LOAD OF *TRICHIURIS TRICHIURA* IN SOIL OF LAHORE'S SLUMS

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ABSTRACT: A study was launched in slums of Lahore, Punjab from Nov 2010 to Oct 2012 to collect 3,600 soil samples. An accurate diagnosis technique "sodium hypochlorite(NaOCl)" was used. This technique plays an important role for monitoring the control programme and patient management. This technique is widely used in detection of helminth eggs from soil samples. The overall 2.25% prevalence of *Trichiuris trichiura* was observed in contaminated soil samples collected from slums of Lahore. Area wise highest prevalence of *T. trichiura* was estimated 2.83% in Siddiqia Colony followed by Scheme No 2 (2.50%), Sheikhupura Road (2.67%), Bhutto Colony (2%) and by Missri Shah (1.83%) while the lowest was observed in Khairdin Park (1.67%) respectively. The month wise highest prevalence (5.33%) in October followed by (4%) in September that gradually declined in November (1%) declined to (0.67%) in March in slums. Statistical analysis (Z-test) was applied to calculate prevalence rate.

Key words: Slums, Pakistan, Prevalence, Trichuriasis, *Trichiuris trichiura*

(Received 04.02.2022 Accepted 28.02.2022)

Objective

- To gather the soil samples from public places and record the presence of parasite's eggs in the soil
- To determine areawise, seasonal and month wise presence of *A.lumbricoides*'s eggs in naturally infected soil samples
- To observe the effect of socioeconomic status on the presence of parasitic infections and display with table and figures for better insight.

INTRODUCTION AND LITERATURE REVIEW

The zoonotic diseases are the most usual and responsible for more than 60 % of all infections among human (Robinson and Dalton *et al.,* 2007). About 2 billion human are infected with Soil Transmitted Helminths (STHs) infection (Oretga *et al.,*2010) globally. These persist in human communities with poor Socio Economic Status (SES), along with inadequate sanitation, poor access to health services (WHO,2012; Kelechi *et al.*,2015), overcrowded families and poor personal hygiene (Mishra *et al.,* 2008), habit of pica (WHO, 2006), nail biting and unaware of washing hands before eating and after defecation (Khanum *et al.,* 2010) promote trichiuriaisis. Globally, it is a common intestinal infection(trichuriasis) (Fallatah and Akbar, 2010) among human and canine (Varkey *et al.,*2007). *Trichiuris trichiura* (*T.trichiura*), was first tracked by Linnaeus in 1771. The human whipworm *T.trichiura*, is a roundworm which lives in large intestine of human and causes trichuriasis. The name whipworm refers to the shape of the worm; look like whips with wide "handles" at the posterior end (Ok *et al.,* 2009). It's three species i.e. *T. trichiura*, *T. suis* and *T. vulips* were regarded zoonotic (Ravasi *et al.,* 2012). It is also a STHs commonly distributed in warm humid i.e. endemic in tropical and subtropical (WHO, 2012) places with poor sanitation (Silva *et al.,* 2011), low socioeconomic (SES) culture (Nkengazong *et al.,* 2010). Dogs and cats are hosts to hookworms that may cause zoonotic infection (Owmen *et al.,* 2010).

Trichiuriaisis is the most usual infestation (Hageli and Giusti, 2010) in pre-school children of age 2-5 years old, risk for health i.e. 800 million people were effected (Tilahun *et al.,* 2015) with trichuriaisis. About 135,000 deaths of children occurred yearly due to trichiuriaisis (Hotez *et al*., 2009) as it was considered a world neglected disease (Molyneux *et al.,*2004). It is more often in rural areas than urban areas due to inadequate infrastructural facilities especially bad sanitation and sewerage. The host becomes infected (Maipanich *et al.,*2008) when it ingests embryonated eggs from the environment via the faecal-oral route. The ingested eggs hatch in the small intestine and release rhabbdi form larvae that develops into an adult worm and moves into the large bowl mainly the cecum and the ascending colon (Fallatah and Akbar, 2010). The adults are present in cecum and adjacent portions of the large

intestine and female produces about 2,000 to 10,000 eggs per day and shed their eggs in the faeces. At continous temperature (24^0C) the eggs form into infective stage within 54 days, if temperature fluctuate (6^0C to 24^0C) the eggs will take 210 days (WHO, 2012). Intestinal *trichiurais* is diagnosed by finding it's eggs in the faeces (Lee *et al.,* 2006).

These eggs contaminate soil, from where they infringe to water, vegetables (Gupta *et al.,* 2009), food by air and stick to wings and legs of insects like cockroaches and house flies (Maipanich *et al.,* 2008). Faecal contamination is the major risk for healthy children. From infection to maturity of adult worm / prepatent time, it takes about 60 days inside the body of infected person (Ichhpuani and Bhatia, 2003). It causes loss weight loss, rectal prolapsed, diarrhea, malnutrition, epigastric pain and abdominal pain when they live in caecum and causes appendicitis when present in appendix, geophagia and anemia are the common symptoms in children of age (1-12 years) (Silva *et al.,* 2011). Trichiuriaisis is very common in preschool children who have habit of geophagia that leads to anemia. Usually juvenile children are at an increased risk of infection because of their habit of playing, more common in the age group 2-7 years where incidence of pica is the highest (AL Mekhlafi *et al.,*2008). Erlanger *et al* (2008) observed 5 years old children were quite malnourished due to *T. trichiura* infection. The Eggs become infective or embryonated about 2-3 weeks after being deposited in the soil (Damen *et al.,* 2010). The prevalence of the trichiuriasis was higher in pre-school children because of poor sanitary facilities (Rim *et al*., 2003).

Many surveys have been conducted in different cities of Pakistan to observe the prevalence ratios of *T.trichiura* in soil samples contaminated by infected / carriers human or animal excreta. That performed research work is not sufficient because it had been done in scanty form and scattered one. Similarly, it did not comprise the socioeconomic / population factors, i.e. 2.4 % in Lahore, (Qureshi, 1995) 1.6% in Islamabad, (Jamil, 1999) 4.1 % in Islamabad, (Shaik *et al.,* 2000) in Larkana, (Chaudhry *et al.,* 2004) 1.0 % in Muzaffarabad, (Kamran *et al.,* 2005) in Karachi and (Khan *et al.,* 2012) in Swat respectively. Many studies highlighted that majority of the Parasite Intestinal Infections in secondary phase (PII) are asymptomatic (Ezeamama *et al.,* 2005) and the carriers did not report to medical laboratories, as carriers are a serious threat for epidemics. According to (WHO, 2012)., The life span of adult worms in human intestine is about 2-7 years. Colonoscopy was a useful diagnostic method for trichiuriasis (Ok *et al.,* 2009). Therefore, the current study was organized to cover all aspects of prevalence to furnish the researcher a milestone to do more, and helpful for the government sector to focus the affected areas to stop in future infestation / infection / disease by improving the SES.

MATERIALS AND METHODS

To record the prevalence of eggs, 3600 soil samples (25 / locality / month) were collected from 6 different areas i.e. 6 slums (Bhutto Colony, Siddiqia Colony, Scheme No 2, Sheikhupura Road, Khairdin Park and Missrisha) of Lahore, Punjab, Pakistan from November 2010 to October 2012. The soil was collected from five different depths of the same spot and was kept in screw caped plastic vials clearly labeled with date and place of collection. The samples were instantly transferred to the Parasitology Laboratory, University of the Punjab, Lahore. These samples were examined on the same day by Sodium hypochlorite recovery method (WHO, 1991), for the presence of helminth's eggs.

Sodium hypochlorite method: By using a test tube of 2 g. of sieved soil (dried in lab) sample was placed with 5 ml of 30% sodium hypochlorite (NaOCl) solution (Solusby, 1982). The tube was shaken intermittently till uniform homogeneous supernatant mixture of soil was obtained. As described by (Urquhart *et al*., 2001), a few drops of prepared solution was placed on glass slide, placed cover glass and examined microscopically at magnification of 4x, to identify the helminth's eggs on the basis of morphology.

RESULTS

Overall Prevalance (%): An overall prevalence (%) of *T. trichiura*'s eggs in the soil was found (2.25 %) ($P<0.001$) in slums (Table1; Fig. 1).

The area wise prevalence of geohelminth's eggs in soil of six slums of Lahore, Punjab province highlighted the prevalence was highest in Siddiqia Colony 2.83, Sheikhupura Road (2.67%), Scheme No 2 (2.50%), Bhutto Colony (2%) followed by Missri Shah (1.83%) whereas lowest in Khairdin Park (1.67%) (Table1; Fig. 1).

Month wise prevalence (%): The highest month wise prevalence rate was found (5.33%) in October followed by (4%) in September that slightly decreased in November (1%) declined to (0.67%) in March in slums (Table 1). When statistical analysis (Z-test) was conducted on month wise data, prevalence of the March was the lowest, so the month of March was compared with other months.

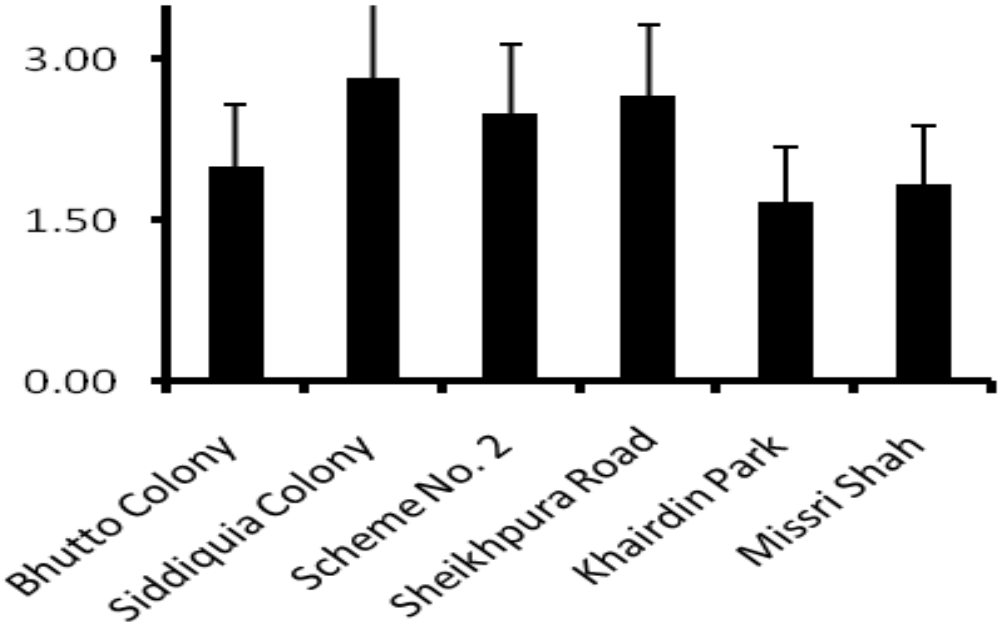

Fig 1: Prevalence (%) of *Trichuris trichiura*'s eggs in soil samples of Lahore slums, (a) area wise an (b) month wise from Nov 2010-Oct 2012.Z-test *=P<0.05, **=P<0.01, ***P<.001.

Table 1 Overall areawise, monthwise and seasonwise prevalence (%) of *Trichuris trichiura*'s eggs in soil samples of Lahore slums, Punjab, Pakistan from November 2010- October 2012.

Factors	Total n= 3,600		Infested	Prevalence (%±S.E)
	Slum	Observed		
Area	Bhutto Colon	n=600/year / area	12	2.00±0.57
	Siddiqia Colony		17	2.83±0.68
	Scheme No.2		15	2.50±0.64
	Sheikhupura Road		16	2.67±0.66
	Khairdeen Park		10	1.67±0.52
	Missri Shah		11	1.83±0.55
	Total	**3600**	81	**2.25±0.25****
Time (months)	Nov2010&2011	n= 300 / month / year	3	1.00±0.57
	Dec 2010&2011		9	3.00±0.98
	Jan 2011&2012		6	2.00±0.81
	Feb 2011&2012		6	2.00±0.81
	Mar 2011&2012		2	0.67±0.47
	Apr 2011&2012		6	2.00±0.81
	May 2011&012		4	1.33±0.66
	Jun 2011&2012		3	1.00±0.57
	Jul 2011&2012		3	1.00±0.57
	Aug 2011&012		11	3.67±1.09**
	Sep 2011&2012		12	4.00±1.13**
	Oct 2011&2012		16	5.33±1.30***
	Total	**3600**	**81**	**2.25±0.25****

*P<.05, **P<.01, ***P<.001 Z-test
Area wise prevalence (%)

DISCUSSION

Human infections and diseases are result of helminth parasites through soil which is a potential source, being infested by STH such as *T.trichiura*, commonly cause infection / disease of chronic morbidity and debilitation. Parasitic infestation and diseases are the major public health problem in developing countries like

Pakistan especially in areas with low SES, poor parental education and prevailed low sanitary conditions. The findings of the present study are different from the observations reported in Mazaferabad 1% (Chaudhry *et al.,* 2004) and 6.20 % (Maqbool *et al.,* 2007) in Lahore, due to the variation in selection of site, change in climatic conditions and use of different techniques for recovery of eggs from soil. In the present study it was observed that mainly the conventional microscopic diagnostic technique sodium hypochlorite technique was used to observe eggs in soil samples, supported by the other epidemiological studies and has been observed the simplest and perfect techniques to be used (Urquhart *et al.,* 2001). Whereas the observations reported 1.81 % in Sukkur (Shaikh *et al.,* 2009) are less than the findings of the present study due to improvement in SES with improvement in education level. The prevalence rate in Australia was 68.4 % (Speare *et al.,* 2006) and (Okolie *et al.,* 2009) in Nigeria greater than the the results of the present study. The contradiction was due to the use of different diagnostic techniques and geographical distribution.

The prevalence of this infection was found more in children who walked barefooted and did not wash hands before and after eating. Lack of personal hygiene, poor sanitation, SES, inadequate education, poor health facilities showed increase trichiuriaisis. This observation is consistent with the research of Ethopia (Vandemark *et al.,* 2010).

It was observed, particularly slum areas did not have proper toilets, where people were used to indiscriminately defecate in depression made in mud yards of houses known locally as gurkies and contaminate the soils, some defecate in open fields as they have no sewerage system in their localities, so use open fields where crops like spinach, mint, melon, sugarcane, saag etc are grown. Eggs stick to these vegetables, if not wash before use, or use as raw food, could cause infection. This condition was aggravated during rainy seasons, as water contributes contamination of soils and transmission of eggs from one place to another. Helminths growth is promoted due to moisture in soil, because the ions which are needed for the development of eggs resides in soil, provide ability to eggs to hatch. Similarly, it was observed that 10 cm depth of moist soil was observed infested with STH eggs consistent with the observation of (Rai *et al.,* 2000). It was also found that children liked to play in ponds and ingest infected eggs via faecal-oral route or through dirty unwashed hands. These observations are consistent with (Vachel *et al.,* 2014) in Philippines. Significant prevalence was observed in October and declined to the lowest in November due to decrease in temperature and humidity, unable eggs to hatch, therefore remain dormant in soil and seek their way to be transmitted to final host whenever chance is there. Prevalence of helminth eggs in slums was significant due to high population density that increases soils contamination with *T.trichiura's* eggs by animal and human wastes. Stray or pet dogs also defecate in the open areas, increases soil contamination, consistent with Mizgajska-Wiktor and Jarosz, 2007.

The difference was also clear in the prevalence of intestinal helminth infection between children living in six slums due to difference in SES, this observation was consistent with study of Ethiopia (Tilahun *et al.,* 2015). Children who walked bare footed, did not wash their hands before eating and after defecation, had habit of pica and remained careless about their hygiene especially whom parents unawared about the importance of hygiene and biology of parasite. They were of the notion that they were made of mud and worms were the natural phenomenon if they reside in their body either in the form of ectoparsistes or endoparasites. Yet after counselling with the local aministration / members of union councils and heads of their families of studied slums with the provision of banners/ cards, visits of doctors / homoeopaths after launching free medical and homoeopathic camps, the natives realized that life is precious and they had to save them from unhygienic way of life to save their lives from helminthes infection /disease. These observations are consistent with (Alemu *et al.,* 2011).

Conclusion: In the present study contamination of soil is ubiquitous due to faecal material. Soil contamination is going to increase due to open defecation and contamination of soil, people are unaware about the biology of parasite. By improving the sanitation system, government can hit the infected areas to reduce the level of transmission of infestation / infection in slums. Thus, native executives should take measured implementation of local ordinances regulating the deworming programmes, exclusively initiating from schools. As it is public health issue, government must include Hygiene and Physiology in academic curriculum, also launch control and prevention strategies of this parasitosis. It is also necessary for teachers to aware the children about the need of washing hands especially after defecation and before eating. This data will aid to target the specific areas of infection to stop further loss of man power.

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