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Geographical Distribution of Cutaneous Leishmaniasis and Sand Flies in Pakistan

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SUMMARY: Cutaneous leishmaniasis is found in all the four provinces of Pakistan; these are NWFP, Balochistan, Sindh and Punjab. In Balochistan the areas from where the patients came are Uthal, Quetta and Ormara. The highest number of patients came from Quetta and least from Ormara. The patients included in this study were from the Mangopir and Chakewara, areas of Karachi. The infection is endemic in this country and the recent epidemics in the Dadu District and Nawabshah indicate its importance in the locality. The sand fly vector is found in all four provinces of Pakistan that are listed here. It is quite obvious that presence of leishmaniasis indicates the presence of sand flies and cutaneous leishmaniasis is more common.

Key Words: Cutaneous Leishmaniasis, sand fly, geographical distribution, Pakistan

Pakistan'da Kutanöz Leishmaniasis ve Kum Sineklerinin Coğrafik Dağılımı

ÖZET: Kutanöz leishmaniasis, Pakistan'ın NWFP, Balochistan, Sindh ve Punjab bölgelerinde görülmektedir. Balochistan'da Uthal, Quetta ve Ormara bölgelerinden hastalar bulunmaktadır. En fazla hasta Quetta en az ise Ormara bölgesindendir. Bu çalışmaya alınan hastalar Karaçi'nin Mangopir ve Chakewara bölgelerindendir. Enfeksiyon bu ülkede endemiktir, Dadu Bölgesi ve Nawabshah'da meydana gelen son salgın enfeksiyonun bu lokalitelerde de önemli olduğunu göstermektedir. Vektör kum sinekleri her 4 bölgede de buunmaktadır ve burada verilmiştir. Leishmaniasisin ve vektör kum sineklerin varlığı kutanöz leishmaniasisin daha yaygın olabileceğini göstermektedir.

Anahtar Sözcükler: Kutanöz leishmaniasis, kum sineği, coğrafik dağılım, Pakistan

INTRODUCTION

Leishmaniasis are a group of infections of the viscera, skin and mucous membrane caused by protozoan of the genus *Leishmania. Leishmania* are transmitted by sand flies of the genera *Phlebotomus* (Old World leishmaniasis) and *Lutzomyia* (New World leishmaniasis).

Leishmaniasis is not a single entity but a collection of diseases, each with its own clinical manifestations and epidemiology. Each species of *Leishmania* tends to cause a certain type of disease within a specific epidemiological context.

Cutaneous leishmaniasis is caused by *Leishmania tropica* in Pakistan. (1). It produces cutaneous leishmaniasis known as oriental sore, Aeppo button, Jericho boil, Dehli boil, Bouton de biskra, Ulcer de los chicleore or forest "yaws" of Yucutan pro parte. Several authors have classified Cutaneous leishmaniasis in old world and new world cutaneous leishmaniasis. (5). The intermediate host of *Leishmania* are sand flies (*Phlebotomus*). The sand flies vector found in Pakistan comprise 29 species of *Phlebotomus* and ten or more species may be expected to occur (4).

The sand flies vector found in Pakistan are *Phlebotomus papatasi*, *P. alexandri, P. nuri, P. sergenti, P. ka. burneyi, P. keshishiani, P. major, P. longiductus, P. argentipes, P. colabaensis and Sergentomyia d. arpaklensis, S. theodori, S. punjabensis, S. babu, S. baghdadis, S. shorttii, Sergentomyia sp, S. palestinensis, Sergentomyia sp. indicia, S. paw. hodgsoni, S. bailyi, S. montana, S. christophersi, S. clydei, S. hospitii, S. tiberiadis, S. dentata, S. a. asiatica and S. grekovi.* They comprise some 29 species of *Phlebotomus*, and ten or more species may be expected to occur. and at least 20 species of *Sergentomyia* (4).

In Pakistan *phlebotomus papatasi* was found in the areas of Kashmore , Bannu, Dera Ismail khan , Idak, Tank (7), Kohat, Lahore Miramshah, Nowshera, Quetta, Rawalpindi, (8),

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Jandola, Khirgi, Landi Kotal, Peshawar (10), Indo Pakistan subcontinent, Qulla, Saifullah, Bashmore, Chamman, Qullah Abdullah, Bostan Ziarat, Nastang, Jangal pir, Alizal, Kuchlak, Sibi, Nushki, Dukl, Mewand, Tall, Dhadar, Kahn, Chilgiri, Kalat, Bhag Miltri, Hairdin, Khurram, Belpat, Adampur, Sohbatpur, Dara Allahyar, Usta Muhammand, Mashkey, Hoshab, Paron, Shaharg, Buleda, Nasirabad, Tump, Balichah, Kalatuk, Nallant, Mand and Suntsar. Bergeroi from Nanasaheb Ziarrat, Kohlu, Panjour, Dasht – e – Kaddam and Turbat.S. Murghabiensis from Tump. Nanasahib ziarat, Kahan, Bela, and Turbat (2, 3) *Phlebotomus alexandri* was found in waziristan (10), Western frontier Kambhar , north-west frontier. Dera Ismail khan , Hyedrabad, Kandhkot, Larkana, Shikarpur, Tank and Parkuta. Mediterranean and west Pakistan (4, 11). *Phlebotomus nuri* is found in West Pakistan, Said pur and Rawalpindi (11). *Phebotomus sergenti* has been reported in Dera Ismail khan (6), Lahore (7), Quetta (8) chitral, Landi Kotal (9), Sukkur, (10) Cherat , Jhelum, Shikarpur, Tank, Chilas. Gilgit, Gotki, Gol, Gwadi, keris, Mir Muhammad , Parkuta, Peshawer, Rawalpindi, Saidpur, Taxila. (4). *Phlebotomus kandelakii burneyi* has so far been reported in the areas of West Pakistan, Gawadi Kalam, Keris and Parkuta. *Phlebotomus (Larroussius) Keshishiani* was found in Gilgit, Parkuta, Rawalpindi and said pur. *Phlebotomus (Larroussius) major* is present in Abbottabad, Rawalpindi and said pur. *Phlebotomus (Adlerius) chinensis longiducutus* is found in Punch (Kashmir) Gilgit, Gol, Gwadi, keris, Parkuta and said pur . *Phlebotomus (Euphlebotomus) argentipes* has been reported in Lahore, Mir Muhammad and Taxila. *Phlebotomus (Anaphlebotomus) colabaensis* is found in Lahore and Devipur orchard On the other hand species of *sergentomyia (sergentomyia) dentata dentata* is reported in Quetta. *Sergentomyia (Sergentomyia) dentate arpaklensis* were isolated from Gwadi , Landi Kotal, Peshawar, Rawalpindi. *Sergentomyia (Sergentomyia) heodori* Dera ismail khan, Kashmore, Larkana and Peshawer, Landi kotal, Rawalpindi. *Sergentomyia (Sergentomyia) punjabensis* is distributed in Kohat area, Dera Ismail Khan, Jhelum, Khanki, Lahore, Peshawar, Mongowol, Said pur and shahzada. *Sergentomyia(Parrotomyia)Africana asiatica* is found in Rhedia (near Larkana), Kandhakot and Shikarpur. *Sergentomyia (Parrotomyia) babu* species was reported in Gilgit, Landi Kotal, Mir Mhammad , Rawalpindi, Said Pur and Taxtila. *Sergentomyia (Parrotomyia)Baghdadis* as been reported in Dera Ismail Khan , Jheum, Kandhkot, Lahore, Rohri, Shikarpur, Sukkar, Bannu, Gugranwala, Janodola, Kashmore, Larkana, Lyallpur, Pano Aqil, Peshawar, Sarghoda, Tank, Landi Kotal, Mir Muhammad, Rawalpindi, Said Pur and Taxila. *Sergentomyia (Parrotomyia) shorttii* is reported in Taxila and Hyederabad, *Sergentomyia (Parrotomyia) sp. was* found in Bahadur (near Peshawar). *Sergentomyia (Parrotomyia) grekovi* is found in Gilgit. *Sergentomyia (Parrotomyia) palestinensis* is so far been reported in Peshawar. *Sergentomyia (Grassomyia) squamipleuris indica* is distributed in Peshawar, Saharanpur, Lahore Dera Ismail Khan, Jhelum, Khanki, Tank, Cherat, Gujrat, Rawalpindi, Said Pur, Saidu Sharif and Taxila. *Sergentomyia (Rondonomyia) pawlowskyi hodgsoni* in Cherat, Jandola, Landi Kotal, Gawadi, Parkuta, Peshawar, Rawalpindi, Said Pur and Taxila *Sergentomyia bailyi* is found in Dera Ismail Khan, Jandola, Lahore, Larkana, Pano Aqil, Tando Moammad Khan, Peshawar, Shikarpur, Tank, Mir Muhammad, Rawalpindi and Taxila. *Sergentomyia Montana* is reported in Murre, Khaira Gali, Western Himalayas , Chitral road, Bahrein, Gilgit, Parkuta, Rawalpindi, Said Pur and Taxila. *Sergentomyia sintonius christophersi* is found in Lahore and Jhelum. *Sergentomyia (sintonius) clydei* is found in Jandola, Khirgi, Peshawar, Tando Muhammad Khan, Khairpur, Kandhokot, Karachi, Lahore, Mir Muhammad, Rawalpindi and Taxila. *Sergentomyia (Sintonius) hospitii* Is found in Abbottabad area, Chilas, Rawalpindi and Said Pur. *Sergentomyia (Sintonius) tiberiadis* is reported in Ahmad Khel, Landi Kotal and Peshawar(4). (Fig – 1, 2 , 3, 4 & 5)

MATERIALS AND METHOD

Blood samples were collected in EDTA from 53 patients and complete blood analysis was carried out, Skin scrapings from the lesions were prepared, stained with Leishman's stain and observed for L.D. bodies for the confirmation of the infection. Complete information about the patients was collected including the name, sex, occupation, and addresses.

RESULTS AND DISCUSSION

Cutaneous leishmaniasis is found in all the four provinces of Pakistan including NWFP, Balochistan, Sindh and Pahjab. Percentage of patients found in these provinces in descending order are, Balochistan, NWFP, Sindh and Punjab (Table 2). However a number of patients were those migrated from Afghanistan which is an evidence that leishmania is also found in Afghanistan.

In Balochistan the areas to which the patients belonged are Uthal, Quetta and Ormara (Table 3). The highest number of patients were from Quetta and least from Ormara. In NWFP (Table 4) highest number of patients were from chitral other areas from where the patients belong are Koat, Dera Ismail khan, District DIR, Bunair district, Peshawar, wazeeristan, and khurram agency.

Cases of cutaneous leishmaniasis were also from Province of Punjab. We had three patients form Punjab (Table 5). From province Sindh , the patients included in this study belong to Mangopir and Chakewara areas of Karachi (Table 6, Fig-4).

This infection is endemic in this country and the recent epidemics in Dadu District and Nawabshah (Daily Jang, 20,21 February 2002) indicate the importance of this disease in this

Table 1. Sand flies found in Pakistan

No	Species	Area	Reference
		Kashmore , Bannu, Dera Ismail khan , Idak, Tank	7
		Kohat, Lahore Miramshah, Nowshera, Quetta, Rawalpindi,	8
		Jandola, Khirgi, Landi Kotal, Peshawar	10
1	***Phlebotomus papatasi***	Indo Pakistan subcontinent, Qulla, Saifullah, Bashmore, Chamman, Qullah Abdullah, Bostan Ziarat, Nastang, Jangal pir, Alizal, Kuchlak, Sibi, Nushki, Dukl, Mewand, Tall, Dhadar, Kahn, Chilgiri, Kalat, Bhag Miltri, Hairdin, Khurram, Belpat, Adampur, Sohbatpur, Dara Allahyar, Usta Muhammand, Mashkey, Hoshab, Paron, Shaharg, Buleda, Nasirabad, Tump, Balichah, Kalatuk, Nallant, Mand and Suntsar. Bergeroi from Nanasaheb Ziarrat, Kohlu, Panjour, Dasht – e – Kaddam and Turbat.S. Murghabiensis from Tump. Nanasahib ziarat, Kahan, Bela, and Turbat	2, 3
		waziristan	10
2	***Phlebotomus alexandri***	Western frontier Kambhar , north-west frontier. Dera Ismail khan , Hyedrabad, Kandhkot, Larkana, Shikarpur, Tank and Parkuta. Mediterranean and west Pakistan	4, 11
3	***Phlebotomus nuri***	West Pakistan ,Said pur and Rawalpindi	11
		Dera Ismail khan	6
		Lahore	7
		Quetta	8
4	***Phebotomus sergenti***	chitral, Landi Kotal	9
		sukkur,	10
		Cherat , Jhelum, Shikarpur, Tank, Chilas. Gilgit, Gotki, Gol, Gwadi, keris, Mir Muhammad , Parkuta, Peshawer, Rawalpindi, Said pur, Taxila.	4
6	***Phlebotomus kandelakii burneyi***	West Pakistan, Gawadi Kalam, Keris and Parkuta	4
7	***Sergentomyia (Parrotomyia) africana asiatica***	Rhedia (near Larkana), Kandhakot and Shikarpur.	-
8	***Sergentomyia (Parrotomyia) babu***	Gilgit, Landi Kotal, Mir Mhammad , Rawalpindi, Said Pur and Taxtila	-
9	***Sergentomyia (Parrotomyia) baghdadis***	Dera Ismail Khan , Jheum, Kandhkot, Lahore, Rohri, Shikarpur, Sukkar, Bannu, Gugranwala, Janodola, Kashmore, Larkana, Lyallpur, Pano Aqil, Peshawar, Sarghoda, Tank, Landi Kotal, Mir Muhammad, Rawalpindi, Said Pur and Taxila.	-
10	***Sergentomyia (Parrotomyia) shorttii***	Taxila and Hyederabad	-
11	***Sergentomyia (Parrotomyia)* sp. *B***	Bahadur (near Peshawar)	-
12	***Sergentomyia (Parrotomyia) grekovi***	Gilgit	-
13	***Sergentomyia (Parrotomyia) palestinensis***	Peshawar.	-
14	***Sergentomyia (Grassomyia) squamipleuris indica***	Peshawar, Saharanpur, Lahore Dera Ismail Khan, Jhelum, Khanki, Tank, Cherat, Gujrat, Rawalpindi, Said Pur, Saidu Sharif and Taxila.	-
15	***Sergentomyia (Rondonomyia) pawlowskyi hodgsoni***	Cherat, Jandola, Landi Kotal, Gawadi, Parkuta, Peshawar, Rawalpindi, Said Pur and Taxila *Sergentomyia bailyi* is found in Dera Ismail Khan, Jandola, Lahore, Larkana, Pano Aqil, Tando Moammad Khan, Peshawar, Shikarpur, Tank, Mir Muhammad, Rawalpindi and Taxila.	-
16	***Sergentomyia Montana***	Murre, Khaira Gali, Western Himalayas , Chitral road, Bahrein, Gilgit, Parkuta, Rawalpindi, Said Pur and Taxila	-
17	***Sergentomyia sintonius christophersi***	Lahore and Jhelum	-
18	***Phlebotomus (Larroussius) keshishiani***	Gilgit, Parkuta, Rawalpindi and said pur	-
19	***Phlebotomus (Larroussius) major***	Abbottabad, Rawalpindi and said pur	-
20	***Phlebotomus (Adlerius) chinensis longiductus***	Punch (Kashmir) Gilgit, Gol, Gwadi, keris, Parkuta and said pur	-
21	***Phlebotomus (Euphlebotomus) argentipes***	Lahore, Mir Muhammad and Taxila.	-
22	***Phlebotomus (Anaphlebotomus) colabaensis***	Lahore and Devipur orchard	-
23	***Sergentomyia (sergentomyia) dentata dentata***	Quetta	-
24	***Sergentomyia (Sergentomyia) dentate arpaklensis***	Gwadi , Landi Kotal, Peshawar, Rawalpindi.	-
25	***Sergentomyia (Sergentomyia) heodori***	Dera ismail khan, Kashmore, Larkana and Peshawer, Landi kotal, Rawalpindi.	-
26	***Sergentomyia (Sergentomyia) punjabensis***	Kohat area, Dera Ismail Khan, Jhelum, Khanki, Lahore, Peshawar, Mongowol, Said pur and shahzada	-
27	***Sergentomyia (sintonius) clydei***	Jandola, Khirgi, Peshawar, Tando Muhammad Khan, Khairpur, Kandhokot, Karachi, Lahore, Mir Muhammad, Rawalpindi and Taxila.	-
28	***Sergentomyia (Sintonius) hospitii***	Abbottabad area, Chilas, Rawalpindi and Said Pur	-
29	***Sergentomyia (Sintonius) tiberiadis***	Ahmad Khel, Landi Kotal and Peshawar	-

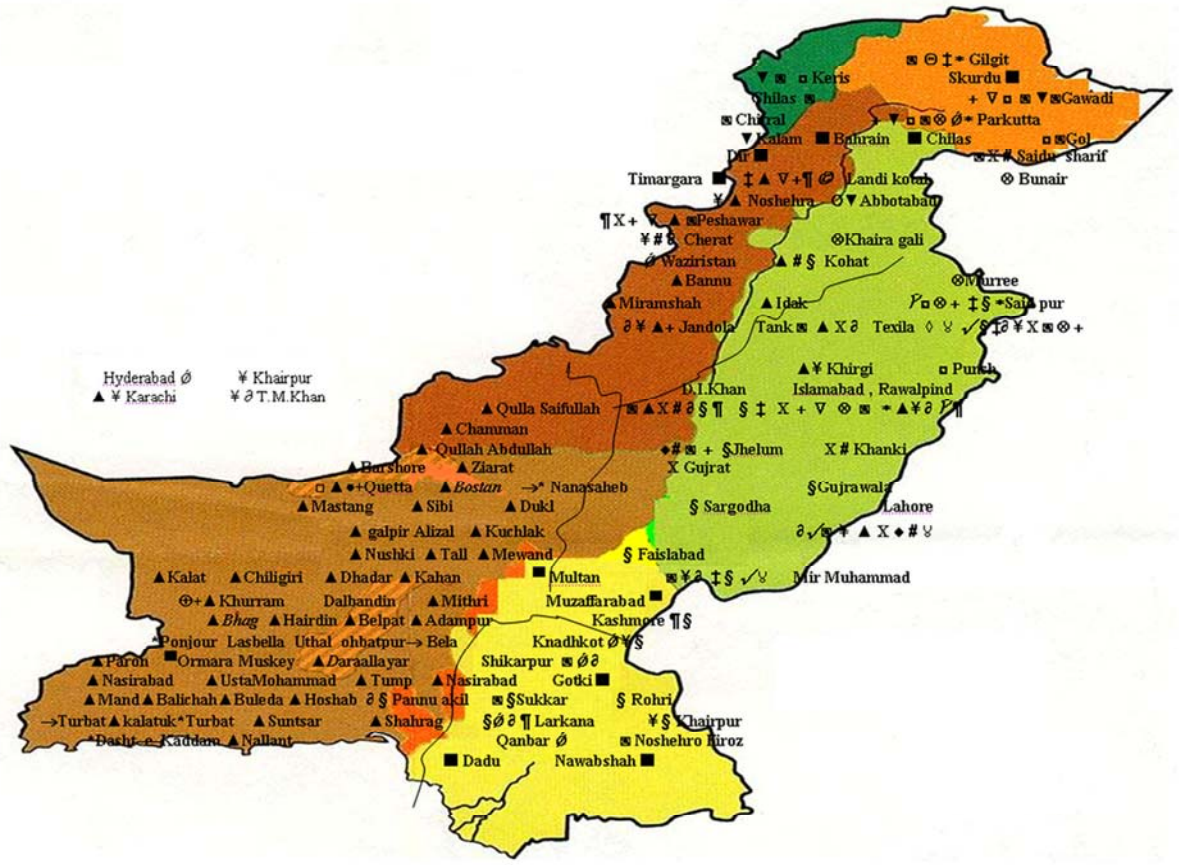
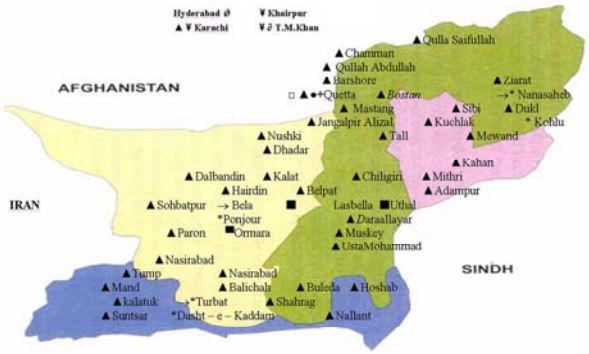
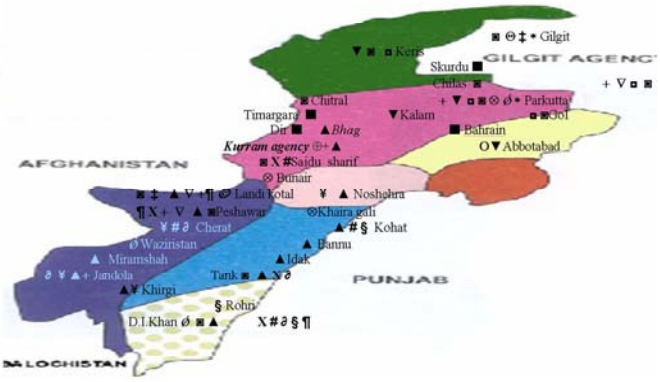


Fig 1. Geographical distribution of Sand flies in Pakistan along with their species
(Legends for different areas are same marked in the maps of provinces)



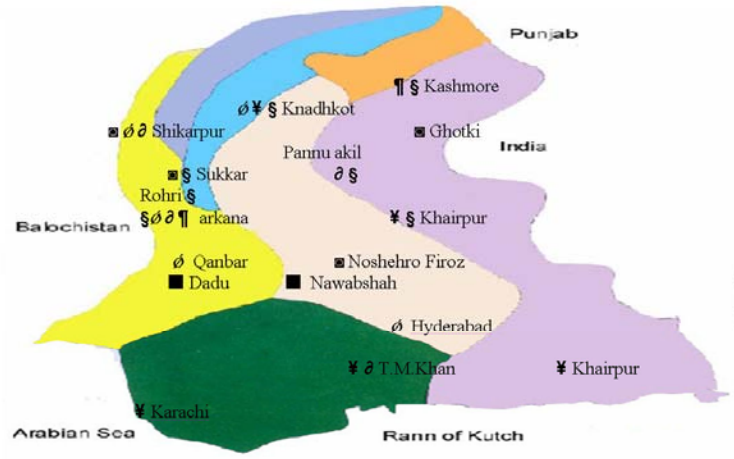
Phlebotomus papatasi ▲; S. sergentomyia danta ♦; P. sergenti +; Species not known ■; S. sp B □; Salehii ◀; S. parw. hodgsoni⊖; bergeroti * ; S. murghabiensis →

Fig 2. Geographical distribution of sand flies in Balochistan (2 ,3)



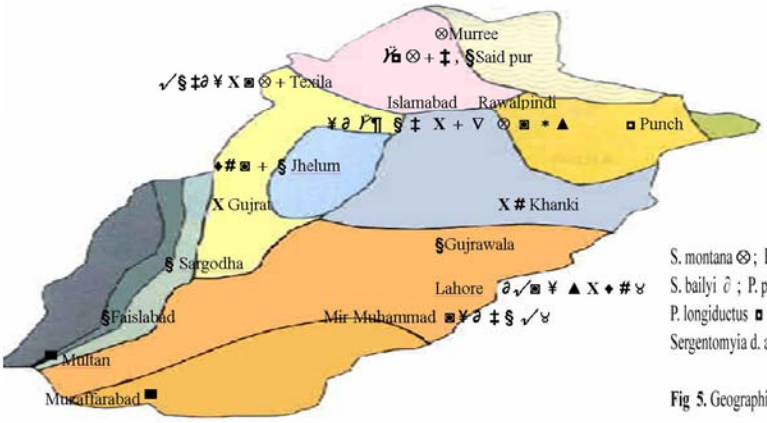
longiductus ◘; S.hospitii: O; P. major, ? ; P. alexandri Ó; P. sergenti ◙; P. keshishiani *; S. baghdadis §; S.baily ĉ; P. ka. burneyi ▼; S. grekovi⊖; S. clydei ¥; S. christophers ♣; P. papatasi ▲ ; S. paw. hodgsoni + ; S. theodori ¶; S. punjabensis # ; S. montana⊗; S. sq. indicia X; S. tiberiadis ©; S. d. arpaklensis▽, S. babu ‡ ; Species not known ■

Fig 3. Geographical distribution of sand flies in NWFP



Phlebotomus papatasi ▲; S. theodori ¶; P. alexandri Ø; S.punjabensis # P. longiductus ◘; S.shorttii ◊; P. sergenti ◙; S.babu ‡; S.bailyi ∂; S.baghdadis §; S.clydei ¥; species not identified ■

Fig 4. Geographical distribution of Sand flies in Sindh



S. montana ⊗; P. argentipes √; P. nuri Ÿ; S. clydei ¥; P. sergenti ◙; S.punjabensis # S. bailyi ∂; P. papatasi ▲; S. sq. indicia X; S.babu ‡; P. keshishiani ¸; S. shorttii ◊ P. longiductus ◘; S. baghdadis §; S. paw. hodgsoni +; S. christophersi •; Sergentomyia d. arpaklensis ▽; Phlebotomus colabaensis ϑ

Fig 5. Geographical distribution of Sand flies in Punjab

locality. Thus the vector sand fly is found in all the four provinces of Pakistan. Maps of the four provinces of Pakistan indicating Cutaneous leishmaniasis and presence of Sand fly vector are included in here (Table 1, Fig 1 – 5). Sand flies belonging to two genera *Phlebotomus* and *Sergentomyia* found in Pakistan are listed.

Complete blood analysis which includes the Hemoglobin estimation, Red cell count, Packed cell volume, Mean cell volume(MCV), Mean cell hemoglobin (MCH), Mean cell hemoglobin concentration (MCHC), Total leukocyte count and Total platelet count was carried out to find out the variation in the blood cell in the peripheral circulation. Hemoglobin estimation, Red cell count, Packed cell volume, Total leukocyte count and Total platelet count were found to be in the normal range and no significant variation was observed. MCV, MCH and MCHC were carried out to find the type of anemia and according to the results the type of anemia was normochromic and normocytic type. No significant variation was observed in n the blood counts Blood counts were normal in majority of the patients. .

Table 2. Geographical distribution of cutaneous leishmaniasis in Pakistan

Province	No of patients	%
Balochistan	22	41.6
NWFP	19	35.8
Sindh	3	5.6
Punjab	3	5.6
Patients migrated to Karachi from Afghanistan	6	11.32
Total	53	-

Table 3. Geographical distribution of cutaneous leishmaniasis in Balochistan

Area	No of patients	% In Balochistan	% In Pakistan
Uthal	2	9.0	3.77
Quetta	8	36.3	15.09
Ormara	1	4.5	1.8
Area not mentioned	5	22.7	9.43
History of visiting Balochistan	6	27.2	11.32
Total	22	-	-

Table 4. Geographical distribution of cutaneous leishmaniasis in NWFP

Area	No of Patients	% in NWFP	% in Pakistan
Kurram agency	2	10.5	3.7
Kohat	2	10.5	3.7
Dera Ismail khan	1	5.2	1.8
Dish deer	1	5.2	1.8
Bunair District	1	5.2	3.7
Peshawer	2	10.5	3.7
Wazeeristan	1	5.2	1.8
Chitral	5	56.3	9.4
Area not mentioned	4	21.0	7.5
Total	19	-	-

Table 5. Geographical distribution of cutaneous leishmaniasis in Punjab

Area	No of Patients	% in Punjab	% in Pakistan
Multan	1	33.3	1.8
Muzaffarabad	1	33.3	1.8
Area not mentioned	1	33.3	1.8
Total	3	-	-

Table 6. Geographical distribution of cutaneous leishmaniasis in Sindh

Area	No of patients	% in Sindh	% in Pakistan
Chakewara	1	11.1	1.8
Karachi	1	11.1	1.8
Mangopir	1	11.1	1.8
Migrated from Afghanistan	6	66.6	11.32
Total	9	-	-

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