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Investigation of behavioral disorders (aggression) among healthy and infected intestinal parasites children attending kindergarten in Sari City, North of Iran

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ABSTRACT

Background: The article explores the development of aggression in children in kindergartens in Sari City, examining the influence of psychological, social, biological, and environmental factors, including intestinal parasite infection, which can lead to neuropathic disorders, behavior, anemia, and malnutrition.

Methods: Between 2015 and 2016, a cross-sectional study was conducted on 100 kindergarten children in Sari City, with 47 suffering from intestinal parasites and 53 suffering from the disease. Data was collected using grade tests and questionnaire sheets, using cluster sampling.

Results: The study revealed that 24% of 24 children in kindergartens were aggressive, with 12 infected and 12 uninfected. There was no significant difference between children infected or uninfected, and no significant relationship was found between aggression rates in boys and girls.

Conclusion: Our results demonstrate that, despite the significant relationship between aggression and intestinal parasite infection, the risk of exposure to aggression is higher in infected children, and the results represent that many factors should be studied about children's aggression simultaneously.

Kewwors: Behavioral disorders, aggression, Intestinal parasites Infection, kindergarten, Sari

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1. Introduction

Aggression is a behavior with the intention of harming (physically or verbally) another person or oneself or destroying other people's property. Aggression and violent behavior are types of violence against others that can cause harm or injury to others. Psychological, social, biological, and environmental factors play a role in creating aggression. Aggression can be classified depending on the type of behavior pattern (for example, a physical attack against oneself, objects, and others). Many behaviors are aggressive, although they may not cause injury. Verbal violence is one of them (2, 1). Considering the higher prevalence of parasitic infections among children compared to other members of society, the complications caused by them, especially in severe and chronic infections, can affect cognitive performance and some educational indicators such as academic progress, learning ability, etc. Let it be a transition. Studies show that pregnant mothers suffering from parasitic infections and a lack of timely treatment can cause psychological disorders in the children born to these mothers in the future (3, 4).

Various studies indicate that some intestinal parasitic infections, such as *Enterobius vermicularis* (worm) and chronic giardia infections, are due to the secretion of toxins by the parasite, as well as disorders in the absorption of fat and vitamin A, malabsorption of D-xylose, and intolerance. lactose (5-7), in infected people, especially children, they cause neurological disorders, growth disorders (loss of weight and height), and even intelligence disorders, etc., and these factors can indirectly cause behavioral disorders with aggression to be made Studies conducted in relation to aggression and other biological factors show that some metabolic diseases and parasitic infections can cause mental disorders (3, 5, 9, 8).

Considering that behavioral disorders start in the early years of childhood and are characterized by opposing, destructive, and aggressive behaviors, psychological, social, biological, and environmental factors play a role in causing aggression, and one of these factors can be parasitic infections. The result of this is the absorption and digestion of food and, ultimately, various physical and mental disorders. On the other hand, due to the higher prevalence of intestinal parasitic infections among children (a more vulnerable age group), the present study, with the aim of investigating behavioral disorders (aggression) in affected children and the absence of intestinal parasite infections in kindergartens in Sari city.

2. Material and methods

This research is cross-sectional descriptive research (during the years 2015–2015). The studied community is composed of the children of Sari kindergartens (1200 people). The statistical sample studied in this research was 7 kindergartens, randomly selected, and about 14–15 children were selected from each kindergarten. In this research, the collection tool was the collection of stool samples and microscopic examination of the samples in two stages of the experiment. All the above children were also examined for contamination with Auxir using Graham's method. In this research, the aggression questionnaire of Vahedi et al. (10) was used.

This questionnaire has 43 questions, which are arranged on a five-point Likert scale (very high (5) to very low (1)). The way to complete the questionnaire was such that some of the questions were based on the daily objective observation of kindergarten children and other departments. The questions were completed by the parents and kindergarten teachers, and in order to analyse the statistical data, descriptive statistics (prevalence, percentage, mean, and standard deviation) and inferential statistics (t-test of two independent groups and odds ratio calculation) were used. In order to improve statistical calculations, SPSS 18 software has been used.

3. Results

This study showed that out of 100 children, 47 (47%) were infected with at least one parasite, 53 (53%) were not infected with parasites, 24 (24%) out of 100 children were aggressive, and the scores were between -3.5 and 3.5. 5 were included, and 12 (50%) of these aggressive children were infected with parasites, and 12 (50%) were not infected with intestinal parasites. As shown in Table 1, 12 of the samples infected with parasites are aggressive, and 35 are not aggressive. Also, out of all the samples not infected with parasites, 12 people are aggressive and 41 people are not aggressive. There is no significant difference between the level of aggression in parasite-infected and healthy kindergarten children. Despite not being significant, it was observed that the risk of violence in the parasite-infected group is 1.1 times higher than in the non-parasite-infected group.

The analysis of the data showed that the incidence of violence was not related to the type of parasite and the odd values were not significant, and the most common parasitic infection out of 47 children with parasites was infection with oxyur in 39 children (83%). As shown in Table 1, there is no significant difference between the aggressiveness of children with and without intestinal parasites in kindergartens. Despite the hypothesis not being significant, it can be seen that the risk of violence in the infected group was 1.17 times higher than in the non-infected group. The level of violence of girls and boys was investigated in the entire sample, and the results showed that there is no significant difference between the level of aggression in kindergarten boys and girls. Also, despite the hypothesis not being significant, it can be seen that the risk of violence among boys was 2.19 times higher than among girls. Examining the types of parasites, it was also observed that the risk of getting parasites was higher in boys than in girls. Also, the type of parasite was observed (table 2).

As shown in Table 2, there is no significant difference between the level of aggression in male and female children with intestinal parasites. Despite the lack of difference among the infected, the risk of violence in boys is 1.77 times higher than that of girls. A similar study was conducted among people without intestinal parasites, and the results of the t-test showed no difference between boys and girls. Although this difference was not significant, the risk of violence in boys was 2.56 times higher than in girls.

4. Discussion

Considering the vulnerability of children and the formation of their personalities in kindergartens and being away from their families and, therefore, their relationships with teachers and peers, it is necessary to investigate the causes of aggression from a clinical point of view. So far, much research has been conducted regarding the aggression of different populations, including children, but in order to carry out correct planning, it is necessary to investigate the cause of aggression, and in this research, we have addressed one of its causes, which may be parasitic contamination. Therefore, for the first time, this study has been conducted in Sari among kindergarten children.

The results of this research showed that there is no significant difference between the aggressiveness of children with and without intestinal parasitic infection in kindergartens in Sari City. Although there was no statistically significant relationship, the risk of violence in the parasite-infected group is 1.1 times higher than in the non-parasite-infected group, considering that most of these children had parasites that are directly contagious and show fecal-oral transmission. Parasites are present in kindergartens due to the number of classes and the lack of disinfection of toys. Sometimes severe contamination with parasites causes an inflammatory response that can affect the child's motivation through changes in his brain

function and cause growth delay, anaemia, etc. Parasites such as *Trichoris*, hookworms (3), *Oxyur*, and *Giardia* (11) have adverse effects on cognitive behaviors and even the rate of growth and development of the affected person, and they will be significantly related to the decrease in weight and height of people, so timely treatment is somewhat necessary to eliminate these effects (3,11). Due to the existence of public media, access to the Internet, and educational booklets and health brochures in health centres and kindergartens, it seems in this research that there are other reasons for aggression in children, such as family relationships and other environmental and social factors other than Parasitic contamination should be investigated at the same time as other factors. In a study conducted by Goldstone and Shapiro (2007), it was found that children of families with tense parents who were hostile, defensive, and anxious or did not express their anger had higher blood pressure, which was the highest during working days (12).

Also, the findings showed that there is no significant difference in the level of aggression between kindergarten boys and girls. It should be mentioned that the result of the present study is in line with the result of Shahim's study (1386) (8). Because in his study, there was no difference in the level of aggression between boys and girls. It should be noted that girls and boys (every two groups) use environmental stimuli such as toys, tablets, and action movies. Also in this research, due to the heterogeneity of demographic conditions such as sample size, parents' education, health level, etc. that can affect the results, it is better to homogenize the variables. Shahim et al. (2016). They showed that most of the preschool children used relational aggression in their relationships with their peers from the age of three, which caused some children to be removed from the group or forced others to break their relationship with them. The difference between boys and girls was not significant in this regard. Also, the amount of aggressive behaviour in relation to peers of different ages did not change significantly (8). Webster et al. (2013) showed that there is a potential relationship between *Toxoplasma gondii* and schizophrenia in the animal model by causing *Toxoplasma gondii* infection in an animal model (rodents) (9). The hypothesis of the relationship between Toxoplasma and schizophrenia has been investigated, considering that schizophrenia is a psychotic disease with a chronic course and Toxoplasma is a parasite that remains chronically (latent) in various tissues, especially the brain. Studies have shown that this protozoan may play a role in some cases of schizophrenia (13). Since childhood is a good time to diagnose children's problems, timely intervention and prevention of their future emotional, social, and educational problems are important. Timely intervention and changing the maladaptive behaviours of the child in this sensitive period increases social skills and popularity among peers and adults and prepares the child to accept the responsibilities of primary school education. This is one of the most common problems of young children that causes referral to a psychologist. It is aggression. Recognizing this problem in young children and providing timely intervention can prevent the continuation of this behaviour (14). By knowing other factors of aggression, especially in children, it is possible to formulate health and sports instructions. Periodic examination of children and routine tests to investigate the cause of aggressive behaviour of the child and to solve the problem, to prevent the intensity and incidence of aggressive behaviour, and to provide factors for the emotional discharge of the child.

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Table 1: Comparison of the level of aggression in children susceptible and non-susceptible to parasites

Parasite contamination status		**Aggressive state**		**Rate of aggression in children based on parasite infection**		**Leven test**		
						F	P	
		Has	Has not	mean±sd	Mean difference	2.191	0.142	
						t- test for compare means		
						t	df	P
Has		12	35	2.0±04.791	0.04	0.286	98	0.775
Has not		12	41	2.0±00.626				

Type of parasite observed among the whole sample *															
		Oxyuris		*Blastocystis hominis*		*Chilomastix mesnili*		*Endolimax nana*		*E. coli*		*Oocyst*		*Giardia*	
		Has	Has not	Has	Has not	Has	Has not	Has	Has not	Has	Has not	Has	Has not	Has	Has not
Aggressive state	Has	10	14	0	23	0	23	0	23	0	24	0	24	0	24
	Has not	29	47	4	72	0	76	2	74	1	75	1	75	2	74
Odds ratio CI 95%		1.16 0.2 – 45.95		0.78 0.7-08.36		9.77 0/247-38.84		1.61 0.18-14.56		1.03 0.26-04.04		1.03 0.26-04.04		0.61 0.13-03.11	

* In some children, more than one type of parasite was observed.

Table 2. Investigating the state of aggression and the incidence of parasites in children by gender

Parasite contamination status	**Gender**	**Aggressive state**		**Rate of aggression in children based on parasite infection**		**Leven test**			**Odds ratio CI 95%**
						Parasite	F	P	
		Has	Has not	mean±sd	Mean difference	Has	0.003	0.954	
						Has not	7.575	0.008	
						Total	3.421	0.067	
						t- test for compare means			
						P	df	t	
Has	Girls	3	13	1.0±86.813	0.27	1.1	45	0.277	1.77 0.7-41.75
	Boys	9	22	2.0±13.777					
Has not	Girls	4	23	1.0±96.539	0.08	0.459	46.5	0.649	2.56 0.9-66.85
	Boys	8	18	2.0±04.714					
Total	Girls	7	36	1.0±93.647	0.17	0.248	98	-1.162	2.19 0.5-81.87
	Boys	17	40	2.0±09.744					

		Type of parasite observed among the whole sample *													
		Oxyuris		*Blastocystis hominis*		*Chilomastix mesnili*		*Endolimax nana*		*E. coli*		*Oocyst*		*Giardia*	
		Has	Has not	Has	Has not	Has	Has not	Has	Has not	Has	Has not	Has	Has not	Has	Has not
Gender	Girls	16	27	0	43	0	43	0	43	0	43	0	43		
	Boys	22	34	5	52	1	56	3	54	1	56	1	56		
Odds ratio 95% CI		1.14 0.2-51.58		9.11 0.169-49.48		2.31 0.58-09.10		5.95 0.11-28.1		2.31 0.58-09.10		2.31 0.58-09.10		3.92 0.83-18.77	

* In some children, more than one type of parasite was observed.

References

1. Giles LL , Martini DR .Acad Pediatr. Challenges and Promises of Pediatric Psychopharmacology. 2016, 5 (16): 30099-7.
2. Schwartz JA, Beaver KM, Barnes JC. The association between mental health and violence among a nationally Representative Sample of College Students from the United States. PLoS One. 2015, 7;10(10):e0138914.
3. Steketee RW. Pregnancy, nutrition, and parasitic diseases. J Nutr. 2003;133(5 Suppl 2):1661S-1667S.
4. Liu C , Luo R, Yi H , Zhang L , Li S , Bai Y , Medina A , Rozelle S , Smith S , Wang G , Wang J . Soil-Transmitted Helminths in Southwestern China: A Cross-Sectional Study of Links to Cognitive Ability, Nutrition, and School Performance among Children. PLoS Negl Trop Dis. 2015, 25;9(6):e0003877.
5. Neava FA, Brown HW (1995) Basic clinical parasitology. 6th ed. London: Prentice-Hall Incooporation.
6. Gendrel D, Treluyer JM, Richard-Lenoble D . Parasitic diarrhea in normal and malnourished children. Fundam Clin Pharmacol 200317: 189–198.
7. Al-Mekhlafi HM , Al-Maktari MT, Jani R, Ahmed A, Anuar TS, Moktar N, Mahdy MA, Lim YA, Mahmud R, Surin J. Burden of Giardia duodenalis infection and its adverse effects on growth of schoolchildren in rural Malaysia. PLoS Negl Trop Dis. 2013, 31;7(10):e2516.
8. Shahim S. Relational Aggression in Preschool Children . IJPCP. 2007, 13 (3) :264-271.
9. Webster JP , Lamberton PH, Donnelly CA, Torrey EF. Parasites as causative agents of human affective disorders? The impact of anti-psychotic, mood-stabilizer and anti-parasite medication on Toxoplasma gondii's ability to alter host behaviour.Proc Biol Sci. 2006. 22;273(1589):1023-30.
10. Vahedi Sh, Fathiazar S, Hosseini-Nasab SD, Moghaddam M. Validity and reliability of the aggression scale for preschoolers and assessment of aggression in preschool children in Uromia . Quarterly J Fundament Mental Healt, 2008. 10(37); 15-24.
11. Nematian J, Gholamrezanezhad A, Nematian E . Giardiasis and other intestinal parasitic infections in relation to anthropometric indicators of malnutrition: a large, population-based survey of schoolchildren in Tehran. Ann Trop Med Parasitol 2008.102: 209–214.
12. Goldestein IB, Shapiro D. Ambulatory blood Pressure in women: family history of hypertension and personality. Psychl Health Med. 2007; 5: 227-40.
13. Flegr J. Schizophrenia and Toxoplasma gondii: an undervalued association? Expert Rev Anti Infect Ther. 2015, l;13(7):817-20.
14. Goodwin, T , Pacey K , Grace M . Children: Violence prevention in preschool settings. J Child Adoles Psychiat Nurs , 2003, 16, 52-59.