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Onchocerciasis in the Democratic Republic of Congo: Survey of knowledge, attitude and perception in Bandundu province

Jean-Claude Makenga Bof[a,*], Dieudonne Mpunga[b], Emery N. Soa[b], Fortunat Ntumba[c], Didier Bakajika[c], Michele E. Murdoch[d], Yves Coppieters[a]

[a] School of Public Health, Université Libre de Bruxelles (ULB), Brussels, Belgium
[b] School of Public Health, Faculty of Medicine, University of Kinshasa, Kinshasa, Democratic Republic of Congo
[c] National Program for Onchocerciasis Control, Kinshasa, Democratic Republic of Congo
[d] Department of Dermatology, Watford General Hospital, Watford, Herts, UK

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ABSTRACT

A community-directed treatment with ivermectin (CDTI) for fighting onchocerciasis was started in 2003 in the hyperendemic province of Bandundu, Democratic Republic of Congo (DRC); such initiative was supported by the African Programme for Onchocerciasis Control (APOC). As the APOC stopped at the end of 2015, there was an urgent need to assess the sustainability of an ivermectin treatment.

A cross-sectional survey of knowledge, attitude and perception was conducted to determine the awareness level of local population regarding the disease. A multi-stage random sampling technique allowed the selection of 450 heads of households.

Most respondents (96.9%) knew about onchocerciasis as a disease. The black-fly was viewed as the causing agent of onchocerciasis by 49.9% of respondents. The most commonly cited clinical manifestations were nodules (34.4%) and pruritus (31.1%), while blindness was the most frequently reported complication (90.7%). Approximately 55.1% of respondents had a good knowledge of onchocerciasis and CDTI. Overall, only 37% of participants had a favourable attitude and 46% a positive perception. Good knowledge was associated with school attendance (adjusted OR = 1.9, 95%CI: 1.3–2.8, p = 0.001), while education and continuation of treatment were related with good attitude (adjusted OR = 9.7, 95%CI:4.8–19.5 and adjusted OR = 19.8, 95%CI: 9.7–40.6, respectively, both with p < 0.001). Good perception was associated with being at least 46 years old, non-Catholic and continuing the treatment (adjusted OR = 3.2, 95%CI:1.2–9.1; adjusted OR = 29.6, 95%CI:14.1–62.2 and adjusted OR = 5.1, 95%CI:1.6–16.0 respectively, all with p < 0.001).

A good level of knowledge, attitude and perception is needed for a massive adherence of population to onchocerciasis control programmes. In the area of study (Moanza, DRC), good attitude and perception motivated the continuation of treatment in the population. In the future, different plans should focus on educational strategies to maintain a massive adherence and reduce onchocerciasis prevalence.

Introduction

Onchocerciasis, or river blindness, is a chronic parasitic disease caused by the nematode worm *Onchocerca volvulus* which is transmitted to humans through the bites of blackflies (genus *Simulium*) [1]. Black flies lay eggs in running waters, thus increasing the risk for populations living nearby. When a female black fly bites an infected human during a blood meal, microfilaria is transmitted from the host to the fly. After 3 weeks, microfilaria grow inside the black fly to become infecting larvae. These are further transmitted to other persons by the infected fly during another blood meal. In human hosts, larvae move in subcutaneous tissues, and form nodules; they mature slowly and achieve their cycle when becoming adult worms [2]. It is estimated that around 37 million people are carriers of *O. volvulus* worldwide, and more than 99% of cases occur in sub-Saharan Africa [3,4]. Small foci of infection have also been identified in Latin America and Yemen [5]. The clinical presentation of the disease involves skin (pruritus, acute, chronic and lichenified onchodermatitis, atrophy, depigmentation and subcutaneous nodules) and eyes (punctate and sclerosing keratitis, uveitis, optic nerve atrophy, chorioretinitis); blindness is the most serious complication [6,7]. Onchocerciasis is a public health priority in affected

* Corresponding author.
E-mail address: jcmakebof@yahoo.fr (J.-C. Makenga Bof).

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areas due to its severe socio-economic impact [8–15], including stigmatization of affected people and decreased education level [16,17]. In the Democratic Republic of Congo (DRC), onchocerciasis is endemic in all 11 provinces [18]. More than 26 million people are estimated to be at risk of infection, which represents 40% of the population; one of a thousand infected patients develops blindness as a complication [19]. Forty percent of children whose parents suffer from onchocerciasis do not attend school; they assume the role of guides for their blind parents and thus become "forgotten" by the community [20,21]. DRC is one of the poorest countries in the world and the United Nations Development Programme considers that the country will not become an emerging country before 13 years from now [22]. In developed countries, patients have access to scientific-based theories informing them on their disease [23], but it is far from being the case in developing countries. In the latter, beliefs and other associated values influence health and the course of a disease. In DRC, levels of knowledge, attitude, skills and perception of population on onchocerciasis, as well as its participation in control programmes, will be critical for the evolution of the disease.

This study was triggered by preliminary results highlighting a low therapeutic coverage, as reported by the National Programme for Onchocerciasis (NPO). We wished to ascertain whether such low coverage was due to a lack of knowledge, or to a negative attitude or perception of the population. Moanza health area (HA), located in the province of Bandundu, was selected because it was one of the first to integrate a treatment strategy based on community distributors, with the support of the African Programme for Onchocerciasis Control (APOC). Onchocerciasis was hyperendemic in that area, and ivermectin therapeutic coverage evolved from 39.6% to 58.7% between 2003 and 2014; a 100%-geographical coverage was ensured over that period. The objective of the study was therefore to determine the level of knowledge, attitude and perception of onchocerciasis in Moanza, following 12 years of Community-Directed Treatment with Ivermectin (CDTI), in order to strengthen future public health interventions.

Materials and methods

Description of the study area and population

The study was conducted in March 2015 in Moanza rural HA, one of the country's 515 areas. The DRC is the second largest country in Africa, falling just behind Algeria. It is a central African country covering 2,345,410 km^2. Between 2000 and 2016, its population ranged between 65 and 77 million people, according to the National Institute of Statistics. The country is bounded on the north by the Central African Republic and Sudan, while Uganda, Rwanda, Burundi and Tanzania border it at East, Zambia in the South, Angola in the Southwest and Congo at West. Its capital is Kinshasa. Onchocerciasis is endemic in DRC, due to its enabling environment for the development of vectors. Moanza is located in the province of Bandundu, sectors of Bindungi and Kinzenzengo, part of the Masimanimba territory. Economy mainly relies on agriculture, livestock farming and fishing. Most onchocerciasis cases are reported in communities located on the Inzia River. A Rapid Epidemiological Mapping of Onchocerciasis (REMO), based on geographical information (in particular river systems), followed by a Rapid Epidemiological Assessment (or REA), were started in DRC and Moanza, in 1997 and 2000, respectively [24].

For each selected community, REA consisted of measuring the prevalence of skin nodules in a sample of 50 men aged at least 20 years old and who were living in the community for 10 years or more. The endemic status of areas was assessed as follows: (i) hypoendemic corresponded to less than 20% of adults presenting nodules, (ii) mesoendemic meant 20 to 39%, and (iii) hyperendemic corresponded to 40% and above. Any community accounting more than 20% of adults with nodules (i.e. meso- and hyperendemic areas) were eligible to receive CDTI.

The REMO survey showed that 84% of the population of interest had onchocerciasis nodules, which corresponds to a hyperendemic area. Since 2003, mass treatment with ivermectin has been implemented gradually, with the assistance of 870 community distributors targeting 275 villages. In 2015, the population eligible for CDTI accounted 163,964 inhabitants.

Type of study, sample size and data collection

Type of study

Our cross-sectional analytical study included 450 households selected by systematic random sampling from the list of 20 HAs. In DRC, a **health zone** (HZ) represents the basic operational level for the organisation, planning and development of sanitary activities. It is a well delimited geographic entity (maximum diameter of 150 km) included within the limits of a territory or administrative municipality; its population reaches at least 100,000 inhabitants and gathers communities homogeneous from a sociocultural point of view. Health services exist at two interdependent levels, i.e. first-line health centres and second-level General Reference Hospital, but under the supervision of a HZ management team.

A health zone is subdivided into several **health areas** (HA); a HA is a well delimited geographic entity composed of several villages in rural areas/several streets in urban environments, established according to sociodemographic affinities. One HA accounts with approximately 10,000 inhabitants, according to the context (rural vs. urban). Each HA is covered by a Health Centre.

In each HA, four villages were selected through simple random sampling. In each village, structured questionnaires were submitted to the heads of 10 randomly selected households, after they provided a written informed consent. Four trained investigators led the interviews.

Sample size

Given that 50% of households had a good level of knowledge, attitude and perception, and considering 95% confidence intervals (95%CI) (i.e. 1.96 standard deviations) along with a 5% margin of error, the minimum sample size was estimated at 384. In order to ensure accuracy, we avoided the problem linked to non-respondents by fixing the sample size at 450 households.

Data collection

Tools and methodology

Data were collected by health professionals in Moanza HZ. Before starting interviews, health professionals were trained on the methodology to use for data collection. Interviews were conducted in Kikongo language. Individuals who were living in the area for more than one year were included in the study.

Variables measured

The following socio-demographic variables were collected: age, sex, marital status, education level, occupation, religion and number of persons living in the household. In addition, data on heads of household' level of knowledge, attitude and perception of onchocerciasis and CDTI were gathered.

The level of knowledge was assessed through seven criteria: knowledge of onchocerciasis as a disease, causing agent, disease transmission, common clinical signs, possible complications, prevention and treatment. Attitude was determined by assessing the

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