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Research Article

Intestinal Helminthiasis in School Age Children of Kashmir Valley and the Need for Intervention: A Systematic Review

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Abstract

Kashmir valley is the most densely populated part of Jammu and Kashmir, India. The enormous population, along with the absence of basic amenities, favourable climatic conditions and underdeveloped public health care system favour the transmission of intestinal helminthiasis. Present paper reviews the prevalence of intestinal helminth infections in the Kashmir Valley and need for control strategies. A survey of published literature by virtue of PUBMED was done. Also many other bibliographic databases were searched to retrieve the relevant articles. After excluding duplicate studies, 11 research papers were retained for this paper. Intestinal helminth infections like those of *Ascaris, Trichuris, Enterobius* and *Taenia saginata* in Kashmir Valley remain very high. Majority of the infected are young children between the age group of 5 and 14 years. The age group, rural or urban residence, type of water source, boiled or unboiled water, type of defecation site, level of personal hygiene and maternal education were associated with helminth infection. Since the World Health Organization (WHO) recommends chemotherapy for intestinal helminth infections among school-age children, there is no government policy for helminth control in Kashmir Valley. Present article stresses on regular school-based programs to deliver anthelmintics to all school age children so as to reduce the prevalence of helminth infections in Kashmir Valley.

Keywords: School-Based Control; Helminths; Chemotherapy; Children; Kashmir Valley

Introduction

Helminth parasites are the common chronic infection among human beings. In developing countries like India, it is more common to be infected than not [1]. Infection by parasitic helminths thrives in areas which are in need of better housing, clean drinking water, better health care facilities, education and better personal hygiene [2]. This is also typical of almost all rural and urban areas of Kashmir Valley. Children growing up in these areas get soon infected after weaning or chances of them getting infected remain high continuously for the rest of their life [1]. Soil transmitted helminthiasis is a major contributor of diseases among children in developing countries [3]. This high infection rates indicate severe shortage in health care facilities, education and chronic poverty [2]. The increase in the level of school attendance in many developing countries in recent years has helped in the delivery of school-based health services. This is proving an excellent and cost-effective opportunity for educational, economic and developmental gains [4]. In many developing countries like India, Bangladesh, Pakistan etc. the children receive only primary school education, and it is during this stage when chances of getting infected by helminth parasites are more. These infections could derail the efforts of governments to provide basic school education [5].

There is concrete evidence that school-based chemotherapy against intestinal nematode infections can be delivered at a very low cost [3,5] which can contribute in improving children's general health [6,7], nutritional status [8,9], cognitive ability [10] and school attendance [11]. This paper is based on published literature available on intestinal helminths in children of the Kashmir Valley and seeks to review current trend of infection which is needed in efforts for control.

Materials and Methods

Information for this review came a survey of published literature by virtue of PUBMED and other bibliographic databases were searched. This study was conducted between January and March 2020, using the key words "School-based control", "Helminths", "Chemotherapy", "children" and "Kashmir Valley". The published literature available on-line were accessed. Full texts of some papers were also obtained from journals at the Iqbal Library of Kashmir

University and at the library of SK Institute of Medical sciences, Srinagar. Also searches were conducted on the basis of links from the cited papers this review was limited to published literature from 2007 to 2015. Websites of organizations like United Nations Children Emergency Fund (UNICEF) and the World Health Organization (WHO) were also thoroughly searched for any relevant data.

Results and Discussion

After excluding duplicate studies, 11 articles were retained for this review. Prevalence of helminth parasites and other relevant information from the cited articles is summarized in table 1.

Epidemiology of soil-transmitted helminthic infections in Kashmir Valley, reported prevalence studies of soil transmitted hel-

S. No	Author/ Reference	Geographical area	Sample size	Sample setting	Parasites	Prevalence (%)	Comments
1	Wani SA., *et al*. 2007 [12]	Kupwara district	312	Rural	*Ascaris lumbricoides*	69.32	Infection highest in children 5-9 years old. Low public and personal hygiene, Multiple infections observed. Infection due to inadequate health education
					Trichuris trichiura	30.76	
					Enterobius vermicularis	7.69	
					Taenia saginata	7.69	
2	Wani SA., *et al*. 2007 [13]	Srinagar	514	Urban	*Ascaris lumbricoides*	28.4	Infection highest in children 5-9 years old. Low public and personal hygiene, Multiple infections observed. Infection due to inadequate health education
					Trichuris trichiura	4.9	
					Taenia saginata	3.7	
3	Wani SA., *et al*. 2007 [14]	Anantnag	432	Rural	*Ascaris lumbricoides*	77.7	Infection highest in children 5-9 years old. Low public and personal hygiene, Infection were more prevalent in children (10-12 years)
					Trichuris trichiura	31.0	
					Taenia saginata	13	
4	Wani SA., *et al*. 2007 [15]	Baramullah district	342	Rural	*Ascaris lumbricoides*	70.84	Infection due to poor disposal of human excreta, Health education and provision of toilet facilities suggested
					Trichuris trichiura	21.65	
					Enterobius vermicularis	12.80	
					Taenia saginata	3.01	
5	Wani SA., *et al*. 2007 [16]	Budgam district	425	Rural	*Ascaris lumbricoides*	56.7	Infection due to poor disposal of human excreta, School-based helminth control recommended
					Trichuris trichiura	38.2	
					Enterobius vermicularis	3.7	
6	Wani SA., *et al*. 2008 [17]	Kashmir Valley	2256	Rural/ Urban	*Ascaris lumbricoides*	68.30	Infection due to poor disposal of human excreta, Health education and provision of toilet facilities suggested, Helminth infections related to level of environmental sanitation, socioeconomic status and water supply
					Trichuris trichiura	27.92	
					Enterobius vermicularis	12.67	
					Taenia saginata	4.60	
7	Wani SA., *et al*. 2008 [18]	Kashmir valley	382	Rural/ Urban	*Ascaris lumbricoides and Trichuris trichiura*	78.27	Infection due to poor disposal of human excreta, Health education and provision of toilet facilities suggested
8	Wani SA., *et al*. 2009 [19]	Pulwama district	199	Rural	*Ascaris lumbricoides*	69.84	Infection due to poor disposal of human excreta, Multiple infections observed. Infection due to inadequate health education
					Trichuris trichiura	31.65	
					Enterobius vermicularis	16.80	
					Taenia saginata	3.01	
9	Baba AA., *et al*. 2009 [20]	Random	131	Radom	*Ascaris lumbricoides*	63.0	Infection highest in children 5-9 years old. Low public and personal hygiene, Multiple infections observed. Infection due to inadequate health education
10	Wani SA., *et al*. 2010 [21]	Gurez Valley	352	Rural	*Ascaris lumbricoides*	71.18	Infection highest in children 5-9 years old. Low public and personal hygiene
					Trichuris trichiura	26.42	
					Enterobius vermicularis	13.92	
					Taenia saginata	5.39	
11	Lone R., *et al* 2011 [22]	Budgam district	396	Rural	*Ascaris lumbricoides*	54.9	Infection highest in children 5-9 years old. Low public and personal hygiene, Multiple infections observed. Infection due to inadequate health education
					Trichuris trichiura	32.49	
					Enterobius vermicularis	2.57	
					Taenia saginata	7.69	

Table 1: Prevalence estimates of intestinal helminthic infections in Kashmir Valley.

minths since the 2007 have indicated that the triad of *Ascaris lumbricoides, Trichuris trichiura, Enterobius vermicularis* and *Taenia saginata* species are common infections in Kashmir Valley (Table 1). These studies indicate that the prevalence of soil transmitted helminth infections mostly *Ascaris lumbricoides* has not changed in the past 30 years [23].

Most papers commented on the unhygienic practice of people defecating in open or in open pit latrines. The condition has not changed much unfortunately, as there is hardly any success in the construction of septic and hygienic latrines to rural Kashmir Valley. The drainage systems in Srinagar city of Kashmir valley unplanned and malfunctioned and is often blocked. This results in widespread dispersal of ova and larvae of these helminths especially during summer season. Nwosu's findings indicated a similar case scenario [24]. In an urban area, a survey of faecal samples collected from various sites showed that 96.3% of the samples contained eggs of *Ascaris lumbricoides* [25]. This playgrounds act as a main source of helminth infection for children [26,27]. Illiteracy and poor socioeconomic conditions of families has been related with higher helminth infestations among children [24,28]. Helminth infection rate among children and socioeconomic status of parents has a strong correlation and in Kashmir valley, helminthiasis is still a disease of poor. Adekunle., *et al.* (1986), also found the same correlation [29]. Some cultural practices favour spread of infection. Since water is used to clean the body after defecation and also there are religious beliefs that people should feed from common bowl, a common practice in many rural areas may also contribute for a high prevalence of intestinal helminth infections [26]. In most of the studies, bulk of infection has been found in children between the age groups of 5 - 14 year [24,29-32]. If this age group (5 - 14 years) is provided periodic anthelmintic drugs, it will definitely help in infection control in general population. Certainly, schools are the best places for its implementation [5].

Effects of helminth infections in school-aged children

Most of the children in helminth endemic areas seldom realize their full potential. The reasons of this underachievement are webbed [10], has been hard to prove [33]. However, many studies have recognized helminth infections as one of the causes, which affect the intellectual and physical development of children [10]. The morbidity is determined by the intensity of helminth infections [34,35], but many times clinical symptoms appear at light infections also [10]. Infection by multiple types of helminthes increases morbidity [29,30]. In some areas, people with multiple infections are more common than others which may have single or are uninfected [10]. The most common consequence of helminth infections is that children seldom achieve their genetic potential for growth and physical development and suffer from malnutrition and iron deficiency anaemia [10]. Heavy *Trichuris* infection in children results in whip worm dysentery syndrome, which is recognized by retarded growth and anaemia [36]. Intense infections by both *Ascaris* and *Trichuris* are related with protein energy malnutrition [8]. The global public health importance of ascariasis and trichuriasis has been comprehensively reviewed [34-38]. The disability-adjusted life-years (DALYs) lost to intestinal helminth infections is very high, when compared with other infections [39] none of the studies by Savioli., *et al*. the main reason for high DALYs values have been attributed to intestinal helminth infections, as *Ascaris* infections lead to growth retardation and *Trichuris* causes decreased school performance [40]. If school children in heavily infected areas are provided periodic anthemintic drugs, about 70% of the helminthiasis can be effectively managed [41]. In one of the studies in Kashmir valley, it has been proved beyond doubt that there occurs improvement in weight gain in children after deworming [42], suggesting that deworming for intestinal helminths may result in a period of growth in previously infected children. There are many studies from Kashmir valley, which show that *Ascaris* may lead to intestinal lumen blockage and inflammation of appendix, hepatic and bile ducts [20-22,43,44]. It is not easy to estimate mortality rate due to helminth infections in Kashmir Valley, because people go for widespread self-medication and public health care system is not effective. It is estimated that world over about 135000 direct deaths occur due to intestinal helminth infections annually [40].

Control strategies

Presently there are no control program for intestinal helminth infections in Kashmir Valley as school health services are poor. Researchers in parasite control had over time advocated for improved sanitation and health education so that environment doesn't get contaminated with helminth infective stages. It has also been advocated that children with heavy infections should be treated over a time, especially during the winter months, when transmission conditions are least favourable [13]. Unfortunately, these recommendations, have not been implemented and the prevalence of helminth infection still remain high across the Kashmir valley.

Chemotherapy can be introduced for intestinal helminth control at a very low cost in health care systems [3,10,33]. Drake and Bundy (2001) has suggested school health services as of paramount importance. These programs offer an opportunity to deliver anthelmintics to a largest number of children at a very low cost [10]. These programmes have therefore attracted the interest by policy makers in developing countries like India [46]. There are examples

that in developing countries, school b health services such as providing anthelmintics can be provided at low cost and more conveniently [3,5,33]. For these reasons, de-worming has now become an essential component of school health programs in many developing countries [45]. School-based programs also reach children who are not enrolled in school, usually the most affected group [9] and serve to transmit health education to the whole population.

Conclusion

Soil transmitted helminthiasis are still highly prevalent children in the age group of 5 - 14 years in Kashmir Valley and a primary cause of morbidity. Lack of personal hygiene, contaminated surroundings, lack of education, and absence of basic enmities, poverty and favourable climate are major reasons which sustain the transmission, but there has not been effort to control at government level. The effectiveness of intervention using anthelminticsy at six monthly intervals has been proved to be cost-effective and feasible in other parts of the globe. This is the time for government agencies in Kashmir Valley to frame a policy regarding the school-based programs and relieve children of the burden of intestinal helminth infection, so that they can achieve their maximum potential.

Conflict of Interest

No conflict of interest exists.

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