



Interest of the Kato Method in the Diagnosis and Counting of Helminth Eggs

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Authors' contributions

This work was carried out in collaboration among all authors. Authors AN designed the study, performed the statistical analysis, wrote the protocol. Authors GOB, DC and CAF managed the analyses of the study. Authors GBR, AJK, AL and KMLA managed the literature searches and statistical searches. All authors read and approved the final manuscript.

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ABSTRACT

This study investigated the value of the KATO method in the diagnosis and enumeration of helminth eggs in HZ-AC/SA. Helminthiasis are widespread disease worldwide and are among the most common conditions constituting a public health problem. It is a fact that most biomedical laboratories limit themselves to direct examination in the search for these parasites. This study lasted three months from May to August 2020 and took place at Abomey-Calavi/Sô-Ava Area Hospital Laboratory. For this purpose 106 stool samples collected from patients received at the laboratory of Abomey-Calavi zone hospital and Zinvé health center for coprological diagnosis were analyzed. At the end of the tests, 06.61% of the stools were positive. Ascariasis came first with 85.71% followed

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by hookworm with 14.29%. The study showed that only children are infested and the diagnosed parasites are only found by the KATO method. This method is effective in the diagnosis and counting of helminth eggs.

Keywords: Helminths; KATO method; coprological diagnosis; ascariasis, ascariasis.

1. INTRODUCTION

Intestinal parasitic diseases are responsible for considerable morbidity and mortality in the intertropical zone and often present as conditions with non-specific symptoms [1]. They are cosmopolitan diseases and represent one of the most frequent causes of medical consultations in tropical areas [2]. Indeed, the precarious lifestyle and climatic conditions are among the factors that influences the spread of these parasitoses. These conditions mainly include protozooses and helminthiases [3,4].

Most parasitic diseases in general and helminthiasis in particular cannot be diagnosed by clinical examination alone. Laboratory tests are necessary to find out whether or not the patient is infested and, if so, by which species. The laboratory thus plays an important role in establishing the diagnosis and is the key element in the choice of treatment. The biological diagnosis of certainty is based on freshly excreted faces and is based on direct examination on the one hand and one or more concentration methods on the other. At the zone hospital of Abomey-Calavi, it has been observed that not only are stool samples very rare, but also parasite tests are often negative.

The study showed the interest of the KATO method in the diagnosis and enumeration of helminth eggs [5,6].

More specifically, it is about :

- Valorize the KATO method
- Assessing intestinal parasite load in patients
- Show the specificity of the KATO method

2. MATERIALS AND METHODS

2.1 Equipment

Our study involved biological material consisting of 106 stool samples collected from patients received at the laboratory for coprological diagnosis and from patients at the Zinvié health center who were asked to undergo a stool

examination. Stool collection was done without distinction of gender.

The laboratory equipment used consists of slides, marker, latex gloves, blotting paper, fine mesh sieve, plastic plate with a hole in the middle and a constant diameter, spatula or tongue depressor, cellophane paper cut into rectangles of 22mm x 18mm, microscope. As reagents we used: KATO solution composed of solution 1 or 2. [7,8,9]

Solution 1

- Glycerin.....100mL
- Malachite green 3%..... 1mL
- Distilled..... water (100mL)

Solution 2

- It is a mixture at equal volume of a solution A
- Formol..... 1volume
- Saturated solution of NaCl1volume

And A B solution

- Polyethylene glycol 300..... 1volume
- Saturated NaCl..... solution ...1volume

2.2 Operating Procedure

The KATO method uses a thick stool spread which requires the use of a stool lightening solution. It is carried out as follows:

- The perforated plate is applied to a microscopic examination slide;
- The hole in the plate is filled with sieved saddles ;
- the surface is levelled and then the plate is removed;
- The sieved stool preparation is covered with a small cellophane rectangle soaked in KATO No. 1 solution at least 24 hours in advance.
- The preparation is left to stand for at least 30 minutes to allow penetration of the reagent. This makes the preparation

clearer and thus facilitates the observation of the eggs of the parasites.

- The totality of the spread is examined by counting all the eggs encountered. The number of eggs found is multiplied by 100 and divided by 3 to find the number of eggs per gram of stool.

We practiced the concentration of KATO on non mucousy, gliaro-bloody and diarrheal stools.

3. RESULTS

This study involved a sample of 106 stools. At the end of the examinations, 07 cases or 06.61% were positive while 99 or 93.39% were negative.

It appears from this Fig. 1 that the positive rate was only observed in patients received at CS-Zinvié.

From the analysis of this Table 2, it appears that the diagnosed parasitosis was observed only in children.

From this Table 3, it appears that only the KATO method allowed the detection of helminth eggs.

This Table 4 shows that the parasitoses observed by the KATO technique are: ascariasis and hookworm with the respective frequencies of 85.71% and 14.29%.

This Table 5 shows that the intestinal parasite load of patients with ascariasis is higher compared to that of patients with hookworm infection.

This table 6 shows that out of 7 positive stool samples no case of polyparasitism was noted.

4. DISCUSSION

The objective of this work was to determine the interest of the KATO method in the diagnosis and

enumeration of helminth eggs at the Abomey-Calavi / Sô- Ava zone hospital.

From data analysis, the study showed that out of a sample of 106 stools, 07 cases or 06.61% were positive, while 99 cases or 93.39% were negative (Table 1). Positive cases were only recorded in patients received at CS-Zinvié (Fig. 1). The low rate of positivity observed is due either to the urban environment of the majority of patients, or to the systematic deworming of the populations themselves [10,11], or to the automatic prescription of deworming agents by physicians during medical consultations. Vaccination campaigns combined with the administration of vitamin A and deworming agents explains the disappearance of parasites and are the cause of less environmental contamination and a reduction in the number of infested subjects [12,13]. All patients admitted to the zone hospital were negative. In fact, these patients are often treated at the health center level and are referred only for complicated cases to the zonal hospital, which is the communal referral center.

Table 1. Overall coprology outcome

Results	Employees	Proportion (%)
Positive cases	07	06.61
Negative cases	99	93.39
Total	106	100.00

Table 2. Age-specific coprological findings

Age (years)	1-2	3 > 13
Total		
Positive cases	07	00
07		
Negative cases	93	06
99		
Total	00	6
106		

Table 3. Distribution of helminth eggs according to the results of coprological examinations

Techniques	Direct examination		KATO	
	Employees	Proportion(%)	Employees	Proportion(%)
Parasites				
Helminth eggs	00	00	07	
100				
Total	00	00	07	
100				

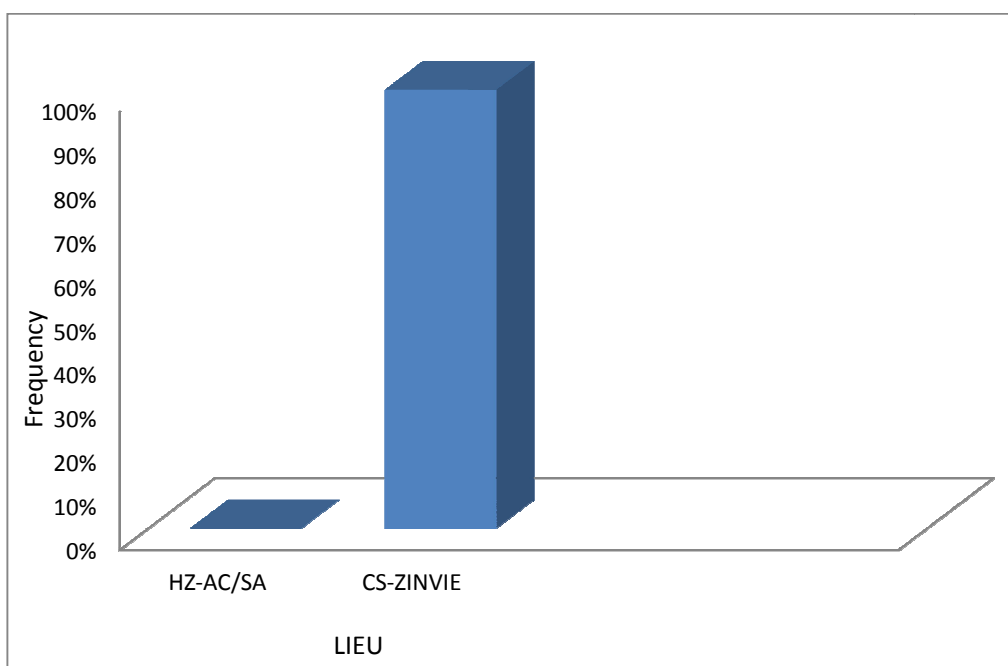


Fig. 1. Prevalence of helminthiasis as a function of location

The results in Table 2 show that parasitosis is observed in children; and this would be explained by the fact that they are constantly exposed to contact with contaminated soil or water without probably being aware of the need for good personal hygiene. Parasites observed using the KATO method are not found with direct examination; i.e. direct examination alone cannot give the certainty of a good coprological diagnosis (Table 3). Diagnosed parasitosis are hookworm and ascariasis. Ascariasis comes first with a frequency of 85.71%. The intestinal parasite load of patients with ascariasis is high compared to that of patients with hookworm infection [14,15]. The KATO method is particularly adapted to the search for *Ascaris* eggs, but not too effective for that of hookworm eggs; this confirms what was said in the work of Callot et al. [8]. This method involves a larger quantity of faeces and allows the detection of low infestations, which means that it concentrates the helminth eggs better and therefore gives a better yield: it is a fairly quantitative method (Tables 4 and 5) [16]. According to Table 6, no case of polyparasitism was observed in the subjects of the study.

It would be wise for laboratories to also practice the KATO method for counting helminth eggs, as the preparation of this solution is inexpensive.

The method is of great interest in the detection and enumeration of helminth eggs. It allows the quantification of eggs per patient, which is of great epidemiological interest. It should be noted that this method is of no value for cysts and vegetative forms of amoeba and flagellates.

Table 4. Prevalence of parasitic species diagnosed by the KATO method

Parasites	Proportion	Frequency (%)
Hookworm eggs duodenal	01	14.29
Eggs of <i>Ascaris lumbricoides</i>	06	85.71
Total	07	100.00

Table 5. Diagnostic performance of the KATO technique

Parasites	Number of eggs/g in stool
Hookworm	533
<i>Ascaris</i>	1733
<i>Ascaris</i>	3267
<i>Ascaris</i>	3033
<i>Ascaris</i>	2767
<i>Ascaris</i>	2566
<i>Ascaris</i>	2433

Table 6. Prevalence of polyparasitism

Type of parasitism	Employees	Proportion (%)
Monoparasitism	07	100
Polyparasitism	00	00
Total	07	100

5. CONCLUSION

At the end of this work, 106 stool samples were studied, 07 cases were positive and 99 negative, i.e. a prevalence of 06.61% of nematodoses. The parasites observed from the KATO method are not found with the direct technique and the present study revealed that only children (1-2 years) were infested. The KATO method allows not only the detection of parasites but also their quantification, hence its interest in the diagnosis and counting of helminth eggs. Given the importance of this method, it would be desirable to associate it with parasite diagnosis in order to increase the chance of finding helminth eggs even if they are rare.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Achir I, Hamrioui B. Coprologie parasitaire, edition pirates, pasteur institute of algeria ; 2010.
- Atchade P. Travaux pratiques de parasitologie médicale, EPAC/ GBH/ ABM/ UAC. 2012;48.
- Atchade P. General Parasitology Course, EPAC/ GBH/ ABM/ UAC. 2012;127.
- Atoba C. Medical Parasitology, unpublished course UNIKIS faculty of medicine; 2009.
- Aubert J. Parasitologie courante à l'exclusion du sida et du paludisme, Paris Nord; 1993.
- Berlandi P. Tropical parasitology: Parasitology in Nosy-Be (Madagascar). Marseille (FR) : University of Aix-Marseille II; 1984.
- Bouree P. Laboratory examinations in tropical medicine: Médecine-Sciences, 2nd Edition; 1987.
- Callot J. et al. La technique de KATO dans la recherche des œufs d'Helminthes, Revue Générale de Techniques de Laboratoire; 1969.
- Chiodini P, et al. Parasitologie médicale: techniques de base pour le laboratoire, France; 1997. 90/8687/-JOUVE- 2000
- Dereure J. Diagnosis of helminthoses, Faculty of Medicine Montpellier-Nimes; 2008.
- Gillet P. Les helminthes parasites, Département of clinical sciences, Unit of tropical laboratory medicine avril; 2009.
- Goarnisson J. et al. Guide médical africain, père le blanc 5e édition, Senne; 1963.
- Menan H. Intestinal Helminthiasis in school-aged children in the city of abidjan: Profile and Influence of socio-economic conditions on the health of school-aged children in the city of abidjan. Economiques, Theses Pharmacie, Abidjan. 1995;104.
- Merad J. Parasitic coprology, faculty of medicine (SBA) Department of Pharmacy.
- M'panda L. Intestinal parasitosis in Kisangani, Unpublished Monograph, Faculty of Medicine, UNIKIS; 1988.
- Nozias et al. Coprological examination in current parasitology, Faculty of medicine Abidjan; 1976.

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