

O blood group as a risk factor for *Helicobacter pylori* IgG seropositivity among pregnant Sudanese women

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Abstract

The objective was to investigate the prevalence and the association between blood groups and *Helicobacter pylori* IgG seropositivity among pregnant Sudanese women. A cross-sectional survey was carried-out at Saad Abul Ela Maternity Hospital, Khartoum, Sudan during the period of July 2014 through December 2015. Questionnaires covering socio-demographic and obstetrics information were administered. Specific *H. pylori* IgG antibody was analysed using ELISA. One hundred eighty six pregnant women were enrolled. The mean (SD) of the age, parity was 28.3 (2.6) years and 2.6 (3.5), respectively. Of the 186 women, 42 (22.6%), 24 (12.9%), 11(5.9%) and 109 (58.6%) had blood group A, B, AB and O, respectively. *H. pylori* IgG seropositivity rate was 132/186 (71.0%). There was no significant difference in age and parity between women with *H. pylori* IgG seropositive and seronegative. Compared with the women with *H. pylori* IgG seronegative, significantly higher numbers of women with *H. pylori* IgG seropositive had O blood group, [84/132(63.6) versus 25/54(46.3), $P < 0.001$]. In binary logistic regression, women with O blood group (OR= 2.084, 95% CI=1.060 -4.097, $P=0.033$) were at a higher *H. pylori* IgG seropositivity. The current study showed that women with blood group O were at higher risk for *H. pylori* IgG seropositivity.

Introduction

The ABO system holds special importance in blood transfusion and transplantation.¹ The red blood cells possess permanent antigens forming lifelong biological markers of different individuals; they are as unique as every individual's fingerprints.²

These antigens form the bases of the ABO system.

Previous studies pointed to a link between diseases and the presence or absence of ABO antigens in the body secretions. Franchini *et al.* reported such an association between thromboembolic diseases and cardiovascular diseases.^{3,4} Moreover, stomach ulcers, are typically more commoner among group O individuals while gastric cancer is more frequently seen among group A individuals.⁵

The ABO system has been found to be associated with *Helicobacter pylori*.^{2,6-11} Interestingly, the link was particularly made with the blood group O, mostly among the general population.^{8,10,12} However other researchers could not find such a link.^{13,14}

Researchers from different countries have reported the adverse effects of *H. pylori* on pregnancy.¹⁵⁻¹⁸ Despite the aforementioned *H. pylori* association with ABO system and the morbidity it causes during pregnancy, no research has been conducted to sort such an association. There is a high prevalence of *H. pylori* among pregnant Sudanese women.¹⁵ The current study was conducted to investigate the association - if any-between the ABO system and the *H. pylori* seropositivity among pregnant Sudanese women. Such a study will have its implications on management and care during pregnancy in a country that is still struggling to reduce the maternal mortality to the acceptable levels.¹⁹

Materials and Methods

A cross -sectional study was conducted among healthy pregnant women attended for antenatal care. Women diabetes mellitus, thyroid disease, renal disease and liver diseases were excluded from study.

After signing an informed consent, socio-demographic characteristics, medical and obstetrics history (age, parity, gestational age, education) was gathered by questionnaires that filled by a trained medical officer in the local Arabic language. Maternal weight and height were measured using the standard scaled and recorded and body mass index (BMI) was computed by weight in kilograms divided by the square of height in meters. The hemoglobin was investigated as part of maternal hemogram.

Specific *H. pylori* antibody was analysed using commercial *H. pylori* specific ELISA (Euroimmun, Lu'beck, Germany) to detect seropositivity for IgG. The tests were performed as per the manufacturers' instructions. Results of ≥ 1.1 units were considered to be positive, those of 0.9-1.1 units were considered to be weakly positive

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(were not considered positive) and those ≤ 0.9 units were recognized as negative for *H. pylori*.

A total sample size of 186 participants was calculated to investigate the difference rate of the O blood group in the women with IgG seropositive and IgG seronegative depend on our previous findings on the prevalence of *H. pylori* seropositivity among pregnant women¹⁵. We assumed the rate of O blood as around 50% depend on the rate of blood groups among pregnant Sudanese women.^{20,21} This rate would provide 80% power to detect a 5% difference at $\alpha = 0.05$, with an assumption that complete data might not be available for 10% of participants.

Statistics

SPSS for Windows (version 20.0) was used for data analyses. The studied variables were described with means and standard deviations (SD). Proportions of the studied groups were expressed in percentages (%). The difference of mean (SD) and proportion were compared between the *H. pylori* IgG seropositive and IgG seronegative using T-test and X^2 , respectively. Binary logistic regression analyses were performed, where *H. pylori* IgG seropositive was the dependent variable and medical/ obstetrics characteristics (age, parity, and residence), blood groups (O vs non O blood group), BMI were the independent variables. Odds ratio and 95% CI were cal-

culated. $P < 0.05$ was considered statistically significant.

Ethics

The current study received ethical approval from the Research Board at the Department of Obstetrics and Gynaecology, Faculty of Medicine, University of Khartoum, Sudan

Results

General characteristics of the participants

One hundred eighty six pregnant women were enrolled. The mean (SD) of the age, parity was 28.3 (2.6) years and 2.6 (3.5), respectively. Around one quarter of all women (186) were primiparae 45 (24.2%), the majority were housewives (133, 71.5%). Thirty-eight (20.4%) had education < secondary levels. Seventy-two (38.7%) women had history of miscarriage.

Of the 186 women, 42 (22.6%), 24 (12.9%), 11(5.9%) and 109 (58.6%) had blood group A, B, AB and O, respectively.

H. pylori IgG seropositivity rate was 132/186 (71.0%). Significantly higher numbers of women with *H. pylori* IgG seropos-

itive had O blood group, [84/132(63.6) versus 25/54(46.3), $P < 0.001$]. However, the rest of the variables, such as age and parity showed no significant difference (Table 1).

In binary logistic regression, there was no association between age, parity, education, BMI and *H. pylori* IgG seropositivity. Blood group O was associated with *H. pylori* IgG seropositivity (OR= 2.084, 95% CI=1.060-4.097, $P = 0.033$) (Table 2).

Discussion

This is the first study of its type among a pregnant population reporting ABO and *H. pylori*. The main finding of the current study was the association between blood group O and *H. pylori* sero-positivity among pregnant Sudanese women. We have previously showed that pregnant Sudanese women with blood group O were at higher risk for malaria infections and at higher risk for preeclampsia.^{20,21} The current study findings goes with the previous findings where Mattos *et al.*, in their study from Brazil reported that O blood group associated with *H. pylori* among patients with peptic ulcer disease or chronic gastritis.²² Interestingly, they found that the chance of

any of the study belonging to blood group O and infected with *H. pylori* was about two and a half times having any other ABO blood group along with *H. pylori* infection. This is nearly the same in our study where the chance of having a blood group O among *H. pylori* positive was more than 2 times. Strong pointers to such an association has always existed, though not validated.²³ In a cohort study among a Scandinavian population, Edgrens and his colleagues showed a clear association between peptic and group O as well as a clear link between gastric cancer and group A. Findings stated by Edgrens *et al* could be further linked to the current study hypothesis by the close link between *H. pylori*, peptic ulcer and gastric carcinoma.^{24,25} In alignment with our finding, Inoue *et al* concluded that among a Japanese population running a routine check-up, blood group O was associated with *H. pylori*.¹¹ Ansari *et al.* reported that there is an association between blood group O and *H. pylori* on their study among a Pakistani cohort of endoscopy presenting with gastrointestinal symptoms.¹⁰ They further described that this association is governed by the Lewis epitope and that it is reduced among persons with blood groups A and B thus resulting in a lower risk of *H. pylori* infection while it is among

Table 1. comparing the obstetrics and clinical characteristics of women with *H. pylori* IgG seropositive and seronegative at Khartoum, Sudan.

Variable	<i>H. pylori</i> IgG seropositive (n=132) The mean (SD)	<i>H. pylori</i> seronegative (n=54) The mean (SD)	P
Age, year	28.0 (6.4)	29.0 (6.5)	0.311
Parity	2.6 (3.8)	2.6 (2.4)	0.991
Body mass index, kg/m ²	26.4 (4.7)	25.9 (4.0)	0.487
Number (%) of			
Education <secondary level	106.0 (80.3)	42 (77.8)	0.693
Lack of antenatal care	44.0 (33.3)	10 (18.5)	0.051
History of miscarriage	57 (43.2)	15 (27.8)	0.068
O	84 (63.6)	25(46.3)	< 0.001
A	25 (18.9)	17 (31.5)	0.162
B	16 (12.1)	8 (14.8)	0.162
AB	7 (5.3)	4 (7.4)	0.162

Table 2. Binary logistic regression of the predictors of *H. pylori* IgG seropositivity, Sudan.

Variables	OR	95% CI	P
Age, year	0.94	0.880-1.003	0.063
Parity	1.03	0.920-1.169	0.553
History of miscarriage	2.099	0.942-4.676	0.070
Education <secondary level	0.864	0.374-1.996	0.733
Lack of antenatal care	1.659	0.690-3.993	0.258
Body mass index, kg/m ²	1.058	0.983-1.138	0.133
O versus none O blood group	2.084	1.060-4.097	0.033

those with blood group O and therefore they tend to have higher rates of *H. pylori* infection.¹⁰ Subjects with blood group O tend to produce more interleukin-6¹² which further promotes adhesion of bacteria, not only this but further promotes the differentiation T helper 2 cells while inhibiting the T helper 1 cells, thus tipping the T helper1/T helper2 ratio,²⁶ a presentation that is commonly seen with duodenal ulcer patients.¹² A number of other researchers claimed finding such an association between *H. pylori* and O blood group; however it was difficult to exclude a confounding effect among most of these studies.^{6,8,9} In contrast, other researchers could find no association between the ABO blood groups and *H. pylori* infection among an adult population in Mashhad, Iran.^{13,14} However, both studies were carried in the same locality, a thing that might raise the possibility regarding an influencing effect of genetics of the group to the outcome, another plausible explanation could be the existence of different *H. pylori* strains in that locality as it has been documented by different studies that the different strains are not equally specific for O group.^{27,28} Moreover, they used the urea breath test in one of the two studies, while they used antibody testing for *H. pylori* in the other study. In the first study they recruited blood donors, while in the second study, patients referred with different gastrointestinal symptoms were involved in the study. Individuals expressing blood group O are more prone to *H. pylori* infection and its different gastrointestinal disease presentations and complications. Such susceptibility is explained by possession O blood group subjects of a higher cellular and immune response to the infection.¹²

One of the limitations of the current study was that the lack of determination of ABO antigens secretions and the Lewis blood group phenotypes. Moreover, we did not investigate the pregnancy outcomes such as preterm delivery, gestational hypertension, fetal growth restriction and gestational diabetes and their association with *H. pylori* and blood groups.

Conclusions

The current study concludes that there is a strong association between Blood group O and the existence of infection with *H. pylori*, such an association should raise the suspicion index of *H. pylori* infection among pregnant women presenting dyspepsia especially among countries with high prevalence of such a pathogen.

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