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Parasitic Infestation: Impact of Life Style in Far North Province, Cameroon

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Abstract: Parasitic analysis of stools, urines and blood, on inhabitants of two districts (Bongor and Banana I) in locality of Maroua, was carried out which permitted us to raise a blood interference predominance on mesoparasites. The mean rate of parasitized subjects by *Plasmodium* sp. is 55,33% against 41.33 and 8% respectively for the parasites present in stools and in urine. Investigations on the behaviour of the inhabitant's studies and their physical setting environment led to the observation that Banana I is less healthful than Bongor. Plasmodia infestation functions in the two districts, because of differences of the people's of life style in each part. For example houses of Bongor do not have a lot of variations contrary to those of Banana I. On the other hand, the infestation of interferences is owed to the behaviour of individual and the living conditions (insalubrities of the district). Infestation is meaningfully more elevated in Banana I, either an average of 50.7% of parasitized subjects against 32% in Bongor (Z = 2,11) to the risk of 5%, for parasites of the digestive tubes. This difference is also audible for the present interferences in the urinary system (Z = 5.6) with the respective rates of 12 and 4% to Banana I and Bongor.

Key words: Parasitic analysis, mesoparasites, life style, banana I, Bongor

INTRODUCTION

The tropical zone is subject to the development of numerous human parasites, because of the climatic condition and hygiene. In the tropical African parasites are more accentuated because of the material poverty of inhabitants. Cameroon does not escape this situation.

The administrative province of the Far North province of Cameroon, like all regions situated in tropical zone is confronted with different types of diseases among which are parasitic illnesses. The uncontrolled regrouping of the human population and the farming exodus, encourage promiscuity, insalubrities and the diminution of their hygiene conditions. The different factors enumerated encourage the infestation of human parasites[1] reveal the permanence of the malaria in the locality of Maroua as a hypo - endemic zone Delome *et al*[2] then Moussa[3] put in evidence the existence of a bilharziose home to Maroua[4] found several human mesoparasites in the population. According to some authors, there is a sporadic presence of certain epidemic illnesses as meningitis[5] and cholera[6].

These illnesses also undergo an expansion because of the certain factors: financial difficulties and the climatic conditions like short rainy season. These two parameters provoke an important reduction of a permanent deforestation, modify the different climatic factors. This modification entails a reduction of the agricultural production[7] Thus, the food suppleness is routed regularly to populations in order to survive during the period understood between the food commodity weariness and the next harvest (period of soldering). The city of Maroua, seat of this province, with its population does not escape these problems.

The objective of the study is to evaluate the relationship between the environment and the behaviour of the inhabitants in order to see the rate of interference frequency in the population in the locality of Maroua.

MATERIALS AND METHODS

Survey zone: The Far North province of Cameroon is situated between the 10° and 13° of North latitude and 13°16′ and 15°40′ of longitude East. The study is achieved in the department of the Diamare (4665 Km^2), characterized by one dry season in the city of Maroua. It has a climate of Sahelian-Sudanese type (October - April) and a rainy season (May - September). The sample population

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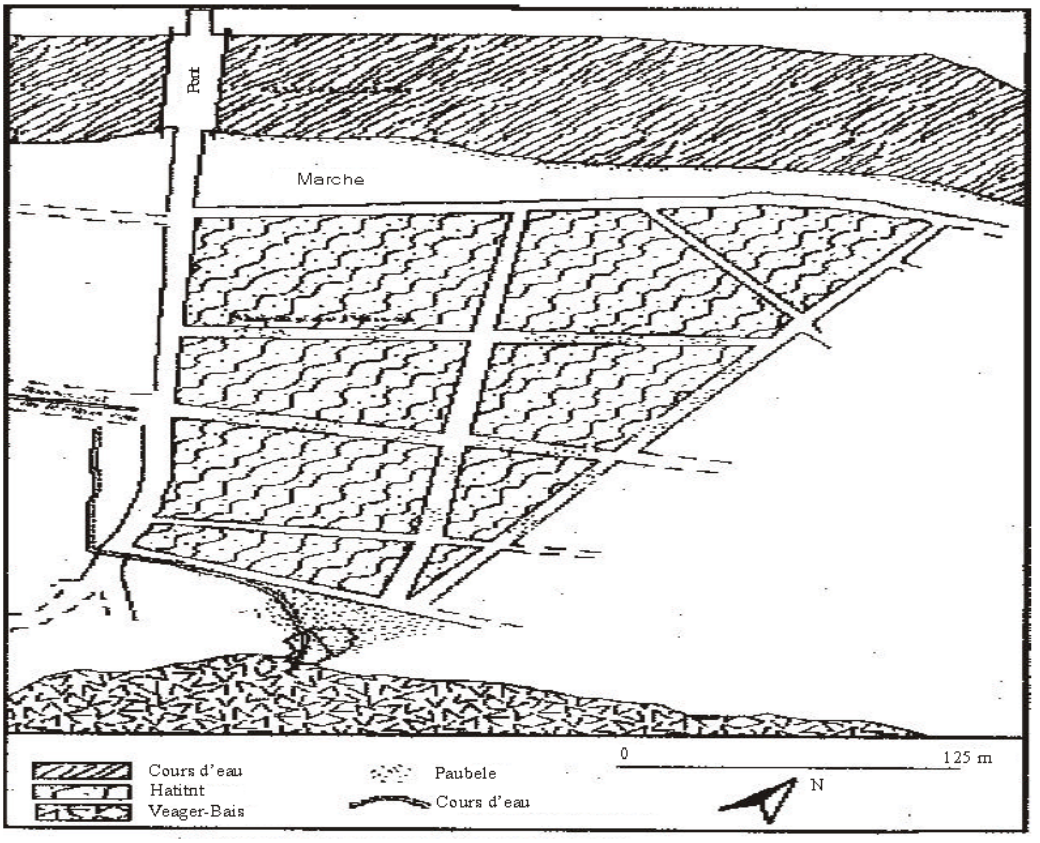


Source: Plan de Marouna, 1: 10,000, 1987 C.G.N.Y

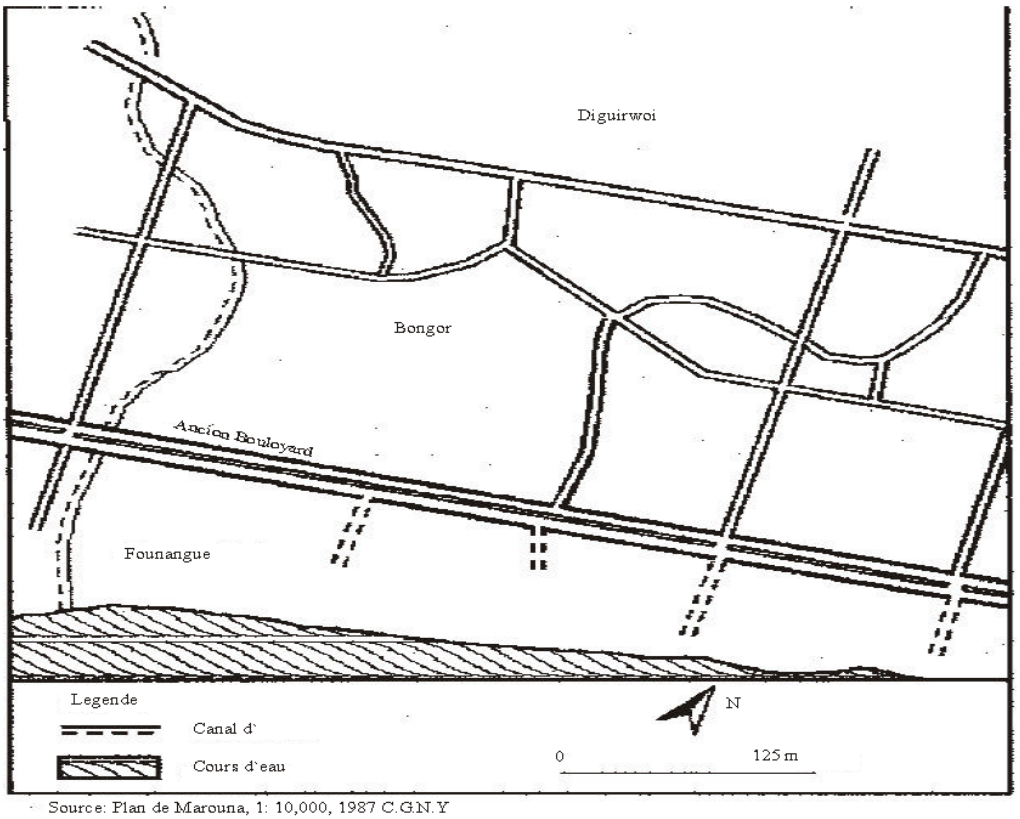
Fig. 1: Schematic representation of the district of Banana I, Maroua (Cameroon)

Technical Card

Names and first names:.....

Sex: M☐ F☐ Age: District:.....

1- Do you consume garishness? (salads, tomatoes, cucumber and other):	Yes☐	No ☐
2 - wash yourselves your garishness before consumption?	Yes☐	No ☐
if it is yes, with		
- simple drinking water?	Yes☐	No ☐
- bleach?	Yes☐	No ☐
- saltwater?	Yes☐	No ☐
- permanganate,	Yes☐	No ☐
- acidified water?	Yes☐	No ☐
3 - eat yourselves of the insufficiently cooked meat?	Yes☐	No ☐
4 - take yourselves your bath to the creek?	Yes☐	No ☐
5 - walk you naked feet?	Yes☐	No ☐
6 - have you latrines in your place of dwelling?	Yes☐	No ☐
Otherwise, you make your needs:		
To the creek?	Yes☐	No ☐
In the nature?	Yes☐	No ☐
7 - what type of water do you drink?		
SNEC (drinkable)?	Yes☐	No ☐
well?	Yes☐	No ☐
Pluie ?	Yes☐	No ☐
8 - have you a protection against mosquitoes?	Yes☐	No ☐
If yes :		
- with screens?	Yes☐	No ☐
- of streamers?	Yes☐	No ☐
- others :.....		



Source: Plan de Marouna, 1: 10,000, 1987 C.G.N.Y

Fig. 2: Schematic representation of the district of Bongor, Maroua (Cameroon)

are 2 districts (Banana I and Bongor). The choice of these districts was due to the conditions of inhabitant life and the state of the district.

Banana I is a peripheral district bordered by a river (Mayo-kalio) to the North (Fig. 1). This district is characterized by a big commercial activity, testified by the presence of markets and schools. The people brew local beer of thousand of it. There is also in this district, a proliferation of trash or dirt which explains the presence of a pole of fly. On the other hand Bongor is situated to the centre of the locality and the commercial activity is reduced there very (Fig. 2).

Investigation on the population: This study was carried out during the months of October to December 2002. The sample of study is constituted of 150 people, 75 by district.

Investigation was done with the help of an individual answer (Technical Card). Questions are completed by the direct observations of the existing structures and the behaviour of inhabitants of the two districts of study, during 2 months. Questions include some food habits, consumption of water, bathing by the creek, the use of pit latrines, the displacement of individuals bare footed and no protection against mosquitoes.

Withdrawal and installation of blades: Three types of withdrawals was achieved during this study; especially the withdrawal of the fresh stools, urine and blood. For the withdrawal of stools and urine the sterilized tubes are given to the sample population in which they had to put stool or urine to inside in the morning the day of the sample recuperation. On the other hand, the withdrawal of blood is directly on individuals using a sterile lancet in order to achieve a thick drop.

Stool and urine are immediately centrifuged, gone up then between blade and gills after coloration. Every coloration of stool presents two phases (dilute Lugol to 10% and physiological water). Urine went up in the physiological water. The appropriated blood, is colored to dilute Giemsa solution to 10% according to the method of the O.M.S.[8].

RESULTS

The sample constituted of appropriated informants and distributed as follow: 45,3% of masculine subjects

(n = 68) and 54.7% of feminine subjects (n = 82). The number of individuals statistically equal in the two sexes (X^2 = 0.656; p = 0,448). The age group more represented were subjects of more than 14 years (Table 1).

Food and present interferences in stools: In the two districts of survey the majority of individuals consume their food almost raw. The number of subjects consuming raw food is not different in the two districts (Z = 0,67), either 65 individuals in Bongor and 62 in Banana I. Observations with permitted to note that all informants of the study consume garishness solely after washing with water.

The questions card analysis and observations achieved in Banana I, permitted us to note that almost all subjects of more than 14 years consume trips presented under shape of soup either grilled called raw Marara or Marara to the Chadian. In the two fashions of cooking meat is cooked insufficiently. This type of feeding does not exist in Bongor. Nevertheless, 12 individuals affirm that they consume the roasted meat (cooked insufficiently), either 16% of the sample population.

Three concessions possess facilities appropriated to provision in water in Banana I. solely inhabitants of this district buy water at the itinerant sellers water or use the rainwater and to a certain extent the one of well water. The origin of the itinerant seller water is doubtful. All concessions of Bongor possess facilities appropriated for provision in drinking water.

Results recorded in this investigation indicate that subjects of Banana I are more exposed to the risk of infestation after consumption of the unclean water and insufficiently cooked meat. Among the 150 subjects examined, the analysis of their stool permitted us to put in evidence 13 interferences. The mean frequency of infestation is 41.33%. This value is raised more to Banana I (Z = 2.37) with 50.7% against 32% of parasitized subjects to Bongor. *Entamoeba coli* is the most regular parasite with a rate of 16% of infested subjects. In Banana I, there is not statistical difference between rates of two age group infestation for subjects having less than 15 years (Z = 1.37). The infestation oscillates respectively between 31% and 57% for age groups understood between 0 and 4 years and those of 5 at 14 years. These rates of infestation do not differ between the young individuals (less than 15 years) and those aged (Z = 1.78), with the respective frequencies of 45 and 55%. The infestation does not present any meaningful variation according to the sex of individuals (Table 3). Individuals of less than 15 years in Bongor, did not present any variation for rates of infestation (Z = 0.7). On the other hand the subjects most aged in this district, are meaningfully less infested than the youngest individuals (Z = 2.7).

Particular behaviour of individuals and present interferences in urine: Observations on the informants and questions card analyses show that 30 individuals take their bath in creek water (20%). The number of subjects taking their bath in the creek is more than that of Banana I (Z = 3.75) with 26 individuals against 4 for Bongor (Table 2). Subjects that take their bath regularly at the creek, belong largely to the age group of 5 to 14 years. Out of the 20 subjects sampled, 6 individuals belonging to those having less than 5 years (Z = 4.62). The more aged is superior at 14 years, did not take their bath at the creek. The distribution of individuals is identical whatever is the sex, with 14 feminine and 16 masculine.

Information recorded several that 29 individuals of Banana I did not possess any pit latrines at home. They use surroundings of houses to ease themselves. In Bongor all individuals possess pit latrines at home. That reduced the use of the outside environment as latrines.

A third of individuals concerned by this study move without shoes, 50 individuals. The number of subjects moving is thus respectively more important in Banana I with 36 subjects against 14 to Banana I and Bongor. In the two districts, alone the young individuals (less than 15 years) move without shoes. Among these 21 subjects belong to the age group between 0 and 4 years and 29 individuals to the age group between 5 and 14 years. The using of shoes is invariable according to sex, with 26 masculine against 24 feminine that walk bare footed.

The analysis of their urine appropriated, permitted to disclose two interferences, so the *Schistosoma haematobium* and *Trichomonas vaginalis* (Table 4). All parasitic subjects were aged at least 5 years whatever the district. Alone subjects having an age between 5 and 14 years are parasitic by *Schistosoma haematobium*.

Table 1: Distribution of the number of individuals appropriated in the two districts of study to Maroua, from October to December 2002

		Number of subjects appropriated			
District	sex	0–4 years	5–14 years	≥ 15 years	Total
Banana I	Masculine	10	9	18	37
	Feminine	6	12	20	38
Bongor	Masculine	5	6	20	31
	Feminine	4	2	38	44

≥ : superior or equal

Table 2: Variation of the behaviour of the human population according to districts of survey of Maroua, October to December 2002

		Banana I			Bongor		
Behaviour of individuals		0-4 years	5-14 years	≥ 15 years	0-4 years	5-14 years	≥15years
Consumption	Raw food	9	20	33	5	6	54
	un potable water	15	8	31	0	0	0
	badly cooked meat	0	2	37	0	4	8
Other	bath in creeks	6	20	0	1	3	0
behaviour	absence of pit latrines	3	9	17	0	0	0
	displacement bare footed	14	21	0	7	8	0

≥ : superior or equal

Table 3: Distribution of the number of subjects presenting interferences in stools in the two districts of survey of Maroua, October to December 2002

	Banana I						Bongor A					
	0–4 years		5–14 years		≥15 years		0–4 years		5–14 years		≥15 years	
Present species	M	W	M	W	M	W	M	W	M	W	M	W
Entamoeba coli	1	2	2	2	3	6	0	1	1	1	2	3
Entamoeba histolytica	0	0	0	0	1	2	1	0	0	1	1	1
Necator americans	0	0	1	0	0	0	0	0	0	0	0	1
Ascaris lumbricoïdes	0	0	1	0	2	1	0	1	0	0	0	1
Hymenolepis nana	0	0	1	1	3	0	0	1	0	0	1	0
Fasciola hepatica	0	0	0	1	0	0	0	0	0	0	0	0
Trichomonas intestinalis	0	1	2	0	0	0	0	1	0	0	0	1
Schistosoma mansoni	0	0	0	0	0	2	0	0	0	0	0	1
Strongyloïdes stercoralis	1	0	0	0	0	0	0	0	0	0	0	0
Taenia solium	0	0	0	1	0	0	0	0	0	0	0	0
Taenia saginata	0	0	0	0	0	1	0	0	0	0	0	0
Giardia intestinalis	0	0	0	0	0	0	1	0	0	0	2	0
Enterobius vermicularis	0	0	0	0	0	0	0	0	1	0	0	0

≥ : superior or equal ; M : man ; W : woman

Table 4: Variation of the number of subjects presenting interferences in urine and in blood, according to the two districts of survey of Maroua, October to December 2002

	Banana I						Bongor A					
	0–4 years		5–14 years		≥15 years		0–4 years		5–14 years		≥15 years	
Present species	M	W	M	W	M	W	M	W	M	W	M	W
Schistosoma haematobium	0	0	2	1	0	0	0	0	0	0	0	0
Trichomonas vaginalis	0	0	1	2	1	2	0	0	0	1	0	2
Plasmodium sp.	7	5	8	7	10	9	4	2	4	1	15	11

≥ : superior or equal ; M : Man ; W : woman

Protection against mosquitoes and parasites in blood: All 150 appropriated subjects pretend to protect themselves in general against the Culicinae and the Anophelinae in particular. Observations recorded, showed that 15 individuals protect themselves solely against the Culicinae. Among these individuals, eight (8) were resident in Bongor and 7 in Banana I.

The main parasites found in evidence in blood is *Plasmodium* sp. Its middle rate is 55.33% of the studied population. Parasitic frequency is meaningfully different in the two districts (Z = 2.4), both 61.3% in Banana I and 49.9% in Bongor (Table 4). Whatever the district, individuals of less than 15 years present an elevated infestation. In Banana I, the recorded rates are thus 75, 76,2 and 50%, respectively for subjects of 0 at 4 years, of 5 at 14 years and 15 years at least. These rates comparable to Bongor his values of 66,9, 62,5 and 44,8% respectively for the same age groups. These results show that the young people (less than 15 years) are generally the more vulnerable to whatever the district.

DISCUSSION

It is evident from this study that uncontrolled consumptions of unpotable water and badly cooked meat increase the infestation of mesoparasites in body. Failures to respect hygiene rules contribute to increase the rate of infestation. Thus, inhabitants of Banana I (healthful district) are infested more that those of Bongor (unhealthful district) are infested more than those of Bongor (healthful district)[9] show also that conditions of life of patients of the central hospital of N'djamena, had a strong parasitic infestation. While the number of parasitic subjects gotten in this study, is weaker than the one recorded by[4] in the locality of Maroua, this difference is explained by the improvement of hygienic conditions in 1977 to 1997. This improvement was materialized by the reduction of refuse deposits and the apparition of new health centre.

The weak rate of interference recorded in the urinary system can be explained comfortably by the present methodology used. It would have been necessary to achieve withdrawals of urine in individuals after a physical effort to increase the probability to find some interference as *Schistosoma haematobium*[10] shows that the region of the Nord–Cameroun includes all vectors responsible for the transmission of the human schistosomiasis. Other authors show that parasitic frequency is generally elevated. Thus[2] got a prevalence in 43% to Yagoua, then Toupoury and had a rate of 34,1% at Guider. The present study shows that the part of the population the more infested are those between 5 and 14 years. This observation explains the fact that individuals of this age group have behaviour to risk, by moving bare footed. These results have been confirmed by[2,11,12]and Akoula *et al.*[12]. It is necessary also to note that the non-use of shoes increases the risk of infestation. Which explains the existence of schistosomiasis in some young individuals in either of the considered district.

The presence of at least a permanent river auspicious to the development of anopheles (Mayo), encourage the increase of vectors of the malaria. This phenomenon results in a growth of plasmodia indication within the human population. This prompt indication shows that the average observed during the year because the number of larval resting-places remained even elevated (beginning of the dry season). Within the study population subjects of less than 15 years have of comparable plasmodia frequency, whereas individuals of more than 14 years present some relatively weaker rates. In the forest zones where malaria is accentuated subjects of less than 5 years have the raised rates. This phenomenon permits us to raise a belated apparition of the premunition in the zone of survey. Thus Josse *et al*[1] find the mean rates between 7 and 16% in the city of Maroua. Whereas in the forest zone where resting places are permanent, rates remain elevated along the year with a precocious apparition of a premunition[13-15].

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