ORIGINAL ARTICLE

INCIDENCE OF VISCERAL LEISHMANIASIS AMONG PANCYTOPENIC PAEDIATRIC PATIENTS

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Background: Visceral leishmaniasis (VL) is a parasitic infection caused by *Leishmania donovani*. The sting of a sand-fly transmits Leishmania to humans. VL can lead to morbidity and even death if there is a delay in diagnosis. The objective of this study was to find out patients with visceral leishmaniasis presenting as pancytopenia in paediatric population. **Methods:** This single centre-cross sectional study was conducted for eight months in Paediatric Department, Ayub Medical Complex Hospital, Abbottabad. After taking informed written consent from all patients fulfilling the inclusion criteria, history was taken, detailed clinical examination done and bone marrow biopsy performed to check the Leishmania Donovani (LD) in the marrow sample. The findings were recorded and analysed. **Results:** Among 159 children presenting with pancytopenia, VL was confirmed in bone marrow biopsy report of 21 (13.2%) children, 100 children (62.9%) were males and 59 (37.1%) were females with the mean age of 5.58±3.44 years. **Conclusion:** VL is not an uncommon cause of pancytopenia in the paediatric population and should always be considered in the aetiology of pancytopenia in children especially those belonging to risky areas and if travel history is positive for the Mediterranean area. As the condition is treatable and has many complications that may lead to death if diagnosis is delayed, so workup and management done in time can actually save life of patient.

Keywords: Paediatric, pancytopenia, visceral leishmaniasis, bone marrow biopsy, *Leishmania donovani*

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INTRODUCTION

Pancytopenia is consequence of many haematological conditions with an extensive differential diagnosis. The aetiology of bicytopenia and pancytopenia varies widely in children, ranging from transient marrow viral suppression to marrow infiltration by life-threatening malignancy. Prompt workup to find aetiology is required to avoid complications.[1] Visceral leishmaniasis (VL) is a parasitic infection caused by *Leishmania donovani*. The sting of a sand-fly transmits Leishmania to humans. Unspecific symptoms such as fever, lack of appetite, weight loss, and lymphadenopathy can appear after weeks to months, and are often followed by more specific findings such as pancytopenia and hepatosplenomegaly.[2]

Leishmania may cause cutaneous leishmaniasis, mucocutaneous leishmaniasis, and visceral leishmaniasis, among other clinical syndromes. In the absence of therapy, VL is the most acute type of leishmaniasis that can be lethal.[3] Transmission through the bite of an infected rodent, organ transplant, accidental inoculation among laboratory staff, congenital transmission, and blood transfusion are among rare causes.[4,5] Pancytopenia is caused by VL in 11.7% of cases.[6]

This study was conducted at Ayub Teaching Hospital, Abbottabad with the aim to report the clinical and epidemiological aspects of VL in our area and to highlight its consideration among differential diagnosis of pancytopenic paediatric patients.

MATERIAL AND METHODS

This cross-sectional study was conducted after ethical approval by the Institutional Review Committee of Ayub Teaching Hospital, Abbottabad. Based on consecutive sampling technique, children less than 12 years of age of either gender, presenting with pancytopenia who fulfilled the inclusion criteria and admitted in Paediatrics Department, Ayub Medical College and Hospital Complex, Abbottabad were included in this study. Patient diagnosed with cancers or using anti-cancers/radiation therapy and immuno-compromised were excluded. Pancytopenia was established when haemoglobin <10 g/dL, TCL <4,000/uL and platelets 150,000/uL. Informed consent was taken from the patient or his/her the family. Bone marrow examination was done and *Leishmania donovan* (LD) bodies were checked. LD bodies were counted under 100× oil immersion objective in bone marrow aspiration. Children were labelled as VL if LD bodies were present. The effect modifiers and biasness was controlled by strictly following the inclusion and exclusion criteria.

Data was compiled and analysed through SPSS-22. Frequency and percentage was computed for qualitative variables like gender, VL (Yes/No). Mean±SD was calculated for quantitative variables, i.e.,

age, weight, height, haemoglobin (Hb), total leukocyte count (TLC) and platelets. Stratification was done on gender, age, weight, height, haemoglobin, total leukocyte count and platelets to see the effect of these modifiers on outcome using Chi-square test, and $p \leq 0.05$ was considered as statistically significant.

RESULTS

A total of 159 children of pancytopenia were included in this study. The mean age of the patients was 5.58±3.446 years. The distribution of age is presented in Figure-1.

The mean height of the patients was 34.37±19.690 Cm, and mean weight was 20.42±11.893 Kg. Among total, 100 children (62.9%) were males and 59 (37.1%) were females. Mean haemoglobin level was 9.70±1.08 g/dl, mean total leukocyte count was 2615.2201±795.757/mm^3, mean platelet count was 87572.27±28230.394/µL, and VL was seen in 21 (13.2%) children.

The frequencies of age groups, gender, height, weight, haemoglobin level, total leukocyte count and platelets were calculated according to VL. In our study, VL was significantly associated with age but not significantly associated with gender, height, weight, haemoglobin level, total leukocyte count, and platelets (p=0.033, 00.701, 00.709, 00.872, 0.833, 00.264, and 00.365 respectively). The results are presented in Table-2, 3, and 4).

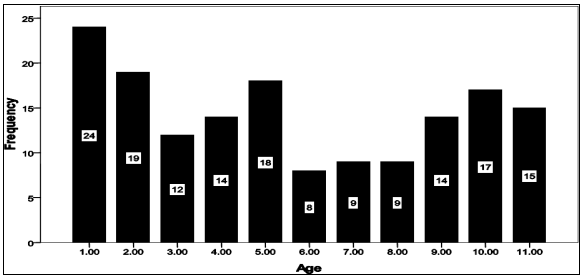

Figure-1: Frequency distribution of age

Table-1: Descriptive statistics of age, height, weight, haemoglobin level, total leukocyte count, and platelets (n=159)

Variable	Mean±SD
Age (Years)	5.58±3.44
Height (Cm)	34.37±19.69
Weight (Kg)	20.42±11.89
Haemoglobin level (g/dL)	9.70±1.08
Total leukocyte count (per mm^3)	2615.22±795.76
Platelets (per µL)	87572.27±28230.39

Table-2: Frequency distribution of gender and VL (n=159)

	Frequency	Percentage
Gender		
Male	100	62.9
Female	59	37.1
Visceral leishmaniasis		
Yes	21	13.2
No	138	86.8

Table-3: Visceral leishmaniasis according to age, gender, height, and weight

Variable	Visceral leishmaniasis n (%)			*p*
	Yes	No	Total	
Age (Years)				
1–5	6 (3.1)	81 (50.95)	87 (54.05)	0.033
6–11	15 (10.1)	57 (35.84)	72 (45.95)	
Total	21 (13.2)	138 (86.8)	159 (100)	
Gender				
Male	14 (8.8)	86 (54.1)	100 (62.9)	0.701
Female	7 (4.4)	52 (32.7)	59 (37.1)	
Total	21 (13.2)	138 (86.8)	159 (100)	
Height (Cm)				
7–43	8 (5.4)	93 (58.8)	101 (64.2)	0.709
44–78	13 (7.8)	45 (28)	58 (35.8)	
Total	21 (13.2)	138 (86.8)	159 (100)	
Weight (Kg)				
5–28	13 (7.8)	93 (58.8)	106 (66.6)	0.872
29–50	8 (5.4)	45 (28.0)	53 (33.4)	
Total	21 (13.2)	138 (86.8)	159 (100)	

Table-4: Visceral leishmaniasis according to haemoglobin level (g/dl), Total leukocyte count (per mm^3), Platelets (per µL) (n=159)

Variable	Visceral leishmaniasis n (%)			*p*
	Yes	No	Total	
Haemoglobin level (g/dl)				
7.5–9.5	9 (5.6)	70 (42)	79 (47.6)	0.833
9.6–11.5	12 (7.6)	68 (44.8)	80 (52.4)	
Total	21 (13.2)	138 (86.8)	159 (100)	
Total leukocyte count (per mm^3)				
1500–2750	12 (7.3)	90 (57)	102 (64.3)	0.264
2751–3905	9 (5.9)	48 (29.8)	57 (35.7)	
Total	21 (13.2)	138 (86.8)	159 (100)	
Platelets (per µL)				
45000–95000	15 (9.2)	83 (50.5)	98 (59.7)	0.365
96000–145000	6 (4.0)	55 (36.3)	61 (40.3)	
Total	21 (13.2)	138 (86.8)	159 (100)	

DISCUSSION

Acquired cytopenias are common in children and are typically caused by infectious agents.[2] Visceral leishmaniasis can affect one or more blood cell lines, resulting in pancytopenia.[7,8] Previous studies on the incidence of Leishmania infection in children with post infectious cytopenia or pancytopenia in endemic areas are limited.[9–11] In developing countries, especially those in the Mediterranean region, VL has been described as one of the most common causes of post infectious pancytopenia in children[12–14] with viral infections, particularly parvovirus B19[15], and bacterial infections being the other major causes[11]. Substitution of natural marrow components by parasitized histiocytes, as well as erythrophagocytosis and haemophagocytosis, are pathogenic mechanisms of pancytopenia in VL patients.[16,17]

In our study VL was a cause of pancytopenia in 21 (13.2%) children. Agrawal *et al*[18] observed bicytopenia in 40% of VL cases, whereas they observed pancytopenia in 25% cases. In Singh *et al*[6] study VL was cause of pancytopenia in 11.7% cases.

Gupta *et al*[10] studied 105 children with pancytopenia, aged 1.5–18 years. They reported that infections, of which *Kala Azar* was the most common, were the third most common cause of pancytopenia. The most frequent presenting complaints in their cohort were fever and gradual pallor, which were present in 81.4% of the cases, accompanied by bleeding presentations in 72.9% of the cases.

VL can be life-threatening if its diagnosis and treatment is delayed. Treatment responses to VL vary by region and recommended treatment also differs. In one study[19] involving children with pancytopenia, a fast therapeutic reaction was reported. In a study from Southern Greece[9] haematological recovery occurred after treatment for a median of 12 days. Similar response was also reported by Verma *et al*[20]. Early diagnosis and prompt intervention may save many lives.

STUDY LIMITATION

It was a single centre study with a smaller sample size. Further studies with larger sample sizes are required.

CONCLUSION

Visceral Leishmaniasis is quite high among patients with pancytopenia. Children with pancytopenia should also be investigated for Visceral Leishmaniasis when belonging to high risk and with a travel history to Mediterranean area. Since it is treatable and has many complications that may lead to death of patient, workup done in time can save life of patient.

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