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Helicobacter pylori and asthma are they linked in Côte d'Ivoire?

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Abstract

***Helicobacter pylori* (*H. pylori*) causes gastric diseases and extra digestive diseases, such as lung disease. As a result of its lipo polysaccharide nature, *H. pylori* is able to guide the immune response towards Th1 or Th2 (Lymphocyte T helper 1 or 2) profiles by stimulating toll-like receptors (TLR) of the dendritic cells of the respiratory mucosa hence controlling asthmatic occurrence. This study aims to find a correlation between anti-*H. pylori* antibodies and asthma evolution. A cross-sectional study was carried out from January 2008 to June 2009 on asthmatic subjects (cases) and non asthmatic blood donors (controls). Anti-*H. Pylori*'s antibodies was detected in all subjects using HP® test kit (Acon laboratories). In asthmatics, expiratory volume were also measure by spirometry. The odds ratio (OR) and relative risk (RR) were used to compare cases and controls groups. p<0.05 was considered significant. Anti-*H. Pylori* antibodies prevalence was lower in the case groups (47.1%) compared to control groups (60.3%). *H. pylori* is not linked to the risk of asthma occurrence.**

Keywords: Asthma, *H. pylori*, antibodies.

INTRODUCTION

Helicobacter pylori (*H. pylori*) is a Gram negative bacilli causing gastric diseases like chronic gastritis, peptic ulcer, gastric cancer and extra digestive diseases including cardiovascular, rheumatic, skinned and liver ones [Realdi 1999,Gasbarrini 1999]. Several studies have found high prevalence of anti-*H. pylori* antibodies in patients suffering for chronic obstructive pulmonary diseases [Langman 1976, Kellow 1986]. Recent studies have linked pulmonary tuberculosis [Lundegardh 1994] and lung cancer [Gocyk 2000] with *H. pylori* infection. Studies are yet to establish a link between asthma and *H. pylori* infection [Blaser 2008, Annagür 2007, Kanbay 2007, Roussos 2006, Jun 2005, Tsang 2000], thousome studies found protective effect of this infection on asthma [D'Elios 2009, Fullerton 2009, Vakil 2009, Codolo 2008,. Chen Y 2007, 2008, Reibman J 2008, Lang 2007, Nijevitch 2004].
H.pylori can induce chronic inflammatory mediator's production causing non-specific inflammatory process as has been described in chronic bronchitis [Gaselli 1999, Roussos 2002]. However, the lipo polysaccharide (LPS which belong to the danger signal group) of *H. pylori*, similar to other Gram-negative bacteria, is able to stimulate toll-like receptors (TLR, particularly TLR4), which are present on dendritic cells of the respiratory mucosa [Zhou 2004]. These receptors are able to guide immune response toward Th1 or Th2 profiles and play a role in allergic disease including asthma. The permanent activation of TLRs may control asthma occurrence or evolution.
This study aims to investigate any link between anti-*H. pylori* antibodies and asthma evolution.

Materials and methods

A cross-sectional study was carry out from January 1st 2008 to June 30 2009 in consented asthmatic patients (cases) attending the Pulmonary Function Service of the University Teaching Hospital of Cocody. Cases were divided in two

Table I : Anti-*H. pylori* antibodies, risk of asthma occurrence and risk of partly or uncontrolled asthma

	Anti-*H. pylori* antibodies n(%)	OR
Asthmatic subjects (n=34)	16 (16,5)	0,66 [0,28 – 1,52]
Non Asthmatic subjects (n=63)	38 (25,8)	
controlled asthma (n=7)	3 (8,8)	0,58 [0,23 – 1,47]
Partly or uncontrolled asthma (n=27)	13 (38,2)	

groups based on asthma's evolution (well controlled asthma and partly or uncontrolled asthma). Healthy non-asthmatic blood donors were selected as controls from the blood transfusion center of Abidjan. For all subject (cases and controls), a venous blood sample was collected and anti-*H. Pylori* antibodies were detected using HP®test kit (Acon laboratories with sensitivity 93.0%, specificity 89.2% and precision 90.7%) at the Immunology Service Unit of the University Teaching Hospital of Cocody. In the case groups, spirometry was also done using Datospir type B 120 spirometer (Sibelmed®). The expiratory volume (FEV) was used to assess asthma control according to GINA 2006 classification [Koshak EA 2007]. Data analysis was done by Epi info software using odd ratio. $p < 0.05$ was considered significant.

Results

Characteristics of groups

At the end of the study, 2 groups have been made, cases group (34 subjects enrolled) and controls group (63 subjects enrolled). In Cases group, age ranged from 7 to 74 years (mean age of 32.2 ±19.1 years). In controls group, age ranged from 21 to 52 years (mean age of 32.5 ±7.5 years). In the two groups, 16 to 45 years subjects were most represented (61.8% and 72.1% in Cases and Controls respectively).
In cases, we note a slight female predominance (sex ratio of 0.8). In contrast, we noted in Controls group a male predominance (sex ratio of 2.7). There was a statistical difference between cases and controls regarding gender.
In cases, 7 (20.6%) patients were classified as controlled asthma. Partly controlled and uncontrolled asthma represented 27 (79.4%) patients.

Anti-*H. pylori* antibodies

Anti-*H. pylori* antibodies prevalence were 47.1% and 60.3% in cases and controls groups respectively. The prevalence of anti-*H. pylori* antibodies was higher in controls than in cases regardless of asthma evolution (controlled asthma 42.9%, partly controlled or uncontrolled asthma 48.1%) (table 1).

Asthma and anti-*H. pylori* antibodies

Anti-*H. pylori* antibodies were not linked to asthma occurrence (OR = 0.66 IC95% [0.28 – 1.52]). Even after adjusting for sex (adjusted OR = 0.73 IC95% [0.30 – 1.81]).

Anti-*H. pylori* antibodies was not associated with a risk of poor evolution of asthma (OR =0.58 IC95% [0.23 – 1.47]) (table 1).

DISCUSSION

Populations studied

'Cases' were mostly young adults (mean age 38,3 years) with a slight female predominance (sex ratio 0.79).'Controls' were also mostly young adults(mean age 32.5 years), but with a clear male predominance (sex ratio 2.7). There was a statistically significant difference among cases and controls regarding gender (44.1% and 82.5% male respectively). The male predominance is found in several studies of blood donors in Côte d' Ivoire [Minga 2010, Kra 2007]. However, these studies report a younger mean age of 27.5 years [Kra 2007] or 28 years [Minga 2010]. In adulthood, due to the influence of gender in asthma, we observed a female predominance [Rubio-Padilla 2009, Koffi 2001], this could explain the slight female predominance observed in 'cases' group.

Overall, the prevalence rate of anti-*H. pylori* antibodies was high in both groups cases and controls. This high prevalence rate of anti-*H. pylori* antibodies could be explained by the socio-economic conditions of our country. [Megraud 1989, Pounder 1995, Attia 2004]. This because of the poor socio-economic conditions which correlate with promiscuity and poor hygiene. However, the prevalence rate of anti-*H. pylori* antibodies was lower in 'cases' group (47.1%) than in the 'controls' group (60.3%), but the difference was not statistically significant.

Anti-*H. pylori* antibodies and risk of asthma occurrence

In this study, there was no statistically significant difference between subjects with or without anti-*H. pylori* antibodies regarding the risk of asthma occurrence (OR 0.66 IC95% [0.28 – 1.52]). The difference between 'cases' and 'controls' regarding anti-*H. pylori* antibodies was not statistically significant, even after adjusting for sex (adjusted OR= 0.73 95% CI [0.30 to 1.81]). These figures are similar to some studies which argue for a lack of statistical relationship between asthma and *H. pylori* [Blaser 2008, Annagür 2007, Kanbay 2007, Roussos 2006, Jun 2005, Tsang 2000]. The high prevalence of anti-*H. pylori* antibodies in our sample despite its relatively small size may have contributed to mask a possible statistical link between *H. pylori* and asthma. However, the lack of statistical relationship between *H.pylori* and asthma is in agreement with several studies [Blaser 2008, Annagür 2007, Kanbay 2007, Roussos 2006, Jun 2005, Tsang 2000].

Anti-*H. pylori* antibodies and risk of partly controlled or uncontrolled asthma

In case groups, we noted a lower prevalence of anti-*H. pylori* antibodies (42.8%) in controlled asthma group than in partly controlled or uncontrolled asthma group (48.1%) although the difference was not statistically significant. These figures are similar to some studies that argue for a lack of statistical relationship between asthma and *H. pylori* [Blaser 2008, Annagür 2007, Kanbay 2007, Roussos 2006, Jun 2005, Tsang 2000].

The presence of anti-*H. pylori* antibodies was not associated with occurrence of partly controlled or uncontrolled asthma (OR = 0,58 IC95% [0,23 – 1,47]). These figures are in agreement to the data of some authors who think that *H. pylori* did not influence asthma [Blaser 2008, Annagür 2007, Kanbay 2007, Roussos 2006, Jun 2005, Tsang 2000]. However, some researchers are of the opinion that this bacterium is rather protective regarding asthma [D'Elios 2009, Fullerton 2009, Vakil 2009, Codolo 2008,. Chen Y 2007, 2008, Reibman J 2008, Lang 2007, Nijevitch 2004]. Biodiversity of *H. pylori* strains showed a number of virulence factors (VacA, CagA) which confer special abilities to strains like the mechanisms of aggression of the gastric mucosa. These virulent strains of *H. pylori* may have a particular impact on asthma as it is with other respiratory diseases [Roussos 2006]. This impact could be unfavorably such as observed with protein HP-NAP. However, some studies have found an inverse relationship between asthma and anti-CagA antibodies [Reibman J 2008, Chen Y 2007]. Further studies are needed to understand potential relationships between asthma and virulence factors of *H. pylori*.

In this study, the anti-*H. pylori* antibodies were not quantified. The measurement of anti-*H. pylori* antibodies could show a possible correlation between asthma and anti-*H. pylori* antibodies. In addition, measurement of serum IgE or

chemokines (Th1 and Th2) could also show a possible relationship between asthma and *H. pylori*. Further studies are needed to ascertain these relationships.

Conclusion

The prevalence rate of anti-*H. pylori* antibodies was high in both cases (asthmatic subjects) and controls (non asthmatic subjects) without statistical significant difference. In cases, the prevalence of anti-*H. Pylori* antibodies were lower in controlled asthma group compared to partly controlled and uncontrolled asthma group without statistical significant difference. *H. pylori*'s infection was not linked to asthma occurrence or to the risk of poor evolution of asthma.

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