Original Article

MALARIA MORBIDITY IN SINDH AND THE PLASMODIUM SPECIES DISTRIBUTION

Ghulam Murtaza[1], Iqbal Ahmed Memon[2], Abdul Rauf Memon[3], MN Lal[4], Nawaz Ali Kallar[5]

ABSTRACT

Objective: To determine the prevalence of Malarial parasites and species responsible in Sindh Province of Pakistan.

Methodology: It is a cross sectional descriptive study conducted in all Districts of Sindh during January 2002 to December 2006. It was based on surveillance data of Malaria control program Sindh in which blood smears from febrile cases in all age group of male and female were seen by facility microscopist in all districts. Senior microscopist rechecked all positive slides. All slides data of different districts of Sindh was reported on monthly basis to provisional centre at Hyderabad for compiling and analysis.

Results: During 2002-2006, out of 5.84 million slides, those with positive malarial parasites were approx. 0.16 million giving an average blood examination rate (BER) 4.46, slide positivity rate (SPR) 2.94, Falciparum ratio(FR) was 41%, annual parasite incidences (API) was 1.36. More cases were seen in post monsoon season.

Conclusion: All basic indicators of Malaria disease are higher than optimum level. Estimated burden can be much higher, Roll Back Malaria goals are lagging far behind to reduce the disease burden. As such integrated approach of diagnosis, treatment and prevention is required.

KEY WORDS: Malaria, Plasmodium Falciparum, Vivax, Prevalence, Incidence, Roll Back Malaria, Malaria Control.

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1. Dr. Ghulam Murtaza, Associate Professor, Pediatrics,
2. Dr. Iqbal Ahmed Memon, Professor Paed-unit-2, Civil Hospital Karachi,
3. Dr. Abdul Rauf Memon, Associate Professor, Medical Unit-3,
1-3; Dow University of Health Sciences
4. Dr. MN Lal, Pediatrician, Civil Hospital Karachi.
5. Dr. Nawaz Ali Kallar, Director, Malaria Control Programme, Sindh.

Correspondence

Dr. G. Murtaza,
A – 79, Block-9. Dastagir Society,
F.B.Area, Karachi-75950
E-mail: jee_murtaza@yahoo.com

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INTRODUCTION

Malaria is one of the global public health problems and imposes a major burden on health in under developed countries of world. Half of world population is at risk of malaria with an estimated 250 million clinical cases and nearly one million deaths were reported in 2006.[1] Pakistan is among 109 countries with endemic malaria. Currently the country is listed among moderately endemic countries for malaria. It is second most frequently reported diseases from public sector facilities.[2] The malarial parasites plasmodium vivax and plasmodium falciparum have wide distribution. The primary vector species are A. culicifacies and A. stephensi.[3] Malaria also considerably affects

the health of children[4] specially malnourished,[5] leaving sequelae increasing susceptibility to other infections and hampering their development. Even non-fatal cases have severe consequences.

Pregnant women[5] are also vulnerable to malaria, being an important cause of stillbirth, infant mortality and low birth weight. Untreated or treated too late, plasmodium falciparum malaria specially caused by drug resistance strains may lead to dangerous complications such as Cerebral malaria which may result in death of the patients. The disease is associated with considerable social and economic burden,[6] increasing direct cost to government and patients for hospital admissions and outpatient consultation, treatment and cost due to absenteeism from productive work or education. The objectives of this study was to see the morbidity of malaria and plasmodium species distribution through malaria surveillance data (2002-2006) from malaria control program, Sindh, Pakistan.

METHODOLOGY

Malaria control programme in Sindh province of Pakistan has been setup in all districts in government health care facilities. Blood samples were collected from febrile cases or suspected fever due to malaria of all age groups of male and female. These blood samples were prepared with labeling and staining of slides with Giemsa stain and examined by facility microscopist, for the presence of malarial parasite and the species type. Malaria supervisors and senior microscopist monitor the work of health worker, microscopist and reliability of prepared slides and positives cases. Malaria supervisors and senior microscopist supervised and reconfirmed all positive slides and by ramdom selection ten per cent of slides which were labeled negative.

All data was recorded and tabulated according to the months and districts in provincial malaria directorate Hyderabad, which includes blood examination rate (BER =all slides x 100 ÷ population), slide positivity rate (SPR =total positive slides x 100/total slides), species differentiation and falciparum ratio (FR %=total falciparum x 100/total positive slides) and Annual Parasite Incidence (API =total positive cases x 100 /population) are calculated. These reports were shared and retrieved from provisional malaria directorate for the purpose of analysis.

RESULTS

In five years (2002—2006)total slides 5843626 were examined in all districts of Sindh province by Malaria control program in which total positive cases for malarial parasites were 165177, plasmodium vivax was found in 97405 and p.falciparum in 67772 cases as shown in Table-I. On the basis total slides examined and positive cases for malarial parasites, the data analysis for blood examination rate(BER), slide positivity rate (SPR), falciparum ratio (FR%) and Annual Parasite Incidence (API) as shown in Table-II.

In five years, the BER was 4.87, 5.75, 4.22, 3.64 and 3.82 in 2002,2003,2004,2005 and 2006 respectively with an average of 4.46. In this duration slide positivity rate was 3.17, 4.23, 2.67, 2.12 and 2.15 respectively with an average of 2.94. Falciparum ratio was ranged from 33% to 47% with an average of 41%. Annual parasite incidence was being 0.77 to 2.44 with an average of 1.36 during this period. The

Table-I: Five year slides with plasmodium species

Years	*Slides seen*	*Positive cases for malaria parasites*	*Plasmodium vivax*	*Plasmodium falciparum*
2002	731038	23218	12938	10280
2003	902223	38629	20718	17911
2004	1519648	40614	27235	13379
2005	1313794	28107	17463	10644
2006	1376923	34609	19051	15558
Total	5843626	165177	97405	67772

Table-II: Comparison of five years parameters

Years	*Blood examination rate (BER)*	*Slide positivity rate (SPR)*	*Falciparum ratio (FR)*	*Annual parasite incidence (API)*
2002	4.87	3.17	44%	1.54
2003	5.75	4.23	47%	2.44
2004	4.22	2.67	33%	1.12
2005	3.64	2.12	37%	0.77
2006	3.82	2.51	45%	0.96
Avg of five year	4.46	2.94	41%	1.36

month wise data of different districts of Sindh revealed that slide positivity rate, falciparum ratio and parasite incidence were increased in post monsoon season form August—September to December-January.

DISCUSSION

Pakistan is among moderately endemic countries for malaria. There is variation in prevalence from province to province and area to area. The province of Balochistan which constitute five percent of the population of the country but contributes over 30 percent of the reported cases while the Punjab province with about 52 percent of population reports less than 10 percent. In the same report[2] the malaria reported cases from Sindh province were about 30 percent with 25 percent national population.

Under the Malaria control program sindh approximately 5.84 million slides were seen in all districts during 2002 to 2006. Out of these 0.16 million slides were positive for malarial parasites. Blood examination rate (BER) is varied from 3.64 to 4.87 in period of 2002 to 2006 except in 2003 it was higher (5.75). The optimum level[7] of BER is five. Slide positivity rate (SPR) range from 2.12 to 4.23 with an average of 2.94 while annual parasite incidence (API) range from 0.77 to 2.44 in this duration. Optimum level of SPR[7] is 2 and API[7] is being less than 0.5. These both parameter are higher than the optimum level. During 1997, according to Pakistan national malaria control program, the SPR in the country was 2.7 while it was 2.4 for Sindh.[8] During 1999 to 2001 it increased to 3.1.[9] It is reported[10] up to 5.9. SPR and API are important key indicators to monitor the situation of the malaria in any locality, SPR is an indicator of prevalence and API reflects incidence of disease. These parameters are high with the available data where malaria control program is working and microscopist is available in district level public health facility which cover approximately 20%-25% of population while rest of 75-80% of population seeked advice from private health clinics and all types of health care provider. The actual estimate can be four fold more than the present figure.

The falciparum ratio (FR) in this duration was 44%, 47% and 45% in year 2002, 2003 and 2006 respectively while it was 33% and 37% in 2004 and 2005. Optimum level of FR[7,11] is less than 40%, but when the situation was reviewed on districts basis it was more than 40% in many districts. SPR, falciparum ratio and parasite incidence start rising from post monsoon August-September and remain at high level till December-January. Upto early eighties vivax was dominant then after that incidence of falciparum has increased.[9,12] Similarly resistance to choroquine has also increased.[13,14] During study period (2002-2006) although falciparum ratio is high than the optimum level but its percentage is close to an average of 41% as compared to 1999 to 2001 data[9] where it was an average of 57.6. Increased prevalence of falciparum would herald increased severity and complication. The situation is further deteriorated by resistance against chloroqunine and other drugs.

This data shows that malariogenic potential is higher in Sindh and conditions are particularly conducive to higher prevalence of p.falciparum. Pakistan is committed to achieving the Roll Back Malaria (RBM) and millennium development goals[15] (MDGs) of halving the number of reported cases of malaria by the

year 2010. Early diagnosis and appropriate treatment is a key strategy for control of malaria[2]. For diagnosis light microscopy is considered to be the gold standard method and is inexpensive in skilled hands. Rapid diagnostic test[16] using immuno-chromato- graphic capture procedure are simple to perform and interpret while they do not require electricity and special equipment. These non-microscopic methods have some limitations due to their costs and availability in remote areas. Appropriate treatment of malaria recommended by national malaria treatment guidelines which are revised and updated in accordance with recommendation of WHO guidelines for antimalarial treatment as per evidence of efficiency and safety. According to these guideline[2,17] the use of monotherapy should be discouraged. For Vivax infection Chloroquine and primaquine therapy has been advised. Uncomplicated Falciparum malaria should be treated by combination therapy of Sulfadoxine-pyrimethamine and artesunate. Complicated Falciparum treatment should be initiated with injection quinine or artemether and refer to secondary care level hospital is advised. Chloroquine injection or halofantrine use is to be avoided.[2] Prevention of malaria is of vital importance with the vector control involving the selective use of methods based on; personal protection (Protective clothing, repellent, door-windows nets and bed-net) use of insecticides along with environmental measures.

Roll Back Malaria strategy is lagging far behind the international goal of reducing the disease worldwide because of weak health infrastructure, illiteracy, poverty, shortage of doctors in rural areas with lack of skilled staff and poor monitoring resulting in the high morbidity of malaria. In spite of challenges ahead, the Malaria control program can aim to meet the ambitious target, provided the concerned authorities put the required amount of resources and health education for tackling the killer disease.

CONCLUSION

All basic indicators of Malaria are higher than the optimum level in Province of Sindh. Malaria is endemic in whole Sindh province with higher risk during post monsoon season. Global initiative of Roll Back Malaria strategies are needed to be adopted and implemented. An integrated approach of diagnosis, treatment and prevention of malaria with the rationale use of antimalarial drugs by the clinicians and health care providers, both in public and private sector is the urgent task to reduce the morbidity and mortality due to malaria.

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