

Study of the correlation between the capsaicin content and the frequency of consumption of five varieties of peppers consumed in the city of Man, Ivory Coast

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Abstract

Chili pepper is used in the culinary field as a flavor enhancer. In the city of Man, chili is very popular because the local sauces which are mostly sticky would be difficult to consume without the spicy flavor of chili. This hot pepper flavor comes from capsaicin (8-Methyl-N-vanillyl-6-nonenamide). The aim of this study is to assess the correlation between the capsaicin content and the frequency of consumption of five varieties of peppers consumed in the city of Man, Ivory Coast. For this study, the investigation focused on 5 neighborhoods in the city of Man. A total of 250 households were surveyed. After the consumption frequency survey, the capsaicin content of the 5 varieties of peppers was determined. The most consumed varieties of peppers belong to the genus *Capsicum annum*. These are the varieties *Capsicum annum* yellow and *Capsicum annum* Antillean with respective capsaicin contents of $812.26 \pm 0.28 \mu\text{g/ml}$ and $703.32 \pm 0.12 \mu\text{g/ml}$. This study established that in the city of Man, consumption frequencies evolve proportionally to the capsaicin content of chili peppers.

Keywords: Chili pepper; Capsaicin; Frequency of consumption; Man

1. Introduction

Chili pepper is part of the nightshade family, like tomatoes, eggplants and potatoes. Chili peppers were only introduced to Europe at the end of the 15th century. In West Africa, chili peppers occupy a prominent place in culinary habits. They are one of the most popular flavor enhancers. Ivorian consumers use them to enhance the taste of sauces and other typical dishes of Côte d'Ivoire [1]. In the Tonkpi region and in the city of Man in particular, sauces that are mostly sticky would be difficult to consume without the spicy flavor of chili peppers [2]. This spicy flavor of chili peppers comes from a molecule called capsaicin [3]. Capsaicin (8-Methyl-N-vanillyl-6-nonenamide) is a chemical compound from the alkaloid family. This alkaloid was discovered in 1816 by the German pharmacologist Christian Friedrich Bucholz [4]. In the medical field, capsaicin helps block cancer in certain lung or prostate cells by apoptosis [2]. The consumption of capsaicin also stimulates the production of two hormones, adrenaline and noradrenaline [5]. Given the organoleptic and therapeutic importance of chili pepper and capsaicin, it seemed necessary to conduct a series of studies on this ingredient and its main alkaloid. The main objective of this study was to study the correlation between the capsaicin content and the frequency of consumption of five varieties of chili peppers consumed in the city of Man, Ivory Coast.

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Specifically, this involved:

- Conducting a study on the frequency of consumption of the five (5) different varieties of peppers present on the Man market.
- Determining the capsaicin level of the five (5) different varieties of peppers present on the Man market.
- Establishing a correlation between the capsaicin level and the frequency of consumption of these five varieties of peppers.

2. Materials and Methods

In order to determine the frequency of consumption of the different varieties of pepper, the head of each of the 250 households is subjected to a questionnaire. Each head had to specify the number of weekly consumption of the 5 varieties of peppers present on the Man market. For this study, the investigations focused on 5 neighborhoods: Djoulabougou; Grand-Gbapleu; Gbêpleu; Domauroud; Air-France. A total of 250 households were surveyed at a rate of 50 households per neighborhood. The five varieties of peppers used in this study are: Yellow Capsicum annum; West Indian Capsicum annum; Sudanese Capsicum annum; Attié Capsicum annum; Sweet Capsicum annum. After the survey on the frequency of consumption, the capsaicin content of the five (5) varieties of peppers was determined. Thus, five hundred (500) grams of each sample of peppers were crushed in order to extract pure capsaicin. Then, the 500 g of crushed peppers are mixed with 500 ml of distilled water. The mixture thus obtained is left to stand for 72 hours. The mixture splits into two phases, a fat-soluble phase on top and an aqueous phase below. The supernatant is collected and filtered. After evaporation and drying in an oven, a crust is obtained which will be reduced to powder. The ratio between the mass of the powder obtained and the initial mass of each sample makes it possible to determine the capsaicin content of each of the 5 varieties in $\mu\text{g}/100\text{ml}$. The data were entered into tables of an ACCES database specially designed according to the data before being transformed into EXCEL files. All the data was then taken and analyzed using Statview 3.1 software. The significance levels of the correlations between capsaicin levels and consumption frequency in households were thus determined.

3. Results and discussion

3.1. Capsaicin content of the 5 varieties of peppers consumed on the Man market

As for the capsaicin content of the 5 varieties of peppers, it appears that the variety with the lowest capsaicin content is Capsicum frutescens sweet $216.92 \pm 0.54 \mu\text{g}/\text{ml}$. While the variety with the highest capsaicin concentration is Capsicum annum yellow $812.26 \pm 0.28 \mu\text{g}/\text{ml}$ (see Table 1). These results corroborate those of Othman et al [2] who showed that Capsicum annum yellow was one of the varieties of peppers with the highest capsaicin content. In addition, these authors established that there was a link between the concentration of capsaicin and the correlation of peppers. Thus, red and yellow peppers are generally more concentrated in capsaicin [2].

Table 1 Capsaicin content of the 5 varieties of peppers consumed on the Man market

Varieties of de Peppers	Capsaicin $\mu\text{g}/\text{ml}$
<i>Capsicum annum jaune</i>	$812,26 \pm 0,28$
<i>Capsicum annum antillais</i>	$703,32 \pm 0,12$
<i>Capsicum frutescens soudannais</i>	$598,68 \pm 0,75$
<i>Capsicum frutescens attié</i>	$535,57 \pm 0,39$
<i>Capsicum frutescens doux</i>	$216,92 \pm 0,54$

3.2. Frequency of consumption of the different 5 varieties of peppers consumed on the Man market

Table 2 Frequency of consumption of the different 5 varieties of peppers

Varieties of peppers	Weekly consumption frequencies
<i>Capsicum annum jaune</i>	6.87 ± 0.37
<i>Capsicum annum antillais</i>	6.32 ± 0.54

<i>Capsicum frutescens soudannais</i>	4.57±0.12
<i>Capsicum frutescens attié</i>	3.88±0.46
<i>Capsicum frutescens doux</i>	3.12±0.25

The different frequencies of food consumption of the 5 varieties of peppers are presented in Table II. The results show that the variety of pepper most consumed among the people surveyed is *Capsicum annuum* yellow with a weekly frequency of consumption of 6.87 ± 0.37 . These results are similar to those of several studies [2] [3] [5], which have shown that the populations of Southeast Asia and those of Sub-Saharan Africa generally consume varieties of pepper highly concentrated in capsaicin.

3.3. Correlation between capsaicin content and consumption frequency of 5 pepper varieties

The correlation curve (Figure 1) shows that consumption frequencies evolve proportionally to the capsaicin content of peppers ($R^2 = 0.8408$). These results demonstrate that the frequency of consumption of pepper is closely linked to its capsaicin content. Thus, as shown by Oulaï and collaborators, in the Tonkpi region and in the city of Man in particular, sauces which are mostly sticky would be difficult to consume without the spicy flavor of pepper [2].

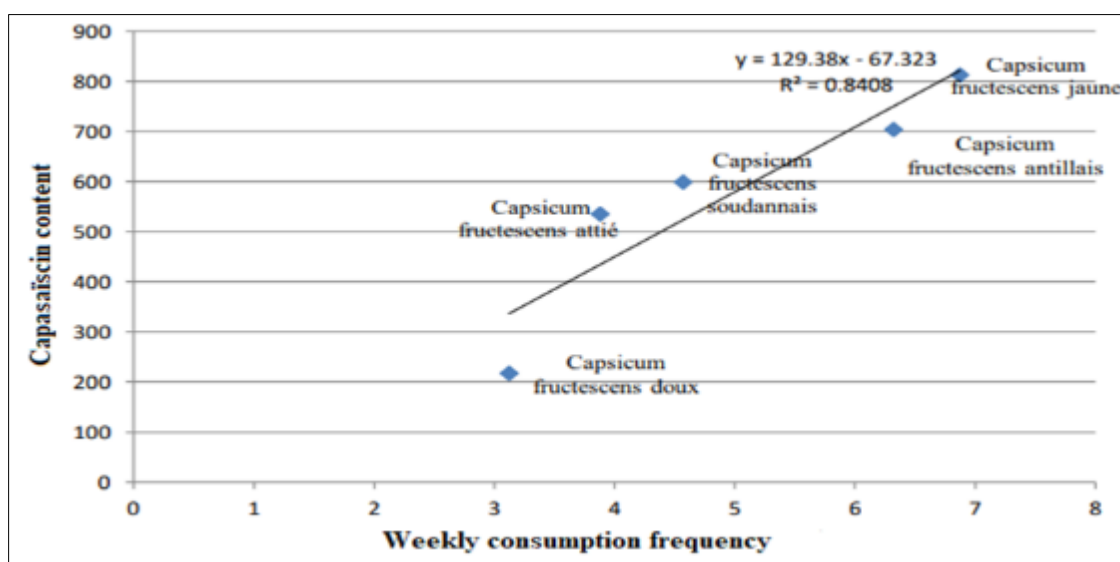


Figure 1 Correlation curve between capsaicin content and frequency of consumption of the 5 varieties of peppers

4. Conclusion

At the end of this study, it appears that among the (5) five varieties of peppers present on the Man market, the most consumed belong to the genus *Capsicum annuum*. These are the varieties *Capsicum annuum* yellow and *Capsicum annuum* West Indian. In addition, the study of correlations made it possible to establish that the frequencies of consumption evolve proportionally to the capsaicin content of the peppers. This indicates that consumer preferences are carried in the city of Man, on peppers with a high capsaicin content.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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