

## Impact of Enterobiasis on Physiology, Psycho-Emotional State and Learning Activities of Primary School Children

Aishet Plieva, Zalina Dzarmotova, Aset Kulbuzheva and Lyuba Oligova  
Department of Biology, State University of Ingushetia,  
P.O. Box 386132, Magistralnaya ul. 17/3B, Gamurzievskiy Municipal District,  
Nazran, Republic of Ingushetia, Russian Federation

**Abstract:** Child's health plays a huge role in the intellectual and psychological development of children, especially those of primary school age, together with emotional atmosphere surrounding it, genetic factors, etc. The effect of enterobiasis infection on psychoemotional state of children was comparatively analyzed using a certain laboratory research method (film method of determining *Enterobios vermicularis* and complete blood count) and R.B. Cattell intelligence and psychological test. It was discovered that children from the pinworm infested group have deviations in neuropsychological development, impatience, concentration and academic performance. The effect of parasitosis on such characteristic values (based on Cattell questionnaire) as sociability, self-confidence, self-control and academic performance was determined and so was the impact of enterobiasis on Hb and eosinophils level in blood: H<sub>b</sub> decreased in 75% of schoolchildren and eosinophilia was found in primary and secondary school children (92% of school children). Upon such factors as sociability, self-confidence, self-control and academic performance, children from the infected group have lower scores compared to healthy ones. Despite the fact that the deviation of these parameters smoothes over with age, a general enterobiasis associated decrease of intellectual and neuropsychological development of children can be seen which leads to corresponding age norm delays and causes difficulties in adapting to the educational process.

**Key words:** Enterobiasis, screening, H<sub>b</sub>, eosinophils, the cattell questionnaire

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### INTRODUCTION

The most important task of the modern education system is to organize universal educational activities in a way that sustains student's ability to learn to develop and to improve themselves. As the main results, the federal state primary education standard defines universal personal and metasubject learning activities not limited by individual curriculum disciplines.

This task is achieved through conscious and active gain of social experience by school children. In this connection, knowledge and skills are considered to be derived from certain focused actions. That is they are trained, applied and maintained in close connection with active actions of children themselves.

As its cornerstones are being laid in childhood, the work on the diagnostics and children's school performance problem is increasingly demanded by science and practical experience, especially in its initial stage.

The development of the problem of children's school (especially primary school) performance diagnostics and improvement is becoming more and more important both in research and in practice. A child's behavior is realized in patterned actions fulfilling certain requirements or rules set by the teacher. Therefore, special features of voluntary behavior can not only be traced by observing the child within individual and group activities but also by using special techniques such as Eysenck's, Roscher's, Wechsler's or Cattell's intelligence tests.

Among other factors, health plays a crucial role in the intellectual and psychological development of children, especially those of primary school age. Child's health plays a huge role in the intellectual and psychological development of children especially those of primary school age, together with emotional atmosphere surrounding it, genetic factors, etc.

According to world health organization, infectious and parasitic diseases are the death causing reasons in >16 out of the 50 million people dying every year. Within infectious diseases structure, intestinal helminthes

infections are located on the third place. Annually, >10 million people in Russian Federation are examined for helminthiasis, most of them children. In 2002 813,000 cases were detected where 681,000 (83.8%) were children under the age of 14. In the helminthiasis structure, enterobiasis (91%) and ascariasis (8%) are taking the lead. The enterobiasis's ratio among other helminth infections is 67.1% and it exceeds to 95% in large industrial cities. Children population accounts for >90% of all the pinworm infections; every 10th secondary school child has enterobiasis and every 20th child attending a preschool institution is pinwormed. According to the classification of S.V. Prozorovskiy, this related to crowd diseases infestation (case rate >100 cases per 100,000 population) is nowadays one of the most serious problems of medical science and practical public healthcare because despite the efforts, little progress has been reached. Based on the fact that even tripled examinations by scraping with perianal folds do not reveal all the infested people, some index corrections from 2.5-15 were proposed. It makes possible to diagnose the actual children infestations in separate groups on the basis of one single examination (Bodnya, 2009; Ershova *et al.*, 2007; Shkurat and Kleimenova, 2011).

In childhood, pinworms are often a contributing factor for the development of chronic eating disorders, Gastro Intestinal Tract dysfunction (GIT), intoxication, sensitization and weakening of the immune system (Putieva, 2004).

The clinical picture of helminthiasis is often dominated by functional neurological disorders. These symptoms of all the most common helminth infestations were reported by clinicians as follows; enterobiasis, ascariasis, whip worm infection etc. Among such patients, signs of asthenic character were mostly frequent as well as muscular twitching of upper and lower limbs, teeth grinding and delays in physical and mental development. In some cases helminthiasis was characterized by sleepwalking, bedwetting, dysphagia and laryngospasm (Bodnya, 2009; Velikoretskaya, 1991; Golovko, 1954; Grabovskaya, 1962).

After successful dehelmintisation all these symptoms disappear or become less prominent, indicating their etiological relationship with the helminths (Alekseeva. and Lysenko, 1980; Padchenko, 1987).

## **MATERIALS AND METHODS**

Even though the clinical manifestations of ascariasis and enterobiasis are currently studied enough, the global environmental changes in recent decades, widespread use of antimicrobial, immunotropic and other medicinal drugs

and other factors have changed the clinical picture of nematodiasis which requires a further study to determine the impact of this particular helminthiasis type on the intellectual and psychological abilities of children (Astafiev, 1975). Among all age groups with enterobiasis infection, children of primary school age were the most infested. Pinworms have a negative influence on children's nervous system, causing increased irritability, absent mindedness and memory impairment.

Based on these opinions we worked on determination of personal characteristics, intelligence level and social adaptation of primary school children using children's version of raymond cattell's 16 factor questionnaire adapted by E. Aleksandrovskaya.

Comparative analysis of laboratory data of both children infected with enterobiasis and healthy ones had been performed against according to R.B. Cattell's method testing results (Cattell's questionnaire).

Cattell's questionnaire represents a multidimensional methodology which assesses emotional, intellectual and behavioral characteristics of child's individuality with the help of which psychological diversity of the main temperament substructures of each child's character can be determined.

## **RESULTS AND DISCUSSION**

Comparative analysis ran using laboratory research method (film method of determining Enterobios vermicularis and complete blood count) as well as Cattell's intelligence and personality test has shown that children from the pinworm infested group have deviations in neuropsychological development. Impatience and low concentration are also observed.

Children from the infested group have higher rates upon factors D (emotional stability), O (apprehension), Q4 (tension). Therefore, the results we have obtained agree with the statements made by the scientists regarding the impact of pathological enterobiasis on neuro-psychological status of a growing organism (especially during long term presence of the pathogen in child's organism due to the possibility of pinworms autosuperinvasion). The younger the child, the more severe these disorders are (Fig. 1). The following factors have low evaluations in the same children; factor A (warmth), C (emotional stability), Q3 (perfectionism). Also, the laboratory data deviations were found; H<sub>b</sub> level decrease (75%), eosinophilia level decrease (92%).

Lower performance of infected children should be mentioned. Above noted factors and disturbance of physiological norms are more pronounced in younger age group (6-8 years old). Deviation intensity of these parameters in older age group (9-10 years old) is relatively

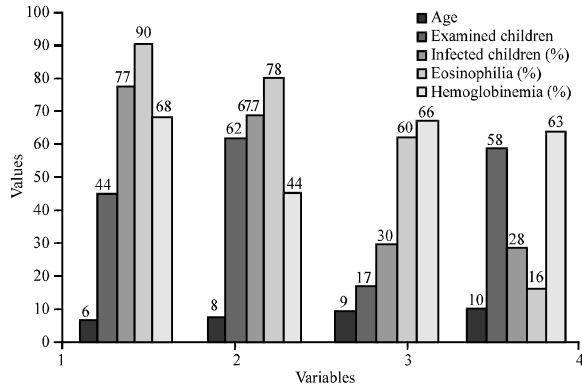


Fig. 1: Comparison of pinworms infestation and certain blood indications in children of different age

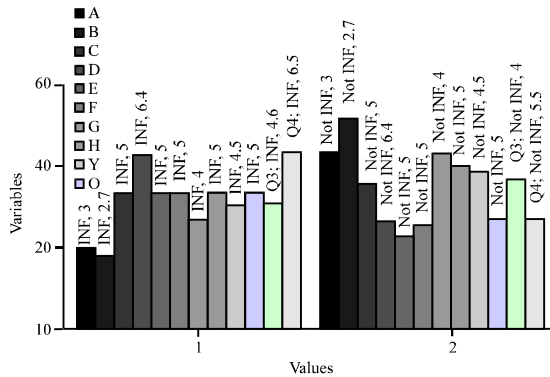


Fig. 2: Average Cattell's test scores among 6 year old children

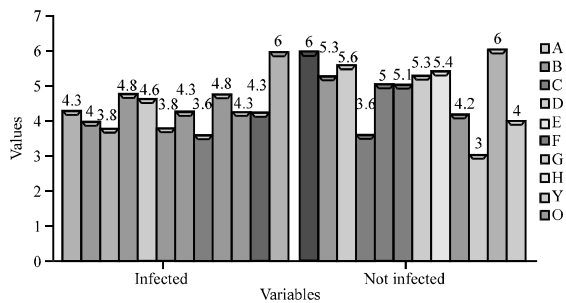


Fig. 3: Average Cattell's test scores among 10 year old children

smoothed due to higher self-control of elder children and their ability to practice good hygiene. However, the Q4 (tension) indications are equally high in children of 6 and 10 (Fig. 2 and 3). Despite the fact that the deviation of these parameters smoothes over with age, general enterobiasis associated decrease of intellectual and neuropsychological development of children can be seen which leads to corresponding age norm delays and causes difficulties in adapting to the educational process.

**CONCLUSION**

Considering that schooling as the most stressful period of a child's life activity adjusts the process of biological developing and often has a negative influence on child's health level, it is very important to examine the child for helminths infection and conduct appropriate anthelmintic therapy before sending the child to school. In junior school groups this work should be carried out annually. In case of infested children preventive activities should be carried out involving the entire class (SanPiN 2.1.1.279-03 in 2003).

Enterobiasis prevention is the most important task for medical and educational institutions as is for the parents. It can be accomplished through simultaneous implementation of action plans which main components are identification and treatment of infected children as well as hygienic measures. In russian federation prevention of enterobiasis and other helminth infections is regulated by the new sanitary standards and regulations, approved by the Ministry of Health of the Russian Federation in 2003.

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