ORIGINAL ARTICLE

Haematological Changes in Malaria in Balochistan

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ABSTRACT

Patients and methods: It was a descriptive study, carried out in department of Medicine BMC hospital Quetta for a period of 4 months (July to October). All the patients, above 12 year of age who are smear positive for falciparum malaria admitted in BMC hospital Quetta was included in this study. Following patients were excluded from this study: those suffering from non-falciparum malaria; those suffering from congenital hemolytic anemia and bleeding disorders. After inclusion a detailed history and focused clinical examination pertinent investigations were done which included complete blood picture, peripheral smear, platelet count, reticulocyte count, urine, prothrombin time, partial thromboplastin time.
Results: Out of 100 patients 58% was male and 42% were female with the ratio of (1.38:1). Anemia was present in 34 patients (female to male ratio 1.42:1) showing the female predominance. Mean age of anemic patients was 21.75 years. Range of hemoglobin was (4.2-10.5g/dl). Hemoglobin less than 8 was found in 15 patients (44.11%), with male to female ratio (1:2.25). Anemia was predominately hemolytic origin as detected by raised indirect bilirubin and increases in reticulocyte count and this was found in 94% of the total anemic patients. Type of anemia was normocytic normochromic (93%) as shown by peripheral smear and blood indices; however in 7 patient's type was microcytic hypochromic. Thrombocytopenia was found in 44 cases with a female to male ratio (1.44:1), range observed to be 20,000-38,7400/mm3. Platelet count less than 50000/mm was significantly found in 15 patients with a female predominance. Normal leukocyte count was noted in majority of patients (n=68), however leukopenia count less than 5000/mm3 was found in 29 % of patients with female to male ratio (1.9:1). Leukocytosis was uncommon, found in 3 % of patients. Prothrombin time and APTT were raised in 17% of total patients, with range of 12.1sec to38.5 sec and 23.2 to74 sec respectively. PT>32.5 sec and APTT> 64 sec were noted in 4 patients. FDP was done only in those patients who shows raised PT and APTT, and was found to be raised significantly in 4 % of patients with male to female ratio (1:1).
Conclusion: Complete blood Picture is easy to done, informative and helpful to pick the patients with severe malaria, so that early aggressive treatment should be done in time. Moreover, clinicians should be aware to the possible hematological complications of falciparum malaria and be ready to manage the patient with blood transfusion and with fresh frozen plasma.
Key words: Complete blood count, Complications, Falciparum malaria

INTRODUCTION

Humans are hosts to nearly 300 species of parasitic worms and over 70 species of protozoa, some derived from our primate ancestors and some acquired from the animals we have domesticated or come in contact with during our relatively short history on Earth.[1] Plasmodium vivax, Plasmodium malariae and Plasmodium ovale appear to have either coevolved with human mankind, or encountered human species during the most ancient phases of Homo evolution; on the other hand, Plasmodium falciparum has been transmitted to humans by monkeys in a more recent period, probably between the end of the Mesolithic and the beginning of the Neolithic age.[2] Malaria is a serious parasitic disease in the developing world, causing high morbidity and mortality.[3] Malaria is one of the serious diseases threatening human health in Pakistan and contributes to a large proportion of the total malaria deaths in South Asia.[4] The provinces of Baolchistan, Sindh and Khyber Pakhtunkhwa and the Federally Administered Tribal Areas have the highest malaria burden. Districts and agencies bordering Afghanistan and Islamic Republic of Iran account for 37% of the malaria burden with an annual parasite incidence (API) exceeding 4.5/1000 population per year.[5] The high prevalence rate (71.7%:1633/2275) of P. falciparum poses a significant health hazard but 28.2% of P. vivax (642/2275) also may lead to serious complications like cerebral malaria[6]. The complications seen in the P. vivax cases are: thrombocytopenia; hepatic dysfunction; renal damage; and acute respiratory distress syndrome (ARDS)[7]. P. vivax mono-infection can cause cerebral malaria and multi-organ dysfunction[8]. Thrombocytopenia was the most common finding in one study from Pakistan[9]. Low hemoglobin,

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oligo/anuria on admission, hyperbilirubinemia, cerebral malaria, disseminated intravascular coagulation, and high serum creatinine were the main predictors of mortality[10]. Severe anemia, respiratory distress, jaundice, convulsion and bleeding were more apparent among younger age groups of malaria cases compared to older children[11]. Anemia was significantly more prevalent among pregnant woman than non-pregnant women and also more prevalent in pregnant women with malaria than non-pregnant women with malaria[12]. In this nonimmune refugee population, severe complications of falciparum malaria occur quickly and commonly; aggressive chemotherapy is necessary to reduce morbidity and mortality[13].

PATIENTS AND METHODS

It was a descriptive study carried out in department of medicine BMC hospital Quetta for a period of 4 months (July to October). All the patients, above 12 year of age who are smear positive for falciparum malaria admitted in BMC hospital Quetta was included in this study. Following patients were excluded from this study: those suffering from non-falciparum malaria; those suffering from congenital hemolytic anemia and bleeding disorders. After inclusion a detailed history was taken with particular references jaundice in past, signs and symptoms suggestive of anemia and bleeding from any sites. A focused clinical examination was done with emphasis on the following: Pallor, Jaundice, Splenomegaly, Hepatomegaly, Petechiae and Ecchymosis. Pertinent investigations were done which included complete blood picture, Peripheral smear, Platelet count, Reticulocyte Count, Urine DR, Prothrombin Time, Partial thromboplastin time and Fibrinogen Degradation Products in selected patients. A detailed Research Proforma was used to record the clinical data and relevant laboratory investigations. Mean (x) and standard deviation (S.D) for quantitative variables and frequency/ percentages for qualitative variables were applied after data analysis which was done on SPSS version 10.The results obtained from the study were compared with the studies performed either locally or internationally on the same subject.

RESULTS

During the study period of 4 months (form July 2002 to Oct 2002), a total of 100 patients were studied to observe the various hematological changes in falciparum malaria. The different age groups with range (12-60yrs) who were affected by falciparum malaria are given in Table 1. Majority of patients (n=62), in this study were related to age groups below 30 years. Out of 100 patients 58% was male and 42% were female with the ratio of (1.38:1) representing the male predominance. Table 2 summarizes the main clinical symptoms in the patients presenting with malaria. Fever was the most common found in total 92 patients (51 male and 41 female). Jaundice was found in total 17 patients (8 male and 9 female patients). Symptoms suggestive of Anemia were found total 25 patients (10 male and 15 female) with a ratio of (1:1.5}. Epistaxis was found in 9 patients (5 male and 4 female). Table 3 shows the common physical findings. Temperature was the most common found with the total of 82 patients (male 46, females 36). The second most important sign was splenomegaly found in 38 patients (male were 22 and female 16). Anemia was found in 29 patients (male 12 and female 17). Jaundice is also important with the 19 (males 7 and females 12). Table 4 shows the main laboratory abnormalities in both sexes according to their severity and frequency. Anemia was present in 34 patients (female to male ratio 1.42:1) showing the female predominance. Mean age of anemic patients was 21.75 years. Range of hemoglobin was (4.2-10.5g/dl). Hemoglobin less than 8 was found in 15 patients (44.11%), with male to female ratio (1:2.25). Anemia was predominately hemolytic origin as detected by raised indirect bilirubin and increases in reticulocyte count and this was found in 94% of the total anemic patients. Type of anemia was normocytic normochromic (93%) as shown by peripheral smear and blood indices; however in 7 patient's type was microcytic hypochromic. Thrombocytopenia was found in 44 cases with a female to male ratio (1.44:1), range observed to be 20,000-38,7400/mm^3. Platelet count less than 50000/mm was significantly found in 15 patients with a female predominance. Normal leukocyte count was noted in majority of patients (n=68), however leukopenia count less than 5000/mm3 was found in 29% of patients with female to male ratio (1.9:1). Leukocytosis was uncommon, found in 3 % of patients. Prothrombin time and APTT were raised in 17% of total patients, with range of 12.1sec to38.5 sec and 23.2 to74 sec respectively. PT>32.5 sec and APTT>64 sec were noted in 4 patients. FDP, an expensive investigation was done only in those patients who shows raised PT and APTT, and was found to be raised significantly in 4% of patients with male to female ratio (1:1). Hemoglobinuria was found in 5 cases.

Table 1: Age distribution among malarial patients

Age (years)	No.	Male (n=58)	Female (n=42)	Mean	SD
12– 20	35	21	14	16.23	2.27
21– 30	27	14	13	25.44	2.45
31– 40	19	11	8	35.70	2.61
41– 50	22	5	6	43.95	1.68
51= 60	8	7	1	54.99	2.4

Table 2: Symptoms of malaria (n=100)

Symptoms	No.	%
Fever	92	92.0
Classic tertian fever	21	21.0
Chills	67	67.0
Headache	82	82.0
Fatigue/malaise/myalgia	71	71.0
Symptom Suggestive of Anemia	25	25.0
Nausea or vomiting	52	52.0
Change in behavior/ Conscious level	33	33.0
Jaundice	15	15.0
Diarrhea	21	21.0
Cough	18	18.0
Epistaxis	6	6.0
Bleeding from any site	4	4.0

Table 3: Signs of malaria (n=100)

Signs	No.	%
Temperature > 98.6deg;F	82	82.0
Afebrile	21	21.0
Orthostasis or hypotension	16	16.0
Anemia	29	29.0
Jaundice	19	19.0
Petechiae/Ecchymoses/Bruises	4	4.0
Hepatomegaly	25	25.0
Splenomegaly	38	38.0

Table 4: Investigation profile of 100 patients presented with falciparum malaria

Investigation	**Range**	**Mean**	**S.D.**
Hb(gm/dl)	4.2 - 15.5	11.58	2.95
TLC/cumm	2300–18300	6985.5	2428.69
Neutrophils	38 - 84%	64.26%	9.04
Lymphocytes	14 - 56%	32.87%	7.9
Eosinophils	1 - 6%	1.88%	1.16
Monocytes	1 - 6%	1.93%	1.45
PCV (l/l)	.17 - .53	0.403	0.108
MCV (fl)	55 – 98	87.27	8.44
MCHC(gm/dl)	23.5 - 35.41	28	4.11
MCH (pg)	21.2 - 31.5	28.09	2.5
Platelets /cumm	20000–387400	174781.9	99015.77
Reticulocyte count %	5 - 7.5%	2.45%	2
Indirect Bilirubin(mg/dl)	23 - 4.7	1.28	1.32
Prothrombin time (sec)	12.1 - 38.5	15.62	5.22
APTT (sec)	23.2 - 74	40.72	9.21

DISCUSSION

Malaria is quite common disease, incidence of which has been rising for the past few years; this has been reflected by the increase in no of patient s admitted with malarial fever and its various complications. This finding is consistent with a statement made in study previously done at Quetta.[9] Cases were seen mainly in month of summer, while in winter due to extreme cold, cases reported quite infrequently[14]. Males were affected more than female, 62% were below the age of 30 years and this was consistent with other studies in this region.[15] These findings are similar to the finding in endemic area where disease is more common in young and pregnant who are non-immune, and whose immunity increases due to repeated exposure.[16] The average duration of illness was 7.65days.Complications and sever malaria is more common in those patient who present late in the hospital. The average hospital stay was 5.25 days as is consistent with other studies conducted in Pakistan.[17] Majority of the patients either belongs to Quetta or Afghanistan indicating the high presence of malaria in Afghan refugees[18]. The clinical presentation is quite similar to the study done in other countries,however a number of pts present atypically.

The major presenting complaints on admissions were fever (92%) headache (82%) symptoms suggestive of anemia (25%), jaundice (17%) while Epistaxis and bleeding signs are rare. The major sign were fever (82%), splenomegaly (38) and anemia (29%) and hepatomegaly. These finding correlated with various studies conducted in past in different countries in past[19]. However, patient presents without fever and chill, with diarrhea, headache without fever and cough, in 18 no of patients no fever was documented. These finding's strongly supports the atypical presentation given in studies[20]. Out of 100 patients 58 males and 42 females, the anemia (n=34) was significantly more prevalent among females (F/M ratio=1.42/1) which is in contrast with other studies[21]. Reasons may be late admission due to cultural ignorance, poverty, repeated and multiple pregnancies. Anemia was found in 34% of patients, this is in contrast to the study which shows anemia 18%[22]. Reasons may be that patients who were selected were admitted patients, having severe malaria and presents late due to multi reasons[23].

Type of anemia was predominantly normocytic normochromic, however in 7% of patients (F/M ratio=2.5/1), type was microcytic hypochromic. Reasons may be iron deficiency secondary to multiple pregnancy, repeated malaria and worm infestation and bleeding which may be due to malaria itself[24]. 44.11% of total anemic patients received blood transfusion, indicating an important aspect in the management of malaria and also shows the severity and rapidity of development of anemia[25]. Our findings are correlated with of later study and which shows thrombocytopenia in 44% of patients. Leukopenia is not relatively uncommon occur in 25% of patients while Leukocytosis is not common and occur in 7% of patient which is consistent with other national studies.[26] Pancytopenia though occurs in 7% but is important in evaluation of a febrile patient considering the possibility of malaria in mind. Though thrombocytopenia less than 5,0000/mm3 occurs in 15% and PT and APTT was deranged in 17 patients incidence of clinical DIC was only in 4 patients and this finding was well correlated with the international study[27].

CONCLUSION

We concluded that CPC is an important investigation. It is easy to done, informative and helpful to pick the patients with severe malaria, so that early aggressive treatment should be done in time. Moreover, clinicians should be aware to the possible hematological complications of falciparum malaria and be ready to manage the patient with blood transfusion and with fresh frozen plasma. This probably would be the single most effective measure to reduce the high rate of mortality due to malaria in developing countries like Pakistan

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