

Impact of *Helicobacter pylori* Intoxication in Throat, Mouth, Eyes and Face Skin Health in the Democratic Republic of Congo

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Abstract

Since a few decades, suspicions of massive criminal poisonings are persistent in the Democratic Republic of the Congo. The Laboratory of Toxicology of the University of Kinshasa started a research work on the phenomenon in 1990. In 2010, a surprising link was established with *Helicobacter pylori*. This finding enlightened *Helicobacter pylori* infection in a new way, conform to extra-digestive pathologies, described in recent literature. Indeed, it was established that, *Helicobacter pylori* toxins, gas ammonia and carbon dioxide, in case of constipation, instead of going down, could fly up along the esophagus and reach the blood stream through lungs way, creating then *Helicobacter pylori* intoxication. The objective of this study was to establish and discuss *Helicobacter pylori* toxins impact on throat, mouth, face skin and eyes. It was a cross-sectional study, conducted on 186 patients received at the Laboratory of Toxicology, for poisoning suspicion, from July 2016 to June 2017. Most patients were from 20 to 50 years old. Main pathologies noticed were: dried throat, throat burn, dried mouth, mouth burn, tongue burn, bitterness of food and beverage, lips burn, lips pimento taste, eyes heat, eyes pricking, eyes itching, double cataract, blackening of face skin, dried skin. All those pathologies were consecutive to the strong causticity of *Helicobacter pylori* toxins gas ammonia and carbon dioxide. In conclusion, this study stated that throat, mouth, eyes and face skin are straightly exposed to *Helicobacter pylori* toxins attack, consequently to their inflammatory potential. Results suggest the gaseous state of *Helicobacter pylori* toxins and the *toxic new trends* of *Helicobacter pylori* infection. Treatment has to take in count the intoxication component.

Keywords: *Helicobacter pylori* Infection; *Helicobacter pylori* Toxic-Infection; Urea Toxicity; Ammonia Toxicity; Carbon Dioxide Toxicity; Dentistry; Ophthalmology; DR Congo

Background

In spite the delay of its discovery, *Helicobacter pylori* is very known throughout the world because of its impact in many usual gastric pathologies [1-5]. Recent literature evokes more and more extra-digestive pathologies linked to *Helicobacter pylori* [6-8], yet more evidence was still needed.

A strange phenomenon is current in the Democratic Republic of the Congo, since a few decades. It's characterized by numerous extra-digestive pathologies. Congolese population thinks to massive criminal poisonings committed principally from the East Region of the DR Congo. Oddity, promptitude occurrence, hugeness of extra-digestive pathologies, and incapacity of Health National system to take care of patients, confirm poisoning believe in the population mind. The phenomenon is managed by initiated traditional practitioners only. After a quick diagnosis, using patients' saliva, miscellaneous plant extracts, mixed with honey, are administered.

In 1990, a research work started at the Laboratory of Toxicology of the University of Kinshasa, on the phenomenon in concern. In 2010, an unexpected surprising link was established between the strange phenomenon and *Helicobacter pylori*.

A poster was presented at the 9th International Symposium on Recent Advances in Environmental Health Research, Jackson State University, USA, in 2012, under the title: "*Helicobacter pylori* responsible of poisoning suspicion in the democratic republic of Congo: about 56 cases" [9]. In 2016, an oral presentation, "Hp-EDRC-Surprising unknown *H. pylori* epidemic in the Democratic Republic of the Congo" was presented at "3rd Euro-Global Experts Meeting on Medical Case Reports (Euro Case Reports 2016)" held on June 30-July 2 at Valencia Spain [10]. The case concerned 402 patients received at the Laboratory of Toxicology from 2005 to June 2016 for "poisoning suspicion". All of them were positive to *Helicobacter pylori*. Biological associated parameters were: Hemoglobin, Blood sedimentation rate, Alanine aminotransferase, Aspartate aminotransferase, Creatinine and Urea. A list of digestive and extra-digestive pathologies collected in patients was presented.

An oral presentation was made at the 5th European Conference on Clinical and Medical Case reports held during September 7-8 in Paris, France, entitled: "Meanders of an atypical research work on *Helicobacter pylori* in the Democratic Republic of the Congo: influence of HIV and other factors and study of some interesting cases" [11]. Three posters were also published, respectively: "Profile of *Helicobacter pylori* patients received at the laboratory of Toxicology of the University of Kinshasa from July 2016 to July 2017", "Opinion of population of Kinshasa City on *Helicobacter pylori* phenomenon responsible of numerous extra-digestive pathologies in DR Congo", and "About the management of *Helicobacter pylori* infection expressing numerous extra-digestive pathologies in DR Congo" [12-14].

Finally, an E-poster was published in Scotland, England, at the 7th International Conference on Predictive, Preventive and Personalized Medicine and Molecular Diagnostics held in September 14-15, 2017, at Edinburgh, Scotland. It was entitled: "*Helicobacter pylori* digestive and extra-digestive pathologies collected in the Democratic Republic of the Congo" [15]. The present article deals with *Helicobacter pylori* extra-gastric pathologies, concerning throat, mouth, face skin and eyes.

Methods

A cross-sectional study was conducted in patients received at the Laboratory of Toxicology of the University of Kinshasa from July 2016 to end of July 2017 for poisoning suspicion. Prior to the study, the protocol of the research was submitted to the Ethics Board of the Faculty of Pharmaceutical sciences. The research work was conducted according to principles of scientific research involving human participants, of Helsinki Declaration, in its revised version of 2013. Parameters of study were as followed:

- Demographic parameters: sex, age, marital status, education, nationality and residency.
- Scientific parameters: *Helicobacter pylori*, Blood sedimentation rate, Alanine aminotransferase, Aspartate aminotransferase, Creatinine, Urea, saliva, Hemoglobin.
- Pathologies were divided in: gastric, extra-gastric and extra-digestive pathologies.
- Extra-gastric pathologies were divided in: throat, mouth, face skin and eyes pathologies.
- *Helicobacter pylori* analysis was performed by chromatographic serological method. Other scientific parameters were analyzed by routine biological methods.
- Results were presented in tables.

Results

Population of study

According to table 1, population of study included 186 patients received at the Laboratory of Toxicology of the University of Kinshasa from July 2016 to July 2017. There were 116 males (%) and 70 (31%) females. There was no patient (0%) under 5 years. 37 (6%) under

20 years and 41 (7%) patients beyond 50 years. Patients from 21 to 50 years old were most represented in the population of study 151 (87%) patients. Unmarried patients were 32 (45%) while currently married patients were 154 (48 %). All the levels of education were represented: primary school 72 patients (24%), High school 64 patients (36%) and Higher education 50 patients (26%). Two nationalities were concerned: DR Congo 179 patients (99%) and Cameroon 7 patients (1%).

Variables	Patients	Percentage
Sex		
Male	116	62,4%
Female	70	37,6%
Total	186	100%
Age (years)		
0 - 5	0	0%
6 - 20	10	5,4%
21 - 50	151	81,2%
< 50	25	13,4%
Total	186	100%
Educational level		
Primary	72	38,7%
High	64	34,4%
Higher	50	26,9%
Total	186	100%
Current marital status		
Unmarried	32	17,2%
Married	154	82,8%
Total	186	100%
Nationality		
Congolese	179	96,2%
Cameroon	7	3,8%
Total	186	100%
Residency		
In DRC	183	98,4%
Elsewhere	3	1,6%
Total	186	

Table 1: Demographic parameters (n = 186).

Biological parameters

Patients' saliva was alkaline in most patients 180 (96,8%). All patients tested for *Helicobacter pylori* (186 patients) were positive to *Helicobacter pylori* 186 patients (100%). Blood Sedimentation Rate, Hemoglobin, ASAT, ALAT, Creatinine and Urea were recorded in 186 patients, as well. Blood Sedimentation Rate was out of norm in 162 (97,0%) patients. ALAT and ASAT were normal for most of patients 162 (97,0%). Iron deficiency anemia was present in 80 patients (56,9%) (Table 2).

Parameters	Patients	Percentage
Alkaline saliva (n = 186)		
Yes	180	96,8%
Total	186	100%
H. pylori (n = (186)		
Positive	186	100%
Total	186	100%
Hemoglobin (n = 186)		
In normal range	106	56,9%
Total	186	100%
Aspartate amino transferase ASAT (n = 186)		
In normal range	162	97,0%
Total	186	100%
Alanine amino transferase ALAT (n = 186)		
In normal range: (0 - 41 U/L)	162	97,0%
Total	186	100%
Creatinine (n = 186)		
In normal range	183	98,4%
Total	186	100%
Urea (n = 186)		
In normal range	183	93,4%
Total	186	100%
Blood sedimentation rate (n = 186)		
In normal range (< 10)	24	12,9%
Total	186	100%

Table 2: Biological parameters (n = 186).

Digestive and extra-digestive pathologies

According to table 3, pathologies recorded were divided in three parts: digestive, general and nervous pathologies. General pathologies involved lungs pathologies as well. Even nervous pathologies are general as well, there were treated apart because of their great impact in patients' health. Extra-digestive pathologies were very far more numerous than digestive pathologies (Table 4).

Digestive pathologies	General Pathologies	Nervous Pathologies
Internal heat in stomach irradiating to thorax	Muscles heat	Intense tiredness
Abdominal pain	Hard breathing	Frequent drowsiness
Throat dryness	Breathlessness	Dizziness
Mouth or tongue burn	Suffocation	Unbalance
Change in food and beverages taste	Allergic reflex cough	Accelerated aging
Alkaline saliva	Skin allergy, Skin blackening	Frequent forgetting
Bloody spit	Pricking	Mental confusion
Stomach fullness	Heart pain	Memory disorders
Stomach buzz	Heart palpitations	Hands shaking
Stomach and gut distending	Hormonal disorders in women	Electroencephalogram disturbance
Nausea	Spermatozoids destruction	Blurred vision
	Hemoglobin destruction	
	Anorexia	

Table 3: Digestive and extra-digestive pathologies collected in patients.

Oral-facial pathologies (n = 186)	Patients	Percentage
Throat pathologies		
Throat heat	164	88,1%
Throat inflammation	97	51,2%
Throat dryness	88	47,3%
Frequent spits	129	69,4%
Bloody spits	48	25,8%
Mouth pathologies		
Sensation of heat in the mouth	148	79,6%
Mucous membrane inflammation	126	67,7%
Tongue inflammation	144	77,4%
Mouth dryness	110	59,1%
Intense Salivation	154	82,8%
Bitterness of food and beverages	120	64,5%
Lips inflammation	65	34,9%
Sensation of pimento on lips	40	21,5%
Alkaline saliva	180	96,8%
Frequent spits	129	69,4%
Bloody spits	48	25,8%
Face skin pathologies		
Sensation of heat on the face	74	39,8%
Face skin inflammation	126	67,7%

Sensation of dryness of face skin	86	46,2%
Intense perspiration	149	80,1%
Face skin blackening	184	98,9%
Eyes pathologies		
Sensation of heat in eyes	95	51,0%
Blurred vision	167	89,8%
Red eyes	82	44,0%
Eyes pricking	62	33,3%
Eyes itching	120	64,5%
Dryness of eyes	185	99,5%
Watering of eyes	184	98,9%
Cataract	40	21,5%

Table 4: Oral-facial pathologies presented by patients.

Discussion

This study aimed to determine the impact of *Helicobacter pylori* toxic-infection on Throat, mouth, face skin and eyes. It was conducted in patients received at the Laboratory of Toxicology of the University of Kinshasa for poisoning suspicion. The main findings were: (i) quite all patients reported intense heat in throat, mouth, face skin and eyes. (ii) Intense heat was followed by burn and dryness (iii) afterwards, according to organs, were noted, frequent spit, bloody spit, alkaline saliva, bitterness of food and beverage, plentiful salivation, face blackening, blurred vision, red eyes, eyes pricking and eyes itching. (iv) Heat started in stomach and irradiated up to thorax, throat, mouth, eyes and face skin. (v) *Helicobacter pylori* was positive in quite all patients.

It's not the first time that *Helicobacter pylori* is incriminated in extra-digestive pathologies [16-24]. Although in this study, patients presented gastric, extra-gastric and numerous extra-digestive pathologies, at the same time, as showed in table 3. Most extra-digestive pathologies reported in literature were observed in this study as well: cardiovascular diseases, diabetes mellitus resistance, metabolic syndrome, neurodegenerative diseases, iron deficiency anemia, idiopathic thrombocytopenic purpura, dermatological diseases, open-angle glaucoma, spermatozoids impairment, inflammatory bowel diseases, and allergy. According to table 3, the scope of extra-digestive pathologies is larger in this study. Table 2 shows that 80 patients (26%) were concerned by iron impairment in this study. It could be assumed that iron impairment would be linked to Glucose-6-phosphate dehydrogenase impairment. This hypothesis has to be assessed.

This study pleads for the passage of *Helicobacter pylori* toxins into blood, via lungs way. Indeed, according to table 4, an intense heat moved up from patients' stomach to thorax and then to throat, mouth, faces skin and eyes. This intense heat accompanied *Helicobacter pylori* toxins, ammonia and carbon dioxide, released in stomach, in their trip along the esophagus to mouth, throat, eyes, and face skin and to lungs as well. Constipation played an important role in toxins moving up in this study. The large scope of extra-digestive pathologies observed in this study is a consequence of high ammonia and carbon dioxide "oxidative stress" exerted in the overall organism. The consecutive toxicity would be ammonia and carbon dioxide dose-dependent. It would be assumed in this study, that great quantities of ammonia and carbon dioxide were produced in patients' stomach corresponding to great quantities of hydrolyzed urea.

Literature reports, that inhalation of a high rate of carbon dioxide, may produce many general disorders: headaches, dizziness, high perspiration, mental confusion, visual distortion (visual hallucination), intellectual activity slowdown, irritability, retina damage, dimness of vision, hearing damage, nausea and vomiting, restlessness, paresthesia, tremor, dyspnea (breathing difficulty), panting, staggering,

malaise (vague feeling of discomfort), weakness, increased heart rate, cardiac output, blood pressure elevation, asphyxia, convulsions, unconsciousness, coma and death [25,26]. Most of those pathologies were met in our study. Consequently, in this study, patients seemed to face especially internal inhalation of gas ammonia and carbon dioxide, in other words, “*urea toxicity like*”.

Urea toxicity was described in animals, especially in ruminants for which urea was used as ration. In ruminants, urease was generated by rumen microbial. Edjtehadi., *et al.* addressing urea toxicity in sheep, reported many extra-digestive pathologies, mainly: depression, muscle spasms of ears and lips, fasciculation of the muscles of the scapular area and hind legs, shaking of the head, general trembling and/or a “colicky-like” state (bending hind legs) and chewing and/or grinding of the teeth, falling down and convulsions, rigidity of all body musculature and widely opened eyes with some protrusion of the eyeballs. Stop of respiration at the peak of convulsions. In case of respiration recovery, cyanosis of mucous membranes and presence of frothing at the mouth were seen. During convulsions and thereafter, serious cardiovascular disturbances were noted [27].

A certain similitude would be done between “*urea toxicity*” described in ruminants and *Helicobacter pylori* intoxication addressed in this study. The mechanism of this “*urea toxicity like*” in throat, mouth, eyes, and face skin would be described as followed. The first step was an internal heat moving up from stomach, accompanied by an intense inflammation and dryness sensation as well. Then, may be by reflex action, dryness induced liquid liberation: frequent spits, salivation, intense perspiration, and watering of the eyes.

According to table 4, 164 patients (88%) suffered from heat throat, 148 patients (79.5%) from mouth heat, 95 patients (51%) from eyes heat and 74 patients (40%) from face skin face heat. In spite of heat dimness in eyes and face skin, consequences in eyes and face skin patients were still strong. Indeed, respectively 185 (99%) and 184 (98.9%) patients faced eyes dryness and watering of eyes. This would be explained by inflammation of deep eyes structures. The principal face skin pathology was face skin blackening experienced by 184 patients (98.9%). It was followed by intense perspiration, 149 patients (80%) and finally, by face skin inflammation experienced by 126 (68%) patients. In this study, skin blackening would be explained as a direct consequence of intense perspiration, carrying *Helicobacter pylori* caustic inflammatory toxins in close contact with the face skin. Literature reports indeed that carbon dioxide could be eliminated through perspiration, like heavy metals [26].

In this study, mouth proved to be the most exposed to *Helicobacter pylori* toxins, because evidently of its location at the top end of esophagus favoring *Helicobacter pylori* toxins attack, dragging along, intense heat (in 148 patients, 79.5%), mucous membrane inflammation (in 126 patients, 68 %), tongue inflammation (in 144 patients, 77%), mouth dryness (in 110 patients, 59%), intense salivation (in 154 patients, 83%), bitterness of food and beverage (in 120 patients, (64.%), frequent spits (in 129 patients, 69%), and bloody spits, (in 40 patients, 21.5%). In this study, dental risks were not assessed; actually, they would exist. Indeed, mouth heat, inflammation, mouth dryness and salivation would exert a negative impact in teeth health. Gums of teeth would also be concerned, considering the fact that certain patients experienced lips inflammation and lips pimento sensation.

Limitations and Strengths of the Study

This study has potential limitations. The population of study, 186 participants, was not representative of the whole population of the Democratic Republic of the Congo and pathologies were not established by relevant tests. The only patients’ opinions collected in this study should not be sufficient. Nevertheless, this is the first study, to the best of our knowledge, to address *Helicobacter pylori* intoxication and its impact in throat, mouth, eyes and face skin health. It’s also the first study, to the best of our knowledge, to compare “*urea toxicity*” described in the literature in ruminants with the ongoing human *Helicobacter pylori* intoxication described in the Democratic Republic of Congo.

Conclusion

This study stated that *Helicobacter pylori* would undergo *urea toxicity like*. Gas ammonia and carbon dioxide liberated in stomach in gaseous state, would indeed fly up along the esophagus and provoke throat, mouth, and eyes and face skin inflammation, before reaching the blood stream by the path of lungs, involving numerous extra-digestive pathologies as well. The responsibility of *Helicobacter pylori* in extra-digestive pathologies is more and more reported in recent literature, demonstrating that the phenomenon described in this study, is not specific to the Democratic Republic of the Congo. *Helicobacter pylori* toxins impact in mouth, eyes, face skin and throat health was highly suggested in this study. The risk seemed higher for mouth, as mucous membrane, tongue, saliva, lips, teeth and gums of teeth would be concerned at the same time. Specialists in Dentistry, Ophthalmology, Dermatology and Otto-rhino laryngology should especially be interested by our study.

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