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Report on helminthic infection in school children in the UT of Dadra & Nagar Haveli

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Abstract
The soil-transmitted helminthes (STH) are the most prevalent, infecting an estimated one-sixth of the global population. Infection rates are highest in children living in sub-Saharan Africa, followed by Asia and then Latin America and the Caribbean. The current momentum towards estimate the transmition intensity of STH, risk factors of transmition and the impact of administration of single dose albendazole on STH among children of the UT of Dadra & Nagar Haveli. Total 289 stool samples were collected urban, semi-urban; slum, industrial and tribal area before two week of de-worming day (10th February 2015) and 319 stool samples were collected after four week of deworming day. Stool samples were concentrated with formol-ether concentration and examined under the microscope using first, the ×10 objective followed by ×40 objectives to identify the eggs. 18.34% pupil of the UT of Dadra Nagar Haveli were found infested with six species STH (*Hymanolepis nana, Ascaris lumbricoides, Necator americanus, Enterobius vermicularis, Trichuris trichiura, and Taenia* spp) before administration of single dose of albendazole. After mass administration of single dose of albendazole the prevalence of STH were reduced and reached upto 9.40%. The Present study indicated that school children with specific risk factors in the studied area were vulnerable with elevated risk of STH infection. Identifying risk factors and dynamics of transmission in vulnerable groups can help to plan for effective prevention strategies

Keywords: Helminthic Infection, School Children, Dadra & Nagar Haveli, *Ascaris Lumbricoides, Trichuris Trichiura.*

Introduction
STH is among the most common infection afflicting humans in developing countries. They are one of the world's most important causes of retardation of physical and intellectual growth in children (Nokes *et al.* 1992, Drake *et al.* 2000) [9, 6]. Between 500 million to 1 billion people are estimated to be infected annually world-wide (WHO 1987) [16]. According to Crompton 1999 an estimated 1472 million persons harbor *Ascaris lumbricoides*, 1298 millions are infected with Necater and about 1049 million with *Trichuris trichiura*. Thus, human intestinal helminthiasis constitutes an important public health problem. In India, the overall prevalence rates range from 12.5% to 66%, with varying prevalence rates for individual parasites. About 50% of the urban population and 68% of the rural population in India is affected. High rates of infection are seen in rural areas due to poor sanitation, contaminated water supplies and high population densities (Ragunathan *et al.* 2010) [8].

STH can be prevented and controlled through various measures. According to Crompton 1999, measures to control these infection should be aimed at reducing morbidity. Chemotherapy has been an important measure used in controlling human intestinal helminthiasis (Savioli *et al.* 1992, WHO 1996) [13, 17]. The approach used in chemotherapy is often the mass treatment of human populations with antihelminthic drugs, a process known as mass drug administration (WHO 1996) [17]. World Health Organization (WHO) is actively promoting the approach of using antihelminthic drugs in the community to lower the intensity of human intestinal helminthiasis (WHO 1996) [17]. School-age children can benefit at any time from appropriate antihelminthic treatment given to reduce the intensity of infection (Nwaorgu *et al.* 1998, Albonico *et al.* 2002) [12, 2]. Human intestinal helminthiasis can be treated with different drugs depending on the parasite involved. The antihelminthic drugs recommended by WHO for the control of soil-transmitted nematodes include albendazole, levamisole and prattle (WHO 1996) [17]. Studies have been carried out time to time to assess the impact of chemotherapy on human intestinal helminthiasis (Xiao *et al.* 2005) [14] This notwithstanding, much still remains to be known about prevalence, socio-economic factor, impact of mass drugs administration of a single dose chemotherapy. The present study indicated that the mass administration of anti helminth seems effective but not appearing the only solution hence other factors such as, socio-economic condition, demography, environment, pattern of transmition and behaviour should be study vigorously.

Materials and Methods
Study Area
The study was carried out in The Union Territory of Dadra Nagar Haveli is in western part of India. Silvassa, the capital city of Dadra Nagar Haveli is situated at latitude, 20° 54' 41'' N to 20° 21' 36'' N and Longitude – 72° 54' 41'' N to 73° 13' 13'' N in the Western Ghat. The 487 sq km area is forested hills, occupied by mainly tribes (population 3.42 lakh) in 72 villages and one town. These area of India has two main seasons; the rainy and dry seasons. The rainy season usually starts in June and ends in September while the dry season usually starts in October and ends in May. The soil is moist and porous, which favors the survival of soil-transmitted helminths ova. The inhabitants of this area are mainly subsistent farmers and traders. In health infrastructure, there are one District Hospital, one Sub District Hospital, two

Community Health Center, seven Primary Health Centers, fifty one Sub-Centers and one hundred twenty five Private Practitioner in the area.

Sample Collection

The stool samples were collected from three sentinel sites and four random sites (Urban, semi-urban/slum and industrial) before two week of de-worming day and after four week of deworming day. A detailed questionnaire was filled with the help of the children's parents. It contained four sections:

1. Socio demographic data including age, gender, residence, education of children, education and occupation of parents, Economic Status and school status
2. Environmental factors including housing status (Kaccha, Semi Kaccha, and Pakka)
3. Behavioral habits including availability of toilet, hand washing (no washing/washing with only water/washing with soap) and use of footwear; and
4. Presence of untrimmed nails. Each of the selected pupils was given a small bottle in which they collected their stool samples. The bottles were labeled with the pupil's name, age and sex. On collection of the stool samples, they were microscopy examine in District Public Health Laboratory, Shri Vinoba Bhave Civil Hospital, the UT of Dadra & Nagar Haveli for examination.

Examination of stool samples

At the laboratory, for the diahrroeal stool samples, a drop of fresh physiological saline was placed on a slide. Using a tooth peak, a small amount of a stool sample was mixed with saline and examined under the microscope using first, the ×10 objective followed by ×40 objectives to identify the eggs (Cheesbrough 1998) [4]. For the non-diarrheic stool samples, the formol-ether concentration technique was employed (Cheesbrough 1998) [4]. Using a stick, 1 g of the stool sample mixed with physiological saline was put in a screw-cap bottle containing 4 ml of 10% formol water. The bottle was capped and mixed by shaking for about 20 s. Thereafter, the stool sample was sieved and the suspension collected in a beaker. The suspension was transferred to a tube and 3 ml of ether was added. The tube was stoppered and mixed by shaking for 1 min. Thereafter, the stopper was removed and centrifuged immediately at 3000 rpm for 1 min. After centrifuging, four layers were evident; the top layer of ether, thin layer of debris, formalin and sediment in the bottom with parasites. An applicator stick was used to loosen the layer of stool debris from the side of the tube. The ether, debris and formalin were then carefully poured off. The sediment was mixed, transferred to a slide and covered with a cover glass. The slide was examined under the microscope using first, the ×10 objective followed by × 40 objectives to identify the eggs (Cheesbrough 1998, Ash *et al.* 1997) [4]. Infection was defined by the presence of eggs of human intestinal helminths in the stool samples. The number of pupils infected with human intestinal helminthiasis and the type of human intestinal helminths' eggs observed were recorded (Cheesbrough 1998) [4].

Implementation of Single dose of albendazole

National Deworming Day was celebrated in the U.T of Dadra & Nagar Haveli on 10th February, 2015 and Mob up Day on 13th February, 2015 where Tab. Albendazole was administered to children from 1-19 years of age, 200mg for 1-2 years and 400mg dose above 2 years. A comprehensive training was organized by the department on Soil transmitted Helminths (STH) throughout the Territory of Dadra & Nagar Haveli. The Programme was implemented through the platform of Anganwadi for non-going children & out of school adolescent boys and girls and through schools for school going children. Further, for any migrant children, separate Mobile teams were formed so that no children are missed out. Wide publicity was done through AIR, Theatres, and Posters & Banners in public places like bus stands, rickshaws, and non-medical helpline 104 for any queries. Total 110050 tablets were distributed against the target of 115097(95%) coverage.

Results

Total 289 stool samples were collected from the children of age grope 1-19 years before two week of de-worming and 319 samples were collected after four week of deworming. Before deworming, the overall prevalence of STH was recorded 18.34%. The infection of *H. nana* were 26 (48.1%), follow to *A. lumbricoides* 18 (34%), *N. americanus* 6 (11.3%), *E. vermicularis* 2 (3.8%), T. *trichiura* 1 (1.9%), while 1 (1.9%) were infected with *Taenia* spp., within the infected group (Table 1). After treatment of single oral dose of 400 mg albendazole tablets 48.74 % reduction in the prevalence of STH (69.3% for *A. lumbricoides*, 3.3% *Necator*, 3.3% *E. vermicularis*), but were largely not effective as exemplified by the high prevalence of post-treatment helminths (66.7% for H. nana). `

The highest prevalence among student of secondary (25%) follow to Primary (19.5%) and chiders not going to school (11.1%) and subsides after deworming 78.94%, 40.9%, and 51.4% respectively. Variable factors were considered during investigation findings like Sex, Education, Economic Status, Type of house, school, Availability of toilet, demography, Use of footwear, hand wash after latrine etc. People having better standard of living, good economic status have less impact of infection compare to subnormal living standard. As per economic status prevalence of infection is more in people under category of BPL (16.5%) compare to the APL (11.5%). Similarly, People living in kaccha type of houses (22.1%) has more prevalence of helminth infection than pakka type house (10.6%) people. Personal hygiene plays an important role in infection also proved as per results findings. After deworming by albendazole better results obtained as shown in table -2.

Table 1: Impact of administration of single dose albandazol on soil transmitted helminth and different age group.

Species		Before Deworming n (%)	After deworming n (%)
	Ascaris lumbricoides	18 (33.33)	6(19.35)
	Necater americanus	6 (11.11)	1(3.23)
	Hymanolepsis nana	26 (48.15)	20(64.52)
	Entrobius vermicularis	2 (3.70)	1(3.23)
	Trichurist Trituria	1 (1.85)	1(3.23)
	Taenia spp	1(1.85)	2(6.45)

Age (Year)			
	1-5	14 (12.1)	6 (3.75)
	6-10	25 (24.0)	18 (17.3)
	11-15	11 (20.0)	5 (10.9)
	16-19	3 (21.4)	1 (11.1)

Table 2: Showing Impact of administration of single dose albandazol along with various risk factors

		Before Deworming	After Deworming
	Variable	**Case n (%)**	**Case n (%)**
1	Sex		
a	Gender (Male)	29(20.9)	17 (10.4)
b	Gender (Female)	24 (16.0)	13 (8.4)
2	Education		
a	Primary	41 (19.5)	24 (11.5)
b	Secondary	4 (25.0)	1 (5.3)
c	Illiterate	7 (11.1)	5 (5.4)
3	Economic Status		
a	BPL	32 (16.5)	21 (8.7)
b	APL	20 (21.1)	9 (11.25)
4	Type of House		
a	Kaccha	43 (22.1)	22 (10.47)
b	Pakka	10 (10.6)	8 (7.3)
5	Type of School		
a	Govt.	38 (18.0)	25 (12.0)
b	Private	6 (31.6)	0 (0)
c	Not Going	8 (13.6)	5 (5.1)
6	Availability of Toilet		
a	Yes	9 (23.07)	4(6.67)
b	No	38 (19.48)	20(10.75)
c	Common	5 (9.09)	6(8.22)
7	Use of Footwear		
a	Always	17 (17.34)	6(7.41)
b	Occasionally	28(21.7)	24(10.34)
8	Hand wash after defecation		
a	yes	48 (18.46)	30(9.68)
b	No	4 (13.79)	0(0)
9	Helping in agriculture Work		
a	Yes	15 (35.71)	3(4.35)
b	No	37 (14.97)	27(10.80)
10	Trimmed Nails		
a	Yes	18(22.22)	14(12.5)
b	No	34 (16.34)	16(7.72)

Discussion

The earlier study from Vellore found 22.8 per cent of all stool samples positive for hookworm and 0.8 percent positive for *Ascaris* Kang *et al.* 1998. Another study on children aged 9-10 yr, conducted in the same region during 2000-2003, reported a prevalence of STH is 60 per cent (Rajendran 2006). Contrary to these findings, the prevalence estimated from the current study was much lower at 18.34 per cent. This could partially be attributed to a single-day mass drug administration campaign in the UT of Dadra & Nagar Haveli (100 mg diethylcarbamazine and 400 mg albendazole) were administered to all residents annually. Another reason for this could be administration of 400 mg albendazole in school going children under school Health Programme. It has been postulated that intestinal parasites spread through poor hygienic practices, unsafe drinking water, poor sanitation are the factor to contribute the transmition of STH present (Kattula *et al.* 2014). In present investigations, living in a field hut (Kaccha House), Childers working helping in agriculture work, availability of toilet, hand washing after defecation, use of footwear was important risk factors for acquisition of STH infection.

Reports of high efficacies of albendazole against STH may be attributed to differences in geographical locations, climatic conditions and hygiene. Hall and Nahar, 1994 [7] had shown that single oral dose of 400 mg albendazole gave cure rate of less than 40.0% for *A. lumbricoides* and *T.trichiura* in children in Bangladesh. In the present investigation, the mass administration of single dose of albendazole in school going children showing significant effect, 70 % reduction *in N. americanus*, 42 % reduction in *A. lumbricoides* and *12* % in the *E. vermicularis*. The low cure rate of albendazole against trichuriasis (22.2%) observed in this study was consistent with that of Adams and others who reported of low efficacy of a single dose of albendazole against trichuriasis (Adam *et al.* 2004).

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