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PREVALENCE OF INTESTINAL PARASITES UNDER FINGERNAILS OF PRIMARY SCHOOL CHILDREN IN ZAKHO, KURDISTAN REGION

Ahmad Y. Jameel[a.] *, Araz R. Issa[a], Kaveen, S.Kh. Amidy[b], Wijdan M.S. Mero[a], Mohammed A. Sabri[a], Mohammed A. Khdihir[a]

[a] Dept. of Biology, Faculty of Science, University of Zakho, Kurdistan Region, Iraq.
[b] Dept. of Biology, College of Science, University of Duhok, Kurdistan Region, Iraq.

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ABSTRACT:
In this study, 103 fingernails samples were collected (31 female and 72 male) from primary school children aged between 6 to12 years, which lived in Zakho city during the period from March to November, 2015. Each fingernail sample was immersed in normal saline, and subsequently centrifuged for 5 minutes at 2500 rpm. The supernatant was discarded; a few drops of the sediment of each sample were placed on the center of a clean glass slide with a drop of iodine or eosin, and then examined microscopically. The results revealed a total rate of 25.24% of infection with parasites. The recorded parasites with their rates included: eggs of *Enterobius vermicularis*, *Hymenolepis nana*, *Ascaris lumbricoides* and *Trichuris trichaura* (7.76, 5.82, 2.91 and 0.97 %, respectively) and cysts of *Entamoeba histolytica* and *Giardia lamblia* (4.85 and 2.91 %). According to age, the highest percentage of infection occurred in 9 years old children. Regarding the gender, males showed a higher rate of infection than females (17.47 % versus 7.76%, respectively). These results clarify the role of fingernails in the transmission of parasitic infections, which requires continuous cleaning and cutting.

KEYWORDS: Parasites, fingernails, children, Zakho, Kurdistan, Iraq.

1. INTRODUCTION

Intestinal parasitic infections are one of the major global health burdens and this burden is even higher among children in developing countries (WHO, 1987). School-aged children are particularly susceptible to parasitic infections (Luong, 2003 and Hotez *et al.*, 2008). The factors associated with intestinal parasitic infections in developing countries include poverty, illiteracy, poor hygiene and healthcare , poor school performance, poorly organized clean water supply, in addition to hot and humid environmental conditions. Protozoa and helminthic parasites are responsible for the prevalence of diseases capable of affecting an individual's health (Quihui *et al.*, 2006 and Harhay *et al.*, 2010).
Soil-transmitted helminthes (STH) are particularly pernicious and are among the ten most common infections in the world (WHO, 1987). The problem of STH is predominant among the school children, and is often associated with poor growth, iron deficiency anemia, malnutrition, reduced physical activity, Vitamin A deficiency and impaired cognitive function (Stephenson *et al.*, 1998, and Sackey `*et al.*, 2003).
The World Health Organization estimates that over 270 million pre-school children and over 600 million in developing countries of school children are living in areas where the parasites are intensively transmitted and are in need of treatment and preventive interventions (WHO, 2010). In developing countries particularly, intestinal parasites have been known to cause significant morbidity and mortality. The fecal-oral route is significant in the transmission of parasitic infections to humans through poor personal hygiene. When the soil becomes contaminated, the eggs in the soil can be transferred onto vegetables, door handles, dust etc…..and then onto the hands from where it is transferred to the mouth (Kagei, 1983 and Mustafa *et al.*, 2001).
Intestinal parasite cysts and eggs adhere to fingers, fruits, vegetables, instruments, door handles and money (Ayeh – Kumi *et al.*, 2009). They can also be transmitted by flies (WHO, 1987). In addition to unclean hands, dirty and untrimmed nails have been associated with high prevalence of parasitic infection (Khan, 1979 and Mahmud *et al.*, 2013).
The aim of the present study was to investigate the prevalence of intestinal parasites (eggs and cysts) under the long dirty fingernails of primary school children in Zakho, Kurdistan regain.

2. MATERIAL AND METHODS

2.1 Study subjects

A total of 103 samples of fingernails were obtained from primary school children of both gender and different ages (6-12 years) from different schools in Zakho city (Table 1). The data of gender, age and other criteria used in this study were recorded on a special questionnaire form which later on used for data analysis. Fingernail clippings were collected from both hands of each student using clean nail clippers and placed in labeled containers with full information.

Table 1. The schools from which samples were taken

Primary school	Number of sample
Jawin school	15
Hassan Iava	10
Dasht mar	10
Bezahe	10
Raman	13
Barzan	12
Ifarman	13
Gashiben	20
Total	103

* Corresponding author

2.2 Laboratory analysis

Wet mounts of the nail clippings were prepared by immersing each nail clip in normal saline, and subsequently centrifuged for 5 minutes at 2500 rpm. The supernatant was discarded. From the sediment of each specimen a drop was placed on the center of a clean grease free slide using a sterile plastic Pasteur pipette with a drop of iodine or eosin stains, mixed well and carefully covered with a clean cover slip, avoiding air bubbles and then examined by light microscopy at low and then high magnifications (10, 40 and 100X) for species identification (WHO, 2006). Helminthic eggs were identified from their characteristic egg morphology, and the protozoa from their cysts and/or vegetative forms. The microscopic work was done in the Department of Biology, Faculty of Sciences, University of Zakho.

2.3 Data analysis

The prevalence rate was calculated as:
Prevalence (%) = number of students infected / total number of students examined X100.

3. RESULTS AND DISCUSSION

Table (2) shows the distribution and percentage of intestinal parasitic stages located under the fingernails of primary school students in some Zakho school. The total rate of infection with parasites was 25.24%, with the higher rate of infection (17.47%) with helminthic eggs and the lowest rate (7.76%) with protozoan cysts. This result is consistent with those of Al-Nafoly (2010) in Mosul city, who found higher rate of infection with helminthes than protozoa (8.88% and 6.66%, respectively). On the other hand, the present results differ from those of Abdullah and Al-Shirifi (2005) in Al-Taamem, as they reported a higher rate of infection with the protozoa (8.94%) than helminthes (6.81%). According to the helminthic eggs, the highest rate of infection was with the eggs of *Enterobius vermicularis* (7.76 %) and the lower rate of infection was with the eggs of *Trichuris trichura* (0.97 %). This is in agreement with, Hassan and Nazir (2010) in Duhok city, Al-Nafoly (2010) in Mosul city, and Abdullah and Al-Shirifi (2005) in Al-Taamem, all of them found high infection rates with *E. Vermicularis* (18.4%, 5.33% and 4.68%, respectively), but they are different from those of Moses *et al.* (2013) in Nigeria, as they found high infection rate (20%) with *A. lumbricoides* eggs.

The high rate of infection with the eggs of *E. vermicularis* is attributed to its direct life cycle, since it is transmitted via fecal oral route, and the gravid female migrate to the pre-anal area at night causing itching to the child, scratching the area with finger nail, in addition children do not pay much attention to washing hands, thus they eat or put the contaminated fingers to the mouth and acquire the infection (Fan *et al.*, 1998).

Regarding protozoal infections, *Entamoeba histolytica* was found to be more prevalent (4.85%) than *Giardia lamblia* (2.91%).Similarly Hassan and Nazir (2010) in Duhok city, found high infection rate with *E. histolytica* as compared to *G. lamblia* (14.4% and 6.2%), respectively. While Abdullah and Al-Shirifi (2005) in Al-Taamem, and Al-Nafoly (2010) in Mosul, they reported higher infection rate with *G. lamblia*. Roche and Benito (1999) attributed high rate with protozoan cysts to the long fingernails especially for girls as parasite cysts they can lodge under them in addition to the poor application of hand hygiene after the use of toilets.

Table 2. Shows the type and percentage of intestinal parasitic stages located under the Fingernails of primary school students, Zakho city (No:103)

Type of parasites		Number infected	%
Helminth eggs	*Enterobius vermicularis*	8	7.76
	Hymenolpis nana	6	5.82
	Ascaris lumbricoides	3	2.91
	Trichuris trichura	1	0.97
	Total	18	17.47
Protozoa cysts	*Entamoeba histolytica*	5	4.85
	Giardia lamblia	3	2.91
	Total	8	7.76
	Total	26	25.24

Table (3) shows the number and percentage of intestinal parasitic stages located under the fingernails of primary school students in Zakho city according to gender and age. According to the gender, the proportion of infected males was higher than females (17.47 % versus 7.76 %, respectively). The higher infection in males is consistent with the results of Al-Nafoly (2010) in Mosul city, who found higher rate of infection in males (9.75%) than females (5.73%). While Abdullah and Al-Shirifi (2005) in Al-Taamem, they found higher rate of infection in females than males (10.21% and 7.23%) respectively. The reason for higher infection rate in males may be due to the possibility of increased contact outside the home with contaminated soil or playing with animals, swimming in contaminated water (Zuk and McKean, 1996).

However, according to age, the highest rate of infection was recorded among the students aged 9 years, while the lowest rate of infection was among 10 years old (6.79 and 1.94%) respectively. This is consistent with the findings of the Al-Nafoly (2010) in Mosul city; they also found the highest rate of infection among 9 years old. The highest infection rate among 9 years students may be due to little care paid by mothers to this age as they grown up, and their activities will increase at this age, they go more often outside playing, so they will be subjected to more dirt's than younger or older ages, as older ages they pay more attention to their cleanliness (Palmer and Biffin 1990).

In conclusion these results clarify the role of fingernails in the transmission of parasitic infections, which requires continuous cleaning and cutting.

Table 3.The prevalence of intestinal parasites under the fingernails of primary school students in the Zakho and its relation with gender and age

Characteristic		Total	Positive	%
Gender	Female	31	8	7.76
	Male	72	18	17.47
	Total	103	26	25.24
Age (years)	6	11	4	3.88
	7	17	2	1.94
	8	26	5	4.85
	9	18	7	6.79
	10	15	2	1.94
	11	9	3	2.91
	12	7	3	2.91
	Total	103	26	25.24

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كورتيا ليكولينێ:

له ڤێ ڤەكولينێ دا, هاتيه كومكرن 103 سامبل ژ نينوكا (31 مێ و 72 نێر) ژ قوتابين قوتابخانێن سەرەتاى كو زيێ وان دناڤيرا 6 بو 12 سال, له باژيرێ زاخو ده ڤێ ماوى دا (مارس حتى نوفمبر 2015.(هەر سامپلك يێ نينوكا مه كر نا (محلول ملحى), كرن له جهازى سينترفيوج بو ماوەێ 5 جركه له لەزاتيا 2500 دور له جركه كێ دا. بيجك ژ(الرواسب) يى هەر سامپلكێ دانان سەر سليدكێ باقژ لەگەل درويك يود او يوزين, پاشێ هات تاقيكرن. ئەنجام ديارىوو كو ب ريژا 25.24% ژ هەبوو مشخور. مشخوريت بو مه هاتينه ديتن ئەڤ بوون: هيكا , Enterobiu vermicularis, Hymenolepis nana Ascaris lumbricoidesو 7.76, 5.82, 2.91)Trichuris trichaura و 0.97 %) له ديڤ ئيك, و كيس ژێ Entamoeba histolyticaو Giardia lamblia و 2.91 %).و له ديڤ ژيێ , ديار بوو كو ريژا بلند يا نەساخى له ژيێ 9 سالێ دا هاتيه ديتن. و له ديڤ رگزێ , ديارىوو كو نەساخێ له نێر ێ دا پتره له مێ دا (17.47 و 7.76 % له ديڤ ئيك).ئەڤ ئەنجام دياردكن كو رولێ نينوكا بو ڤەگوهاستنا نەخوشيت مشخور, ئەڤ داخازى ژ مه دكت كو به ردوام نينوكا بهينه ژيڤەكرن و پاقژكرن.

ملخص البحث:

في هذه الدراسة، تم جمع 103 عينة من الأظافر من أطفال المدارس الابتدائية (31 إناث و 72 ذكور)الذين تراوحت أعمارهم بين 6-12 سنة، والذين يقطنون في مدينة زاخو خلال الفترة من مارس لغاية تشرين الثاني2015. للكشف عن وجود الطفيليات المعوية .غمرت كل عينة من ألاظافر في محلول ملحي طبيعي ثم وضعت في انابيب زجاجيه لجهاز التنبيذ وتم تنبيذها لمدة5 دقائق عند2500 دورة في الدقيقة. اخذ جزء صغير من الراسب من كل عينة و وضع في وسط شريحة زجاجية نظيفة مع قطرة من اليود أو صبغة الايوسين، ومن ثم فحص باستخدام المجهر. أظهرت النتائج المجموع الكلي للاصابه ب 25.24% ببيوض واكياس الطفيليات المعوية. الطفيليات التي وجدت تضمنت ما يلي: بيوض ال Hymenolepis nana , Enterobius vermicularis , Ascaris lumbricoidesو Trichuris trichaura بنسب بلغت 7.76, 5.82, 2.91 و 0.97 % على التوالي، واكياس الاوالي لل*Entamoeba histolytica*و Giardia lamblia بنسبة 4.85 و 2.91 % على التوالي. بالنسبه للعمر، سجلت أعلى نسبة إصابة في الاطفال بعمر 9 سنوات. وفيما يتعلق بالجنس، أظهرالذكور أعلى معدل للإصابة من الإناث (17.47مقارنة 7.76 % علي التوالي). توضح هذه النتائج دورالا ظافر في انتقال العدوى الطفيلية، الأمر الذي يتطلب التنظيف المستمر والتقليم.