	2	8

Table 2. Number of infestations of the the *Leishmania sp* at the Shadi hospital in Erbil according to the body parts.

In table 3 show the infestation ratio according to the age,the highest percentage ratio was recoreded in the category of people more than 40 years with 28% while the lowest was recoreded in people 10-20 years 12% in people 20-30 years was 20% , 30-40 years was 20% in less than 10 years the percentage ratio was 24%. X^2 test, 24.000[c] P ≤0.05 There is a significant relationship between sex and ages by the *Leishmania sp* . The result agree with result of(Khezzani and Bouchemal, 2017).

sex	less than 10	%	10-20	%	20-30	%	30-40	%	more than 40	%
male	3	12	2	8	3	12	5	20	2	8
female	3	12	1	4	2	8	0	0	5	20

Table 3 Number of infestations of the the *Leishmania sp* at the Shadi hospital in Erbil according to the ages.

Table 4 show the ratio of infestation according to the academic achievement the highest infestation record was recorded in the uneducated people with 44% comparing to the educated people which was 40%. X^2 test, $P \leq 0.05$ There is a significant relationship between sex and academic achievement by the *Leishmania sp*

Sex	educated	%	Uneducated	%
Male	10	40	5	20
Female	4	16	6	24
Total	14	56	11	44

Table 4 Number of infestations of the the *Leishmania sp* at the Shadi hospital in Erbil according to the acadmic achievement

4.2 *Sarcoptes scabiei var. hominis* Human scabies mites

During the inspection 1013 patients who arrived at the dermatology department in Shadi Hospital, Erbil for the period from January to April (2023). The total number of infestations by the human scabies mite *Sarcoptes scabiei var. hominis* was (% 13.75) Table 1. A study was conducted about some factors that affect the infestation percentage of 48 patients.

Table. 1

Months	No. patient	No. infested	% infestation
January	303	0	0
February	314	25	7.96
March	396	23	5.8
Total	1013	48	13.76

X^2 test,7.792^a $P \leq 0.05$

There is a significant relationship between months and infestation by the . *Sarcoptes scabiei var. hominis* The ratio of infestation the study recorded among males was (57.3%) were higher than the females (41.7%). (Figure 1). This result contrast a previous study by(Lassa *et al*.2011) which reported that the highest 1% in male and 1.7% in female. The attributed it to the study design, the

possibility of more exposure to infestation as results of the type of work performed by males in addition to poor hygienic measures and the outdoor activities.

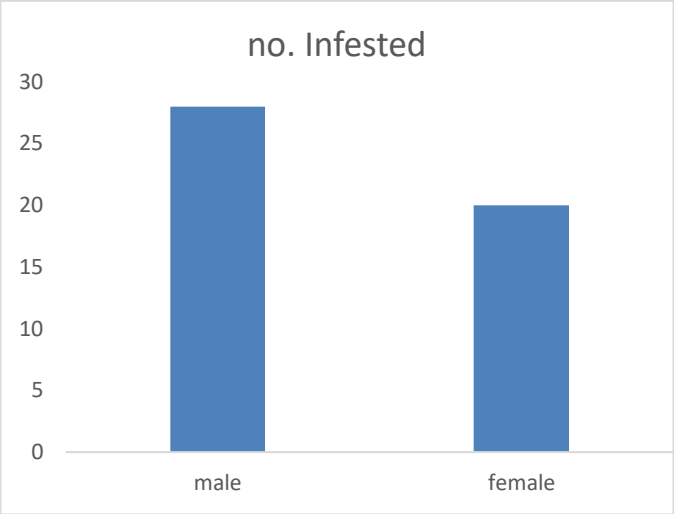

Figure 1. The ratio infestation of the human scabies mites between male and female at the Shadi hospital in Erbil

A high percentage of infestation observed on the uneducated person it was (%69.75), and the lowest percentage recorded on the educated person (%31.25) (Figure 2). In this aspect, the present results disagree with those reported by (Al-Chalabi, 2009) in which she stated that only 13.1% were illiterates, 35.8% completed the primary level and 16.9% were university graduates. Infestations were more frequent in children with mothers whose education levels were low. This indicates the necessity of an improvement in the economic and sociocultural status of the community and the promotion of hygiene concepts and practices in order to improve the health of children (Ciftci et al, 2006).

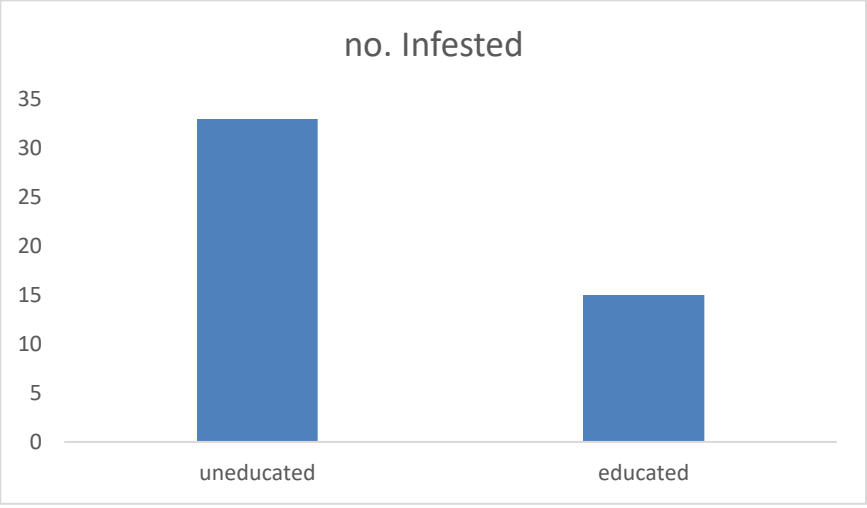

Figure 2. Effect the education on the infestation of the human scabies mites

The infestation among the age groups of less than 20 years (% 56.25) was higher than that of the age groups of more than 30 years (% 43.75). (Figure 3). The prevalence was age dependent, with children under five years accounting for 77%, peaking to 86% among the 5 to 9-yr-olds, and steadily declining with an increase in age (Rahdar *et al*, 2008). However, this is in accordance with that reported by (Al-Shawa, 2007), they indicated that scabies is more common in ages less than 10 years up to 19 years and this prevalence may be due to overcrowding, poor living conditions and the prolonged contact among patients and their family members

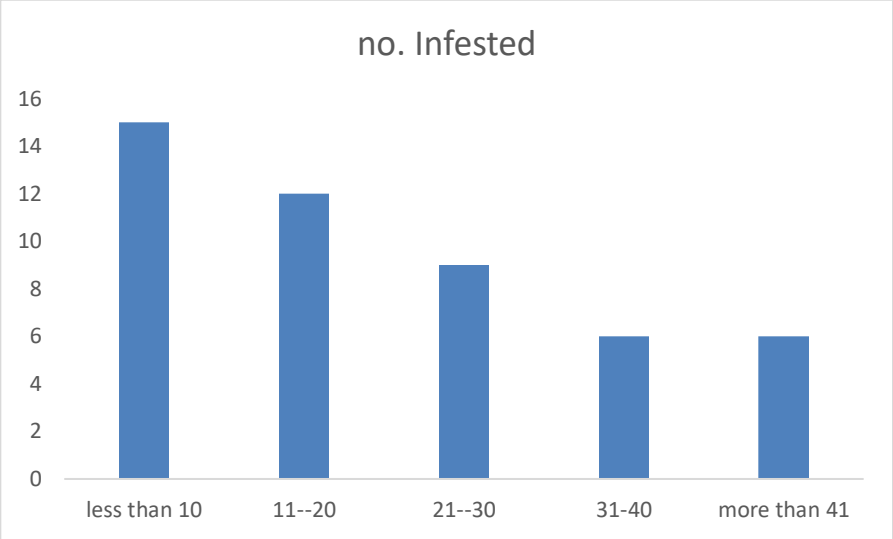

Figure 3. Effect the age on the infestation of the human scabies mites

A high percentage of infestation observed on the legs and hands and it was (%42and %33.3) respectively, and the lowest percentage recorded on abdomen (%25) (Figure 4). Lesions were found on almost all parts of the body, but lesions were more commonly located on the fingers, legs, hands, face, belly, and genitalia. *Sarcoptes scabiei* var *hominis* was recovered from 84 (67%) of the 125 skin scrapings examined (Terry *et al*. 2001). This disagree with what have been reported by (Al-Chalabi ,2009) as they found the most affected sites were the abdomen and back (100%) and Palms, wrists and interdigital webs were involved in 72% of the cases.

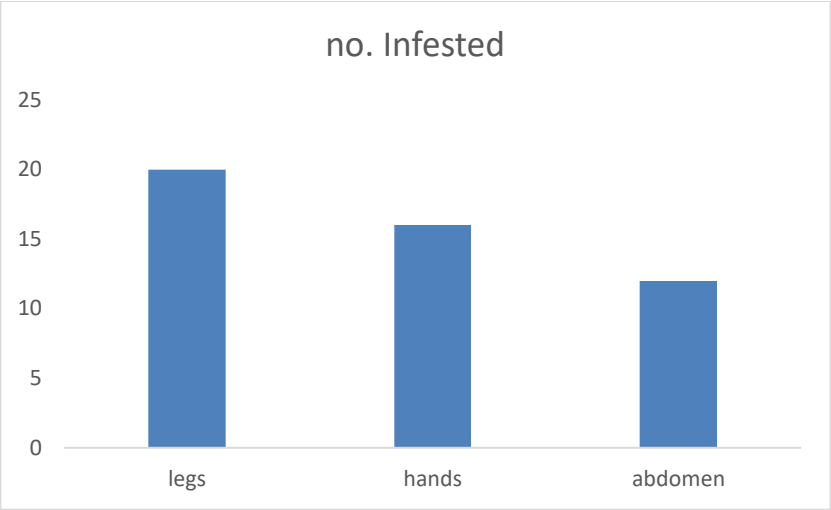

Figure 4. Number of infestations of human scabies mites at the Shadi hospital in Erbil according to the body parts.

The percentage of infestation among persons who lived in rural regions was higher than that of the person who lived in the cities, and it was (%54.17 and % 45.83) respectively (Figure 5). This result confirms a previous study by (Golchai *et al*, 2003) which reported the prevalence of scabies was 1.0% in urban schools and 1.61% in rural schools.

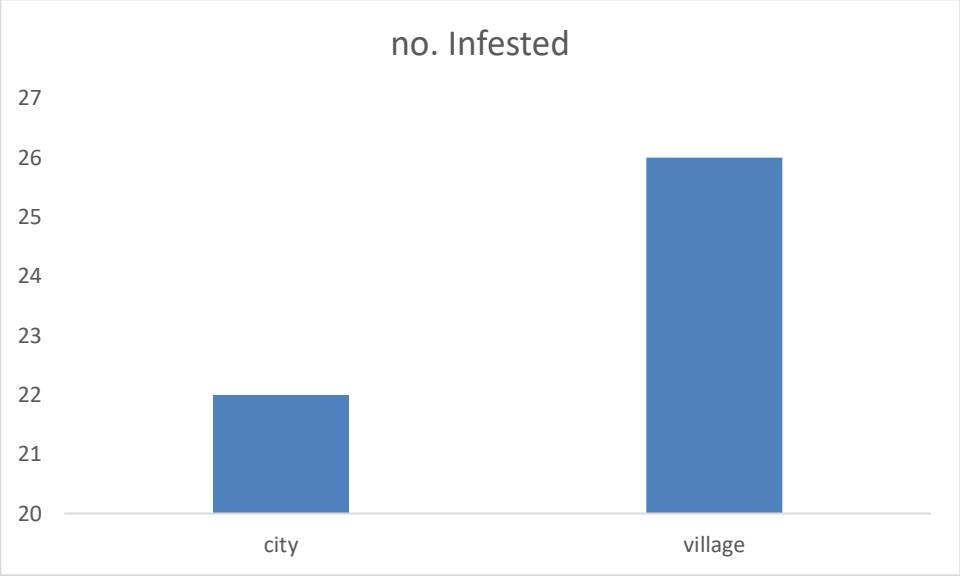

Figure 5. Number of infestations of the human scabies mites at the Shadi hospital in Erbil according to the residence place.

A high percentage of infestation observed on the families was contain more than 8 and 5-7 it was (%45.83 and %39.59) respectively, and the lowest percentage recorded in families was contain (%14.83) (Table 2). Similar results were reported from other developing countries (Al-Chalabi, 2009) where scabies was more prevalent among large families with a high crowding index at night due to close contact and sharing of beds that increase the transmission of the scabies mite. The present study revealed that families of scabies cases were often of large size and a high crowding index. This could implicate close contact and the sharing of beds in the transmission of the scabies mite.

no. of family	No. of infested	%infestation
3-4	7	14.58
5-7	19	39.59
more than 8	22	45.83
Total	48	100

Table 2. Number of infestations of human scabies mites at the Shadi hospital in Erbil according to the number of family.

5 Conclusion and outlook

1. The results of this study show that scabies and Lishmanians were common in the Shadi Hospital
2. The results of this study show that in both case males much more infested than females.
3. The results of this study show that in both case .
4. I recommend to conduct the same study in other provinces in the Kurdistan region.

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