

Research Article

Study of Relationship Between Food Habits and the Occurrence of Constipation Among Students in Ivory Coast

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Abstract

The work of Amoikon *et al.* (2016) showed a high prevalence of constipation and dietary deviations in a student population in Ivory coast. In order to seek a probable relationship between dietary factors and this health problem, a study was carried out at the Felix Houphouët-Boigny University of Ivory Coast. It took place from October 15, 2016 to February 17, 2017 in a population of 1228 students, with an average age of 22.5 years, dominated by males. This is a prospective cross-sectional study, with a descriptive and analytical aim, with the main objective of studying the relationship between eating habits and the appearance of constipation among students. After analysing the relationship between their eating habits and the occurrence of constipation, it was blamed, on the one hand, the high consumption of certain foods such as red meat, carbonated drinks, sugary foods, foods containing eggs or milk and on the other hand a low consumption of water, fruits and vegetables. In view of these results we can conclude that certain inadequate dietary behaviors are responsible for constipation in students' population and could have repercussions on their success rate in our universities. To this end, it would be important to organize nutritional awareness campaigns throughout the country and to educate students with a view to improve their eating habits and their health conditions.

Keywords

Students, Eating Habits, Constipation

1. Introduction

Constipation is a generally chronic digestive disorder whose causes vary but are often of food origin. It can have a serious consequence on the lives of patients [17]. This is a rarefaction of the passing of stools with hard faeces that are difficult to evacuate (less than 3 times per week). Very common in general in the elderly, constipation is not negligible in young people (Tzeuton, 2000) [17]. According to a

nutritional epidemiological study carried out in a student population at the Felix Houphouët Boigny University in Abidjan in 2016, a high prevalence of the pathology was noted (72.6%), with serious impacts on their health conditions such as hemorrhoids [1]. In order to contribute to the dietary management of patients and to prevent its occurrence among students, it seemed essential to us to research the dietary

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reasons, with a view to propose suitable and adapted solutions. It is in this context that a health and nutritional epidemiological survey was carried out, in order to analyze their implications in the occurrence of constipation.

2. Materials and Methods of the Study

2.1. Material

2.1.1. Framework of the Study

The study was carried out in West Africa, in Ivory Coast at the Félix Houphouët Boigny University of Cocody in Abidjan. It is part of the perspectives of the work of Amoikon *et al* (2016) [1] and N'guessan *et al.* (2024) [1] who studied the eating habits and health status of students at the University and who found among them a significant prevalence of constipation, and poorly balanced diet.

2.1.2. Study Population (Inclusion and Non-Inclusion Criteria)

A total of 1228 males and females students volunteered to participate in the study. Any student enrolled in the second year of Chemistry Biology Geology (CBG) at Félix Houphouët-Boigny University who wished to participate in the study was included. They were not included, all other people whom did not respect the conditions raised.

2.1.3. Data Collection Tools

A questionnaire was designed and pre-validated by a pilot survey with 45 students from the Agrhymet Regional Center of NIAMEY (NIGER). It is composed of three parts: (i) the first part retraced the socio-demographic characteristics of the study population (ii) the second revealed the medical histories regularly experienced by the patients over a period of one year while (iii) the third part was reserved for eating habits (Frequency of food consumption).

2.2. Methods

2.2.1. Type of Study

This is a prospective cross-sectional study with descriptive and analytical aims.

2.2.2. Sampling

The convenience sampling technique was chosen. A total of 1228 male and female students volunteered to participate in the study.

2.2.3. Diagnosis of Constipation

The diagnosis of constipation is primarily clinical. So, we based our investigation on a clinical examination consisting of questioning, abdominal palpation in search of organic mass. Any

respondent who frequently presented a rarefaction of the emission of stools with hard faeces and difficult to evacuate (less than 3 times per week) were considered sick. Objective bloating, a feeling of incomplete evacuation or pushing efforts reinforced the diagnostic criteria [11]. The existence of an abdominal mass on palpation motivates paraclinical investigations such as abdominal ultrasound, colonoscopy or abdominal CT.

2.2.4. Statistical Analysis

- *Quantification of the frequency of food consumption:*

We based ours study on the methods used by Amoikon *et al*, (2016) [1] and Kouakou Ossei (2010) [10] for the classification of the level of food consumption. Thus, food consumption was assessed by the food consumption frequency method and by retrospective analysis of eating behavior, re-adjusted by week. So:

- (1) Consumption of a food less than once to once a week was considered low,
- (2) Consumption of twice a week was considered medium,
- (3) When consumption was 3 to 4 times per week, it was reported as high,
- (4) When it was 5 to 7 times per week, it was considered very high.

- *Quantification of the frequency of water consumption:*

- (1) Water consumption of less than one liter per day was considered low.
- (2) Water consumption of 1 to less than 1.5 liters per day was reported as medium and water consumption of 1.5 to 2 liters was considered very high.

(i). Processing of Qualitative and Quantitative Data

The analysis of the quantitative and qualitative data collected was done with SPSS 20.0 software. For quantitative variables, the average and extreme values were highlighted. At the level of qualitative variables, the distribution and comparison of proportions was retained. The relationship between food habit and the pathology has been searched by the Chi square test.

(ii). Ethical Aspects

With regard to ethical considerations, the volunteers were informed of all stages before the start of the investigation and were interviewed or examined after free and informed consent. Confidentiality was assured by assigning an anonymity number to each survey sheet. This study was approved by the Félix Houphouët Boigny University of Côte d'Ivoire and the ethical principles of the Declaration of Helsinki were respected.

3. Results

3.1. Socio-Demographic Characteristics

In terms of sociodemographic characteristics, three indi-

cators were analyzed, namely ethnic group, age and gender. Regarding the ethnic group, the Akans are the most represented with a number of 621 people, the Krous, the Northern Mandé and the Gour are respectively 161, 109 and 182 and the foreigners are the least represented with a workforce of 31 people (figure 1). Regarding the age of the respondents,

the age of the population was subdivided into 3 groups. Thus, respondents aged 17 to 19 years old are 20% and those aged 20 to 24 years old and 25 and over are respectively 77% and 3% (Figure 2). And in this population, 74% are men compared to 26% women (Figure 3).

a. Ethnic group

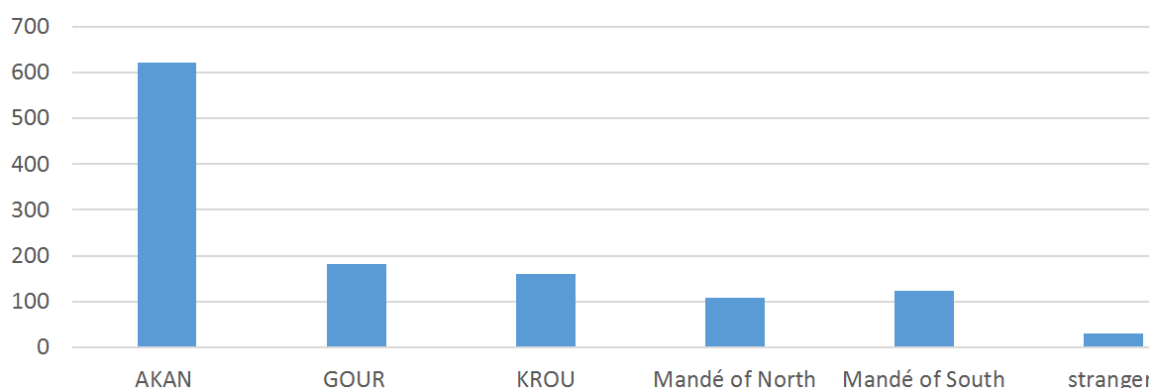


Figure 1. Distribution of respondents according to ethnic group.

b. Age of respondent

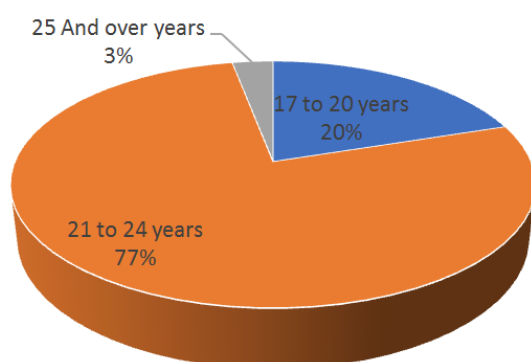


Figure 2. Distribution of respondents by age.

c. Sex of respondent

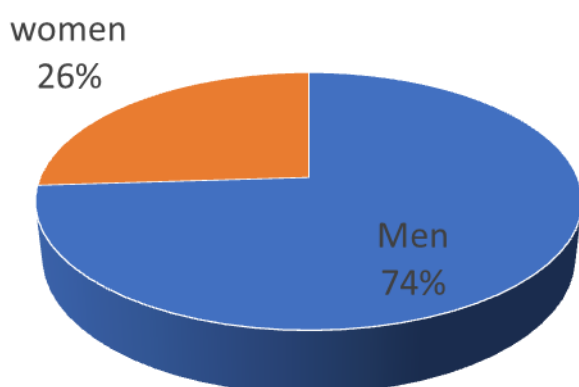


Figure 3. Distribution of respondents by gender.

3.2. Prevalence of Constipation Among Students

The health assessment in the study population revealed a prevalence of 53.1% of constipation in the population.

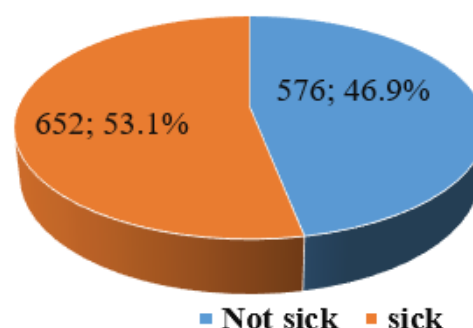


Figure 4. Distribution of respondents according to their pathological status.

3.3. Eating Habits and Occurrence of Constipation

The analysis of the relationship between eating habits and the occurrence of constipation in the study population revealed the implication on the one hand of the high consumption of certain categories of food such as red meat/animal fat, starchy foods, and carbonated drinks, spicy foods, sweet foods containing eggs or milk, non-alcoholic exciting products, flavor enhancers and on the other hand a low level of water consumption ($P < 0.05$).

When it comes to fruits and vegetables, we can see that the lower level of consumption lead to the higher frequency of

constipation. The level of consumption of fish, white meat, vegetable fat, cereals and alcoholic products is not linked to the occurrence of constipation in the population ($P > 0.05$).

Table 1. The relationship between the level of red meat/animal fat consumption and the occurrence of constipation.

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
No sick	143 40.6%	82 48.0%	174 _b 48.2%	177 51.5%	576 46.9%	P = 0.010
Sick	209 59.4%	89 52.0%	187 51.8%	167 48.5 %	652 53.1%	
TOTAL	352 100%	171 100%	361 100%	344 100%	1228 100%	

N= 1228

P= 0.003

Table 2. The relationship between the level of consumption of food containing eggs and the occurrence of constipation.

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
No sick	15 42.9%	30 37.5%	51 _b 44.0%	479 48.1%	576 46.9%	P = 0.010
Sick	20 57.1%	50 62.5%	65 _b 56.0%	516 51.9 %	652 53.1%	
TOTAL	35 100%	80 100%	116 100%	995 100%	1228 100%	

N= 1228

P= 0010

Table 3. The relationship between the level of tuber consumption and the occurrence of constipation.

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
No sick	0 0%	4 33.3%	16 32.7%	555 47.6%	576 46.9%	P = 0.010
Sick	0 0%	8 66.7%	33 _b 67.3%	611 52.4 %	652 53.1%	
TOTAL	0 0	12 12	49 49	1166 1166	1228 1228	

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
	100%	100%	100%	100%	100%	

N= 1228

P= 0.010

Table 4. The relationship between the level of soft drink consumption and the occurrence of constipation.

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
No sick	287	64	186	39	576	P = 0.010
	45.1%	40.5%	50.3%	60.9%	46.9%	
Sick	349	94	184 _b	25	652	
	54.9%	59.5%	49.7%	39.1 %	53.1%	
TOTAL	636	158	370	64	1228	
	0%	100%	100%	100%	100%	

N= 1228

P= 0.010

Table 5. The relationship between the level of consumption of flavor enhancing products and the occurrence of constipation.

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
No sick	117	0	112	347	576	P = 0.001
	56.5%	0%	46.7%	44.5%	46.9%	
Sick	90	1	128	433	652	
	43.5%	100%	53.3%	55.5 %	53.1%	
TOTAL	207	1	240	780	1228	
	100%	100%	100%	100%	100%	

N= 1228

P= 0.001

Table 6. The relationship between the level of spicy food consumption and the occurrence of constipation.

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
No sick	73	35	160	308	576	P = 0.043

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
Sick	52.1%	48.1%	50.0%	44.5%	46.9%	
	67	41	160	384	652	
	47.9%	53.9%	50.0%	55.5 %	53.1%	
TOTAL	140	76	320	692	1228	
	100%	100%	100%	100%	100%	

N= 1228

P= 0.043

Table 7. The relationship between the level of consumption of non-alcoholic exciting product and the occurrence of constipation.

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
No sick	258	74	106	138	576	P = 0,002
	44.3%	43%	46.9%	55.9%	46.9%	
Sick	325 _a	98	120 _b	109	652	
	55.7%	57.0%	53.1%	44.1 %	53.1%	
TOTAL	583	172	226	247	1228	
	100%	100,0%	100,0%	100%	100,0%	

N= 1228

P= 0.002

Table 8. The relationship between the level of water consumption and the occurrence of constipation.

Constipation	Consumption frequency N (%)				Total	P value
	Low	Medium	High	Very high		
No sick	108	399	64	5	576	P = 0.014
	32.1%	50.3%	68.8%	83.3%	46.9%	
Sick	228	394	29	1	652	
	67.9%	49.7%	31.2%	16.7 %	53.1%	
TOTAL	336	793	93	6	1228	
	100%	100%	100%	100%	100%	

N= 1228

P= 0.014

4. Discussion

During this study, the predominant ethnic group was that of the Koua Akan with 51% of respondents. This could be explained by the geographical location of the Félix Houphouët Boigny University of Abidjan, which is more accessible to this ethnic group, especially because the biosciences specialty is found in other universities in the country located in the North and the center-West. These results are comparable to those of Amoikon *et al* in 2016 [1]. The study population was young with an average age of 22.5 years and dominated by men with a sex ratio of 2.84 in favor of men. This could be explained by the fact that in Ivory Coast the level of education of young boys is higher than that of young girls. (INS, 2015) [8]. In the population a prevalence of 53.1% of constipation was recorded. These results are superimposable to those of Amoikon *et al*. 2016 [1].

According our previous work, N'guessan *et al*. (2024) [12], the diet of students is unbalanced, unstructured, little varied and poorly hydrated with a predominance of foods low in fiber. The analysis of the relationship between eating habits and the occurrence of constipation in the study population revealed the implication on the one hand of the high consumption of certain categories of food such as red meat/animal fat, tubers, carbonated drinks, spicy foods, sweet foods containing eggs or milk, non-alcoholic exciting products, flavor enhancers and on the other hand a low level of water consumption ($P < 0.05$) and the occurrence of the pathology. Furthermore, we note that the lower level of fruit and vegetable consumption, leads to the increasing of frequency of constipation.

In terms of the red meat/animal fat category, there is a relationship between high consumption (more than 3 times per week) and the occurrence of the disease. These results are identical to those of Dembélé (2009) [3]. Furthermore, according to Dabo (2006) [2], meat consumption is one of the factors most associated with constipation in Mali and could be justified by the fact that it is difficult to be digested due to its low fiber and its richness in lipids (Dukan, 2011) [6]. This slow digestibility then leads to a slow progression of the food bolus and a long stay of food in the digestive tract, capable of leading to bouts of constipation in the event of heavy consumption.

Concerning carbonated drinks, sweet foods, spicy products, foods containing eggs or milk and non-alcoholic exciting products, these are foods with a known inflammatory and food with allergenic effect on the digestive tract [13]. Food allergies, in fact, are immune reactions of intolerance of the body to the ingestion of a food that is usually well tolerated by the majority characterized by inflammation of the digestive tract [13]. In the event of prolonged exposure to causal dietary factors in subjects, these chronic inflammatory immune reactions promote a reduction in the intensity of intestinal peristalsis which could lead to a slow progression of the food or fecal bolus thus leading to the occurrence of constipation

[13].

This phenomenon could be similar to what happens with flavor enhancing products, in particular potash. Indeed, studies have proven that the consumption of potassium bicarbonate (potash) accidentally or intentionally, in small cumulative doses, in the diet, is responsible for corrosive digestive lesions which could lead to segmental narrowing of the digestive tract in sensitive subjects' population [7]. These lesions also lead to a weakening of peristaltic movements, a slowing down of food or fecal bolus and induce constipation. Moreover, several studies in Mali such as Diallo, (2008) [4]; Diarra *et al.*, (2009) [5] and Kanouté, (2010) [9] revealed that the high consumption of potash and salt in the preparation of corn toh was a contributing factor to colorectal cancer, which is a disease strongly associated with constipation.

In terms of water, fruits and vegetables, we can see that the lower level of consumption lead to an higher frequency of constipation. Indeed, fruits and vegetables are rich in water and fiber [14], and they have been recognized for several centuries as food-medicines for constipation [6]. Furthermore, consumption of more than one and a half liters of water per day is the best way to combat constipation [15]. In fact, these foods reduce digestive inflammation, soften stools, increase volume and facilitate the elimination of the fecal bolus [18].

The level of consumption of fish, white meat, vegetable fat and cereals is not linked to the occurrence of constipation in the population. This trend could be justified by the easy digestion of some of these foods which constitute the basis of the dietary treatment of constipation attacks (Dukan, 2011) [6]. Furthermore, the low involvement of certain foods such as alcohol, identified in certain studies as highly constipatogenic foods [16] could be justified by their low level of consumption in our population.

5. Conclusion

This study revealed the existence of a relationship between eating habits and the occurrence of constipation in the study population. Indeed, the high consumption of red meat/animal fat, tubers, carbonated drinks, spicy foods, sweet foods containing eggs or milk, non-alcoholic exciting products, flavor enhancers were involved in the occurrence of the disease among students. It also made it possible to understand that a low level of water consumption from fruits and vegetables also led to pathology. On the other hand, certain foods such as fish, white meat, vegetable fats, flavor enhancing products, cereals, carbonated drinks, spicy products, non-alcoholic exciting products, alcoholic products are not linked to the occurrence of constipation in the population. In view of these results, it would be wise to rationalize the consumption of different causal foods according to personal sensitivity and seasonal availability, so as to obtain a balance and food security, capable of ensuring lasting digestive homeostasis in students population.

Abbreviations

CBG	Chemistry Biology Geology
WHO	World Health Organization
FAO	Food and Agriculture Organization
INS	National Institute of Public Health

Author Contributions

Anon Franck-Donald N'Guessan: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision Validation, Visualization, Writing – original draft

Francis Beranger Angelo Aka: Conceptualization Formal Analysis, Investigation, Resources, Writing – original draft

Kouame Hermann Yeboue: Conceptualization, Data curation, Formal Analysis, Resources

Purifine Sassor Odile Ake-Tano: Formal Analysis, Methodology, Project administration, Supervision, Writing – original draft

Ahoua Yapi: Conceptualization, Data curation, Investigation Methodology, Supervision

Conflicts of Interest

The authors declare no conflicts of interest.

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Research Fields

Anon Franck-Donald N'Guessan: Food toxicology and pharmacology, nutrition and health policy, nutrition and public health care, Nutrition and no communicable diseases, nutrition and food formulation, Food security

Francis Beranger Angelo Aka: Nutrition and no communicable diseases, Interaction between food and health, Quality control of

food and medicines, Human / animal nutrition and food formulation, Plants and pathology, Food toxicology, Human dietetics

Kouame Hermann Yeboue: Nutrition and no communicable diseases, Interaction between food and health, Quality control of food, Human / animal nutrition and food formulation, Plants and pathology, Food toxicology, Human dietetics

Purifine Sassor Odile Ake-Tano: Nutrition and no communicable diseases, Nutrition and pediatric care, Nutrition policy, Human / animal nutrition and food formulation, Quality control of food and medicines, Food toxicology, Human dietetics

Ahoua Yapi: Plants and pathology, Food toxicology Human dietetics, parasitology, Human Nutrition and Neuro Psychological pathology Animal Nutrition