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ORIGINAL ARTICLE

Anthropometric Indices in Individuals Infected With Ascaris Lumbericoids in Iran

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ABSTRACT

Context: Ascaris Lumbericoids infection is more common in children and teenagers and in areas with poor sanitation or crowded living conditions. Largest of all the parasites inhabiting the human intestine it is also the most common of parasitic infections in developing countries. It has been reported to infect about one-fourth of the world population. Chronic ascariasis has been reported to adversely effect the growth rate and anthropometric indices in infected individuals of growing age.

Aims: The goal of this research was to evaluate the anthropometric indices in individuals infected with Ascaris in Hamedan province of Iran.

Settings and Design: This was a descriptive cross sectional study.

Methods and Material: Six hundred fourteen randomly selected individuals who were inhabitants of Hamedan province of Iran were chosen for this study. Stool samples of these individuals were collected and then experimented with Formel-Ether method to determine Ascaris Lumbericoids infection. Height and weight of these individuals were measured and compared with the indices related to NCHS. Demographic information of these individuals was entered into questionnaires and ultimately was analyzed with SPSS software.

Results: Out of the total study population, 16.5% of individuals were found to be infected with Ascaris. Out of the individuals infected with Ascaris, 1% were underweight. In the age groups of 6-10, 11-15, 16-20 years, 3.5%, 5.1% and 3.5% were found to be suffering from malnutrition, respectively.

Conclusion: Malabsorption in children might result in malnutrition. In this study, few individuals infected with Ascaris had malnutrition, thus Ascaris infection may not be an important cause of malnutrition among children in our area.

Key Words: Ascaris Lumbericoids, malnutrition, Anthropometric indices, Iran

Key Message: Ascaris infection may not be an important cause of malnutrition among children in our area.

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Introductions

Most of the studies done in tropic and semi tropic regions of the world, clearly point towards an association between Protein-Energy malnutrition and the incidence of intestinal parasitic infections [1], [2]. According to the estimates of year 1994, around 1471 million individuals around the world are reportedly

infected by the intestinal parasite Ascaris [3]. Current literature suggests Ascariasis to be the most common amongst the parasitic infections in developing countries [4]. Chronic Ascariasis among growing children has been reported to adversely effect normal growth processes along with compounding the existing state of malnutrition, leading to inappropriate changes in the anthropometric indices of this group of children [5]. According to some researchers, this parasite is responsible for disability in infected individuals and estimation of the amount of this disability is possible using Disability Adjusted Life Years (DALYs) index.

Aims and Objectives

The goal of this study was to evaluate the nutritional status using anthropometric indices as standard parameters amongst Ascariasis infected individuals living in Hamedan province of Iran.

Materials and Methods

Fifteen out of 63 villages from central part of Hamedan were randomly chosen for the study. The cohort sample chosen from each village was in the same ratio as to the ratio of population of the individual village with respect to the total population of the fifteen villages chosen. Stool samples of the cohort population were collected and experimented by Formel-Ether method in the medical college of Hamedan. Weight of participating individuals was measured with precision of 100 grams with clothes and their length without shoes and with precision of 0.5 centimeters. Age of individuals according to records or as told was registered in questionnaires. For evaluating the nutritional condition of individuals between 2-20 years of age, anthropometric indices of weight for age (underweight index) length for age [nutritional shortness index: stunting], weight for length for [thinness index: wasting] and body mass index (weight/length) were used. For prediction of being underweight, nutritionally short and thinness the individual had to be under -2 SD the standard of length and weight of NCHS (recommended by WHO) [7], [8]. For specifying thinness of individuals between 11-20 years of age, the weight for length standard of NCHS acted as a limitation, so the parameter of BMI for age was used [9], [4],[10]. Individual being under 5th percentile of BMI for age and sex curve was used as a base for this purpose. For specifying over weight and obese individuals between 2-20 years of age, the BMI for age index was used [10]. Being above 95th percentile was specified as obesity for this purpose [11]. For evaluating nutritional status in individuals aged 21 years or more, BMI for age index was used. BMI of less than 18.5 was considered as protein-energy malnutrition [PEM], in the range of 25-29 was considered as being overweight and 30 or above was considered as obesity for this purpose [12].

The total population of the villages of central part of the Hamedan Province adds up to about 66,026. Six hundred fourteen individuals, who inhabited the area for at least 2 years duration, were chosen from 15 villages by cluster sampling method. Demographic details of each individual were obtained from family health files in health centers in these villages and entered in separate questionnaires.

Statistical Analysis

The data thus obtained was analyzed with SPSS software and with student t-test and chi-square test.

Results

The prevalence of Ascaris Lumbericoids in this study was 16.5%. The highest prevalence of this parasite was observed to be in the age group of 11-15 years [3.7%]. In the age group of 15 years or younger the parasite was found to infect 5.3% of the individuals. Out of all the individuals detected to be infected by Ascaris, 1% of them were found to be underweight with respect to their age. In the age ranges of 6-10, 11-15 and 16-20 years 3.5%, 5.4% and 3.5% of individuals were found to be suffering from mild and average malnutrition respectively.

Considering the data provided in [Table/Fig 1], it is observed that there is no significant difference between infected and non-infected individuals, in being underweight (P-value > 0.05). 12.8% of individuals infected with Ascaris were found to be underweight.

[Table/Fig 2] depicts a statistically significant difference (P-value < 0.05) in being thin between infected (15.2%) and non-infected (11.6%) individuals. 21.3% of infected individuals were found to be short in height, but this was not found to be statistically significant in comparison to non-infected individuals (P-value > 0.05) [Table/Fig 3]. Statistically significant difference in BMI was observed between infected and non-infected individuals (P-value < 0.05) [Table/Fig 4].

(Table/Fig 1) Distribution of weightless based on ascaris infection in individuals less than 20 years old in Hamedan, Iran

Weightless index	< -2 SD Number (%)	± 2 SD Number (%)	> +2 SD Number (%)
Ascaris infection			
Negative	27 (12.3)	189 (85.9)	4 (1.8)
Positive	6 (12.8)	41 (87.2)	0 (0)

(Table/Fig 2) Distribution of thinness based on ascaris infection in individuals less than 20 years old in Hamedan, Iran

Thinness index	< -2 SD Number (%)	± 2 SD Number (%)	> +2 SD Number (%)
Ascaris infection			
Negative	26 (11.6)	177 (79.4)	20 (9)
Positive	7 (15.2)	34 (73.9)	5 (10.9)

(Table/Fig 3) Distribution of shortness index based on ascaris infection in individuals less than 20 years old in Hamedan, Iran

shortness index	< -2 SD Number (%)	± 2 SD Number (%)	> +2 SD Number (%)
Ascaris infection			
Negative	62 (27.9)	159 (71.6)	1 (0.5)
Positive	10 (21.3)	37 (78.7)	0 (0)

(Table/Fig 4) Distribution of BMI index based on ascaris infection in Hamedan, Iran

BMI index	< -2 SD Number (%)	± 2 SD Number (%)	> +2 SD Number (%)
Ascaris infection			
Negative	359 (79.1)	70 (15.4)	25 (5.5)
Positive	59 (71.9)	15 (18.4)	8 (9.7)

Discussion

Determining the effects of parasitic infections on occurrence of nutritional abnormalities [in infected individuals] is a necessary as they adversely effect public health [1],[2]. Some researches show that Ascaris decreases intestinal absorption of nutrients in infected individuals [1]. Suggested explanations for occurrence of this intestinal malabsorption include inhibitory effect of Ascaris, competition of parasite with host in absorption of nutrients and occurrence of some changes in normal histology of intestine [2]. Additionally, reaction between behavioral factors and biological indices is also presumed to add to the state of malnutrition in individuals infected with this parasite.

Due to the mild nature and lower prevalence rate of Ascaris infection among the adults, most of the researches have been exploring the influences of chronic Ascariasis on growth and development of children. Ascariasis reportedly has negative influences on growth process in children [13], [15]. This study reports mild to average malnutrition in various age groups. Prevalence of Ascaris in age group of 6-10 years was 1.1% and prevalence of malnutrition was 3.5%. Previous studies showed that Ascariasis is one of the main reasons of mal-nutrition [15], [16]. Due to the multi-factorial etiology of mal-nutrition, it is not possible to single-handedly blame Ascariasis mal-absorption of nutrients in the digestive [12]. But some researches do point towards a major role of Ascariasis in children suffering from mal-nutrition [17]. Although children in this age group are more in infection with Ascaris especially its severe type [18], but quality of absorption of nutrients in this age range is better in comparison with adults [17]. In this research it was specified that individuals infected with Ascaris are thinner than non-infected ones (P-value < 0.05). Some studies clearly indicate a relationship between infection with Ascaris and inappropriate growth of children [19], [20]. But in some other studies this relationship was not observed [20, 21]. Individuals suffering from Ascariasis had a lower BMI index (P value < 0.05) as compared to the non-infected ones. This finding was similar to those of various other studies [22]. Another similar study observed no remission in the nutritional indices of children after resolution of Ascariasis infection [23]. But other studies report remission in nutritional indices of children just after treatment [24].

This study reports lower BMI and thinness indices for individuals infected with Ascariasis as compared to the non-infected ones. Some studies show that mild Ascariasis infections have no effect on intestinal absorption of nutrients [17]. Conflicts exist among researchers regarding the determinant criteria for amount of severity of Ascariasis and reciprocate reactions between disease and nutritional factors [17].

Some researches report improved growth rate among children suffering from co-existent malnutrition and Ascaris infection, after administration of anti-parasitic drugs [25, 26]. But some other researches do not show similar results [27].

Conclusion

Ascaris being the most common parasitic infection in developing countries [4] and due to its oft proven and considerable effects on public health [especially among children of growing age] [28], various controlling strategies have been studied [29]. One of these studies report that single dose of anti-parasitic drugs can help cure patients and reduce environment infective resources [30]. Controlling the infection in developing countries should be based on selection of appropriate treatment strategies that are adaptive with economic conditions and health policies [31].

References

[1]. World Health organization. Soil-Transmitted Helminthes, Report of a WHO Expert Committee on helminthiasis. WHO Report Series 1964; No. 277.

[2]. World Heath Organization. Control of Ascariasis, Report of a WHO Expert Committee, WHO Report series 1967; No, 379.

[3]. Stephenson LS, Latham MC and Ottesen EA. Malnutrition and parasitic helminthes infections. Parasitology 2000; 121: 23-38.

[4]. Florentino RF, Villavieja GM, Lana RD. Regional study of nutritional status of urban primary school children.1.Malina, Philippines. Food Nutrition Bulletin 2002; 23[1]:24-30.5.

[5]. Thein H, Thanc T, Than S, et al. A controlled chemotherapeutic interaction trial on the relationship between Ascaris lumbricoides infection and malnutrition in children. Transaction of the Royal Society of Tropical Medicine and Hygiene 1991; 85: 523-28.

[6]. Chan MS, Medley GF, Jamison D, et al. The evaluation of potential global mortality attributable to intestinal nematode infections. Parasitology 1994; 109: 373-87.

[7]. Onis MD, Frongillo EA, Blossner M. Is malnutrition declining? An analysis of changes in level of child malnutrition since 1980. Buletin of the world Health Organization 2000; 78: 1222-33.

[8]. World Health Organization. Physical status: the use and interpretation of anthropometry. 1995, Geneva: WHO.

[9]. Soekirma H, Hardinsyah J, Jus'at J, et al. Regional study of nutritional status of urban primary school children, West Jakarta and Bogar, Indonesia. Food Nutrition Bulletin 2002; 23: 31-40.

[10]. Tee ES , Khor SC , Ooi HE , Young SI , et al. Regional study of nutritional status of urban primary school children, Kuala Lumpur, Malaysia. Food Nutrition Bulletin 2002; 23: 41-47.

[11]. Centers for diseases control and prevention. National center for health statistics 2000. CDC growth charts for the United States: methods and development. Vital and Health Statistics 2002; Series 11, Number 246.

[12]. Must A, Dallal Ge, Dietz Wh. Reference data for obesity: 85th and 95th percentile of body mass index [wt/ht] and triceps skinfold thickness. Am J Clin Nutr 1991; 53: 839-46.

[13]. Cerf BJ, Rohde JE, Soesanto T. Ascaris and malnutrition in a Balinese village: a conditional relationship. Tropical and Geographical Medicine 1981; 33: 367-73.

[14]. Saldiva SR, Silveria AS, Philippi ST, et al. Ascaris-Trichuris association and malnutrition in Brazilian children. Paedatr Perinat epidemiol 1999; 1389-98.

[15]. Tripathy K, Gonzales F, Lotero H, et al. Effects of Ascaris infection on human nutrition. Am J Trop Med Hyg 1971; 20: 212-18.

[16]. Tripathy K, Gonzales F, Lotero H, et al. Malnutrition syndrome in ascariasis. Am J Clin Nutr 1972; 25: 1276-81.

[17]. Cornu A. Ascariasis and digestibility: A study in Cameroonian children. Available at: http://www.unu.edu/unupress/food/8f074e06.htm.

[18]. Haswell-Elkins MR, Elkins D, Anderson RM. The influence of individual, social group and household factors on the distribution of Ascaris lumbricoides within a community and implications for control strategies.Parasitology 1998; 98: 125-34.

[19]. Hadju V, Stephenson LS, Mohammad HO, et al. Improvements of growth, appetite, and physical after a single dose of albendazole. Asia Pacific Journal of Clinical Nutrition 1994; 7: 170-76.

[20]. Stephenson LS, Latham MC, Kinoti SN, et al. Weight gain of Kenyan school children infected with hookworm, Trichuris trichiura, and Ascaris lumbricoides is improved following once-or twice-yearly treatment with albendazole. Journal of Nutrition 1993; 123: 656-65.

[21]. Adams EJ, Stephenson LS, Latham MC, et al. Physical activity and growth of Kenyan school children with hookworm, Trichuris trichiura, and Ascaris lumbricoides infections are improved after treatment with albendazole. Journal of Nutrition 1994; 124: 1199-1206.

[22]. Dedieu P, Gibon M. Parasitoses et malabsorption. Gastroenterol Clin Biol 1981; 5: 456-68.
[23]. Freij L, Meeuwisse G, Berg NO, et al. Ascariasis and malnutrition: A study in urban Ethiopian children. Am J Clin Nutr 1979; 32: 1545-53.
[24]. Gupta MC, Withal S, Arora KL, et al. Effect of periodic Deworming on Nutritional status of Ascaris infested preschool children receiving supplementary food. Lancet 1997; 2: 108-10.
[25]. Lorcain PO, Holland CV. The public health importance of Ascaris lumbricoides. Parasitology 2000; 121: 51-71.
[26]. Hlaing T. Ascariasis and childhood malnutrition. Parasitology 1993; 107: 125-36.
[27]. Watkins WE, Pollitt E. Effects of removing Ascaris on growth of Guatemalan schoolchildren. Pediatrics 1996; 97: 871-76.
[28]. De Silva NR, Chan MS, Bundy DAP. Morbidity and mortality due to Ascariasis: reestimation and sensitivity analysis of global numbers at risk. Tropical Medicine and International Health 1997; 2: 519-28.
[29]. Hal A, Holland CV. Geographical Variation in Ascaris lumbricoides Fecundity and its Implications for Helminth Control. Parasitology Today 2000; 16: 540-44.
[30]. Holland CV, O'Shea E, Asaolu SO, et al. A cost-effectivness analaysis of antelminth intervation for community control of soil-transmitted helminth infection: Levamisole and Ascaris lumbricoides. Journal of Parasitology 1996; 82: 527-30.
[31]. Kobayash IA, Hara T, Kajima J. Historical aspects for the control of soil-transmitted helminthiases. Parasitology International 2006; 55: 289-91.

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