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Pathogenicity of Ancylostoma duodenale in The Population of Meerut District

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ABSTRACT

For the present study the samples of stool were collected from urban and rural population of Meerut. The collected stool specimens were examined microscopically for the presence of eggs, cysts and trophozoites of intestinal parasites, using direct saline smear method for the confirmation of parasitic positive patients. The persons having any cysts/ova/trophozoite/whole parasite were treated as parasitic positive. Parasitic positive patients were subjected for hematological and biochemical examination. Blood samples from parasitic positive patients were collected for hematological and biochemical investigations. This study revealed that undernutrition and intestinal parasitic infection were public health problems among the rural and urban population. These results highlight the importance for integrated efforts to address under nutrition and parasitic infection. The prevalence of ancylostomiasis was found to be 36.4% in rural population as compared to (30.0%) the urban population of Meerut. This study provides the influence of unhygienic condition of the continuity of human intestinal parasitic infections in rural and urban population.

Keywords: - Anchylostomiasis, Parasitic Infection, Poverty and Epidemiology.

Introduction

In the beginning of 20th century ancylostomiasis was considered a serious public health problem and government started the first systematic planning for the control of an endemic disease in large scale. Therefore, ancylostomiasis was considered ales important subject because efficient anti helminthic drugs were introduced, this in combination with the economic development in rich countries, reduced undernourishment and improved housing and sanitary conditions. Consequently, the residual cases of infection became in general asymptotic. Two species of hookworm's A. duodenale and N. Americans are found exclusively in human. A. duodenale or "Old World" hookworm is found in Europe, Africa, China, Japan, India and the pacific. Until the early 1900s N. Americans infestation was endemic in the southern United States and was only controlled after wide spread use of modern plumbing and footwear. Even though the prevalence of these parasites has drastically decreased in the general population, CDC reports that the United States, hookworm's infection is the second most common helminthic infection. However, in the third world problem is still present and must be considered with realism and managed accordingly. It was believed that 60 – 80 percent of population of Eastern Coast of Tamil Nadu and Andhra Pradesh were infected with hookworms. Different species of parasites have been found in preserved human faecal material from historic and prehistoric times throughout the World. Many findings of nematodes, Trematodes, cestodes, and acanthocephalan eggs in archaeological material are available in literature (Rainhard, et. al. 1986, Rainhard, at. al. 1990 and Golcaves et. al. 2003). The ancylostomatidae worms are collectively known as hookworm and comprise two species: - *Ancylostoma duadenale* and *Necator americans* (Bethony, et. al. 2006). Hookworm mainly lives in the human small intestine. Ancylostomiasis is widely globally distributed (de Seilva, et. al. 2003) but mainly found in tropical and subtropical regions (Rabelo, et. al. 2017and Booker, et al. 2006).

Material and Methods

This study was conducted on human intestinal parasitic patients and few healthy subjects as control. In this study, a survey was carried out for human parasitic diseases, from rural and urban populations of Meerut District from 2006 to 2008. For the present study, there was the total no. of 451 samples of stool collected from both rural and urban populations of Meerut region. During the microscopic investigations in laboratory simple Smear in Saline method was used to determine the stool samples. The persons having any cyst /ova / trophozoite / whole parasite were treated as parasitic positive patients. For further investigation of hematological and biochemical test the blood samples were collected from intestinal parasitic positive patients and few healthy subjects as control for hematological (Hb, RBC, TLC, DLC, ESR, PCV, MCV, MCH and MCHC) and biochemical (Serum Total Protein, Serum Total Albumin, Serum Total Globulin. Serum Iron, Serum Binding Capacity, Serum Glucose and Serum Lipids) studies. The t –Squared tests were performed.

Results and Discussion

1. Hematological findings: -

The mean level of Heamoglobin (Hb) in the patients of ascariasis was observed as 9.6 ± 0.122gm/dl, Red Blood Cells (RBCs) 3.18 ± 0.372 million/cumm, Total Leucocytes Count (TLC) 8610 ± 64.04 mm^3. It was higher than control. The mean level of erythrocyte sedimentation rate (ESR) was observed as 10 ± 0.709 mm in 1^{st} hr. It was significantly higher as compared to control group. Packed cell volume (PCV) was 28.8 ± 0.375 percent, mean corpuscular volume (MCV) was observed as 90.54 ± 0.112 cubic micron and it was significantly higher as compared to control. The mean level corpuscular haemoglobin (MCH) was observed as 30.18 ± 0.365 picograms. Mean corpuscular concentration (MCHC) was 33.3 ± 0.352 percent. The mean level of differential counts (DLC) was observed in Polymorphs (P) 58.6 ± 0.677 percent, in Lymphocytes (L) 32.2 ± 0.862 percent, in Eosinophils (E) 6.8 ± 0.375 percent, in Monocytes (M) 2.2 ± 0.375 percent and in Basophils (B) was observed as 0.4 ± 0.245 percent.

2. Biochemical Findings: -

The mean level of Serum total protein (STP) was observed in the patients of ascariasis as 6.6 ± 0.130 gm/dl, Serum albumin (S. A) was 3.96 ± 0.143 gm/dl, Serum globulin (S. G) was observed as 2.64 ± 0.125 gm/dl, Serum Iron (S I) mean level was 83.2 ± 0.862 µg/dl, Serum iron binding capacity (SIBC) mean level was observed as 321.4 ± 2.29 µg/dl, the mean level of serum of glucose (S G) was observed as 100.4 ± 4.68 mg/dl and the mean level of serum lipids was observed in the patients as 585.4 ± 12.29 mg/dl. It was decreased as compared to control group. However, it was statistically insignificant value. It is revealed that the high prevalence of intestinal helminthes shown in the low socio – economic group. (Bhandari, et. al. 1985, Kumar et. al. 2013, Kumar et. al. 2015, Kumar, et. al. 2017, Kumar, P., 2018, Kumar, P., 2018, Kumar, P. 2018, Kumar, P. 2021 and Kumar, P and Singh, R.B. 2022). The relationship between socio - economic status and child mortality has been well documented (Faarah, et. al. 1982, D'souza, et. al. 1982, Da Vanza, 1983, Majumdar, et. al. 1993 and Spencer, at. al. 1996).

CONCLUSION

Ancylostomiasis is a serious public health problem that negatively influences health and hinders socio – economic development. Positive measures are required by both health services and individuals to prevent and control hookworm diseases. Harmless facal fermentation methods, improvement of water supply and sanitation, environment beautification and new energy production methods will all reduce soil contamination from hookworm egg. Personal measures also need strength energy, such as promotion of the use of protective clothing and boots to farmers, to avoid exposed skin contact with soil especially after rain. In summary. A focus on improved personal, dietary and environmental hygiene well assist in reducing the prevalence of ancylostomiasis. The aim this study was to find out association, if any, between social factors like as age, sex, rural or urban area, marital status, income, education and parasitic diseases these factors and prevalence of diseases might prove helpful in planning and execution of an effective strategy directed to eliminate the diseases in highly endemic areas.

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Table: - 1. Hematological findings in the patients of Ancylostomiasis: -

Parameter (Unit)		Control	Ancylostomiasis
Hb (gm/dl)		14.42 ± 0.185	2.92 ± 0.0377*
RBC (million/cumm)		4.78 ± 0.058	8.72 ± 0.107*
TLC (mm3)		8570 ± 48.29	8530 ± 48.2
ESR (mm in 1st hr)		3.2 ± 0.375	22.8 ± 1.160*
PCV (%)		42.8 ± 0.58	26.2 ± 0.372*
MCV (cubic micron)		89.4 ± 0.134	89.68 ± 0.149
MCH (pictograms)		30.2 ± 0.0776	29.84 ± 0.145
MCHC (%)		33.7 ± 0.086	33.24 ± 0.134*
DLC (%)	P (%)	61 ± 1.0	57.6 ± 1.03*
	L (%)	32.2 ± 1.34	32.2 ± 0.86
	E (%)	2.6 ± 0.40	7.2 ± 0.375*
	M (%)	03 ± 0.44	2.6 ± 0.401
	B (%)	0.2 ± 0.20	0.4 ± 0.245

Values express as mean ± SE (n=5)
* Value significantly different from control.

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Table: - 2. Biochemical findings in the patients of Ancylostomiasis: -

Parameter (Unit)	Control	Ancylostomiasis
Serum Total Protein (gm/dl)	7.06 ± 0.075	5.4 ± 0.158*
S. Albumin (gm/dl)	4.08 ± 0.058	3.08 ± 0.159*
S. Globulin (gm/dl)	2.98 ± 0.116	2.32 ± 0.080*
S. Iron (µg/dl)	85.6 ± 1.54	66 ± 1.70*
S. Iron binding capacity (µg/dl)	326.4 ± 4.65	325.2 ± 1.589
S. Glucose (mg/dl)	102 ± 1.27	98.6 ± 2.37
S. Lipids (mg/dl)	630 ± 6.34	618.6 ± 2.189

Values express as mean ± SE (n=5)
* Value significantly different from control.

Fig:- 1. Hematological studies showing the status of TLC in the patients of Ancylostomiasis.

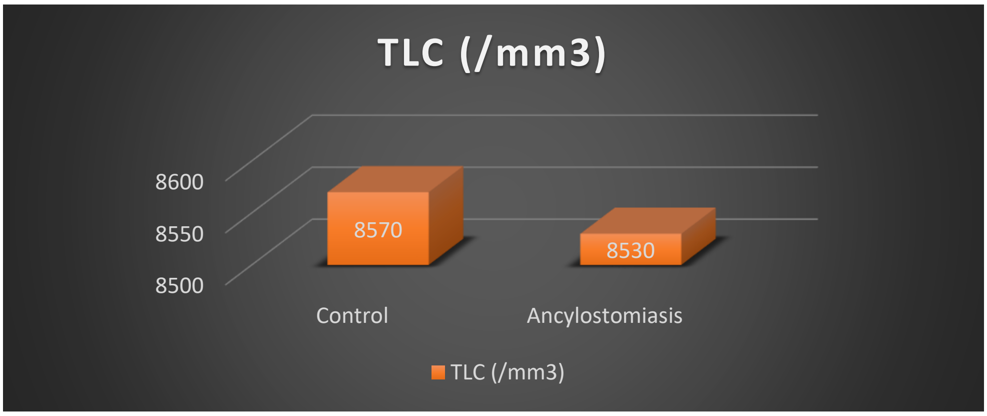


Fig:- 2. Hematological studies showing the status of DLC in the patients of Ancylostomiasis.

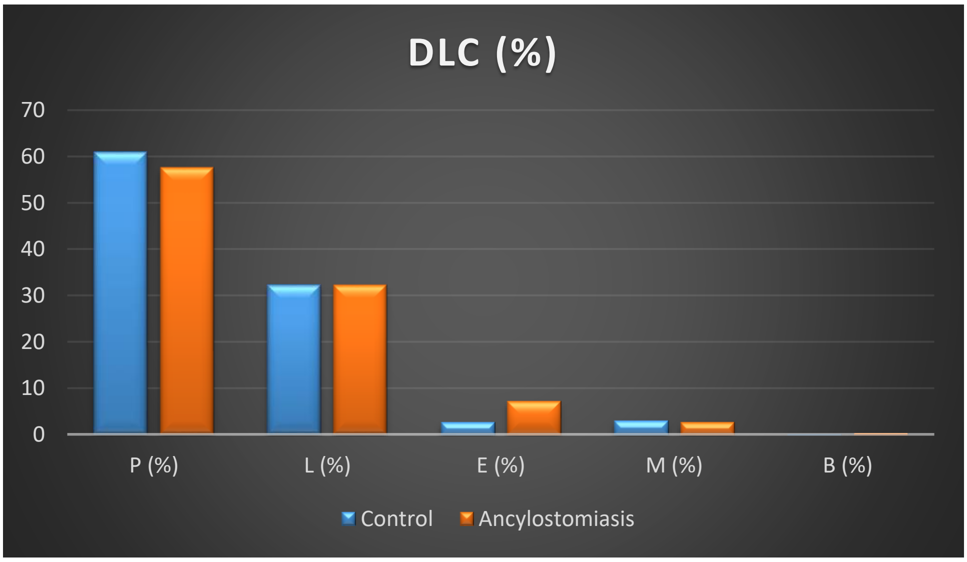


Fig:- 3. Hematological studies showing the status of Hb, RBC, ESR, PCV, MCV, MCH and MCHC in the patients of Ancylostomiasis.

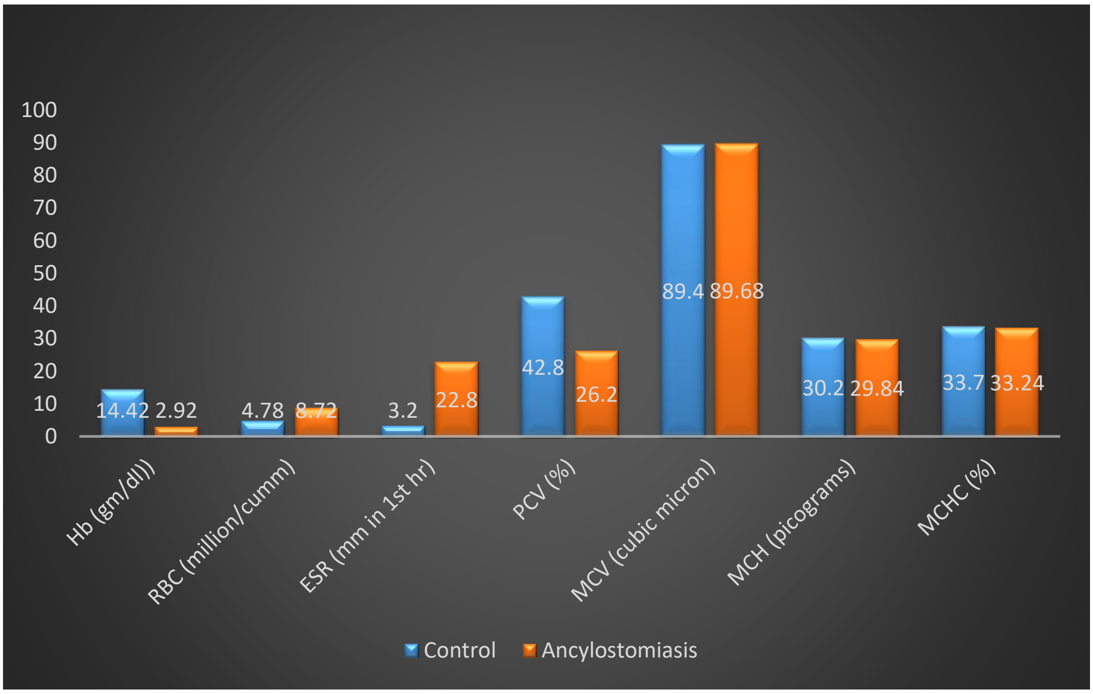
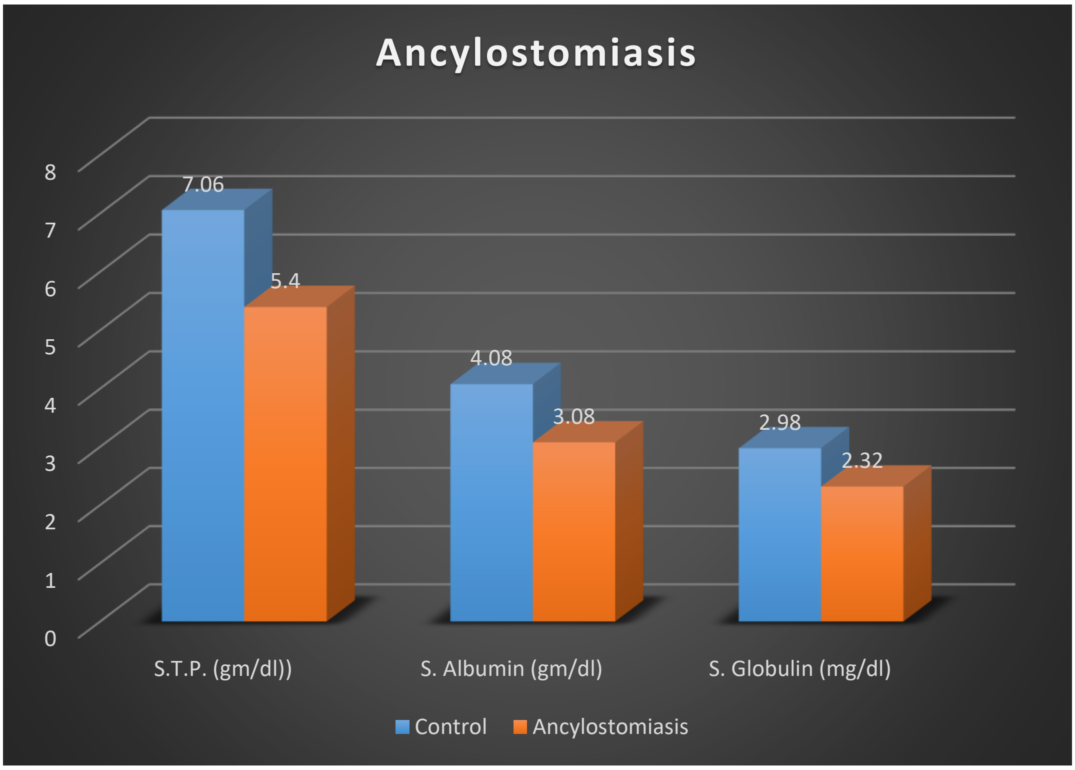


Fig:- 4. Biochemical studies showing the status of STP, S. Albumin, S. Globulin in the patients of Ancylostomiasis.



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