Original Article

To Determine the Frequency of Pancytopenia in Children Presenting with Malaria

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ABSTRACT

Objective: To determine the Frequency of Pancytopenia in children presenting with Malaria
Study Design: Descriptive / cross sectional study.
Place and Duration of Study: This study was conducted at the Pediatrics Department, DHQ Teaching Hospital, Gomal Medical College, D. I Khan from October, 2015 to April, 2016.
Materials and Methods: Before carrying out the research permission was obtained from ethical committee of hospital. Questionnaire was used for collection of data. All children < 18 yrs with malaria were registered in research from OPD. MP and Special smear tests were done for diagnosis of malaria in admitted children with fever. Informed written consent was taken from parents. All the above-mentioned information were recorded in a pre-designed proforma. Strictly exclusion criteria was followed to control confounders and bias in the study results.All the laboratory investigations were done under supervision of single expert pathologist having minimum of five years of experience.
Sample size was 232 while technique used was Nonprobability consecutive sampling.
Results: In this study males were 60.34% and females were 39.66%. The female to male proportion was 1:1.6.8.51 years+4.23SDwas the average age of the patient. The frequency of pancytopenia among children with malaria was found in 85(36.64%) patients.
Conclusion: Pancytopenia is a common problem in clinical practice. The incidence is high in malaria patients. & requires prompt action when patients present with malaria so that one can be managed to decreaseillness and prolong survival.
Key Words: Pancytopenia, Aplastic anemia, Bone Marrow, Malaria.

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INTRODUCTION

Pancytopenia refers to a reduction below normal values of all 3 peripheral blood lineages; leukocytes, platelets and erythrocytes. It can be inherited or acquired. It is caused by decrease in or damage to hematopoietic stem cells and their microenvironment, resulting in hypoplastic or aplastic bone marrow, maturation defects or differentiation defects such as myelodysplasia. Drugs, chemicals, toxins, infections (malaria) and radiations are important causes of pancytopenia[1]. Weakness, fatigue and pallor result from anemia; petechiae, purpura and bleeding occur due to thrombocytopenia and infections occur due to leucopenia[2].

Many studies have shown its incidence to range from 2 to 14 cases/million/year. Greater frequency is found in Asian countries[3].

Malaria is caused by Plasmodium of genus (falciparum, vivax, ovale, malariae and knowlesi) & transmitted to human by female anopheles mosquito. Malaria affects about 300-500 million people and causes more than a million deaths per year worldwide[4]. The prevalence of plasmodium in Pakistan among treatment seeking patients with suspected malaria was 6.6% in Pakistan and 10.8% in KPK[5]. In 2010 in Pakistan ,95 million people out of 161 million people roughly 60% live in malaria endemic regions. In 2006, Malaria Disease Surveillance Programin Pakistan, registered 3.5 million slides and 127825 confirmed cases of malaria with an

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annual parasite incidence (API) of 0.8 case per 100 population[6].

Pancytopenia is a complication of malaria. A study from India observed pancytopenia in 4% of patients with malaria[7], while a study from K.P.K observed it in 9% of patients with malaria[8]. One study from Balochistan showed that main cause of pancytopenia was malaria (29.44%)[9].

This study is not performed previously in Paediatrics department, Gomal medical college, Dera Ismail Khan. Malaria is endemic and epidemic in Dera Ismail Khan and surroundings of Punjab and Balochistan (Zhob, Bakkar). This research will support prompt identification and early treatment of reversible complication (pancytopenia) of malaria.

MATERIALS AND METHODS

The descriptive cross-sectional study was conducted at the Pediatrics Department DHQ Teaching Hospital, Gomal Medical College, D. I Khan, over a period of 6 months.

Inclusion Criteria:

- Patients from the age of 6 months to 18 years.
- Children having fever with rigors and chills showing positive test for malaria.

Exclusion Criteria:

- Children with known hematological abnormalities.
- Children suffering from leukemia.
- Children with pancytopenia of other etiologies.

Data Collection Procedure: Before beginning of the research, approval was taken from ethical committee of hospital. Data was entered on questionnaire. Patients< 18 yrs with malaria were registered in research from OPD. Investigations like special smear & MP were done for patients presenting with fever. From parents Informed consent in written form was taken. In a pre-designed proforma all the above-mentioned information was entered. To control bias &confounders in the research's results, exclusion criteria was obeyed exactly. A single expert pathologist having experience ≥ 5yrscarried out all investigations.

Data Analysis: Data was analyzed by using SPSS version 10. Quantitative variables were described in form of means ± standard deviation. Data was explained in form of percentages &frequency. Pancytopenia was stratified among age gender to see effect modification. Post stratification was done through Chi Square test. Keeping P value less than 0.05 as significant. Data was presented as tables, diagrams and charts.

RESULTS

This study included a total of 232 malarial patients. Females were 92 (39.66%) & males were 140 (60.34%).Female to Male proportion was 1:1.60.

8.51 yrs ±4.23 SD was recorded as average patient's age with range 6 months- 18 yrs. Based on age, patients were classified in 4 groups, the common stone was 6-10 yrs. In the group of age ≤ 5 yrs, 64(27.6%) children were recorded, the group of 6-10 yrs contained 99(42.7%) children, 55(23.7%) children were 11-15 yrs old and 14(6%) children were of age more than 15 years. (Table 1)

Table No. 1: Age wise distribution of the patients

Age in Years	Frequency	Percent	Mean ± SD
<= 5	64	27.6	8.51 Years ±4.23 SD
6 – 10	99	42.7	
11 – 15	55	23.7	
16+	14	6.0	
Total	232	100.0	

Table No. 2. Age wise distribution of pancytopenia

		Pancytopenia			p-value
		Yes	No	Total	
age (in years)	<= 5	22	42	64	0.008
		34.4%	65.6%	100.0%	
	6 - 10	47	52	99	
		47.5%	52.5%	100.0%	
	11 - 15	11	44	55	
		20.0%	80.0%	100.0%	
	16+	5	9	14	
		35.7%	64.3%	100.0%	
Total		85	147	232	
		36.6%	63.4%	100.0%	

Table No. 3. Gender wise distribution of pancytopenia

		Pancytopenia			p-value
		Yes	No	Total	
Gender	Male	53	87	140	0.369
		37.9%	62.1%	100.0%	
	Female	32	60	92	
		34.8%	65.2%	100.0%	
Total		85	147	232	
		36.6%	63.4%	100.0%	

Out of all the patients,85(36.64%) children were having pancytopenia &in 147(63.36%) children there was no pancytopenia.

It is clear from this research that pancytopenia is common amongst younger children. Twenty-two (34.4%) patients have pancytopenia with age ≤ 5 years, age group 6-10 years contains 47.5% patients with pancytopenia and 35.7% patients having more than fifteen yrs of age have pancytopenia. Table 2

Gender wise aplastic anemia in children presenting with pancytopenia reveals that sex has no role over them. Pancytopenia was observed in 37.9% male and 34.8% female patients with malaria. Table 3

DISCUSSION

In Tropics Malaria is one of the common health issues. In Pakistan Vivax & Falciparum malarias are the most important Public health issues. According to National Malaria Control Program Pakistan, falciparum malaria is more common & accounts 42% of all malaria patients which shows that there has been a 6-foldrise in falciparum malariain the previous 10 yrs[10].

Malaria caused by falciparum is the most fatal and severe disease if not treated properly. If remained undiagnosed or not diagnosed on time it will progress to severe malaria with complications. After diagnosis, maximum level of medical care with the provision of adequate, harmless doses of proper anti-malarial is required for treatment of severe F. Malaria with complications[11].

Malaria caused by P.vivax is the commonest malaria & one of the major reason of illness in regions like South &Central America,Asia& Oceania,.[12]However, P.Vivax malaria is not so severe & also have low blood parasite level. Parasitized RBCshave no knobs, so there is little chance ofobstruction of microvasculature& as a resultmajor organs like brain, lungs,kidneysetc. develop complications infrequently[13].

Pancytopenia is common hematological issue and whenever there iscomplain of persistent fever or bleeding or pallor then pancytopenia should be suspected clinically. For the determination of the cause of the Pancytopenia bone marrow examination is advised. It comparatively harmless invasive technique with little chance of bleeding even in the existence of low platelet counts. [11]

This research included children of all ages, ranging from 2 month to 15 yrs. Comparable ranges of ages were observed in local [3] and foreign [7, 13,] researches.

Since our study was not confined to gender so both female & male children were studied with pancytopenia. Female were 39.66%, Males were 60.34% and the female: male was 1:1.6. In other research work done locally in Peshawar [3,4,14] Jamshoro[15], Abbottabad.[1] & abroad in Nepal[7], India[16] and Yemen.[17] male dominance was noted

Rare causes of pancytopenia in our study are also uncommon in other studies including multiple myeloma and normal bone-marrow,[7] neuroblastoma,[7, 15] Myelodysplastic syndrome[3,7] malaria and abnormal mononuclear cell infiltrate. [3]

Malaria corresponded to the fourth and second most frequent cause in pancytopenic patients respectively.[18-20] Malaria due to Plasmodium falciparum has been implicated as a cause of pancytopenia. The high incidence of malaria is observed in low income group with poor sanitation facilities. It is critical to eliminate places around home where mosquitoes breed / hide& spraying insecticides on home's premises to kill adult mosquitoes those come inside. Taking anti-malarial medications for malaria prophylaxis is good strategy to prevent malaria.[21,22]

The likely symptoms & signs of severe P. vivax malaria includes cerebral malaria, pancytopenia severe anaemia, jaundice, acute renal failure, splenic rupture & acute respiratory distress syndrome. acute pulmonary oedema &Severe anaemia are also common. It is notable that there are no distinct signs & symptoms/management of severe malaria caused by P. vivax, but, quick and efficient management should be like the complicated & severe malaria caused by P. falciparum according to the WHO.[16]

CONCLUSION

Clinically and hematologically Pancytopenia is a very crucial health issue. Examination of Bone-marrow is a well-known investigation in assessment of pancytopenia. Greater prevalence of Pancytopenia has been noted in younger age group. In order to reduce morbidity and prolong survival due to pancytopenia it is crucial to understand various causes of pancytopenia, as some of the causes are completely curable while others can be treated symptomatically.

Author's Contribution:

Concept & Design of Study:	Sami ul Haq
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REFERENCES

1. Jeffrey D. Hord. The acquired pancytopenia. In: Nelson text book of pediatrics 19th ed. Philadelphia: Sunders Elsevier;2011.p.1691-2.
2. Charles A, Linker. Aplastic anemia. In: Current Medical Diagnosis and Treatment. Mc Graw Hill Lange;2008.p.437-8.
3. Bakhshi S. Aplastic anemia [Internet]. [cited 2012 May 15]. Available from: http://emedicine. medscape.com/article/198759- overview#aw2aab6 b2b2aa
4. John CC, Krause PJ. Malaria. In: Nelson text book of pediatrics 19th ed. Philadelphia: Sunders Elsevier;2011.p.1198-207.

5. KhattaK. Prevalence and distribution of human Plasmodium infection in Pakistan. Malaria J 2013;12:297.
6. Kakar Q, Khan MA, Bile KM. Malaria control in Pakistan: new tools at hand but challenging epidemiological realities. East Mediterr Health J. 2010;16 (Suppl): S54-S60.
7. Amieleena C, Vipan C. Clinico-aetiological profile of pancytopenia in pediatric practice. JIACM 2012;13(4):282-5.
8. Khan K, haider I. Peripheral blood picture of malaria in patients coming to a tertiary care hospital, Peshawar. Kmu J 2013;5(2):91-4
9. Tareen SM, Tariq MM, Bajwa MA, Awan MA, Ahmad Z, Javed Y. Study of pancytopenia in Balochistan, Pakistan. Gomal J Med Sci 2012; 10:248-51.
10. Memon IA, Kanth N, Murtaza G. Chloro¬quine resistant malaria in children. J Pak Med Assoc 1998;48(4):98-100.
11. Pukrittayakamee S, Imwong M, Looaree¬suwan S, White NJ. Therapeutic responses to antibacterial drugs in vivax malaria. Acta Trop 2004;89(3): 351-6.
12. Jadhav UM, Singhvi R, Shah R. Prognostic Implications of White Cell Differential Count and White Cell Morphology in Malaria. J Post Med 2003;49(3):218-21
13. White NJ. Determinants of relapse periodicity in Plasmodium vivax malaria Malar J 2011;10:297.
14. Memon S, Shaikh S, Nizamani MAA. Etiological spectrum of pancytopenia based on bone-marrow examination in children. J College of Physicians and Surgeons Pak 2008;18 (3):163-7.
15. Khan MN, Ayyub M, Nawaz KH, Naqi N. Pancytopenia: Clinicopathological study of 30 cases at military hospital Rawalpindi. Pak J Pathol 2001;12 (1):37–41.
16. De La Rossa R, Pineda JA, Delgado J. Influence of highly active antiretroviral therapy on outcome of subclinical visceral leshmaniasis in human immunodeficiency virus infected patients. Clin Infect Dis 2001;32:633-5.
17. Hamid GA, Shukry SAR. Patterns of panytopenia in Yemen. Turk J Hematol 2008;25:71-4.
18. Osama I, Haider ZB, Anwer F, Nisar H. Patterns of pancytopenia patients in a general medical ward and a proposed diagnostic approach. J Ayub Med Coll Abbottabad 2004;16:8-13.
19. Shishir KB, Jagdish C, Shashi N, Sunita S, Varinder S, Ashok KD. Pancytopenia In children:etiological profile. J Trop Pediatr 2005; 51:236-9.
20. RERFe (Radiation Effects Research Foundation). Introduction to the Radiation Effects Research Foundation. 2007:[cited on: jan 12, 2016]. Available at: www.rerf.or.jp/shared/ introd/ intro RERFe.
21. Arya TV, Prasad RN. Fatal pancytopenia in falciparum malaria. J Assoc Physicians Ind 1989; 37:469-70.
22. Hemmer R. Airport malaria in Luxembourg. Euro Surveillance Weekly 1999;3:790-819.