The Importance of Public Knowledge of The Vector of Cutaneous Leishmaniasis For Establishing Control Activities in BaniWalid-Libya

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Abstract

Cutaneous leishmaniasis (CL) is one of the major public health problems in Libya, where many cities are endemic at various levels. BaniWalid is one of the infected cities, where the infection is endemic. The city is a small town located in the north west, with 180 km from the south side of capital. The infection rate was noticeably rising during the past 10 years in Libya, especially in BaniWalid city, which is a matter of serious concern that requires the attention of health care providers and policy makers in the country and the need for public awareness and knowledge of the disease and its control.

The study aims to Identify people's knowledge and awareness about sand flies to establish control activities in BaniWalid. As well as to highlight the seriousness of the CL and educate people to avoid and reduce infection. The city was divided into four sections and questionnaires were distributed in 300 houses with a total population of 2618 individuals belonging to all age groups and both genders.

The finding of study have shown that 80% of the respondents had heard about the disease up to some extent, but the people's knowledge of the parasite of leishmania was 39 %. About 55 % of the participants had wrong idea and blame mosquitoes as the vector of CL. The reservoir host was identified by 30% of participants. The people's knowledge about breeding and resting sites of sand flies was as follow, 30% reported animal house, 25% damp dark places. The respond of participants towards vector control programme was very poor, as 95% do not believe in it. People's knowledge in the city is a very poor and they need to be educated about the disease, its transmission and control. Proper health education programme in a simple language along with visual demonstration must be promoted to enhance the awareness and co-operation at community level.

Key words: Cutaneous leishmaniasis, Sand fly, Control, BaniWalid, Libya, knowledge.

Introduction

Cutaneous leishmaniasis disease is a problem in many parts of the world, including Mediterranean countries, affecting mainly poor rural populations (Masoudi *et al*., 2013). Leishmaniasis is an endemic parasitic infection recognized as an important infection but neglected tropical disease with an estimated 350 million people at risk worldwide (WHO, 2010). New cases are emerging in areas previously free of the disease. Over 100 000 new

cases of cutaneous leishmaniasis are reported annually by countries in Mediterranean region, but in fact the actual infection rate is estimated to be three to five times higher since many patients do not seek medical care and not all patients with a diagnosis of cutaneous leishmaniasis are reported to health authorities (WHO, 2014). In Libya, Cutaneous leishmaniasis represents a health problem in northwestern parts of Libya (figure.1), affecting high numbers of people every year in aljabal al-gharbi and other areas (Abdellatif et al., 2013). The first case of Cutaneous leishmaniasis was reported in 1930, followed by 40 cases in 1971 were reported in Nalut (El-Buni, et al., 2000, Ahmed and abou faddan, 2013). More than 20,000 cases were reported in last three decades, and the rate of infection is high, because the disease infects all age groups in both sexes (Obenauer et al., 2012 and El-bouni and Ben-Darif, 1996).

The disease causes skin lesions on exposed parts of the body, mainly arms and face leaving life-long scars (WHO, 2015). It is transmitted by a bit of a sand fly vector, there are over 900 species and subspecies of sand flies have been identified from 88 tropical and subtropical countries, where, they belong to *Phlebotomus* species in the Old World and *to Lutzomyia* species in the New World (Ramalho-Ortiga et al., 2010; Maroli, 2012). Phlebotomine sand flies present great diversity of species and 21 species of phlebotomine were recorded in Libya by some studies were conducted on sand flies (El-Buni et al., 1993; Annajar, 1999, Elhosk et al., 2014). Female sand flies of *Phlebotomus papatasi* is responsible for transmitting the haemoflagellate LEISHMANIA TROPICA *AND* LEISHMANIA MAJOR, the causative agents of human cutaneous leishmaniasis **(**Sant'Anna et al., 2014**).** The principal vector of *Leishmania major* in Libya is the sand fly (Diptera: Psychodidae: Phlebotominae) *Phlebotomus papatasi*, which is considered an outdoor species (Sharma and Singh, 2008). *Phlebotomus papatasi* uses rodents' burrows for daytime resting and breeding (Aoun and Bouratbine, 2014). Cutaneous leishmaniasis in Libya involves rodents as reservoir hosts such as gerbil *Meriones libycus* and the fat sand-rat *Psammomys obesus* (Annajar, 1999). *Psammomys obesus* is the main reservoir host of L. major and it was naturally found infected in Libya (Aoun and Bouratbine, 2014). The main parasite agent of cutaneous leishmaniasis in BaniWalid is *Leishmania major*, however the presence of *Leishmania killicki* in BaniWalid was reported in 1986 (Ashford et al., 1976; Aoun et al., 2004).

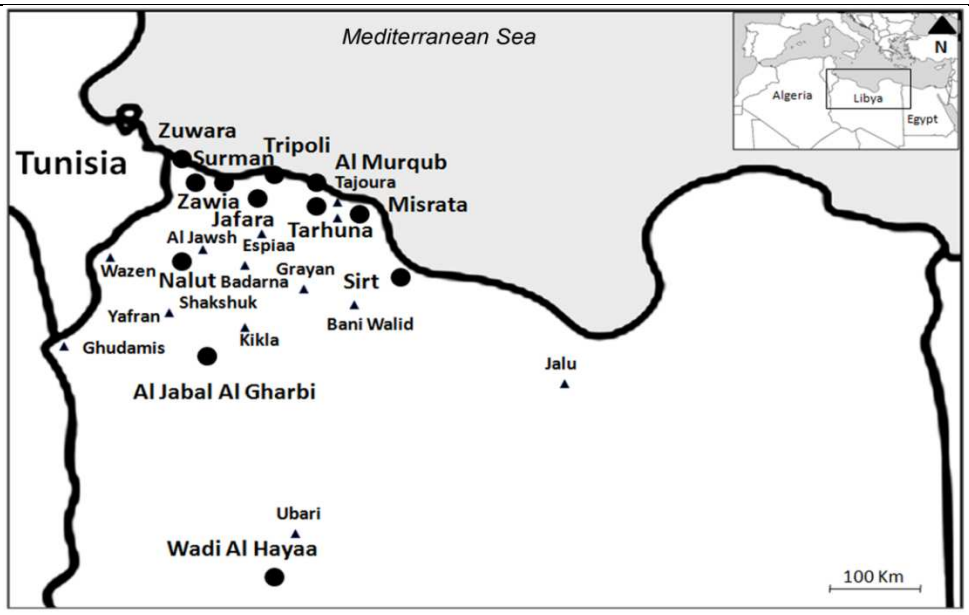

Figure 1: Map shows the geographical distribution of cutaneous leishmaniasis in Libya. Taken from Amro et al. (2012). ● Districts, ▲Endemic cities.

BaniWalid is a small city located in the north west of Libya with 180km away from the south side of Tripoli (Figure 1). This disease is one of the major public health problems in the city of BaniWalid, where the districts of the city are endemic at various levels. The infection rate of cutaneous leishmaniasis was noticeably rising during the past 10 years in Libya, especially in BaniWalid city (health authority), which is a matter of serious concern that requires the attention of health care providers and policy makers in the country and also the need for good public awareness and knowledge of the disease and its control. The presence of Sand flies and rodents in the city made it a suitable environment for leishmaniasis to spread by infecting people involved in outdoor activities in farms, building and others staying till night (Lainson, 1988; Abdellatif et al., 2013).

The relation between people and their animals is very strong as residents keep their animal sheds near their own homes in BaniWalid (figure 2 A and B), which provides breeding and resting sites for sand flies and thus provides good transmission conditions resulting in human infection (Kasari et al., 2010). The geographical distribution of disease in Libya is expanding as new cases are reported from cities that were free of infection such as Komas

and Misrata (El-Buni et al., 2000). The geographic expansion requires the development of effective integrated vector management strategies based on sand flies behavior (Qualls et al., 2015).

A **B**

Figure 2 A and B: shows animal sheds next to residents houses.

Cutaneous leishmaniasis control is a global cause of concern. The control of disease in Libya remains a challenge to the health sector in many cities (El-Buni et al., 2000). The aim of the control programme is to reduce the number of the infected people and stop transmission of disease (Kumar et al., 2008). The best method of leishmaniasis control is to reduce contact between vectors and humans, and also reduction of vector can be a good strategy of control (Sharma and Singh, 2008). The control of the disease relies on several factors including community knowledge, attitude, Respond and practice toward the infection (Hassan et al., 2012). The present available local control methods in the city rely on case detection and treatment with available medication (Pentostam injections). Also another measure of vector control was used in BaniWalid consists of spraying residual insecticides on the animal sheds and old buildings as well as on house surfaces as a barrier against incoming sand flies.

Alternative methods of control is insecticide-impregnated bed nets are used in many countries in the world (Ostyn et al., 2008). Community education about the disease and community commitment and involvement in implantation of control activities are very important for the successful control programme in the infected areas (Hassan et al., 2012). Therefore the public knowledge about the disease in Libya must be assessed.

Number of studies have been carried out to assess the knowledge, attitude, and practices of residents towards other diseases, for instant, malaria, onchocerciasis and leishmania (Seaman et al., 1996; Khalil et al., 2008; Hassan et al., 2012; Lo´ Pez-Perea, 2014; Akram, 2015), Such information is, however, vital because successful control programme of any infectious disease requires a high level of understanding of the social and cultural characteristics of individuals and communities residing in endemic areas (Koirala, 1998). In Ethiopia a study on the knowledge of visceral leishmaniasis, was carried out by Lo´ pez-Perea (2104) has stated the knowledge on how the infected communities perceives the disease is essential for establishing successful control strategies. They have found that when the knowledge of population is increased about the disease, resulted in the increase of the knowledge of protection measures. Up to date there is no study has been published and no data are available about the public knowledge of leishmaniasis in Libya. Therefore this study was conducted in the city of BaniWalid.

Objective:

Identification of the people's knowledge and awareness about sand flies to establish proper control activities in endemic areas of BaniWalid. As well as through the light on the seriousness of the infection in the city and educate people about how to avoid contact with sand flies and reduce infection by implementing successful control programme.

Materials and methods:

The study area:

This study was conducted during July, August and September 2014, in BaniWalid city, which is located in the north-western Libya (13°58'59"*E AND* 31°59'00"*N*), about 180 km

south east of Tripoli (Figure 3). The area of the city is 19,710 km^2 and inhabited by a total population of 98,424 according to the registry office survey in the year of 2013.

Methods:

The city was divided into four sections according to the highest reported number of cases to the main medical assembly, to ease the distribution of questionnaire to the respondents. Questionnaires were distributed to inhabitants of 300 houses that were randomly chosen from each section (Dahra and Tareek Almatar (Airport road), Alsouq (city center market), Alhai Alsanaie (industrial complex) and Almanasla) as shown in figure 3. The 300 households were visited with total population of 2618 individuals belonging to all age groups and both genders were included in this study. The study was carried out using well structured and very simple questionnaire, which is easy to answer by respondents. The questionnaire was designed to elucidate information on respondents' Knowledge about sand flies, its breeding and resting sites and leishmania parasite and reservoir host. The questionnaire allows the collection of data on participants' knowledge about the cause of the disease, recognition, transmission, symptoms and treatment of the disease; also control information was collected on programmes for spraying houses with insecticides, use of bed nets. In addition, environmental information was also obtained such as the presence of animal sheds next to respondents homes.

Statistics:

Data collected from participants by questionnaires were statistically analysed using SPSS 20.0 statistical software (SPSS, 2011).

Ethics.

Permissions from health authority and participants were obtained and study steps were explained in details to respondents beforehand. Confidentiality was assured and participants' names were not mentioned.

Figure 3: Map shows the four sections of BaniWalid. Taken from googlemaps.com

Results:

The finding of the present study is illustrated as follow in table 1, and figures 4, 5 and 6.

Table 1: The knowledge of participants about sand flies and leishmaniasis disease

	Know or heard of	**yes**	**no**
1	The leishmaniasis disease	80%	20%
2	The route of transmission	33%	67%
3	The parasite of leishmania	39 %.	61 %
4	The vector	38%	62 %
5	Need for reservoir host	40%	60%
6	Breeding site animal shelter	30%	70%
7	Resting in damp dark places	25%	75%
8	The symptoms	54%	46%
9	Recognize the CL	48%	52%
10	Treatment of the CL	26%	74%
11	Have you been Infected with CL or know someone	12%	88%
12	Do you Believe in Control program	5%	95%
13	Bed nets application	3%	97%
14	Do you live in a house nearby animal sheds	67%	33%

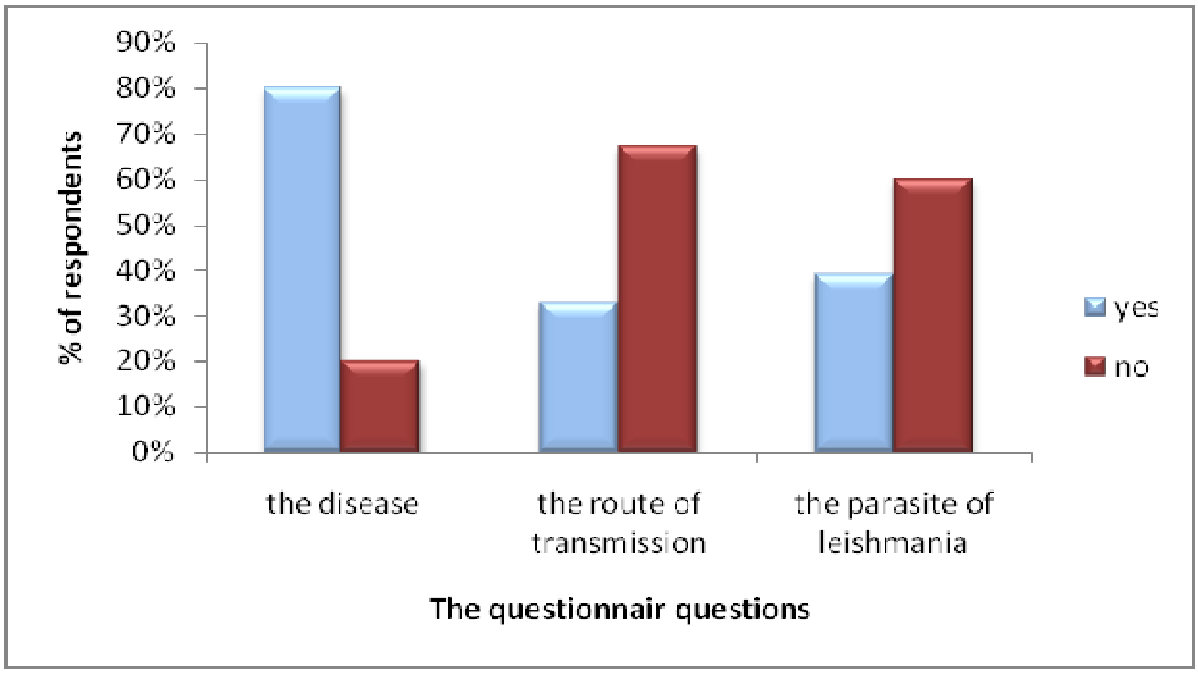

Figure 4: The knowledge of respondents about the leishmania parasite and disease.

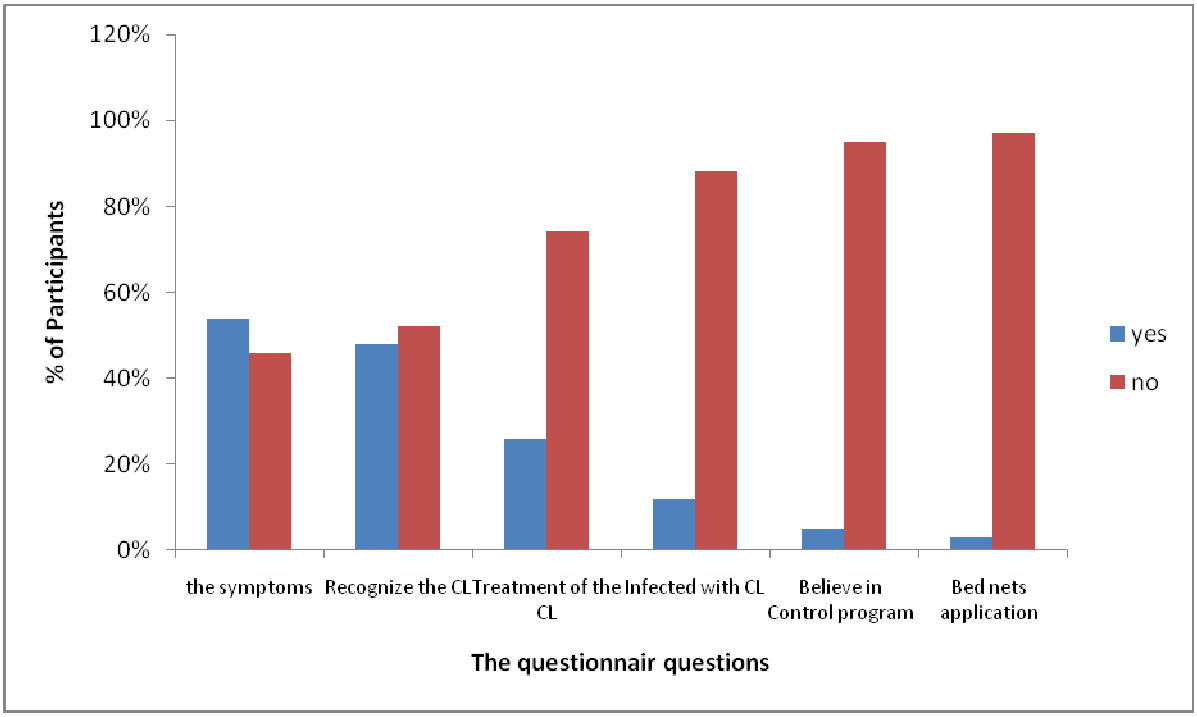

Figure 5: The knowledge of respondents about the leishmaniasis and its control.

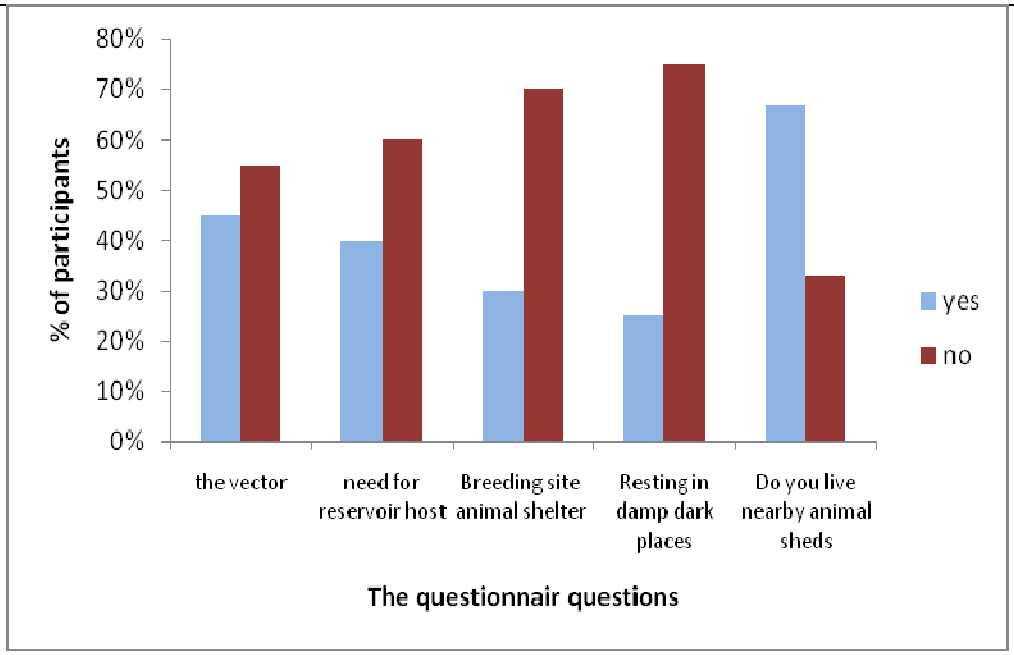

Figure 6: The knowledge of respondents about the sand flies vector and other hosts.

The results summarized in figures 4, 5 and 6, show that 80% of the respondents had heard about the disease up to some extent, but surprisingly 67% of respondents were not aware of the route of transmission of the disease. The people's knowledge of the parasite of leishmania was reported by less than 40%. About 55 % of the participants had wrong idea and blame mosquitoes as the vector of CL. The need for reservoir host was identified by 40% of participants. The people's knowledge about breeding and resting sites of Sand flies was as follow; 30% reported animal house, 25% damp dark places.

The answers indicated that majority of people do not recognize the disease, symptoms and treatment as only 26% know the medication used. The respond of participants towards vector control programme was very poor, as 95% do not believe the control programme in the city has worked. 67% of the respondents live nearby animal shed of their own homes. The 97% of the respondents do not know about insecticidal impregnated bed nets are used as control methods for mosquitoes and sand flies in many countries

Discussion:

Cutaneous leishmaniasis represent a health problem in western parts of Libya, affecting high numbers of people every year because the disease affects all age groups in both sexes. At the present there is no vaccination available for cutaneous leishmaniasis and the case finding and treating remains one of the control methods (Davies et al., 2003; Ostyn et al., 2008). Indoor spraying of residual insecticide is remains the main control strategy for sand fly control programme in many countries. The impact of house spraying on transmission of visceral leishmania disease was cost effective in many countries (WHO, 2002; Gurtler et al., 2007; Kasari et al., 2010) but did not achieve the same impact in India (Kasari et al, 2010). The success of the use of household spraying of residual insecticides to control the vector of cutaneous leishmaniasis was documented in few publications (Ostyn et al, 2008).

The insecticide treated bed nets are used in many countries for mosquitoes control might present alternative method for sand fly control. The presence of animals sheds near people's homes in the city provides breeding and resting sites for sand flies and thus provides good transmission conditions resulting in human infection. Sand flies were collected from animal shed in endemic and non-endemic areas (Kasari et al., 2010).

According to the centre of disease control, the geographical distribution of leishmaniasis in Libya is expanding and new cases are reported from cities that were not infected before (El-Buni et al., 2000). The spread of infection can be due to population migration, geographical expansion and armed conflicts (Desjeux, 2001; and Antinori, 2005). This geographic expansion requires urgent actions to develop effective integrated vector management strategies, which can be modified based on the knowledge of sand flies behavior (Qualls et al., 2015). The biggest difficulty was in the recognition of the phlebotomine sand flies by participants. The finding of this study shows that the knowledge of respondents involved in the survey about the vector of the disease is low, as only 38% have expressed some knowledge, whereas 62 % do not recognize sand flies as the vector of the leishmania and thought mosquitoes rather than sand flies were responsible for transmission of the disease. This is a challenge, which will face sand flies local control progrrmame as people cannot recognize the sand fly and thus will not avoid its bite, therefore this issue needs to be

solved by proper health education and information about sand flies should be updated regularly (Yaghoobi-Ershadi, 2012).

Only 5 % of the participants believed that control programme might result in reduction of infection, whereas 95 % of respondents expressed their disbelieve in control programme with justification that no reduction in mosquitoes number was seen in recent years. Almost 97 % of the respondents do not know about insecticidal impregnated bed nets are used as control methods for mosquitoes and sand flies in many countries in the world (Ostyn *et al.,* 2008), as less than 3 % showed to have heard of it, however insecticidal impregnated bed nets are considered the best protection method against sand fly and mosquito by respondents after explanation of the method. Bed nets are expensive methods and were not practiced in BaniWalid before and thus are not known to the public in the city.

The study showed the way of life in BaniWalid acts as additional factor for the spread of the disease, as the culture, which is created by communities in the city provides a suitable environment for vector breeding. Phlebotomine sand fly larvae are known to feed on the feces of animals and rodents (Wasserberg et al., 2008). The presence of animals sheds near people's homes in BaniWalid provides breeding and resting sites for sand flies and thus provides good transmission conditions resulting in increased human infection (Kasari, 2010). Therefore sand flies can cause many infections in one household due to the short flight range and infection is affected by presence of humans, sand flies vector, rodents, gardens, domestic animals and number of parasites in the same area (Killick-Kendrick, 1999; Reithinger et al., 2007; Amro et al., 2012). In this kind of situation, proposes of environmental management and community involvement in control strategies to avoid contact with the vector become very important (Gouveia et al., 2008).

The data obtained in studies such as the present study can be very useful for planning or evaluating cautenous leishmaniasis control activities. The assessment of public knowledge towards other diseases, such as malaria, onchocerciasis and visceral leishmania have been published (Seaman et al., 1996; Khalil et al., 2008; Hassan et al., 2012). But to our knowledge, this is the first study about the public knowledge of leishmaniasis in Libya (BaniWalid city). Therefore more studies have to be carried out in Libya to assess the situation and the public knowledge about the disease and control programme, also to educate people in infected area to fulfill the gap between the public and health providers to apply appropriate control methods

to reduce the infection by implementing successful control programme.

This study indicated that people in the city need to be educated to know more about the disease and its control methods and how they can be a part of the fight against the disease. The finding in our study is similar to the finding of other study in Pakistan carried out by Akram et al (2015), which has found that the knowledge of how the population perceives the disease and its vectors is essential in order to design an effective control strategy in future. The present study suggested that proper health education programme in simple Arabic language in schools, local radio stations and mosques is a very important, along with visual demonstration should be promoted to enhance the awareness and co-operation at community level for the success of leishmaniasis control programme in Libya.

Figure 7: A . Sand fly feeding on blood

http://www.raywilsonbirdphotography.co.uk/

Figure 7: B. Picture of Leishmania infection on Patient's hand from BaniWalid

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أهمية المعرفة العامة لناقل مرض اللشمانيا الجلدية ودورها في تعزيز أنشطة المكافحة في مدينة بني وليد– ليبيا

الملخص

مرض اللشمانيا الجلدية هو احد المشاكل الصحية الرئيسية في ليبيا، حيث انه يستوطن العديد من المدن بليبيا بمستويات مختلفة. بني وليد تعتبر واحدة من المدن المستوطنة بالمرض، وهي مدينة صغيرة تقع في الشمال الغربي من البلاد، على بعد 180 كم جنوبا من طرابلس العاصمة. معدل الإصابة ارتفع بشكل ملحوظ خلال السنوات العشرة الماضية في ليبيا، خاصة في مدينة بني وليد، وهي مسألة تثير قلقا بالغا والتي تتطلب انتباه مقدمي الرعاية الصحية وصانعي السياسات في البلاد والحاجة لتوعية الناس لمعرفة المرض وطريقة مكافحته وتفادي الإصابة. تهدف الدراسة لتحديد معرفة الناس بذبابة الرمل ناقل المرض ومرض اللشمانيا وكيفية انتشاره لإقامة أنشطة المكافحة في بني وليد وكذلك لتسليط الضوء على خطورة المرض وتثقيف الناس حول كيفية تجنبه وتقليل انتشار العدوى. تم تقسيم المدينة إلى أربعة أقسام، ووزعت استبيانات لسكان 300 منزلا. وقد بلغ عدد أفراد هذه الأسر إلي 2618 شخص ينتمون إلى جميع الفئات العمرية وشملت كلا

الجنسين. أظهرت النتيجة أن 80٪ من المستطلعين سمعوا عن المرض إلى حد ما، ولكن كانت نسبة معرفة الناس بطفيل اللشمانيا تساوي 39٪. بينما 55٪ من المشاركين لديهم فكرة خاطئة ويلمون البعوض على نقل طفيل اللشمانيا. تم التعرف على المضيف خازن بنسبة 30٪ من المشاركين. معرفة الناس حول مكان عش الدبابة على النحو التالي، 30٪ بيت الحيوانات، 25٪ الأماكن المظلمة الرطبة. أتضح أن المعرفة العامة للناس في المدينة فقيرة جدا وأنهم بحاجة إلى المعرفة بهذا المرض وطرق انتقاله والسيطرة عليه. يجب تعزيز المعرفة ببرنامج التثقيف الصحي بلغة عربية بسيطة جنبا إلى جنب مع تدريبات بصرية لتعزيز الوعي والتعاون على مستوى المجتمع المحلي.

الكلمات المفتاحية: اللشمانيا الجلدية، ذبابة الرمل، المكافحة، بني وليد، ليبيا، المعرفة.