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ON LOOK ON MEBENDAZOLE DEPARASITIZATION COVERAGES OF CHILDREN OF AGE UNDER FIVE (2011-2016) AND HELMINTHIASES INCIDENCE RATE IN THE HEALTH ZONE OF KAMALONDO, DR CONGO: DISCONTINUE OR CONTINUE WITH THE STRATEGY?

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ABSTRACT

Introduction: One of neglected tropical diseases, geo-helminthiasis, currently recognized as an extremely preoccupying ongoing public health problem. In DR Congo, the Mebendazole therapy coverage rates and its incidence are less documented.

The aim of this study was to assess the Mebendazole therapy coverages of children under age five years in proportion to the ongoing mass strategy.

Methods: This is a cross-section descriptive study conducted in children under age five in the town of Lubumbashi in DR Congo; all the structures whether public or private and children under age five were randomly selected. The studied parameters were: the proportion; the coverage rates and the incidence rates.

Results: Out of a total of 12, 592 examined children under age range of 6 to 59 months, we registered 6, 571 who were diagnosed and submitted to Mebendazole; out of a sample of 46, 130, the following cover ages were found : 106.85% in 2012 ; 102% in 2013, 100% in 2014, 101% in 2015 ; 101% in 2016.

And 10.3% of parents of children under age five and 17% of the population appreciated the organizational aspect of the mass Mebendazole distribution campaign. In all 6, 571 treated cases; only lumbricoidascarid was identified as a parasite with the highest prevalence 17.68%. Incidences rates during the last five years reveal inferior to 20% i.e. respectively: 15.6% in 2012; 15.5 % in 2013; 15.9% in 2014 ; 16.3% in 2015 and finally 16.8% for 2016.

Conclusion: From these results stemming from this study we gather that geo-helminthiasis remain one of the causes of parasitosis concerning public health; it is thus important to make significant inquiries for the improvement of the strategy already implemented in order to reduce their parasitosis charge arising from geo-helminthiasis.

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INTRODUCTION

Geo-helminthiasis are infections due to different species of parasitic worms. They are transmitted by eggs present in human feces which contaminate the soil where sanitation leaves to be desired. They affect the poorest and most under privileged populations and are very common in the world. Helminthiasis and intestinal worms are widespread parasitoses in the world, more particularly in tropical and intertropical countries [1,2]. Ancylostomiasis, ascariasis, anguillulosis and

trichocephalosis are the most frequently encountered helminthiasis in tropical area [3, 4].

Helminthiasis are related to the presence in the human intestine of round or flat worms. Certain species of nemathelminthes or round worms such as: Lumbricoidascarides, Enterobius vermicularis, Strongyloides stercoralis, Wuchereriabancrofti, Loa loa, and of plathelminthes or flat worms such as: Schistosoma intercalatum and Taenia. They are found in the Democratic Republic of the Congo, particularly in

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Lubumbashi. Frequently lumbricoid ascarid, Enterobius vermicularis are found.

In the world about 1.5 billions of people are contaminated by geo-helminthiasis. Although carrying grownup worms may often be asymptomatic, there are repercussions on the health state of an individual such as nutritional deficiency, anemia and diminution of cognitive infections in children[5]. The number of yearly death rate directly related to geo-helminthiasis infections has reached 135, 000, but the main impact of these infections lies in their chronic effects on health and nutrition[6].

In Africa, several people of all age are contaminated by this pathology especially with a proportion of preschool and school age in developing countries having very low social and economic lives.

Treatment of helminthiasis is done by using antihelminthiasis medication capable of destroying responsible worms[8], or by paralyzing them in order to be evacuated by peristalsis in the waste matters. Preventive measures: always use the toilet or latrines to prevent feces from contaminating the soil and water; always thoroughly wash the food (fruits, vegetables...) using clean water; always wash hands with clean water and soap after using the toilet, keep hands clean; always wear shoes and avoid walking barefoot in rivers, water body and ricefields; take vermifugal tablets at least once per year[9].

The Member States of WHO proposed a combined approach to fight at the same time morbidity due to schistosomiasis and that one due to geo-helminthiasis aware of the fact that the tools for fight and target groups are basically the same. A regular treatment is accessible and can be delivered in existing locations. This strategy applied to treat the persons exposed to the risk of morbidity due to schistosomiasis and geo-helminthiasis was approved by the World Health Assembly in its resolution WHA54.19. Since 2004, the foundation BILL and BELINDA GATES in collaboration with WHO resolved to finance mass treatment campaigns in six African countries.

The WHO recommends periodical administration of drugs such as Mebendazole (500mg) and Albendazole (400mg) which are objects of donations by this structure to national health ministries of all the endemic countries in order to treat the totality of children. A drug treatment administered once per year when geo-helminthiasis prevalence in a community is superior to 20% and twice per year when it is superior to 50%.

In the Democratic Republic of Congo, thousands of persons are contaminated by geo-helminthiasis and specifically in Lubumbashi but information on coverages and incidence rates are very often unavailable. Grown-up worms can be directly detected by a macroscopical examination of stool. In most cases it is the microscopical examination which highlights the eggs. Examination of beef; observation of proglottis in clothes, in bed; sensation of the passage of proglottis through the anus in case of Tænia [7].

METHODOLOGY

Study site: This study was implemented in the town of Lubumbashi, in DR Congo, which counts 9 sanitary districts, 7 reference general hospitals and 104 health centers belonging mostly to individuals [10].

Type of study and period: Transversal descriptive from 2011 to 2016.

Population under study and Technique of collection: Children under age five, the data collection was carried out by way of a self-administered questionnaire addressed to all health workers after the obtention of their clarified consent; registers containing data on the campaigns of Mebendazole administration deparasitization covering the last five years.

Sampling: About the significance of the survey; it was convenient and should be more than the double of the one of state as well as private structures; thus, we worked on a sample of 46, 130 children under age five; even here the random sampling was applied (health zone; health structures; children).

Data analysis: The program used to analyze and process the data was EPIINFO 7.2 downloaded from the site of CDC Atlanta and free. This program helped us to calculate the proportion of the cases treated with Mebendazole during the last five years, the proportion of children of age under five infected by helminths during the same period of time in the health structures of Kamalondo. We also calculated the incidence rate at the same time.

RESULTS

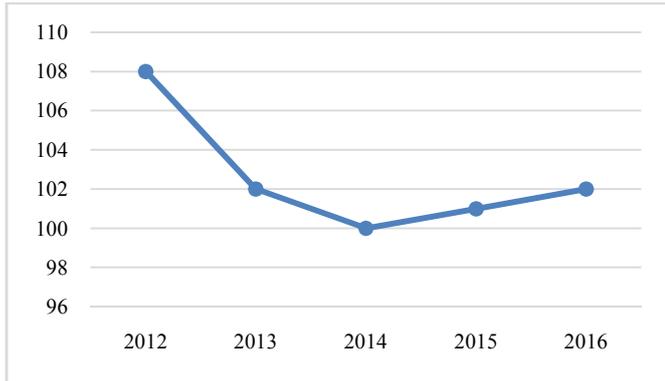
Data on coverage and incidence rate: Mebendazole administration deparasitization coverage of children of age under five during the last five years with a measurable sample from state and private structures was 57, 624 cases (children aged from 6 to 59 months); one coverage reveals very high 108% in 2012 and two others 2013 and 2016 have an identical coverage of 102% and successively 100% in 2014 and 101% in 2015 (Graphic I) while the annual geohelminthiasis incidence rates are very high 16.50% in 2016 followed by 16.25% in 2015 with a low rate of 15.50% in 2013 (Graphic II); and out of 46, 130 (80.1%) deparasitized children of age under five; the incidence rate rises along with the years i.e. 15.6% in 2012; 15.5 % in 2013; 15.9% in 2014; 16.3% in 2015 and lastly 16.8% for 2016; the general remark was that during the last five years incidence rates were inferior to 20 % (Table 3).

Table 1 Distribution of geo-helminthiasis to children under age five (2011-2016)

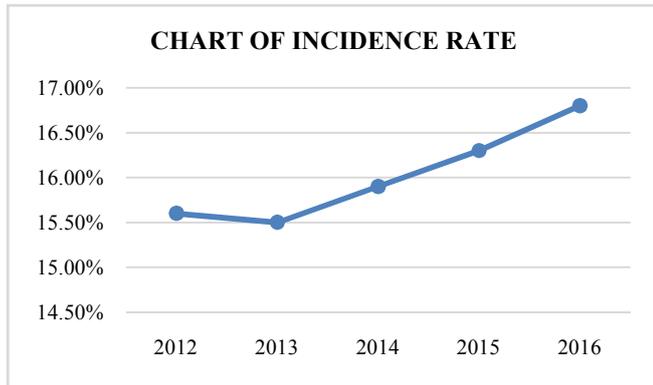
Age range (months)	Number of children	Deparasitized	Percent
] 6-12]	8,580	4,711	54.91%
] 12-18]	6,041	4,977	82.39%
] 18-24]	6,438	3,545	55.06%
] 24-30]	7,072	6,241	88.25%
] 30-36]	4,269	5,602	131.23%
] 36-42]	7,056	4,050	57.40%
] 42-48]	6,562	6,697	102.06%
] 48-54]	7,798	5,854	75.07%
] 54-60]	3,808	4,453	116.94%
Total	57,624	46,130	80.05%

Geo-helminthiasis distribution: In relation to age range (in months), out of 57, 624 children of age under five (only 46, 130 deparasitized children), age range of]30-36] is the most infected (131.23%) and the least infected is of]6-12] with (54.91%). (Table 1); regarding sex, the general trend during the

last five years indicated that male children are the most infected, i.e. a proportion of 87.65% (Table 2).



Graphics I Representative chart of Mebendazole distribution coverages to children under age five in the health zone of Kamalondo for the last five years.



Graphics II Representative chart of annual incidence rates of Geo-helminthiasis in children under age five in the health zone of Kamalondo for the last five years

Table 2 Distribution of Geo-helminthiasis to children under age five according to sex in the health zone of Kamalondo during the last five years

Year	Sex	Number of children	Deparasitized	Percent
2011-2012	Male	7,702	6,420	83.35%
	Female	4,814	2,549	52.95%
2012-2013	Male	7,775	5,985	76.98%
	Female	5,126	2,948	57.51%
2013-2014	Male	7,208	6,499	90.16%
	Female	3,663	2,644	72.18%
2014-2015	Male	6,301	5,953	94.48%
	Female	4,412	3,457	78.35%
2015-2016	Male	6,502	6,065	93.28%
	Female	4,121	3,610	87.60%
Total		57,624	46,130	80.05%

Table 3 Annual incidence of Geo-helminthiasis of children under age five in the health zone of Kamalondo during the last five years

YEARS	Deparasitized	
	Mebendazole	Incidence Rate
2012	8,969	15.6%
2013	8,933	15.5%
2014	9,143	15.9%
2015	9,410	16.3%
2016	9,675	16.8%
Total	46,130	80.1%

Parasites prevalence: According to the species of helminthes Ascarid (lumbricoid Ascaris) that is 17.68% is the most prevalent helminth followed by Oxyuriasis (Enterobius vermicularis) with 15.45% and then by Ancylostoma

(Encylostoma duodenalis) (12.89%). (Table 4); regarding high risk months during the last five years, the month of June (8, 516 children infected by helminthes) is the highest risk month followed by August with 8, 459 and finally by July with 6, 943 children (Table 5).

Table 4 The most prevalent helminthes

Helminthes (species)		Percent
Nematodes	Ascarid (Ascaris lumbricoides)	17.68%
	Pinworm Infection enterobiasis Oxyuriasis (Enterobius vermicularis)	15.45%
	Hookworm Ancylostoma (Duodenal Ancylostoma)	12.89%
	Trichocephalis (Trichuris trichuria)	9.56%
	Anguillulosis (Strongyloides stercoralis)	4.73%
Trematodes	Schistosomiasis (Schistosoma mansoni)	9.87%
	Schistosomiasis (Schistosoma haematobium)	11.30%
	Schistosomiasis (Schistosoma intercalatum)	6.87%
Cestodes	Tapeworm (Taeniasolium)	7.31%
	Tapeworm (Taeniasaginata)	4.34%
Total		100%

Table 5 High risk months during the last five years

Cumulated months	Number of children infected by helminthes
January	1,523
February	2,127
March	4,437
April	4,247
May	5,237
June	8,516
July	6,943
August	8,459
September	2,457
October	709
November	786
December	689
Total	46,130

Opinion on Mebendazole: 10.3% of parents of children of age under five and 17% of the population appreciated the organization of mass deparasitization campaign while 21.6% of parents liked the simplicity of treatment and 21.1% did not like the drugs because of its secondary effects; and as a feeling of satisfaction after the deparasitization 79.2% of parents with 74.2% of the population recovered their health (Table 6).

Table 6 Opinion of parents of children under age five and of the population of the health zone of Kamalondo (%) about their health state after mass treatment (2011-2016).

Opinions	Parents	Population
Health state		
Good	79.2	74.2
Improved	18.2	23.1
No improvement	2.3	2.4
Aggravated	0.3	0.3
Likes		
Organization	10.3	17
Simplicity of treatment	21.6	24
Information on secondary effects	4.5	5
No opinion	15.7	8
Dislikes		
Taste of drug		38
Number of swallowed tablets	11.5	12
Undesirable effects	21.1	13
Size of tablets	17.6	24
No opinion	18.8	13

DISCUSSION

Our study sets out to assess the coverages of Mebendazole deparasitization of children of age under five implemented in the health zone of Kamalondo in Lubumbashi through a descriptive transversal study.

Regarding the coverage during the last five years, the coverage rates in Mebendazole deparasitization were very satisfactory. As a matter of fact, these coverages were beyond 99% starting from 2012. This reveals the adherence of parents to this strategy. But this tendency is also confirmed by the scale of certain health zones of the town in Lubumbashi, it is an average of 95% according to the provincial coordination of nutrition of Haut-Katanga. We should also note that an anthropometric nutritional survey financed by USAID conducted in April 2013 had revealed a coverage of 83.1% in the health zone of Kinda [11, 12].

The coverages of Mebendazole distribution to children of age under five during the last five years in the health zone of Kamalondo are of 106.85% in 2012, 102% in 2013, 100% in 2014, 101% in 2015, and 101% in 2016.

About the routine distribution of drugs, Anthelminthics are prescribed to children of all range and adults [13]. The medical personnel takes the time to inform the population to get themselves and their children deparasitized by giving them a certain period of time after each deparasitization which they should comply with. 10.3% of parents of children of age under five and 17% of the population of the health zone of Kamalondo appreciated the organization the mass deparasitization campaign.

About the prevalence of parasites; Ascarid revealed to be the most frequently encountered parasite (17.68%), followed by multiple infestations such as Enterobius vermicularis (15.45%), Duodenal Ancylostoma (12.89%), Schistosoma haematobium (11.30%), Schistosoma mansoni (9.87%), Trichuris trichuria (9.56%), Taenia solium (7.31%), Schistosoma intercalatum (6.87%), Strongyloides stercoralis (4.73%) and finally Taenia saginata (4.34%). The high prevalence of Ascarid is due to hot, humid region, proper soil favoring the survival and spread of eggs of Ascarid [14]. The habit of bad conditions of hygiene is the most important factor of the high prevalence of Ascarid; the way of discarding feces and their use in the fertilization of soil are also undoubtedly principal sources of infection for man. Multiple infestations could be explained as everywhere else by the fact that most of these intestinal parasites live in the same conditions [15, 16].

Regarding Geo-helminthiases prevalence and high risk months; our study reveals that the month of June and August counted the largest number of geo-helminthiases. Opposite to this, MWEZE [17] had found in his study that May, August and September counted the largest number of Geo-helminthiases due to the abundance of rains during these months. Rains soak the soil and favors the stagnation of water, which in turn favors the development of eggs and larvae of parasites [18, 19]. It flows from our study that parasitoses have no periodicity in our environment. It is due to the permanence of geographical and climatic conditions favorable to parasites.

These optimal conditions for the development of parasites increases the chance of infestation of the population.

Talking about the involvement of parents and of their feeling of satisfaction after Mebendazole deparasitization, parents are involved in the fact of insuring that their children take the drugs properly. They take part in the action of deparasitization and assure themselves of the passing character of undesirable effects related to the taking of the drugs for the good of their children. 21.6% of parents of children of age under five like the simplicity of treatment and 21.1% do not like the undesirable effects. Parents actively participate in the deparasitization campaigns and constitute a major pillar for the good progress of the treatment. The satisfaction of parents of children of age under five and of the population after Mebendazole deparasitization is most often observed. 79.2% of children of age under five and 74.2% of the population regained good health after deparasitization.

Incidence rate: The incidence rate in the health zone of Kamalondo is of 15.6% during 2012, 15.5% in 2013; 15.9% in 2014; 16.3% in 2015 and 16.8% in 2016. The general remark is that during the last five years the incidence rates are inferior to 20% [20].

CONCLUSION

In developing countries only a clean environment could insure to millions of residents of city areas a permanent protection against common chronic sicknesses caused by intestinal parasitoses. At the end of this study it seems that the objectives of Mebendazole therapy in terms of distribution of drugs to children have been reached. However, the burden of Geo-helminthiases still remains high. Ascariidiosis, oxyuriasis and ancylostomiasis are the most dominant. Considering the results of this study, stop or continue? It is advisable to improve with the help of WHO other strategies than those ones already implemented since they have revealed their limitations against Geo-helminthes to lower the burden of these in DR Congo.

Update knowledge on the topic

1. Children under age five are extremely vulnerable to deficiencies caused by helminthiases;
2. Geo-helminthes most commonly referred to as intestinal worms represent a serious public health problem in tropical regions, in regions where health and hygiene conditions leave much to be desired;

Contribution of our study to the knowledge

- To have the community actively take part in the strategy of Mebendazole distribution,
- More attention should be paid to children under age five;
- Prevention by sanitation of environment remains a key-weapon.

Interest Conflicts

Authors declare no interest conflicts.

Contributions of authors

AK conceived the study, collected, analyzed the data and wrote the manuscript. PM contributed to the redaction of the

manuscript and to the reading and correction; OL and EM was the coach.

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