A Prospective Study Of The Prevalence Of Dengue, Malaria And Mix Infections Along With The Correlation Of Hematological Parameters

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Abstracts: Background & Objective: A prospective comparative study was done to see the prevalence of Dengue, Malaria and mix infections in the patients attending in tertiary care hospital during a period of March 2013- February 2014. Study also included the pattern of changing Hematological parameters during infections. Methodology: Patients suffering from fever of more than 4-5 days were investigated for Dengue, Malaria and concurrent infections. Peripheral blood smear examination was done for Malaria while Rapid card and IgM & IgG ELISA were done for Dengue. Hematological investigations- CBC, Platelet count was done by sysmex auto analyzer. Results: Total 3650 samples of suspected cases tested for Dengue and Malaria. Out of 3650 samples 934 were positive of Dengue, Malaria and mix infections. Out of 934, 105 were Malaria, 816 Dengue and 13 cases of mix infections were found. In Malaria positive cases Hematological parameters showed anaemia, thrombocytopenia and Eosinophilia while in Dengue cases thrombocytopenia was observed. Conclusion: Prevalence of Dengue is more than Malaria in Moradabad during the study period. Hematological parameters of the cases Dengue, Malaria now are changing their patterns that are a serious matter of concerned. Even mix infections are also building up in the society that's why Hematological parameters must be monitored regularly. [Mishra A NJIRM 2015; 6(4):27-30]

Key Words: Dengue, Hematological parameters, Malaria, Mix Infections.

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Introduction: Dengue and Malaria are two common vector-borne diseases prevalent in India. Dengue is a viral disease transmitted by *Aedes aegypti* and female *Anopheles* mosquito is the vector for Malaria which is a parasitic disease. In India both the vectors co-exist, simultaneously occurrence of Malaria and Dengue in an individual cannot be ruled out[1,2]. Therefore a prospective study was conducted to see the prevalence of Dengue and Malaria and to compare the predominance & severity of Hematological changes in Dengue and Malaria mono infections and mix infections.

Material and Methods: A prospective study was conducted in the Department of Microbiology, at Teerthanker Mahaveer Medical College Hospital and Research Centre, Moradabad U.P, from March 2013 to February 2014 after taking prior permission of the ethical committee. Patients those were suffering from fever of more than 4-5 days were investigated for Dengue and Malaria. After diagnosis, patients were grouped into Dengue mono-infection (Group A) and Malaria mono-infection (Group B), Dengue and Malaria mix infection (Group C)[3].

Pre-collected blood samples were tested for Dengue & Malaria. For Malaria diagnosis, thick and thin peripheral blood smear were stained by Leishman's stain and examined different stages of Malaria parasites under oil immersion lens (100X)[4]. For Dengue cases outdoor patients were diagnosed by Dengue Day-1 Rapid card test by (J.mitrapvtltd.) including NS1 Antigen, IgM and IgG antibodies, while Indoor patients were diagnosed by Dengue IgM and IgG ELISA test. [6] Hematological investigations were done by sysmex auto analyzer.

All the readings were tabulated & subjected to statistical analysis using mean ± standard deviation of data evaluated with 'Independent sample t test' by using IBM SPSS Statistics v 21.0 to undertake the statistical analysis. We were considered the tests at 5% level of significance i.e. in case $p < 0.05$, we were considered the result to be significant.

Results: Total 3650 clinically suspected cases of Dengue and Malaria were studied during the study period. Total 934 positive cases were reported, out of 934 cases, 816 (87.36%) cases of Dengue mono infection, 105 (11.24%) cases were Malaria mono infection and 13 (1.69%) cases of mix infection were reported. In the 934 positive cases, 607 (65%) were males and 327 (35%) females and the mean

of the population was 29.7±13.8 years. Out of 105 Malaria mono infections, 82.85% was *P.vivax* infection. However, *P.falciparum* mixed (*P.falciparum* and *P.vivax*) was only 6.66%.

Comparison of Dengue and Malaria along with the Hematological parameters from the table-1 [p-value A 'X' B] Hemoglobin (p= 0.000), RBC count (p= 0.000) and Lymphocyte (p= 0.003) were significantly lower under Malaria than Dengue (p< 0.05). It showed that Hemoglobin, RBC and lymphocyte counts decreased more in Malaria rather than Dengue. Platelet count (p= 0.000), TLC (p= 0.000), Neutrophil (p= 0.010) and Eosinophil count (p= 0.000) were significantly lower under Dengue than under Malaria (p < 0.05). It showed that Platelet count, TLC, Neutrophil and Eosinophil decreased more in Dengue than Malaria.

Table 1: Hematological Parameters

Hematological Parameters	Dengue (A)	Malaria (B)	Mix (C)	p-value A 'X'B	p-value B 'X'C	p-value A 'X'C
Haemoglobin gm/dl	13.1844±2.26710	10.3164±3.18398	13.4364±2.48527	**.0001**	**.003**	.716
RBC (No./mm^3)	4.7138±0.84013	3.5516±1.02771	4.36±0.73819	**.0001**	**.032**	.211
TLC (No./mm^3)	4949.288±2994.7927	8064.876±4431.2967	6344.00±2537.85649	**.0001**	.236	.144
Platelet Count (No. x L/mm^3)	.6774±0.48582	.9270±0.88935	.4445±0.37925	**.0001**	.082	.115
Neutrophil (No./mm^3)	60.6906±15.05121	65.7692±14.36758	64.2727±18.56928	**.010**	.761	.437
Lymphocyte (No./mm^3)	30.7459±13.56	25.5077±12.64308	24.8182±10.87951	**.003**	.865	.151
Monocyte (No./mm^3)	6.2578±3.88770	5.3077±5.02781	5.0000±3.37639	.072	.846	.287
Eosinophil (No./mm^3)	2.1621±1.8224	3.2923±4.38650	5.9091±8.47885	**.000**	.122	**.000**
Basophil (No./mm^3)	0.0018±.04299	0.0156±.12500	0.0000±.0000	.070	.681	.887

We were considered the tests at 5% level of significance i.e. in the above table p < 0.05, we were considered the result to be significant, hence in Table 1- p-value A X B of Hemoglobin, RBC, TLC, Platelet Neutrophil, Lymphocyte and Eosinophil were significant while Monocyte and Basophil were insignificant.

From the table-1 [p-value B 'X' C], we observed that p-value of Hemoglobin and RBC were significant rest of all hematological parameters were insignificant. Hemoglobin, RBC count significantly lower in Malaria mono-infection than mix infection (p < 0.05) which clearly concluded that in mix infection, the clinical features of Dengue fever are predominant over Malaria.

From the table-1 [p-value A 'X' C], we observed that p-value of Eosinophil were significant rest of all parameters were insignificant. In comparison to Dengue mono-infection to mix infection, low level of Eosinophil was observed in Dengue rather than Malaria.

Discussion: In the present study, Dengue was present in the majority of the cases of high fever 87.36% while in other 48.75% were observed in the Saudi Arabia[5]. The present study also showed that the incidence of mix Dengue and Malaria infection was 12.38%, while other studies were reported 5.8% in Odisha[3].

In the present study, mean of Hemoglobin level was 10.31 ± 3.18 gm/dl in the Malaria cases, 13.18 ± 2.26 gm/dl in Dengue cases and 13.43 ± 2.48 gm/dl in mix infection were observed. While in the study of Fotedar P, Rairikar SS et al, 2014, mean of the Hemoglobin count 10.23 ± 3.01 was observed in the Malaria cases[6]. According to Mohammad MobassirHussain et al, 2013 mean of Hemoglobin in P.vivaxwas 10.56 ± 0.3 gm/dl observed[7].In the study of M.K.Mahopatra et al, 2012, Hemoglobin level was 6.8 ± 1.2 gm/dl in the Malaria cases, 10.8 ± 2.9 gm/dl in Dengue cases and 10.7 ± 1 gm/dl in mix infection were observed[3], while the study of UM Jadhav et al, (2004) mean of Hemoglobin count in Malaria cases was 12.2 ±7.1/µl observed[8].

In the present study mean of TLC was 8064.87 ± 4431.29 No./mm^3 in Malaria , 4949.28 ± 2994.79 No./mm^3 in Dengue cases and 6344.00 ± 2537.85 No./mm^3 in mix infection were observed. While in other studies, 6278 ± 6323 leukocytes/mm^3 was observed by Fabio A Leal-Santo et al, (2013) in Malaria cases[9].In the study of M.K. Mahopatra et al[3], (2012) mean of leukocyte count was 6109.6 ± 765.8 in Malaria, 4512.8 ± 920.9 in Dengue and 4244.4 ± 728.1 were observed in mix infection[3], and in the study of Muhammad Ayyub et al, 2006; total leukocyte count in 48.72% Dengue cases were below (4,000 No./mm^3) [5].

In the present study mean of the Neutrophil count 60.69 ± 15.05 were in Dengue, 65.76 ± 14.36 were in Malaria and 64.27 ± 18.56 in mix infection were observed. While in the study of Dr. Shamim Akhtar et al, 2012 mean of the Neutrophil count 68.9% were observed in the *P.vivax* infection[10]. According to Fotedar P, Rairikar SS et al, 2014, mean of the Neutrophil count 57.48 ± 14.64 was observed in the Malaria cases[6].

In the present study, mean of platelet count in the Malaria cases 0.92 ± 0.88 No. x $10^5/mm^3$, in Dengue mono-infection cases 0.067 ± 0.48 No. x $10^5/mm^3$ and in mix infection was 0.4445 ± 0.37925 No. x $10^5/mm^3$.While in other study mean of platelet count 0.76 L/mm^3 were observed by Fabio in Malaria cases[9]. In the study of Fotedar P, Rairikar SS et al, 2014; of the 119 cases studied maximum (82) patient showed platelet count between (50,001–150000)[6].In the study of M.K. Mahopatra et al, (2012) platelet count was 145000.7 ± 908.6 No./mm^3 in Malaria , 48000.6 ± 9235.8 No./mm^3 in Dengue cases and 58230.7 ± 5893.0 No./mm^3 in mix infection were observed[3].

Conclusion: Dengue and Malaria is the serious, vector borne diseases causing major health problem in India. The present study showed that the prevalence of Malaria and Dengue is not uncommon in the area, where both the vectors exist. In mix infection, the clinical features of Dengue fever are predominant over Malaria and severe Malaria is uncommon among the patients with mix infection.

Hematological parameters are changing their patterns that are a serious matter of concerned. Even mix infections are also building up in the society that's why Hematological parameters should be monitored regularly.

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