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Impact of Lymphatic Filariasis (LF) on Hemoglobin Content and Anemia: A Cross-Sectional Based Study

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Abstract
Lymphatic filariasis (LF) is a vector-borne chronically disabling parasitic infection causing elephantiasis, lymphedema, and hydrocele. The infection is endemic in 83 countries worldwide, with more than 1.2 billion people at risk and 120 million already infected. LF is caused by thread-like adult parasitic worms, which live in the human lymphatic system and causes swelling of the scrotum, male genitalia, breast and limbs. It is caused by tissue-dwelling nematode worms belonging to the order “Filariidea” which is transmitted to man by the infective bites of blood sucking mosquitoes. About 90% of these infections are caused by Wuchereria bancrofti. There are limited number of reports available describing the presence of microfilaria in bone marrow. There is a report a young patient who developed aplastic anemia following varicella infection, and peripheral blood and bone marrow showed many microfilariae of Wuchereria bancrofti. This experiment was designed to assess hemoglobin content by sex; and anemic condition by age and sex among 119 case respondents and 102 controls. Hemoglobin level was found to be a bit better among case respondents than controls. By sex, hemoglobin level was better among males than females in both case respondents and control groups. Among case respondents 6-59 months age male group and 5-9 years age female group was found anemic. But in control group all the male respondents in all age groups and only one female in 5-9 years age group were found anemic.
Keywords: Hemoglobin, Anemia and Lymphatic Filariasis.

1. Introduction

Lymphatic filariasis is widespread throughout the tropical and subtropical areas of Asia, Africa, the Western Pacific and some parts of the Americas (1), where it is a major cause of acute and chronic morbidity affecting persons of all ages and both sexes. Not only does it lead to great personal suffering from its disabling and disfiguring lesions, but it is also a significant impediment to socioeconomic advancement, both locally and nationally (2).

More than 1.1 thousand million people (20% of the world's population) now live in areas where they are at risk of infection with lymphatic filarial parasites (1), and a minimum of 120 million people are currently infected (about 107 million with Wuchereria bancrofti and 13 million with *Brugia malayi* or *B. timori*. A total of 44 million persons currently suffer from one or more of the overt manifestations of the infection: lymphoedema and elephantiasis of the limbs or genitals, hydrocele, chyluria, pneumonitis, or recurrent infections associated with damaged lymphatics. The remainder of the 120 million infected have "preclinical" hidden damage of their lymphatic and renal systems (3); and to this burden of disease must also be added the serious psychosocial consequences that these profoundly disabling lesions often have, including the seldom mentioned sexual/social dysfunction of men of all ages afflicted with hydroceles or other genital abnormalities and of young women with lymphoedema of the breasts or genitals (4).

Aplastic anemia is a disorder which can occur due to various factors, absence of hematopoietic progenitor stem cells, immune abnormalities, exposure to various drugs, as a consequence of viral infections (5).

There is no clinical report found that Lymphatic filariasis plays role to reduce hemoglobin content in blood and generate anemia. For this reason this experiment was designed to assess the hemoglobin content and find out the anemic level among 109 Lymphatic filariasis patients by comparing with 102 control subjects.

2. Materials and Methods

2.1 Study Setting

The study was a cross sectional type of case-control study. Two Unions, namely Satpoa and Mohadan of Sharishabari upazila under Jamalpur district which in as endemic area of filariasis. The study subjects included 119 filariasis affected patients as case subjects and 102 normal persons matched with age and sex as well as occupation (if possible) as control subjects.

2.2 Hemoglobin Measurement

Hemoglobin was measured by manual and automated method. As per manual method 2 ml of Venus blood was collected into BD Vacutainer™ Plastic Blood Collection Tubes with specific amount of K2EDTA. One drop of blood sample was added in each glass slide which marked for Draw a thin Smear. Then waited for dry of the slide. Took an air dried blood smear on and glass slide; and covered the smear with the undiluted stain. Took care not to overflow with excess stain. Preferably added just the enough number of drops to cover the smear. Added twice the volume of distilled water to dilute the stain, taking caution that the stain should not overflow and wait for 10 minutes. Washed off the stain with clean (or filtered) tap water. Then observed the slide with emulsion oil in a light microscope. As per automated procedure well mixed blood (though not shaken) placed on a rack in the analyzer. This instrument has flow cells, photometers and apertures that analyze different elements in the blood. The cell counting component counted the numbers and types of different cells within the blood. Blood counting machines aspirate a very small amount of the specimen through narrow tubing followed by an aperture and a laser flow cell. Laser eye sensors count the number of cells passing through the aperture, and can identify them; this is flow cytometry.

3. Results

Presenting the results about the impact of lymphatic filariasis on hemoglobin content and anemia among the filariasis patients of Satpoa and Mohadan unions of Sharishabari upazila under Jamalpur district, Bangladesh. The number of intervention respondents was 119 People and the number of respondents control as many as 102 people. Presentation of data result of this research was done by using computer device.

Table 1: Percentage Distribution of respondents according to Hemoglobin level

Hemoglobin gm/100ml of blood	Case			Control		
	Male	Female	Both	Male	Female	Both
<10	37.5 (36)	86.9 (20)	47.0 (56)	50.0 (41)	95.0 (19)	58.8 (60)
10 - 10.99	43.7 (42)	8.7 (2)	37.0 (44)	43.9 (36)	5.0 (1)	36.3 (37)
11 - 11.99	18.8 (18)	4.4 (1)	16.0 (19)	6.1 (5)	0	4.9 (5)
Total	100.0 (96)	100.0 (23)	100.0 (119)	100.0 (82)	100.0 (20)	100.0 (102)

Table-1 shows the distribution of respondents by hemoglobin level. Hemoglobin estimation was done for 119 case and 102 control respondents only. It shows that 47%, 37% and 16% of all case respondents had <10, 10-10.99 and 11-11.99gm/dl of hemoglobin, compared to 58.8%, 36.3% and 4.9% control respondents respectively. The hemoglobin level was found to be a bit better among the case respondents than the controls. By sex, hemoglobin level was better among males than female in both case and control groups.

Table-2: Percentage of anemic persons among the respondents by age and sex group

Age group	Indicators	Case			Control		
		Male	Female	Both	Male	Female	Both
Children 6 to 59 months	Normal (>11gm/dl)	25.0 (1)	0	25.0 (1)	0	0	0
	Anemic (>11gm/dl)	75.0 (3)	0	75.0 (3)	100.0 (2)	0	100.0 (2)
Children 5-9 years	Normal (>12gm/dl)	0	0	0	0	0	0
	Anemic (>12gm/dl)	100.0 (5)	100.0 (1)	100.0 (6)	100.0 (4)	100.0 (1)	100.0 (5)
Adolescent 10-17 years	Normal (>12gm/dl)	0	0	0	0	0	0
	Anemic (>12gm/dl)	100.0 (13)	0	100.0 (13)	100.0 (12)	0	100.0 (12)
Adults 15 years and above	Normal (>13gm/dl)	0	0	0	0	0	0
	Anemic (>13gm/dl)	100.0 (74)	100.0 (22)	100.0 (96)	100.0 (64)	100.0 (19)	100.0 (83)
All Subjects	Normal	1.1 (1)	0	0.8 (1)	0	0	0
	Anemic	98.9 (95)	100.0 (23)	99.2 (118)	100.0 (82)	100.0 (20)	100.0 (102)

Table-2 presents the prevalence of anemia among the respondents by age and sex groups. It shows that only one male case respond was non-anemic who belonged to 6-59 months age group and all other male and female respondents of both case and control groups were anemic. By age group, 75% in 6-59 months old children, 100% in 5-9 years old children, 100% adolescent and 100% adults were anemic among male case respondents, and only one female in 5-9 years age group was also anemic. But in control group all the male respondents in all age groups and only one female in 5-9 years age group were anemic

4. Discussion

In this study hemoglobin content of 112 case filariasis affected subjects and their counter parts of the same age and sex of 109 controls were studied. The results were compared between the two groups to find out any relationship between the said parameter and the causation of filariasis whether exists or not. Case respondents were identified with better hemoglobin level than controls. Hemoglobin levels were found better among males than females in both Lymphatic filariasis patients and control healthy groups. 6-59 months age male group of and 5-9 years age female case respondents group was found anemic. But in control group all the male respondents in all age groups and only one female in 5-9 years age group were found anemic.

5. Conclusion

In summary, it appears to have almost no effect of filariasis on hemoglobin content and as well as anemia. The apparent effect of filarial infection on decreased hemoglobin levels is intriguing and warrants further study in a larger cohort.

6. References

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