

The Incidence of Scabies and Head Lice and Their Associated Risk Factors among Displaced People in Cham Mishko Camp, Zakho City, Duhok Province, Iraq

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Submitted 7 September 2020, revised 4 November, accepted 4 November 2020

Abstract

This study was conducted to estimate the incidence and the effects of associated risk factors of scabies and head lice on displaced people in Cham Mishko camp, Zakho city, Duhok Province, Iraq. The study included 1300 internally displaced people (IDPs) who visited the dermatology clinic and health care center in Cham Mishko camp from January 2018 to December 2019. Participants' bio-information was collected on special questionnaire form after receiving permission from the camp's health authorities and verbal consent from the participants. Monthly weather data were collected from Duhok Directorate of Meteorology and Seismology. The total rate of ectoparasites was 81.2% (45% for scabies and 36.2% for head lice). Ages from 1–10, 21–30, and 31–40 years showed the highest rates with scabies (48.1%, 46.7% and 46.1%, respectively), while the highest rates of head pediculosis were at ages from 1–10 and 11–20 years (40% and 36.6%, respectively). Scabies rate was slightly higher in males than females (46.6% vs. 43.4%), while the rate of head pediculosis was significantly higher in females than males (58.2% vs. 13.9%). Families with more than ten people showed the highest rates of scabies and head pediculosis (49.5% and 74.5%). Scabies was more common in cold months than in summer while head pediculosis was more common in hot months. The number of scabies and head pediculosis cases increased by 123 and 85 cases, respectively, in 2019. It is inferred that the effects of scabies and head pediculosis in IDPs will be considerable, with a higher carriage rate than other studies in Iraq.

Key words: scabies, pediculosis, infestation, displacement, climate, Iraq

Introduction

Ectoparasites are the most prevalent parasites among displaced people and refugees. The most commonest parasites found on human skin are lice, and scabies mite, 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 scabies and head pediculosis (Hay et al. 2013; Gharsan et al. 2016; Moradiasl et al. 2018). Both head pediculosis and Sca-

abies are diseases of overcrowding and poverty rather than poor hygiene (Zayyid et al. 2010; Bhat et al. 2017; Alsamara et al. 2017).

Scabies is considered as one of the most prevalent neglected ectoparasites caused by *Sarcoptes scabiei* var *hominis*, causing skin infestation with asymptomatic or present symptoms, progressing to secondary skin infections. Although scabies is not a notifiable disease, there are over 300 million scabies cases worldwide (Micali et al. 2016; Anderson and Strowd 2017). Scabies is highly contagious and can affect people of any age, sex, race, or cleanliness level. However, it is more common among those living or working in crowded conditions; even if a person had a scabies infestation before, a person could be reinfested when exposed to mites (Walker and Johnstone 2002). There are three clinical forms of scabies: persistent nodules, papulovesicular lesions, and crusted scabies. Individuals infested with scabies may be asymptomatic for up to 4–6 weeks, then

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symptoms of scabies may develop and include intense itching (pruritus), predominantly at night, as sensitization develops to the presence of mites, eggs, or their products such as feces (Chosidow 2000; Chouela et al. 2002). The formation of burrows in the skin surface of the fingers, wrist, penis, and feet is the most apparent sign of scabies. Burrows can appear linear, curved, or S-shaped, 15 mm long, and 2 mm wide (Burgess 2002; Gunning et al. 2012). Extreme scratching of the infested skin may make the body vulnerable to secondary bacterial infection such as impetigo caused by *Streptococcus pyogenes* or *Staphylococcus aureus* (Zayyid et al. 2010; WHO 2015; Bhat et al. 2017). Scabies is more prevalent in urban areas, among women and children, and is more common in winter than summer (Farhana et al. 2018).

Head lice infestation is 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).

Experimental

Materials and Methods

Study area and sample collection. This study was conducted in a dermatology clinic and health care center at Cham Mishko camp started from January 2018 to December 2019. The distribution of internally displaced people (IDPs) in the Kurdistan region of Iraq was around 1.2 million in 38 camps. Cham Mishko camp is one of the biggest United Nations High Commissioner for Refugees (UNHCR) camps in Zakho city, Duhok province, Kurdistan region, Iraq. This camp was established in 2014 for displaced people during the conflict against the so-called Islamic State of Iraq

and Syria (ISIS) and inhabited by 26,478 individuals of internally displaced people (IDPs) comprising more than 5,000 families living in 4,993 shelters (tents), the average number of family members is six persons. The camp located 10 kilometers north of the Zakho city is provided with two nursery schools, three primary and two secondary schools, which were established especially for IDPs residences. Hence, students cannot get access to schools outside camps, while adult IDPs can freely access the institutes and the city's university.

A total of 1,300 individuals were included in the study that complaining of skin problems and head pediculosis who attended the dermatology clinic and health care center at Cham Mishko camp for investigation and treatment. During the interviews, each participant was inspected for head lice and scabies 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 infestation 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 scabies infestation, skin scraping specimens were taken from individuals with clinically suspicious lesions, and all specimens were examined microscopically, mixed with two drops of 10% potassium hydroxide to digest the cornified skin and were examined at low magnification to observe mites and eggs (Alasaad et al. 2009). Demographic data was collected from the enrolled persons using a questionnaire that included several potential risk factors, including age, gender, and family size.

Statistical analysis. SPSS version 25 software was used to analyze the collected data, represented as numbers and percentages, calculated with a confidence interval of 95%. *Chi-squared* (X^2) test was used. *P*-value ≤ 0.05 was considered significant, and more than that was considered non-significant.

Ethical approval. Ethical approval for this study was obtained from the Board of Relief and Humanitarian Affairs (BRHA).

Results

Out of 1,300 individuals complaining of dermatological problems that visited the health care and dermatological center in Cham Mishko camp over two years, 81.2% (1,056/1,300) of them were infested with ectoparasites, 45% (585/1,300) patients were infested with scabies, including 284 females and 301 males; but this difference was statistically non-significant ($p=0.251$) difference between both genders. On the other hand, 36.2% (471/1,300) patients were infested with head lice, of which 90 were males, and 381 were

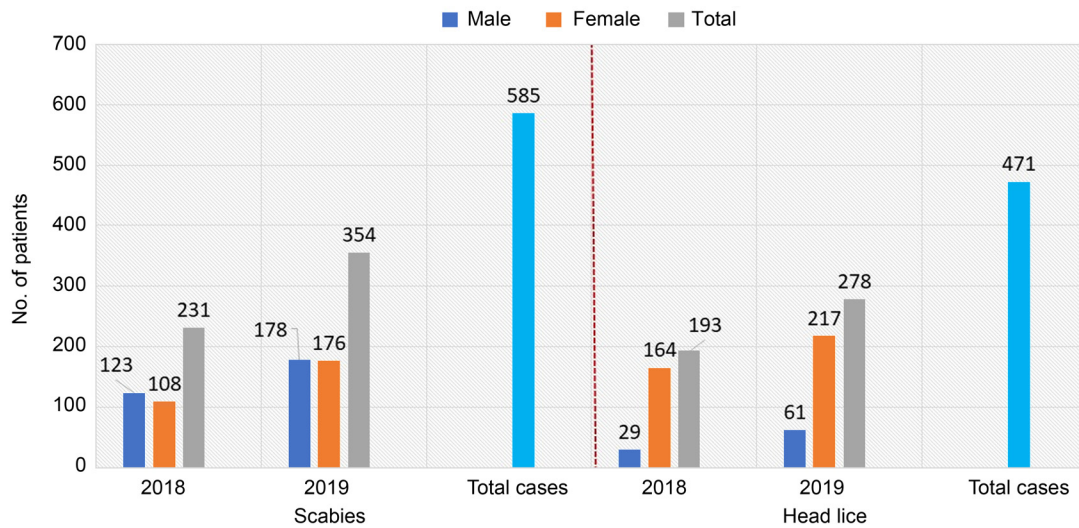


Fig. 1. Number of scabies and head lice cases related to gender in Cham Mishko camp during 2018 and 2019.

females, with a statistically significant ($p < 0.05$) difference between both genders as shown in Fig. 1. Furthermore, the number of scabies and head lice cases increased from 231 and 193 in 2018 to 354 and 278 in 2019, respectively (Fig. 1.)

Table I shows the incidence rate of scabies among participants (IDPs in the UNHCR Cham Mishko camp). Among infested, children aged 1–10 years displayed the highest rate (48.1%), followed by the 21–30 age group (46.7%). Males (46.6%) had a slightly higher rate than females (43.4%). The rates were compared between different age groups, and there was a significantly higher rate of scabies in the age groups (1–10 years) ($p = 0.018$). Similarly, rates were also compared according to a number of family members, and there was a significantly

higher rate of scabies in families with more than ten people ($p = 0.023$).

Table II shows the number and percentage of head lice among both genders and different ages. The incidence of head lice among females was higher four times (58.2%) than in males (13.9%). Children aged 1–10 years had the highest infestation rate (40%), and it was more common among girls, followed by the age group 11–20 years (36.6%). The age group, 1–10 years, showed a significantly ($p = 0.033$) higher infestation rate with head lice than other ages. Similarly, when rates were compared with the number of family members, families with more than ten people had a significantly higher head lice rate ($p < 0.05$). Fig. 2 shows the seasonal variation of scabies and pediculosis during 2018

Table I
Prevalence of scabies infestation among 1300 IDPs.

Variables		Scabies infestation		
		Number of infestation/ totals	%	<i>p</i> -value
Gender	Male	301/646	46.6	0.251
	Female	284/654	43.4	
Age (years)	1–10	325/675	48.1	0.018
	11–20	41/101	40.6	
	21–30	35/75	46.7	
	31–40	60/130	46.1	
	41–50	80/180	44.4	
	50+	44/139	31.6	
Family members	1–5	216/533	40.5	0.023
	6–10	260/547	47.5	
	10+	109/220	49.5	
Total		585/1300	45	

Table II
Prevalence of head pediculosis in 1300 IDPs.

Variables		Head pediculosis infestation		
		Number of infestation/ totals	%	<i>p</i> -value
Gender	Male	90/646	13.9	0.000
	Female	381/654	58.2	
Age (years)	1–10	270/675	40	0.033
	11–20	37/101	36.6	
	21–30	24/75	32	
	31–40	34/130	26.1	
	41–50	57/180	31.6	
	50+	49/139	35.2	
Family members	1–5	109/533	20.4	0.000
	6–10	198/547	36.1	
	10+	164/220	74.5	
Total		471/1300	36.2	

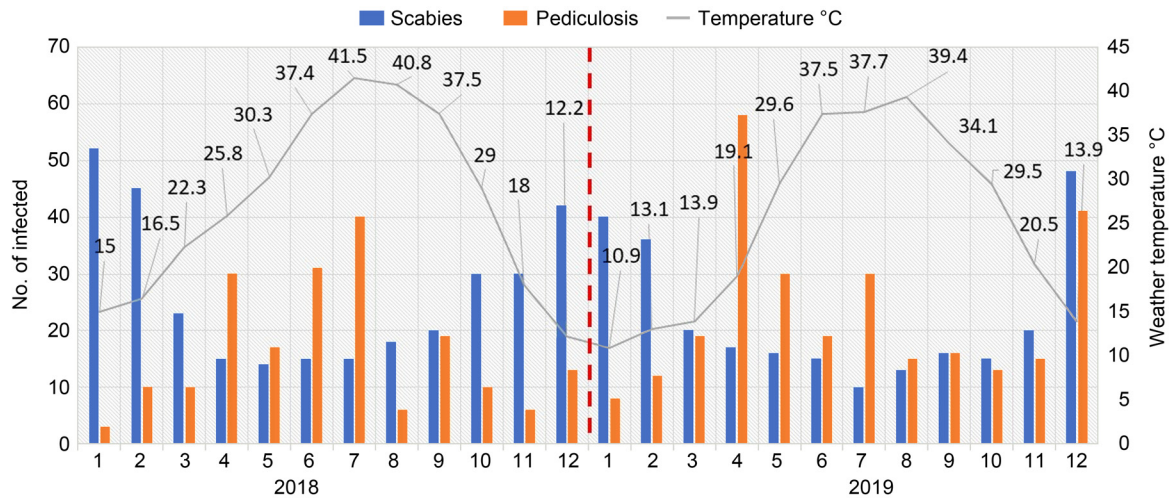


Fig. 2. Seasonal variation of scabies and pediculosis among IDP in Cham Mishko camp in 2018 and 2019 in relation to weather conditions.

and 2019. The results showed a much higher number of scabies cases in winter than in summer. Regarding head pediculosis, when the mean monthly temperature increased, especially in summer, the number of cases increased dramatically, while a low number of cases were recorded in winter.

Discussion

This study showed that the incidence of scabies was higher among children and males, as shown in Table I, due to the closer physical contact among children, particularly within large family units, which facilitates the transmission and explains different rates relative to age and sex indirectly for the spread of scabies. Besides spreading scabies through close direct skin-to-skin contact, infested persons can transmit scabies indirectly by sharing contaminated items with mites such as clothing, bedding, bed linens, furniture, shared hats, and head coverings (Liu et al. 2016; Korycińska et al. 2020). High rate of scabies recorded in males may be due to their intensive social lifestyle in the community as they work outside their households for long period which increased the chance for exposure to potential mite sources (Otero et al. 2004; Hengge et al. 2006; Ursani and Baloch 2009).

In Iraq, many refugees and displaced camps settings are in remote areas in places that are off the way or considerably secluded from cities and Cham Mishko camp is one of these camps located outside Zakho city. Hence, students of IDPs often cannot get access to schools outside camps for reasons of security, lack of documentation, and other restrictions. Therefore, they are obliged to attend two preschools, three primary and two secondary schools located in the camp; hence

they become more crowded, leading to an increase in the chances of transmitting infestation between them. Furthermore, household crowding conditions and poor personal hygiene make IDPs more prone to infestation with scabies, including continuously sharing infested items such as clothes and bed linen.

The prevalence of ectoparasites among people living in displaced camps has been investigated on a limited scale in the Kurdistan region in general and Zakho city in particular. Few studies have been conducted in Duhok city on the prevalence of ectoparasites among internal displacement people living in Camps. Barwari (2016) reported a rate of 4.5% of scabies among people living in 35 camps, while the much higher rate was reported by Hassan and Mero (2020), a rate of 10% (395/3,925) for scabies and 7% (277/3,925) for pediculosis among internally displaced people living in five camps around the city of Duhok, Kurdistan, Iraq. The overall rate of scabies was 45%, which was higher than the rates reported in previous studies among various populations (Mahmood 2011; Ibrahim et al. 2012; Mero and Hassan 2014; Barwari 2016).

Regarding head pediculosis, the general rate of head lice (36.2%) was similar to that reported in previous studies (Banaz 2015; Khidhir et al. 2017; Ali and Hama 2018). A prevalence rate of 1.2% was reported in the Sulaimani Governorate, Kurdistan Region, Iraq, among refugees and displaced people (Ali and Hama 2018). On the other hand, a very high rate (42.7%) was reported among displaced secondary school girls in Kirkuk city, Iraq (Kadir et al. 2017). Girls, mothers, and children often have closer physical contact, facilitating transmission, and explaining why these groups have a higher incidence relative to males. Other head lice studies have illustrated an association with female sex, overcrowding, and other infested family members (Kokturk et al.

2003; Bauer et al. 2009; Magalhães et al. 2011). There is only one study in Zakho about the prevalence of scabies among displaced people living in the Bersifi1, Bersifi2, and Cham Mishko camps, in which a rate of 6.1% was reported (Choli 2017). It was much lower than the rate recorded in the present study because during 2018, there was less supporting and funding from the UN Refugee Agency (UNHCR) to IDPs camps, hence less organization of public-awareness campaigns among IDPs, and limited quantities of drugs were provided against such neglected parasitic diseases.

Lice infestation was more common in children due to direct contact, environmental conditions, poor personal hygiene, and the continuous sharing of hair combs and other hair items. Girls have the highest rate of infestation, because they have longer and thicker hair, which provides an optimal environment for the growth and occurrence of head lice; furthermore, girls more likely spend their time in close play areas, and engaging during play in more head-to-head contact. Head lice also flourish indoors, while boys tend to spend more time engaged in active informal sporting activities outdoors (Zayyid et al. 2010). The large population of IDPs in Cham Mishko camp facilitates more close contact among family members, increasing the chance of infestation. Mother-to-child head lice transmission is expected due to close body contact, facilitating the spread of lice and reflecting why these groups have a higher occurrence than males. Other survey studies have demonstrated the relation of head lice with sex, overcrowding, and many family members (Mumcuoglu et al. 2001; Frankowski et al. 2002; Ko and Elston 2004; Takano et al. 2005).

Lower rates of scabies infestation were recorded in hot months (May, June, and July), while cold weather in November, December, and January was associated with a higher incidence of scabies. It may enhance overcrowding, which is conducive to scabies mite transmission, in addition to wearing heavy clothes in winter may maintain mite survival and transmission, also changes in host behavior may facilitate transmission, due to people gathering indoors, increasing overcrowding in cold weather (Chosidow 2000; Heukelbach and Hermann 2006). This explains the higher incidence of infection during cold weather, coupled with inadequate and poorly designed ventilation in crowded public places, and people have a tendency to share small spaces which promotes personal contacts beside that during the winter season may also be influenced by greater sexual activity (Savin 2005; Korycińska et al. 2020). In summer, the incidence of scabies in children was lower due to less physical contact and overcrowding during the summer. The difference in the incidence of scabies in this study compared to other similar studies carried out in the middle and southern parts of Iraq

may be due to differences in the weather temperature; since the north is relatively cooler, resulting in prolonged mite survival, in addition to the significant number of IDPs in the north of Iraq (Alsamarai 2009; Ibrahim et al. 2012; Mohy et al. 2018). Cham Mishko camp is located in the north of Zakho city, where the ratio of relative humidity is higher in the spring season (65%), which indicated that humid environments might result in higher rates of scabies infestations. The essential element in transmitting scabies is the mite's ability to survive and keep infectivity in the external environment. Therefore, a high humidity ratio associated with low-temperature results in a longer survival time of scabies outside the host body (Liu et al. 2016; Korycińska et al. 2020)

Regarding the effect of seasonal variation of weather temperature on head lice, although lice infestation exists throughout all months of the year at different rates, it increases in hot months. There is a significant association between seasonal variation and head lice infestation among IDPs. April 2019 was the highest month for infestations (58 patients), and January 2018 was the lowest (3 patients only). In hot months (April, May, June, and July), most head lice infestation cases were recorded. Children tend to play together more in the warm weather, creating a greater chance for the transmission of head lice from head-to-head. Lice can lay more eggs and reproduce more rapidly in warm weather, too, so head lice cases are more common at this time of the year compared to the winter months (Liu et al. 2016; Korycińska et al. 2020). During the summer months, especially in the summer holidays (June, July, and August), children have more frequent head-to-head contact than at other periods of the year. In addition, children and their families may travel outside Cham Mishko camp and visit their relatives in other refugee campuses outside Zakho city, who may be infested with head lice. All of these factors led to increased exposure to other people, building up a reservoir of lice infestation, and when schools open after the summer holidays (which in Iraq happens between September and October), head lice are transferred from an enlarged reservoir to classmates, playmates, and siblings. Therefore, when schools are open, there is increased awareness, rapid diagnosis, and appropriate treatment; hence the transmission of head lice will decrease to low levels during late Autumn and remain at a low level for the remaining period of the year.

Concerning head lice, no previous studies are dealing with this parasite's prevalence; this reason encouraged us to adopt this study to explore the distribution of these parasites among displaced people living in Cham Mishko camp and correlate the subsequent data with specific demographic factors. The incidence of scabies and head lice in the IDP camps in Iraq is still high.

Hence, screening and treatment for scabies and head lice among displaced people need to be carried out frequently to reduce infestation rates. The older adults and children should well know the health education concerning the modes of transmission of head lice and scabies and their prevention. It is essential to organize public-awareness campaigns to raise the campus's awareness and strongly emphasize the IDPs to avoid sharing personal belongings such as hair combs to prevent head lice infestation and stop sharing infested clothes and linens to prevent scabies transmission.

Conclusions

Scabies and head lice are still considered the most critical public health problems in developing countries, especially among displaced communities with social and psychological impact. The incidence of scabies infestation is high in males while head lice are higher in children and young women. Scabies is prevalent in cold months while pediculosis in hot months. Therefore, it is still a significant health problem in Iraq as a neglected disease, and it can be reduced by improving social health education and hygienic conditions and promoting more efficient health services.

Conflict of interest

The authors do not report any financial or personal connections with other persons or organizations, which might negatively affect the contents of this publication and/or claim authorship rights to this publication.

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