



RESEARCH PAPER

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Prevalence of malarial disease among school going children in Peshawar University and adjacent area, Pakistan

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Abstract

School children of age 09 to 14 years, in Peshawar University Campus were survey for the presence of malarial parasites during March to November, 2006. A questionnaire was designed which include questions regarding to locality, age, sex and the presence or absence of domestic animals and wire screens in the houses of examined students. A total of 795 school children were examined, 4 cases (0.5%) were found positive for malarial parasite. The studied children come to these schools from different parts of Peshawar city, which are divided into three sectors, for analysis purpose on the bases of their localities. The possible reasons for the low prevalence of malaria in the present study are discussed. Statistically analysis showing significant difference between different localities regarding malarial infection is $\chi^2 = 3.5533$, $df = 2$, $\alpha = 0.05$, between different age of the students is $\chi^2 = 0.5251$, $df = 4$, $\alpha = 0.05$, effect of presence of domesticated animals $\chi^2 = 4.060$, $df = 2$, $\alpha = 0.05$ and gender is $\chi^2 = 0.586$, $df = 2$, $\alpha = 0.05$.

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Introduction

Malaria remains the most important disease responsible for causing great suffering and loss of life in the world. The term malaria is used for the acute or chronic infection caused by *Plasmodium parasite*. The common symptoms are high fevers and chills in human beings (Harmening, 1992). The parasite is transmitted from an infected person to the other person, by the bites of certain female *Anapheline* mosquitoes which feed on the red blood cells at night (Sartwell, 1973). The Malarial parasite may also be transmitted artificially by inoculation of the infected blood. Man can be infected experimentally with several species of plasmodium from apes and monkeys (Davey and Wilson, 1971).

Pre historic man in the old world was subjected to malaria. It is probable that the disease originated in Africa, that is, the cradle of the human race. Fossils of mosquitoes were found in geological strata's 30 million years old and there is no evidence that they have spread from the other warmer regions of the globe, long before the dawn of history. The specific name "malaria" was given by the Italian in 1753, which mean mala "bad" and aria "air". It was clearly known that the cause was related to foul air common near marshy areas (Schmidt, 1989).

Malaria was widespread around the shores of the Mediterranean, in southern Europe, across the Arabian Peninsula and in Central, South, and Southeast Asia, China, Korea, and Japan. Malaria probably began to spread into northern Europe in the Dark and Middle ages via France and Britain. The growth in international trade in the sixteenth century contributed to the spread of disease, as international traders introduced new sources of infection. Europeans and West Africans introduced malaria in the New World at the end of 15th century. Thus by 19th century, malaria reached its global limits with over one-half of the world's population at significant risk and 1 in 10 affected expected to die from it. From the mid-19th century onward, with the use of the Cinchona bark, mortality rates fell rapidly decreased (WHO, 1984).

The mid of 20th century, the mortality started dropping, mainly as a result of the spontaneous decline in contact between human and vector populations as a result of improved living conditions as well as by the vector control measures. In the early 1950 malaria almost disappeared from North America and from almost all of Europe but still existed in Africa and Asia. Among the Asian countries it specially prevails in Afghanistan, India, and Pakistan (Schmidt, 1989).

Objectives of the present study, to carried out to know the presence of asymptomatic cases of malaria present in the school going children's of the schools present in the Peshawar University and its adjacent area.

Methods and materials

A study prevalence of malaria in the children of school situated in and nearby areas of University Campus Peshawar and its adjacent area was conducted during the period of March to November, 2006. Age of the studied children range from 09-14 years in which both male and female students were included.

Sample collection

Questionnaires were developed for information about subject students, sex, age, residence, parents Occupation, general health condition, past history of malarial disease, environmental condition of their home, number of family members and presence or absence of domestic animals. Blood smears was collected from the school children and labeled properly.

Preparation of thick and thin blood smear

Thick and thin smear were prepared on the same slide. Two clean slides were taken, one for the blood film and another used for preparation of smear. The finger of the student was cleaned with 70% Alcohol and then pricked at the tip with a sterilized lancet. The first drop of that blood come out from the finger was discarded and the next blood drop was placed on one side of the slide. Fixation of the thin smear was

done with methyl alcohol. Blood films were stained with giemsa's stain with the technique given by Russel *et al.*, (1963). The screening was done under microscope 100X objective with oil immersion. The intensity of malaria parasite per microscopic field was noted according to the Popes (1959) method. All the slides were cross checked by senior microscopist Nasim Khan in H.N.I (Health Net International).

Results

Study was carried out to know the asymptomatic cases of malaria disease in the school children situated in the Peshawar University Campus and adjacent area. For this purpose four schools were surveyed. A total of 795 students were screened for malarial parasite. Out of these only four cases were found positive. The parasites from all the four cases were *P.vivax*. Students were divided into different groups according to locality, age, sex and presence or absence of domestic animals. Students from different localities of Peshawar were admitted in these schools (Table. 1).

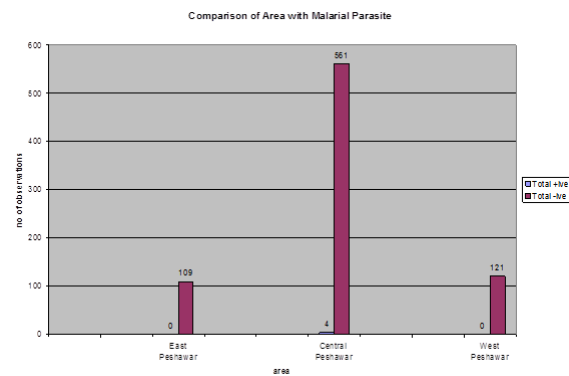


Fig. 1. Comparison of area with Malarial parasite.

Malarial infection in children of different area

A total of 565 students belonging to sector-2 i.e. central Peshawar were screened for malarial parasite, out of which four students were found positive for malarial infection. The infected students were two from Tehkal and one each from Palosi and Achena. Statistically no significant difference could be found between different localities regarding malarial infection $\chi^2 = 3.5533$, $df = 2$, $\alpha = 0.05$ (Fig. 1).

Students age and malarial infections

According to age, students were divided into two groups, the 1st group of students were less or equal to 11 years and the second 12 or more than 12 years. 314 students were from first group while 481 students belong to the 2nd group. Two students from each group were screened positive for malarial parasites. Statistically there was no significant difference present between different ages of the students, in the study. $\chi^2 = 0.5251$, $df = 4$, $\alpha = 0.05$ (Fig. 2).

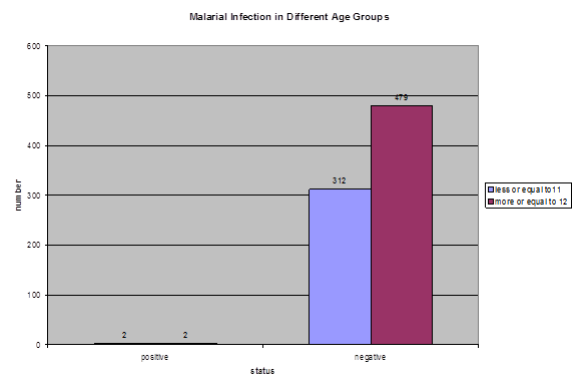


Fig. 2. Malarial infection in different age groups.

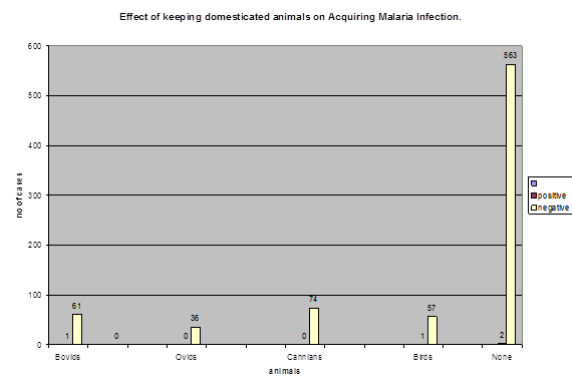


Fig. 3. Effect of keeping domesticated animals on acquiring Malaria infection.

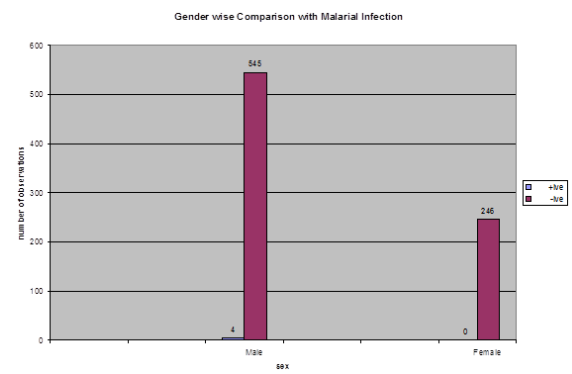


Fig. 4. Gender wise comparison with Malarial Infection.

Effect of keeping domesticated animals on acquiring Malaria infection

According to the presence of domesticated animals, the subject was divided into four groups on the basis of presence of different types of animals, namely Bovids, Ovid's, Canines and birds. One case each from students having bovids and birds as domestic animals were screened positive for malarial parasite and the remaining two cases were reported from those where no domesticated animals were present. Statistically the presence of domesticated animals does not affect the development of malarial infection at least to the extent of this data, (Minitab-Statistical Software). $\chi^2 = 4.060$, $df = 2$, $\alpha = 0.05$ (Fig. 3).

Table 1. Schools from which blood samples were collected.

S. No	Name of the school	Male students	Female students	Total prepared Blood Smears
01	Islamia Collegiate Urdu Medium	304	-	304
02	Islamia Collegiate I.E.R section.	195	-	195
03	University Model School	-	210	210
04	Wisdom House School Lalazar Colony	50	36	86
Total		549	246	795

Gender and malarial infections

A total of 795 students were screened, comprising 549 male and 246 female. From the female students no positive case was observed, while four students were screened positive for malarial parasite among male students once again this result was Statistically insignificant in this study as for as gender is concerned. $\chi^2 = 0.586$, $df = 2$, $\alpha = 0.05$ (Fig. 4).

The diagnostic feature and taxonomic position of Plasmodium species

Taxonomic position of *Plasmodium vivax*:

Phylum Protozoa
 Class Sporozoa
 Family Plasmodiidae (Mensil, 1903)
 Genus *Plasmodium* (Celli and Marchia, 1985)

Species *Plasmodium vivax* (Grassi and Feletti, 1890)

Host Human being
 Location R.B.C
 Locality Central Peshawar

Diagnostic feature of Plasmodium vivax:

In the blood most stages of *P. vivax* are larger than other human plasmodia. The young trophozoites or ring grows rapidly up to $\frac{1}{2}$ of the R.B.C. and later becomes typically amoeboid. The infected R.B.C. gradually enlarges and become decolorized.

A charecterestic stippling in the form of small reddish points appears in the infected R.B.C. and is known as Schuffiners dots. Immature schizonts are irregular in outline with Scattered golden rodlets like malaria pigment in the trophozoites. The R.B.C. is usually enlarged and pale in colour, with only one large piece of chromatin mass. The macrogametocytes has a dark blue staining cytoplasm and small compact nucleus, lies eccentrically.

The micro gametocyte has a grayish blue cytoplasm and large diffuse nucleus, with irregularly distributed pigment granules.

Discussion

The prevalence of malaria in school going children of Peshawar university campus was studied, during 2006. Malarial parasite namely *Plasmodium vivax* was found only in four students out of 795 screened students. This low level of infection was expected due to the following reasons.

- Children were examined while in schools. In case of active malaria, they could not have been able to come to the schools rather confined to bed, where they were expected to be treated for malaria. High parasetemia for malaria without the development of symptoms, though exist but very, very rare. In the present study no such case was diagnosed.

- Low parasetemia may also be prevailing in asymptomatic cases, which are more common as

compared to the above mentioned situation but in that case it is very hard to find all such cases by the ordinary use of microscopy.

- The studied area is generally considered to be free of malaria therefore high incidence is not expected.

The four positive cases found were from relatively less developed areas where sanitation conditions are not up to the mark. The other factor contributing to the incidence of malaria like health conditions and socio-economic status are also poor, therefore, these asymptomatic malaria cases were found. One can expect higher incidence of malaria in general population.

The study was limited by several factors and the major one for the diagnosis of asymptomatic malaria was the microscopic diagnosis. For the low parasitemia more refined technique like PCR is more appropriate and the result will be certainly different from the present result.

Previous work on prevalence of malaria among school children

Pari (1981) worked on the prevalence of malaria among primary school children of Mardan District and reported 16% of malarial infection. The prevalence of malaria observed by Shah (2003) among students of religious schools (Madaris) of Bannu District was 3.61%. In 2003 Karim observed the prevalence of malaria among school children in rural areas of Bannu District, and reported 3.05% of malarial infection.

Rauf (2006) surveyed the hostelized girls of the Peshawar University Campus, where no positive case of malaria found. Mumtaz (2006) worked on prevalence of malaria in primary school children (Girls schools) in University Campus and where no malarial infection found.

Rasheed (2006) surveyed University Campus area to know the species diversity of mosquitoes. In this survey he reported very low population of malarial vector, *Anopheles* which was only 0.18% of total specimens identified.

According to the present survey only 0.5% malarial infection found in the school childrens of the University Campus, it means that the infected childrens comes to the school from different localities of Peshawar.

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