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# Prevalence of Malaria infection in Fezzan region (south of Libya)

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**Abstract** This study was carried out to determine the prevalence of malaria infection in Fezzan region (south of Libya). Two hundred and twenty blood samples were collected from 220 patients suspected for malaria infection. All samples were collected from both out-patients and in-patients hospitalized in different wards at Sebha Medical Center in south of Libya (these patients were from different places in south Libya, Sebha, Murzug, Gaat and Um-alaranib) males and females. Results revealed that out of the 220 blood samples collected 43 samples were positive, 35 patients were from Sebha city, 4 patients were from Gaat, 2 patients were from Um-alaranib and 2 were from Murzug (41 Libyans, 1 Sudanese and 1 from Niger), (39 were *Plasmodium falciparum* and 4 were *P. vivax*). Thirty-three (76.74 %) patients were males and 10 (23.26%) were females.

**Keywords:** Malaria; infection in south of Libya**.**

## Introduction:

Malaria remains the most important infection causing morbidity and mortality in the world, and is second only to Mycobacterium tuberculosis as the single most important infectious agent.[1] In 2001, malaria was ranked the 8th highest contributor to the global Disability Adjusted Life Year (DALY) and 2nd in Africa.[2] Malaria is caused by five species of the parasite belonging to the genus *Plasmodium*. Four of them, *P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale* are human malaria species, which spread from one person to another by female mosquitoes of the genus *Anopheles*. *P. falciparum* is the most prevalent in Africa, and is responsible for most deaths from malaria. *P. vivax* has a wider geographic distribution than *P. falciparum* because it can develop in the Anopheles mosquito vector at lower temperatures, and can survive at higher altitudes and in cooler climates.[3-4] Each year, there are probably about 500 million episodes of clinical *Plasmodium falciparum* world-wide.[5] There is substantial evidence that host genetic factors play a major role in determining the outcome of infection with many pathogens. Detailed analysis of malaria has identified twelve genes that affect susceptibility in various human populations.[6] Malaria transmission occurs in all six WHO regions. The burden is heaviest in the WHO African Region, where an estimated 90% of all malaria deaths occur, and in children aged under 5 years, who account for 78% of all deaths.[3] Malaria in endemic-disease areas with explosive epidemics in many parts of Africa is probably caused by many factors, including rapidly spreading resistance to anti malarial drugs, resistance to insecticides, climatic changes and population movement. In the last decade, the prevalence of malaria has been escalating at an alarming rate, especially in Africa and the cases account for approximately 90% of malaria cases in the world. In Africa, some countries in the North have achieved malaria elimination in the last 30 years (Libya in 1973, Tunisia in 1979, and Morocco in 2010) and the majority of the region is largely regarded as malaria free despite a few disputed residual foci in Algeria and Egypt. Elimination, however, poses a major challenge in the majority of countries in Africa owing to the intrinsically high transmission intensity within each country's national borders.[7]

Malaria is rare in the desert regions, but Libya has reported some cases of Malaria outbreaks and fears the invasion of mosquitoes carrying the deadly disease. Climate serves as a protection for parts in Libya. Libya is an extremely arid North African country extending southwards from the Mediterranean into the Sahara.[8] Many Libyan oases, like those in other parts of the Sahara, have a history of occasional outbreaks of malaria involving *Plasmodium vivax* and *P. farcipamm*. "The latter species of malaria parasite has been eradicated from the Mediterranean basin but still predominates in Africa south of the Sahara".[8]

Due to specific immunity of the people,[9] P. vivax is absent from West Africa. It has been eradicated from Europe since 1975[10] and almost eliminated from the Mediterranean basin, though transmission persists in some Middle Eastern and North African countries.

Little information is available about the prevalence of this disease in the south of Libya. This work aims at assessing the prevalence of malaria infection in Fezan region in the south of Libya.

## Material and methods:

**Sample collection:** During the period from November 2012 to February 2015, 220 blood samples were collected from 220 patients suspected of malaria infection. All samples were collected from both out-patients and in-patients hospitalized in different wards (Internal medicine, pediatrics, infectious diseases department and the outpatient clinics OPD) at Sebha Medical Center in south of Libya (these patients were from different places in south Libya- Sebha, Murzug, Gaat and Um-alaranib) males and females.

**Laboratory diagnosis:** All samples were diagnosed in the laboratory using ICT (Immuno-chromotography Test) (BIOGENE: One Step Malaria (pf/pv) Tri- line test, a rapid, one step

Immunochromatographic Assay for the Detection of Malaria (pf/pv) in Human Whole Blood, Code No.: ITP11004- TC40, LOT: 2013121009). Positive results were confirmed by Microscopic diagnosis of *Plasmodium* parasite. Thick and thin smears were prepared from blood drops taken from each individual sample, and immediately stained with Giemsa for 15 minutes. The slides were examined under a light microscope and the results were scored after the observation of 100 fields at 100X magnification.

**Results:**

Out of the 220 blood samples collected from 220 patients suspected of malaria infection 43 samples were positive, 35 patients were from Sebha, 4 patients were from Gaat, 2 patient were from Um-alaranib and 2 were from Murzug (41 Libyans, 1 Sudanese and 1 from Niger) (table1). (39 samples were *Plasmodium falciparum* and 4 were *P. vivax*) (table 2). Thirty-three (76.74 %) patients were males and 10 (23.26%) were females (table 3).

**Table 1: The incidence of Malaria infection according to location**

| City | N0. of positive samples | Percentage |
|---|---|---|
| Sebha | 35 | 81.40% |
| Gaat | 4 | 9.30% |
| Um alaraneb | 2 | 4.65% |
| Murzug | 2 | 4.65% |
| TOTAL | 43 | 100 % |

**Table 2: The incidence of Malaria infection according to Species**

| Species | Number | Percentage |
|---|---|---|
| Plasmodium falciparum | 39 | 90.7% |
| Plasmodium vivax | 4 | 9.3 % |
| Total | 43 | 100 % |

**Table 3: the incidence of Malaria infection according to sex**

| Patient sex | Number | Percentage |
|---|---|---|
| Male | 33 | 76.74 % |
| Female | 10 | 23.26 % |
| Total | 43 | 100 % |

**Table 4: The incidence of Malaria infection according to age.**

| Age range | Percentage |
|---|---|
| 1 ------- 15 | 36.2 % |
| 16 ------ 30 | 27.7 % |
| 31 -------- 45 | 25.5 % |
| 46 -------- 60 | 10.6 % |
| TOTAL | 100 % |

**Discussion:**

Although Libya is safe within the Mediterranean basin and sheltered by the Sahara, it is still at risk for malaria. In Libya, a continuing influx of foreign workers, many from highly malarious parts of the world, ensures the maintenance of a parasite reservoir probably larger than at any time in the past.[8] Malaria was endemic in Libya until 1973 when it was declared by WHO to be a country free of malaria.[12] The situation continued like this until in 1976 when there was an epidemic of febrile illness among petroleum company workers ... blood slides of all cases were positive for *falciparum malaria*, reconfirmed in a referral lab. In 2004, cases of malaria were again discovered in Libya. All cases were microscopically confirmed and were considered imported, except for one case thought to be which was unimported.[11]

This study also revealed that of the 220 blood samples collected from 220 patients suspected of malaria infection, 43 samples were positive 35 patients were from Sebha, 4 patients were from Gaat city, 2 patients were from Um alaranib and 2 were from Murzug (41 Libyans, 1 Sudanese and 1 from Niger), (39 were *Plasmodium falciparum* and 4 were *P. vivax*). Thirty-three (76.74 %) patients were males and 10 (23.26%) were females. All the positive samples were sent to the National Center of Disease Control in Tripoli for confirmation. Also The National Center of Disease Control (the Monitoring and Rapid Response Department) reported that on December 05- 2015 two suspected cases of malaria have been detected in Al-Disa district in Wadi Al-Shati, southwest Libya. The two malaria cases were of a pregnant woman and her son in law. The NCDC reaffirmed that the epidemiological investigation on the two cases proved that they had not traveled abroad, and did not undergo blood transfusion prior to the infection. It suggested that the presence of illegal labors from different African countries might be the cause of the infection.[13] The Fezzan region has a long history of epidemic malaria; with many outbreaks of *P. falcipamm* brought in by carriers in caravans coming from the south and transmitted by local vectors. P. vivax was more prevalent near the coast. Most imported malaria at the present time is of *P. vivax*, though there are some cases of *P. falcipamm*. Moreover, most current parasite carriers quickly disperse from ports (airports); therefore, all parts of the country are equally vulnerable. Records of many recognized vectors exist, but only the desert An. multicolor and An. seqentiisergentii, considered by Macdonald (1982)[14] to be the principal vector species are sufficiently prevalent to maintain malaria transmission in most of Libya.[8] Improved air and land communications increasingly facilitate people movement within, as well as into the country. Up-to-date information on prevalence of anopheline mosquitoes, some of which are the vectors of human malaria parasites in Libya, continues to be of relevance to public health.[8]

Gebreel et al. (1985)[15] reported that indirect fluorescent antibody studies were conducted in order to determine possible risk to Libyan communities of malaria, particularly relapsing forms, as a direct result of the presence of large teams of immigrant labour. Two groups of Indians (100 and 81) indicated past exposure to relapsing malaria, measured by Plasmodium fieldi antigen, in the range (42.0-44.0%), to recent/heavy relapsing infection (12.4-19.0%) and to recent/heavy P. falciparum infection (2.5-4.0%). A non-Asian group (149) indicated 8.7, 3.4 and 2.0%, respectively. A group of native schoolboys (106) indicated a total lack of antibodies to any

form of malaria. The prospect of the re-establishment of malaria transmission following successful control throughout 20 years past is considered on this basis.[15]

Awareness of malaria infection, the symptoms and the treatment need to be raised among the public through educational programs. The risk of fatal malaria practice in Libya is high. It is important to remain vigilant in the diagnosis of new malaria cases to keep them under control.

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