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Helicobacter pylori infection and hypertension: Is there an association?

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Abstract

There are conflicting reports in the literature regarding the association of *Helicobacter pylori* with cardiovascular diseases like hypertension. However there is a paucity of literature from the Indian subcontinent on the relationship between *Helicobacter pylori* and the heart, coronary artery disease and hypertension. This study aims to evaluate the association between Helicobacter pylori seropositivity and hypertension. 40 hypertensives and 40 normotensive controls were included in the study. The presence of Helicobacter pylori was confirmed by serological evidence of Helicobacter pylori IgG antibodies as estimated by ELISA (> 40 EU/ml considered as positive). 18 subjects with hypertension and 9 controls were positive for *Helicobacter pylori* as per serological evidence. Chi square test revealed that the difference in the number of seropositive cases was statistically significant ($p<0.05$). Thus in the present study *Helicobacter pylori* infection had significant association with hypertension as compared to controls.

Keywords: Atherosclerosis, *Helicobacter pylori*, hypertension, infection.

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Introduction

Helicobacter pylori is a spiral shaped gram negative flagellate bacterium implicated in various upper gastrointestinal tract diseases like peptic ulcer, gastric adenocarcinoma and MALT lymphoma [1]. It has also been linked to various extra gastric conditions like coronary artery disease, hypertension and atherosclerosis, but the causative role is yet to be established [2]. There has been emerging interest in the role of *Helicobacter pylori (H.pylori)* in hypertension with the observation for the past few years that infections like Chlamydia pneumoniae and *Helicobacter pylori* are more common in hypertensives. Studies have not yet demonstrated a consistent relationship between *H.pylori* and hypertension.

Arterial hypertension is a risk factor for atherosclerosis and evidence points to the causative role of endothelial dysfunction [3]. The concept of association of chronic infection with hypertension is much debated in the last two decades. Hypertension causes target organ damage by the active promotion of atherosclerosis and thrombogenesis. Because the processes of atherosclerosis and thrombogenesis have many similarities to inflammatory, the role of chronic infection in causing inflammation leading to thrombogenesis and atherosclerosis in hypertension is postulated [4]. In addition to classic risk factors epidemiological research has identified a number of other conditions like chronic infections that might significantly contribute to cardiovascular risk in patients with hypertension. Although adequate control of blood pressure is of basic importance in cardiovascular risk prevention in hypertensive patients, correction of additional risk factors is an integral part of risk management.

There are conflicting reports in the literature regarding the association of *H. pylori* with cardiovascular diseases like hypertension. However there is a paucity of literature from the Indian subcontinent on the relationship between *H.pylori* and hypertension. Measuring serum immunoglobulin IgG antibody to *H.pylori* is most commonly used for population based studies, and its accuracy has been sufficiently established through many studies across a diverse range of ethnic groups and countries [5]. This study aims to evaluate the association between *H. pylori* infection confirmed by *H. pylori* seropositivity and hypertension.

Methods

Ethical clearance was obtained from the Institutional Ethics Committee. 40 hypertensives attending the RL Jalappa Hospital and Research Centre attached to Sri Devaraj Urs Medical College, Tamaka, Kolar were randomly selected and included in the study after taking informed consent. Hypertension was defined as SBP≥140mm Hg or DBP≥90mm Hg or self reported use of antihypertensive medication, with adaptation of the WHO definitions [6]. Weight and height were measured with participants standing without shoes and wearing light clothing. Participants stood upright with the head in Frankfort plane for height measurement. Height was recorded to the nearest 0.5 cm, and weight was recorded to the nearest 100 g. BMI was calculated as weight (kg)/height $(m)^2$. Smokers and diabetics were excluded. 40 age matched subjects who were normotensives and volunteered to participate in the study constituted the control group. Helicobacter pylori infection was confirmed by the serological evidence of *H.pylori* specific IgG antibody titres, measured by a commercially available ELISA kit (>40EU/mL was considered as positive).

Independent t- test was done to compare the difference in BMI between the study groups and chi-square test for comparing the gender distribution and difference in number of *H-pylori* seropositive cases between hypertensives and controls. A value of $p<0.05$ was considered as statistically significant.

Results

The mean age was 46.71±8.81years in the hypertensive group and 41.47±8.56 years in controls (p = 0.06). There were 19 males and 21 females in the hypertensive group and 22 males and 18 females in control group and the gender difference was not significant (p=0.50). Among the hypertensive subjects 45% (18 out of 40) were seropositive to *H.pylori* as compared with 22.5s% (9 out of 40) healthy controls and the difference was statistically significant. ($p = 0.033$) (Table 1)

Table 1. Profile of study subjects

	Hypertensives	Controls	p value
Age (in years)	46.71±8.81	41.47±8.56	$p=0.06^{ns}$
Male : female	19:21	22:18	$p=0.5^{ns}$
BMI	24.59±2.33	22.63±1.66	$p=0.04^{*}$
H.pylori seropositivity	45 % (18/40)	22.5% (9/40)	$p=0.03^{*}$

Age and BMI are expressed as mean ± standard deviation
*ns- not significant,.. * - significant at p<0.05*

Discussion

Thus in the present study there was significantly more *H. pylori* seropositive cases among the hypertensives than controls indicating an association of *H. pylori* infection with hypertension.

Similar relationship was found between *H. pylori* infection and hypertension in some earlier studies.

Barnes and colleagues from England observed 103 patients who had been investigated for dyspepsia between 1973 and 1980 and had normal upper endoscopic results. They noticed an unexpected significant association ($p<0.01$) between *H. pylori* infection and hypertension [7].

Lip et al [8] reported a significantly higher seroprevalence of *H. pylori* infection in patients with hypertension (85%) as compared with healthy controls (66%) (p=0.007).

Inflammation has been implicated in the pathogenesis of atherosclerosis, and markers of inflammation, have been reported to be associated with the risk of atherosclerosis-related cardiovascular disease [4].

Migneco et al demonstrated a significant decrease in blood pressure values, in particular in diastolic blood pressure values, after *H. pylori* eradication in hypertensive patients. They postulated that the possible links between hypertensive disease and *H. pylori* infection may involve the activation of the cytokine cascade with the release of vasoactive substances from the primary site of infection, or molecular mimicry between the CagA antigens of *H. pylori* and some peptides expressed by endothelial cells and smooth muscle [9].

Beever et al suggested that salt intake may in some probable way facilitate *H. pylori* infection [10]. A high-salt diet might irritate the gastric mucosa and allow *H. pylori* to enter the body [11]. Within Japan, an association has been reported between the intake of salty food and the risk of *H.pylori* infection [12]. This might explain the association of *H. pylori* with hypertension as there is a known relation between salt intake and hypertension.

Earlier studies have shown that greater age and higher BMI were seen in *Helicobacter pylori* seropositive subjects as compared to the seronegative subjects [13,14]. In our study there was no significant difference in age between the two groups. But the hypertensive subjects had higher BMI than the normotensive controls (24.59±2.33 vs 22.63±1.66, p= 0.04) and this might have contributed to the association seen.

Few studies have failed to find an association between *H. pylori* infection and hypertension [15, 16, 17].

Conclusions

There has been a significant increase in subjects with seropositivity to *Helicobacter pylori* in hypertensives as compared to normotensives. The importance of this association of *H.pylori* infection with hypertension is highlighted by the possibility of an effective intervention against *H.pylori* infection as the organism can be easily eradicated using simple & reliable drug regimen.

The association between *Helicobacter pylori* and hypertension that we have demonstrated doesn't mean causation. To establish causative role *H. pylori* in hypertension, randomized control studies are required and the best evidence of an association between *H. pylori* infection and hypertension so far have come from cross-sectional studies. The association needs further investigation from prospective studies.

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