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Haematological studies of lymphatic Filariae, *Wuchereria bancrofti* affected patients in Sindewahi Tehsil, Chandrapur District (MS)

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Abstract
Both humans and other animals are impacted by the filariases group of vector-borne parasite diseases. Long, threadlike worms that develop into adults and reside in the lymphatics or connective tissue are the cause of many conditions. Among the eight filarial parasites that frequently infect humans, three species the lymphatic living filariae *Wuchereria bancrofti* and *Brugia malayi*, and the skin-dwelling *Onchocerca volvulus* account for the majority of the pathology connected to these infections. A total of 20 samples of filarial cases were investigated and assessed during the study period. Several haematological measurements, including Hb content, total blood cell count (RBC and WBC), WBC differential count, platelet count, P.C.V., M.C.V., M.C.H., and M.C.H.C., were compared between healthy individuals and filaria-affected patients visiting Primary Health Centers in Sindewahi to see if there were any obvious differences. Those who tested positive for microfilaria showed the most significant haematological findings. The majority of the cases mentioned above are mild to moderately anaemic, and they demonstrate that the leukocyte count was raised. Due to excessive protein production in patients who tested positive for microfilaria, the number of Polymorph increased, which has an impact on the kidneys' metabolic rate. Patients with filariasis had higher lymphocyte and eosinophil counts, which indicated the presence of the disease's obvious symptoms.

Keywords: Vector-borne diseases, connective tissue, Microfilaria, Haematology

Introduction
A condition known as lymphatic filariasis affects humans and is caused by filarial worms, which are parasitic worms. The majority of cases with the illness are asymptomatic. However, some patients develop elephantiasis, a sickness characterized by significant swelling inside the limbs, legs, breasts, or genitalia. According to Dickson, Benjamin FR *et al*. (2018) [4], lymphatic filariasis is the primary cause of lifelong disability in tropical and subtropical nations. Native instances of lymphatic filariasis have been documented from 20 states in India, where over 600 million people are at risk. There are a total of 250 districts where filariasis is endemic (Cecilia, Dayaraj, 2014) [3]. Of the 17 districts in Maharashtra that are endemic for the disease lymphatic filariasis, nine of them are located exclusively in the state of Vidarbha (Mahakalkar, AL. *et al*., 2017) [7].
Lymphatic filariasis can be brought on by the filarial worm *Wuchereria bancrofti*. Presently, globally Lymphatic filariasis affects over 120 million people worldwide (WHO 2000) [13]. The microfilaria is transferred to the mosquito by an infected animal. A different vertebrate receives the nematode after it grows inside the mosquito (Ellwood, Martin DF, *et al*., 2002) [5]. *Wuchereria bancrofti*, which causes Bancroftian filariasis and accounts for 9% of cases in India, is the most common cause of this illness. Both urban and rural regions are affected by this kind of filariasis. The acute attack results in temporary incapacity whereas the chronic effects are irreversible. Adult worm live in the lymphatic vessels of the definitive host and microfilaria is released and circulates in the peripheral blood (Shastry S. *et al*., 2017). Modulation of human eosinophil, polymorph leucocytes count migration and function were observed (Goetzl EJ, 1976) [6]. Study of the stimulated neutrophils locomotion, Chemokinesis and chemo taxis postulated. (Becker, EL. 1977) [2]. Peripheral blood eosinophil counts are typically less than 500/mm3. Globally, severe eosinophilia is most frequently linked to multicellular helminth parasites (WHO, 2012) [12]. The cause of acquired eosinophilia is filariasis, and eosinophil blood count is frequently employed as a screening method. (Emilio Palumbo, 2008) [9] Among parasites that migrate through tissue during their developmental phase, such as schistomiasis, visceral toxocariasis, strondyloidiasis, filariasis, ancylostomiasis, fascioliasis, trichinellosis, and paragonimiasis, the greatest blood count is that of eosinophils (Tefferi A. 1999) [11]. The work on the haematological study have been made in the Sindewahi tehsil, district Chandrapur (M.S.) India.

Materials and method
The present investigation was focused on the Sindewahi tehsil Chandrapur district in Maharashtra because that is where the filariasis outbreak appears to be most severe. Blood samples were taken from participants who had been exposed to filaria in and around the Sindewahi region. Patients that were chosen for the current study ranged in age from 20 to 60. The following hematopoietic variables were estimated from the specimens: mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular haemoglobin concentration (M.C.H.C.), erythrocyte sedimentation rate, haematocrit value (packed cell volume), haemoglobin, total erythrocyte count, total leucocyte count, and platelet count (PC). The gathered data was statistically examined.

Observation and results
Hb content, total blood count (RBC and WBC), WBC differential count, platelet count, PCV, MCV, and MCHC were the haematological markers that were measured. 20

filariasis patients were examined; 10 males (Table: 1) and 10 females (Table: 2). When comparing filariasis patients to healthy individuals, reduction in haemoglobin content, by sex, haemoglobin level was better among male than female. A decrease in total count of RBCs, lymphocytes, basophils, monocytes, mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration, means corpuscular value and packed cell volume. There was considerable increase in number of white blood cells overall, neutrophils, eosinophils in the affected patients. There was no considerable difference in platelets count.

Table 1: Haematological Parameters in Filariasis Affected Male

Ep	Hb mg/ml	RBC-TC mi/cu.mm	WBC-TC /cu.mm	WBC-N %	WBC-L %	WBC-E %	WBC-B %	WBC-M %	PC L/cu.mm	PCV %	MCV Cu.mic	MCH pg.	MCHC %
c	15	5	7000	60	30	3.5	1	06	2.8	45	92	29.5	33
1	12	4.82	6790	63	31	02	00	04	2.35	37.8	78.4	24.9	31.7
2	13.7	4.66	3890	69	21	05	00	05	2.33	41.7	89.5	29.4	32.9
3	15.1	5.15	10090	69	22	04	0	05	2.46	43.2	83.9	29.3	35
4	15.5	5.6	9210	63	27	05	00	05	1.88	48.1	85.9	27.7	32.2
5	15.4	4.99	9910	67	25	04	00	04	2.61	46	92.2	30.9	33.5
6	11.4	3.63	7760	61	32	02	00	05	2.26	37.6	103.6	31.4	30.3
7	9.0	4	8610	70	20	04	00	06	3.54	33.6	84	22.5	26.8
8	14.9	4.63	7470	65	25	04	00	06	2.21	43.9	94.8	32.2	33.9
9	11.2	3.71	9080	79	15	02	00	04	2.31	37.1	100	30.2	30.2
10	10.3	4.82	7930	66	25	02	00	07	2.16	32.8	68	21.4	31.4

Haemoglobin (Hb); experimental parameters (EP); Red blood corpuscles (RCB-TC), white blood corpuscles (WBC-TC), and white blood corpuscles (WBC-DC) are the three-blood corpuscle counts. The letters N, L, E, B, M, and PC stand for neutrophil, lymphocyte, eosinophil, and monocyte, respectively. Packed Cell Volume, or PCV Standard deviation (SD), standard error (SE), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC).

Table 2: Haematological Parameters in Filariasis Affected Female

Ep	Hb mg/ml	RBC-TC mi/cu.mm	WBC-TC /cu.mm	WBC-N %	WBC-L %	WBC-E %	WBC-B %	WBC-M %	PC L/cu.mm	PCV %	MCV Cu.mic	MCH pg.	MCHC %
C	13.5	4.3	7000	60	30	3.5	1	06	2.8	45	92	29.5	33
1	12	3.78	9120	52	36	06	00	06	3.98	36.1	95.5	31.7	33.2
2	10.8	4.84	7660	58	25	08	00	09	2.93	34.5	71.3	22.3	31.3
3	10.03	4.58	4880	55	33	06	00	06	2.54	34.1	74.5	22.5	30.2
4	12	4.46	4170	47	43	05	00	05	1.90	37.7	84.5	26.9	31.8
5	8.6	3.79	4460	60	26	07	00	07	1.79	29	76.5	24.7	29.7
6	11.7	4.29	5100	58	32	05	00	05	2.05	36.1	84.1	27.3	32.4
7	12.1	3.94	7160	50	40	02	00	08	2.89	35.2	89.3	30.7	34.4
8	11.7	5.24	9070	58	32	04	00	06	2.66	37.1	70.8	22.3	31.5
9	11.5	4.04	7880	52	38	02	00	08	3.23	34.8	86.1	28.5	33
10	11.8	4.97	8860	66	25	04	00	05	4.60	37.1	74.6	23.7	31.8

Haemoglobin (Hb); experimental parameters (EP); Red blood corpuscles (RCB-TC), white blood corpuscles (WBC-TC), and white blood corpuscles (WBC-DC) are the three-blood corpuscle counts. The letters N, L, E, B, M, and PC stand for neutrophil, lymphocyte, eosinophil, and monocyte, respectively. Packed Cell Volume, or PCV Standard deviation (SD), standard error (SE), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC).

Fig 1: Second stage of elephantiasis

Fig 2: Female Culex mosquito

Discussion

The parasitic filariae grow on two hosts. In contrast to mosquitoes, who serve as the secondary hosts, man is the primary host (definitive) (Intermediate). The parasite takes a long time (5–18 months) to develop in humans, but just 10–14 days in mosquitoes. The adult worms, which are 4 to 10 cm long and thread-like, are trapped in the human lymphatic system.

Within the human body, female and male worms mate, and the fertilised female releases thousands of microfilariae larvae (mf). Microfilariae are still concentrated in the blood arteries and capillaries of internal organs, particularly the lungs, during the day. These are intermittently released into the bloodstream at night and circulating in the peripheral circulation. The mosquito vector's body continues to host the growth of mf. The microfilaria (mf), which mosquitoes consume with the blood, sheds its skin and moves to the mosquito's thoracic muscle, where it goes through two moulting.

L1 stages, often known as the first stage, is short, thick, and sausage-shaped. L2 stage, sometimes known as the second stage, is a lengthy one. After the second moulting, or L3 stage. The parasite sheds its cuticle and migrates to the mosquito's proboscis, where it is known as the L3 stage larva, or infective stage larva. These larvae are deposited on the skin close to the bite site when the parasite feeds on humans, but only a small percentage of them are able to penetrate wounds. Within the human body, the infectious stage larvae grow into adult worms. Because of their lack of specificity or inability to distinguish between current and historical infections.

In contrast to our research, Musso D. (2013) [8] discovered a significant predictive value for elevated eosinophil blood counts in filariasis and suggested that, when compared to a test and treat approach, treating all eosinophilic patients systematically could result in a greater number of antigenemic patients receiving treatment and lower healthcare costs. They showed that 25% of patients with eosinophilia tested positive for CFA. Our analysis differed from a cross-sectional study conducted by Bari FS *et al*. (2017) [1] on 112 cases of filariasis, which found that the disease had virtually no influence on anemia or Hb level. Similar to our work, a study conducted in 2013 [14] by S. Sarojini and P. Senthilkumaar to investigate haematological parameters in filariasis, found that in 20 affected cases, there was a decrease in Hb content and a significant increase in TLC, neutrophils, eosinophils, and platelet counts. However, the current investigation found no evidence of a substantial difference between the case and control groups.

Now, just the haematological research was focused on in this investigation. For the observation of changes in blood cells and blood cell organelles, more research is required. In conclusion, the Mass Drug Administration (MDA) is advised in the areas impacted by mf based on prior studies and our investigation.

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