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### RESEARCH ARTICLE

#### IMPORTANCE OF INTRADOMICILIARY PARAMETERS AND POTENTIAL VECTORS ON THE OCCURRENCE OF DERMATOSES IN BRAZZAVILLE.

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#### Abstract

Skin diseases are increasingly a public health problem in many countries, particularly in Africa. The dermatoses identified have often revealed various etiologies and many arthropods may be responsible. A study was conducted in the city of Brazzaville, in order to determine the types of arthropods involved in certain immuno-allergic dermatoses and to evaluate the conditions characterizing the aggression of human skin by them. The study was carried out mainly in an indoor nursing home, following consultations at the health center. A total of 43 patients out of a total of 603 people followed were found to be carriers of dermatitis, or 37% of them. The H / F ratio was 0.59, with an average age of  $13.69 \pm 16$  years. Atopic dermatitis was most common with (74.41%) followed by Prurigo Strophilus (16.27%). A total of 668 arthropod specimens were obtained including 96.85% mites and 3.14% insects. It appeared that *Ixodes ricinus* is the most abundant species with a rate of 84% followed by *Blomia tropicalis* with 12.7%. The average temperature during the observations was evaluated at 28 ° C while the average humidity was 50% RH.

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#### Introduction:-

Arthropods are a public health problem in Africa and the world; they represent a real socio-economic burden and their prevalence is growing inexorably (Emodi et al, 2010; OMS,2016). In Africa in general and in Congo in particular, the richness of the flora and fauna, characterized by a large variety of biting insects and mites in the latter case, justifies an in-depth study of the vector agents (Tchouassi et al., 2019).

More than 50000 varieties of mites are currently enumerated and the most common are in house dust, this is the case of species of mites pyroglyphidae and pteronyssidae. Studies show that temperature and humidity are among the factors influencing their life cycle and abundance (Lenga et al., 2013; Boehnke et al., 2017; Alkishe et al., 2017).

In addition, it has been well established that the treatment of certain allergic dermatoses involves the study of the arthropod vectors which are responsible for them, as well as conditions of their transmission (Arlian et al., 2002; Gonzalez-Pérez et al., 2019).

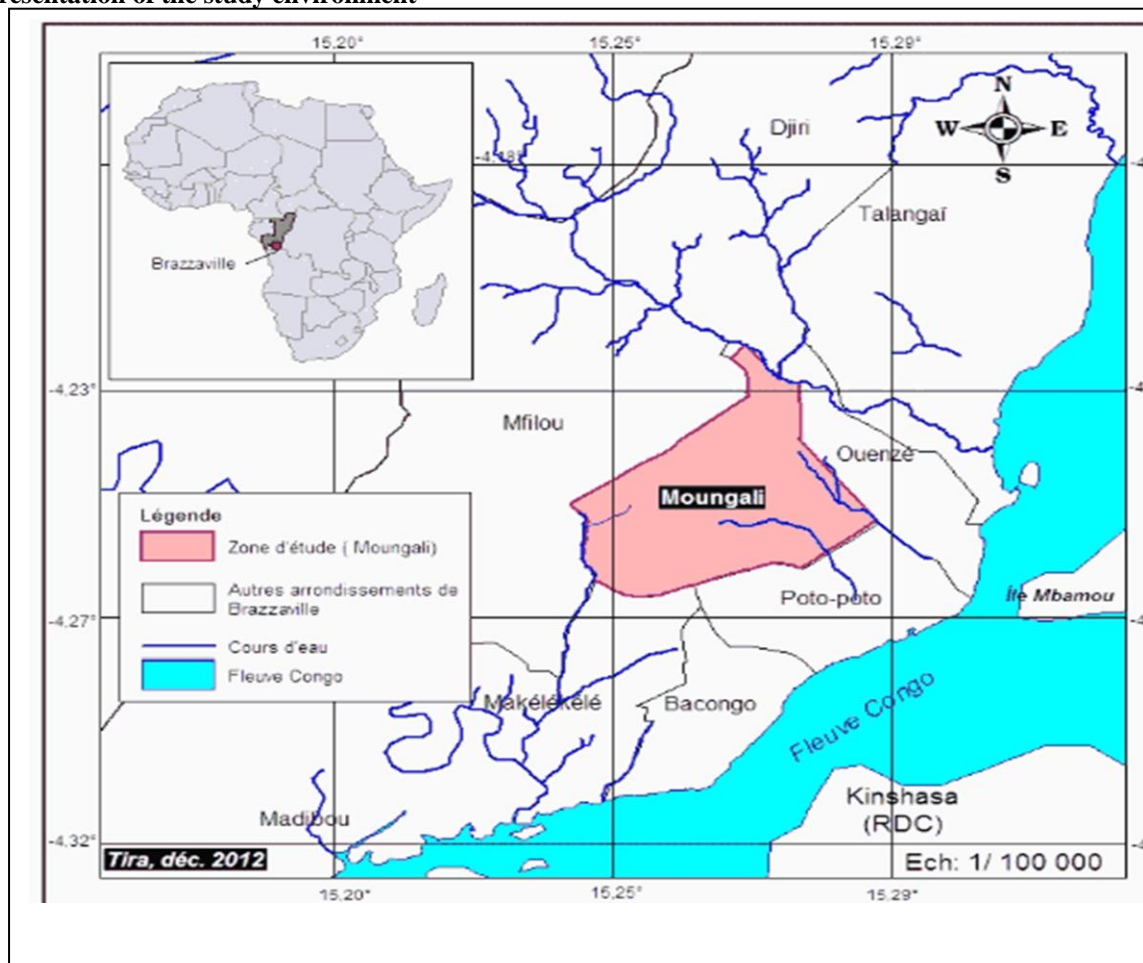
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In Brazzaville, Congo, prurigo strophulus ranks first in dermatological consultation in children, followed by atopic dermatitis. The various studies carried out in certain districts of the city (Lenga et al., 2013) have allowed the identification of numerous arthropods including *Ixodes ricinus*, *Sarcoptes scabiei*, *Pulex irritans*, *Simulium albivirgulatum* and *Cimex lectularius* (Lenga et al., 2013; Lenga-Loumingou, 2014; 2015).

We have undertaken to identify the arthropods potentially implicated in the occurrence of dermatoses under indoor conditions.

### Presentation of the study environment



**Fig 1:-**Location of districts, study sites in the city of Brazzaville

Brazzaville, capital of Congo has an area of 263,9km<sup>2</sup>. It is located between 4 ° 10 'South and 4 ° 32' North in altitude and in longitude between 15 ° 16 'East and 15 ° 45' West with an altitude average is 335 meters. The city is bordered on the west by the Congo River which is watered by many tributaries. Average temperatures are 27 ° C in the rainy season and 22.4 ° C in the dry season. The tropical climate is humid and the vegetation encountered is heterogeneous and contains many species of trees, the most common of which are *Terminalia superpa*, *Cassia siamea*, *Milletia laurenti*, *Mangifera indica* or *Kigelia africana*, *Dolenix regia* and *Largestromia speciosa*.

The health center Saint Martin, place of our study for the enumeration of patients in consultation, is located in the district 3 poto-poto. He receives a great multitude of patients coming from the nearest districts. An average of 7600 patients of all sexes and ages are registered annually, according to the admission register. Patients retained in the health center were followed to their homes located in Makelekele, Poto-poto, Moungali, Ouenzé, Talangai, Mfilou and Djiri districts.

## **Material And Method:-**

### **Equipment**

In the intradomiciliary medium, white sheets of dimensions 1.40x1.80 cm placed under the beds were used for the harvests. 125 ml glass jars and an Oregon Scientific thermo-hygrometer were used in the first case for the conservation of samples collected and in the second case for the evaluation of temperature and humidity variations in homes. In the laboratory, watch glasses, soft forceps and forceps, 70 ° C alcohol, a Leica zoom 2000 binocular loupe and a Visiopic-type optical microscope were used.

### **Method**

This is a descriptive, analytical and experimental study, carried out from 17 September to 19 November 2018 at the Saint-Martin health center, following the evaluation of the fact sheets provided for this purpose.

Only patients with dermatosis that may have been caused by an arthropod have been selected: these are mainly dermatite atopic, prurigo strophulus, chronic urticaria and scabies. The diagnosis was made by a hospital and university dermatologist. The diagnostic criteria for atopic dermatitis are those of the United Kingdom Working Party.

One out of two patients with one of the selected dermatoses was chosen in order of arrival at the health center and then followed at home for an entomological survey.

Patient cards were then established. They included age, sex, and diagnosis. Similarly, consultation dates such as housing benchmarks were noted.

The consent of the guardians of children was obtained in writing, as well as from the local municipal authorities.

In indoor settings, sessions by home in the bedrooms allowed the collection of specimens from October 5 to November 7, 2018, once a day from 7 am changing homes every 2 days, at the rate of 2 harvests at least in each bedroom. A total of 18 homes were followed.

In indoor settings, sessions by home in the bedrooms allowed the collection of specimens from October 5 to November 7, 2018, once a day from 7 am changing homes every 2 days, at the rate of 2 harvests at least in each bedroom. A total of 18 homes were followed.

Arthropods were captured from dust collected under the beds using a brush scoop. After collection of the dust, the collected arthropods were placed in vials containing alcohol at 70 ° C and then in a watch glass for their observation by magnifying glass and binocular microscope.

The variations of the temperature and hygrometry in the homes were followed at the beginning and at the end of the session, that is 10 minutes after the entrance to the home and 10 minutes before the exit of this one, (7h and 12h). The identification of the specimens was performed according to the criteria indicated in the dichotomous determination keys (Krantz et al., 2009; Picker et al., 2019).

## **Results:-**

### **Epidemiological aspect**

A total of 603 patients were received at Saint Martin Health Center, of whom 114, or 18.9%, had a dermatosis potentially associated with arthropods. 43, or 7.13% a dermatosis of arthropodian origin. Twenty-two (22) of the 43 patients in the health center were followed at home for arthropod research in their homes. The frequency of immunoallergic dermatoses was 37.7% determined from eighteen (16) men and twenty seven (27) women. The sex ratio was 0.59 with an average age of  $13.69 \pm 16$  years.

### **Clinical aspects**

Atopic dermatitis was revealed as the highest dermatosis with 32 cases or 74.41%, followed by prurigo strophulus with 7 cases or 16.27% then chronic idiopathic urticaria with 3 cases or 6.97% and finally of a single case of scabies.



**Fig. 2:-Prurigo strophulus impetiginized**

#### Age distribution

The frequency of potentially immunoallergic dermatoses was high before the age of 10, rising to almost 40%. She appeared weak from adolescence with nearly 7% and then fluctuated around 4.6% throughout the selected ages.

#### Entomological aspects

The harvested arthropods concern essentially two taxa: two types of mites, *Ixodes ricinus* and *Blomia tropicalis* and two types of insects, *Pulex irritans* a Siphonaptera and *Cimex lectularius*, a Hemiptera.

A total of 668 individuals, 96.85% mites and 3.14% insects were found in homes, with an average of 30.36 individuals per habitat.

**Table I:-Concomitant observation of dermatoses with the arthropods potentially incriminated**

Patients followed by the health center	Dematoses observed	Specimens 1 observed and incriminated in the appearance of dermatoses	Specimens 2 observed and incriminated in the appearance of dermatoses
01	Prurigo strophulus	<i>Ixodes ricinus</i>	<i>Blomia tropicalis</i>
02	Atopic dermatitis	<i>Blomia tropicalis</i>	<i>Cimex lectularius</i>
03	Prurigo strophulus	<i>Ixodes ricinus</i>	/
04	Atopic dermatitis	/	/
05	Atopic dermatitis	/	/
06	Prurigo strophulus	<i>Blomia tropicalis</i>	/
07	Atopic dermatitis	/	/
08	Atopic dermatitis	/	/
09	Atopic dermatitis		/
10	Atopic dermatitis	<i>Ixodes ricinus</i>	/
11	Atopic dermatitis	/	/
12	Atopic dermatitis	<i>Blomia tropicalis</i>	/
13	Atopic dermatitis	<i>Blomia tropicalis</i>	/
14	Atopic dermatitis	<i>Ixodes ricinus</i>	/
15	Atopic dermatitis	<i>Ixodes ricinus</i>	/
16	Atopic dermatitis	<i>Ixodes ricinus</i>	/
17	Chronic urticaria	<i>Ixodes ricinus</i>	/
18	Atopic dermatitis	<i>Ixodes ricinus</i>	/
19	Atopic dermatitis		/

20	Atopic dermatitis	<i>Ixodes ricinus</i>	<i>Pulex irritans</i>
21	Prurigo strophulus	<i>Ixodes ricinus</i>	/
22	Atopic dermatitis	/	/

A rate of 77.27% of atopic dermatoses was obtained including 18.18% of prurigo strophulus. The results obtained indicate that arthropods were harvested in 63.63% of the patients followed in the homes. Thus, *Ixodes ricinus* has emerged as the most common and often unique species in homes. In addition, a maximum of three arthropods have been obtained in the concerned homes. The identification allowed to observe essentially two species: *Ixodes ricinus* and *Blomia tropicalis* which were the most encountered arthropods with respectively 50% and 22.7%. The insects *Pulex irritans* and *Cimex lectularius* were only found in two homes and always in the company of a mite.

*Blomia tropicalis* appeared to be associated with prurigo strophulus and the *Ixodes ricinus* species was associated with atopic dermatitis and chronic urticaria, such as the species *Pulex irritans*. *Cimex lectularius* has been found in homes where cases of atopic dermatitis have been observed.

**Table II:-**Distribution of dermatoses and arthropods as a function of temperature and hygrometry.

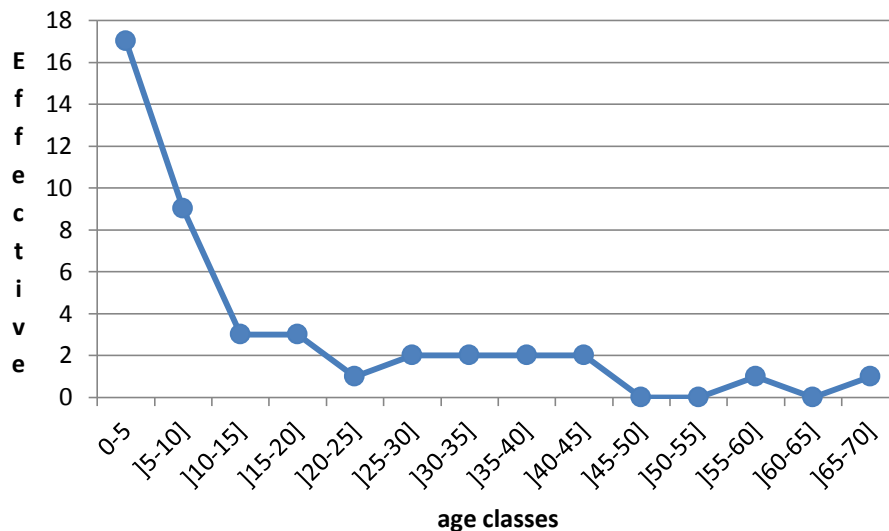
Patients /Houses	Hygrometry(%RH)	Temperature(°C)	Arthropods
01	48,5	32	<i>Ixodes ricinus</i> , <i>Blomia tropicalis</i>
02	53,5	28	<i>Blomia tropicalis</i> , <i>Cimex lectularius</i>
03	41,5	27,5	<i>Ixodes ricinus</i>
04	46	32	/
05	48,5	29	/
06	59,5	28,5	<i>Blomia tropicalis</i>
07	50,5	31	/
08	54,5	29	/
09	54,5	29	/
10	51	29	<i>Ixodes ricinus</i>
11	52	29	/
12	47	29,5	<i>Blomia tropicalis</i>
13	47	29,5	<i>Blomia tropicalis</i>
14	53	31	<i>Ixodes ricinus</i>
15	50	29	<i>Ixodes ricinus</i>
16	51,5	27	<i>Ixodes ricinus</i>
17	51,5	27	<i>Ixodes ricinus</i>
18	53	30	<i>Ixodes ricinus</i>
19	56	30	/
20	38,5	29,5	<i>Ixodes ricinus</i> , <i>Pulex irritans</i>
21	52	30	<i>Ixodes ricinus</i>
22	45	30,5	/

The results in Table II show the hygrometry and temperature values noted in the homes visited. The types of arthropods observed are also indicated. This shows an average temperature of 28.09 ° C for all 22 patients visited, as well as an average humidity of 50.20% RH. The average temperature in households with *Ixodes ricinus* was 29.2 ° C and the average humidity was 43.9% RH. By cons for *Blomia tropicalis*, the temperature fluctuated around 29.5 ° C and the humidity at 51.5% RH on average. *Pulex irritans* proved to be the least common species during these visits.

The comparison of hygrometric and thermal variations in 8 houses including 4 in each of the 2 districts selected, through the Chi-square test, did not show any significant differences, with Moungali and Talangai at 1.029 and 0.094, respectively, at  $p = 0, 05$ . The observed thermal and hygrometric variations therefore have no influence on the number and quality of

harvested arthropods.

**Fig. 3:-**Evolution of the patient population with dermatitis according to age groups.



### Discussion:-

The Saint Martin Brazzaville dispensary facilitates access to health care, it is supported by the Congolese government and non-governmental organizations (Dom and GO mission santé, 2015).

In many sub-Saharan African countries, health centers are improving community health. In these centers, the frequencies of reported immunoallergic dermatosis range from 32.5% in Mali (Youssouf et al., 2016) to 54.76% in Bukavu (Semikenke, 2018) or 30% in Bangui (Kobangué, 2014). In our study, immuno-allergic dermatoses accounted for 37.7% of cases, a rate close to the results obtained by Adegbidi in Cotonou with 37% [16] or Moussirou-Soumbou in Libreville with 25.1% (Moussirou-Soumbou, 2018).

The female predominance of immunoallergic dermatoses is classic in the sub-Saharan region (Lenga et al., 2013; Kaloga et al., 2016). In our study, the same type of result was obtained. Dress habits could be the justification.

The average age for the occurrence of dermatoses is 13.69 years in our case. He is 40 years old in the Maghreb [19]. The mode of recruitment could be responsible for these differences.

Atopic dermatitis appeared to be the most common pathology (74.41%), far ahead of prurigo strophulus (16.27%), chronic idiopathic urticaria and scabies. In a study by Lenga Loumingou at the University Hospital of Brazzaville, atopic dermatitis accounted for 7.43%, and prurigo strophulus 7.46% (Lenga Loumingou, 2014; 2015). Prurigo strophulus is a major health problem in Brazzaville, with a prevalence of 70% in some districts of Brazzaville (Lenga et al., 2013) and 7.43% in the Brazzaville University Hospital (Lenga Loumingou, 2014; 2015). Scab was not very present in our study, this rarity could be explained by the periodicity of epidemics (Barete, 2001).

*Ixodes ricinus* is the most common mite found in patients' homes irrespective of immunoallergic dermatosis, its role in immunoallergic dermatoses has been established. It is one of the most common house dust mites (Honig et al., 2017). *Blomia tropicalis* was found in 5 dwellings of patients with prurigo strophulus or atopic dermatitis. No study in Brazzaville has previously identified this species, which is frequently implicated in skin and respiratory allergies in sub-Saharan Africa, the Maghreb, South-East Asia and Latin America (Guilleminault et al., 2017). *Cimex lectularius* and *Pulex irritans* were least frequent in the habitats of patients with allergic dermatitis.

*Dermatophagoides pteronyssinus* and *farinae*, commonly found in house dust, were not found in our study, probably because of the conditions of the study. The temperatures and the humidity in the presence and the conditions of maintenance of the residences probably did not allow their capture. (Arlian et al., 2002).

On the other hand, the captured insects are few in the habitats followed compared to the mites. As shown in Table II, only two species (*Pulex irritans* and *Cimex lectularius*) were found in our study. Diptera (Anopheles, Aedes, or Simulium) is difficult to explain, perhaps because of their mobility. Their character, especially for the Simulium, would push them preferentially outside the homes. However, the high prevalence of prurigo strophulus is attributed to them (Lenga et al., 2013).

The temperature of the study showed a fluctuation of 28.09 ° C on average for the temperatures and 50.20% RH on average for the relative humidity. These values are usually favorable to the activation of the Arthropods (Alkishe et al., 2017; Gonzalez-Pérez et al., . 2019)

Other studies have shown that hygrometry between 50 to 80% RH is favorable for the proliferation of mites (Medlock et al., 2013). This interval, somewhat different from bears, has been interpreted as favorable to the development of mites. It is likely that the low hygrometry is a factor in the growth of mites, which has been shown to be favorable, from 2000 to 1.5 million mites. a mattress (Pauli et al., 2013).

### Conclusion:-

This study allowed us to show some parameters of the bio-ecology of domestic Arthropods found in the habitats of patients with immunoallergic dermatosis. It also allowed for the first time finding *Blomia tropicalis* in the habitats of Brazzaville.

This study did not establish the etiopathogenic evidence of these immunoallergic triggering allergic dermatoses. Rather, it has made it possible to identify immuno-allergic dermatoses in a health center in Brazzaville where most common immuno-allergic pathologies are atopic dermatitis, prurigo strophulus, chronic urticaria and scabies.

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