




Original Article

Obesity and *helicobacter pylori* infection in adults with non specific colitisHuda Saleem H. Al-Khalidy  *

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ABSTRACT

Background: Non specific colitis is defined as inflammatory condition of the colon that when examined microscopically lacks any characteristic features of any specific form of colitis and is commonly seen in reports of colonoscopy biopsies. There are many factors that cause it like obesity and *H. pylori*.

Aim of the study: To determine the association of obesity and *H. pylori* as contributory factors to this disease.

Patients and methods: This is a case-controlled study was carried out in Al-Kindy College of Medicine from January 2017 to June 2018. Sixty individuals were included; forty of them had non specific colitis. The rest were healthy control group. Demographic information's were taken like age and sex. Anthropometric measurement like weight in kilograms (kg), height in meters (m), waist circumference in centimeters (cm), and body mass index was done. *H. pylori* IgG was done to both groups.

Results: Study results indicated that this disease was more common with increasing age, there is a significant difference ($p = 0.002$) between patients (48.12 ± 1.50) and control group (41.00 ± 1.10) regarding age. BMI of the patients is significantly higher in patients group (29.21 ± 0.41 ; $p = 0.000$) than the control (22.23 ± 0.41). Patients with non specific colitis showed significant ($p = 0.000$) increased in *H. pylori* infection 33 (82.5%) compared with control group 2 (10%).

Conclusions: Obesity and infection with *H. pylori* may predispose to non specific colitis.

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Obesidade e infecção por *Helicobacter pylori* em adultos com colite inespecífica

RESUMO

Introdução: Colite inespecífica é uma condição inflamatória do cólon que microscopicamente não apresenta características de qualquer forma específica de colite; é comumente observada em relatórios patológicos de biópsias de colonoscopia. Vários fatores podem causar colite inespecífica, dentre os quais obesidade e infecção por *H. pylori*.

PALAVRAS-CHAVE:

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Objetivo do estudo: Determinar o possível papel da obesidade e *H. pylori* como fatores contribuintes para esta doença.

Pacientes e Métodos: Este foi um estudo caso-controle, realizado na Al-Kindy College of Medicine entre janeiro de 2017 e junho de 2018. Um total de 60 indivíduos foram incluídos, 40 dos quais apresentavam colite inespecífica. Os demais foram incluídos no grupo de controles saudáveis. Foram coletadas informações demográficas, como idade e sexo. Medidas antropométricas, como peso (kg), altura (m), circunferência da cintura (cm) e índice de massa corporal, também foram coletadas. Nos dois grupos, foi feita serologia para *H. pylori* (IgG)

Resultados: Os presentes resultados indicaram que esta doença era mais comum entre pacientes de idade mais avançada; observou-se uma diferença significativa $p=0,002$ entre os pacientes $48,12 \pm 1,50$ e o grupo controle $41,00 \pm 1,10$ quanto à idade. O IMC foi significativamente maior no grupo de pacientes $29,21 \pm 0,41$; $p=0,000$ do que no grupo controle $22,23 \pm 0,41$. A infecção por *H. pylori* foi significativamente mais frequentemente observada no grupo de pacientes (33; 82,5%) em comparação ao grupo controle (2; 10%; $p=0,000$).

Conclusões: A obesidade e a infecção por *H. pylori* podem predispor à colite inespecífica.

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Introduction

The terms non specific colitis is an inflammatory condition of the colon and it is a term usually used by histopathologists during examination of colonic biopsies. It is caused by different etiologies like infectious amebiasis and immune colitis is the most commonly reported causes.¹ Other cause is obesity which is chronic medical condition of the 21st century that defined as excessive body fat mass leading to many diseases and global public health. About 30% of obese adults are having a Body Mass Index (BMI) greater than 30 kg/m^2 .² World Health Organization demonstrate that prevalence of overweight or obese individuals that $\text{BMI} > 25 \text{ kg/m}^2$ about 35% of the global population with increases over time in developed and developing countries.³ This adipose tissue is responsible for the secretion of a number of pro- and anti-inflammatory cytokines that termed adipokines that had multiple interaction pathways with other cytokines like TNF-alpha⁴ Inflammatory bowel disease have been independently associated with obesity and proinflammatory cytokines.⁵ There is evidence that obesity and increasing Body Mass Index and overweight are emerging features of colitis like Crohn's disease and more severe disease course. There is an association between higher BMI and higher C-reactive protein which could be considered as a marker linked both with obesity in the general population and with CD.⁶ There are suggestions that obesity may reduce the efficacy of biologic agents, reduce the need for hospitalization and surgery. The apparent co-expansion of both obesity and IBD suggests similar environmental changes may be involved in the promotion of both.⁷ Other factor is *Helicobacter Pylori* (HP) infection which is a bacterium responsible for chronic gastritis. That mucosal inflammatory process stimulates the host's immune system caused by the bacterium. This results in high production of Interleukin (IL)-12, leading to increase in a T-helper type 1 (Th1)-polarized response and their cytokines that may travel to extra-gastric sites that

linking HP infection to the pathophysiology of a variety of extragastric diseases.^{8,9}

This study was conducted to estimate the association between obesity, *H. pylori* infection and non specific colitis among sample of patients with this disease.

Patients and methods

This is a case-controlled study was carried out in Al-Kindy College of Medicine from January 2017 to June 2018. The approval of this study and the proposal was obtained and accepted by the Al-Kindy College of Medicine and Al-Kindy Teaching Hospital.

The Scientific and Ethical Committee of Al-kindy medical college and Al-Kindy Teaching Hospital had approved and registered the study. Patients and control group agreed to give a written informed consent for this study and for performing all examinations needed.

The inclusion criteria were patients at any sex and clear indication for colonoscopy examination. They complaining from overlapping features of inflammatory bowel disease like Ulcerative Colitis (UC) and Crohn's Disease (CD) and confirmed by pathologists, endoscopists, and clinicians as non specific colitis.¹⁰ Colonoscopy, upper gastrointestinal endoscopy, biopsies, serological tests, radiography, and other scanning procedures used for confirming diagnosis. The exclusion criteria were patients with proved UC, CD, malignancy and infectious colitis.

Sixty individuals were included in this study, forty of them had non specific colitis. The rest were healthy control group. Demographic information's were taken like age and sex by questionnaire. Anthropometric measurement like weight in kilograms (kg), height in meters (m), and waist circumference in centimeters (cm), body mass index was calculated as weight in kilograms divided by the square of height in meters.¹¹ Normal Weight group ($\text{BMI } 18.5\text{--}24.9 \text{ kg/m}^2$), Over

Table 1 – Data of different parameters between patients with non specific colitis and control group.

Parameters	Patients with non specific colitis (n = 40) X ± SEM	Control group (n = 20) X ± SEM	p-value
Age (year) range	48.12 ± 1.50 (25–73)	41.00 ± 1.10 (20–62)	0.002
Male, %	25 (62.5%)	15 (75%)	0.497
Female, %	15 (37.5%)	05 (25%)	
Height (m)	1.65 ± 0.01	1.60 ± 0.02	0.01
Weight (kg)	80.13 ± 1.01	85.30 ± 1.12	0.002
BMI kg/m ²	29.21 ± 0.41	22.23 ± 0.41	0.000
Waist circumference (cm)	103.45 ± 2.88	97.25 ± 1.078	1.428
Waist to hip ratio	1.23 ± 3.04	1.71 ± 2.17	0.934
<i>H. pylori</i> IgG + vê, n (%)	33 (82.5%)	2 (10%)	0.000

Weight group (BMIs 25.0–29.9 kg/m²) and Obese group (BMIs ≥30 kg/m²).

All patients examined for lower gastrointestinal endoscopic by gastroenterologists using gastroscope: GIF-H260; Olympus, Tokyo, Japan and Display screen; Olympus OEV-261H liquid crystal display monitor; Olympus, Tokyo, Japan. Histopathologic examination of the colonic biopsies for determining the presence of inflammatory cells including lymphocytes, plasma cells and neutrophils. Blood from the patients was aspirated and determination of anti *H. pylori* IgG was done in both groups using ELISA test (Eco test-Chaina).

Statistical analysis

Statistical analysis was done using software (MiniTab version 3.0) including Chi-Square test for frequencies, while student t-test for means and standard deviation. p-value less than 0.05 were considered statistically significant.

Results

This study consists of sixty individuals, forty of them were patients with non specific colitis and the rest were control apparently healthy individuals. This disease was more common with increasing age, there is a significant difference ($p=0.002$) between patient (48.12 ± 1.50) and control group (41.00 ± 1.10) regarding age. This disease was affect both male 25 (62.5%) and females 15 (37.5%) without a significant difference between them ($p=0.497$). Regarding height, weight and BMI, there were a significant differences between two groups ($p=0.01$, 0.002 and 0.000 , respectively). BMI of the patients is significantly higher in patients group (29.21 ± 0.41 ; $p=0.000$) than the control (22.23 ± 0.41). This indicates that obesity may be a contributing factor in disease pathogenesis. There is no significant difference between two groups regarding waist circumference and hip to waist ratio. Patients with non specific colitis showed significant ($p=0.000$) increased in number of patients that infected with *H. pylori* 33 (82.5%) compared with control group 2 (10%) that indicate this bacteria may had a role in disease causation (Table 1).

Discussion

Epidemiological studies have indicated that overweight and obese people have a higher risk for colitis and colon cancer.¹²

This study demonstrated that increased in body mass index and obesity were significantly increased in the patients with non specific colitis. This in agreement with clinical and experimental studies showed that obesity leads to inflammation and increases disease activity of colitis which attributed in part to the effects of Th17 cells that infiltrate the mucosa and due to changes in the level of immune cell subsets and inflammatory cytokines expression. In addition to that n-3 poly unsaturated fatty acids would reduce the percentage of inflammatory immune cell subsets and suppress inflammatory gene expression. Obesity may reduce serum hormone concentrations of leptin and resistin, and adipose tissue mRNA expression of inflammatory cytokines like MCP-1, IFN γ , IL-6, IL17F and IL-21. Adding to that splenic Th17 and Th1 cells were reduced in obese subjects. Collectively, these results indicate that n-3 poly unsaturated fatty acids suppress Th1/Th17 cells and inflammatory macrophage subsets and reconfigure the inflammatory gene expression profile in diverse tissue.¹³ Other study demonstrate that diet-induced obesity accelerates colitis through increased inflammation and immune cell recruitment. Obesity induced Interleukin-6 (IL-6) production and shifts macrophage polarisation towards tumour-promoting macrophages that produce the chemokine CC-chemokine-ligand-20 (CCL-20) that recruits CC-Chemokine-Receptor-6 (CCR-6) expressing B cells and $\gamma\delta$ T cells via chemotaxis.¹⁴

Other risk factor is *H. pylori* infection. There is much diversity among studies that deals with the association of this bacteria and colitis and most of them dependent on detection of this bacteria by different methods like gastric biopsies, breath test and serum antibody testing. This study depends on serum antibody detection and there is a significant increase in percentage of *Helicobacter pylori* IgG in patient's serum with non specific colitis than control group. This in accordance with other studies that showed *Helicobacter pylori* infection may play a role in colitis pathogenesis due to their comparable immunological features and expression of miR-155 that is up-regulated in the mucosa and resulted in impaired pathogen specific Th1 and Th17 responses.^{15–17} Other studies showed that there is an independent striking inverse association between HP infection and colitis. So this bacterium is a causal relationship of this disease or not remains to be more studies.¹⁸ *H. pylori* may be an initiating factor for this disease through chronic inflammation of the mucosa caused by increased cellular production of Nitric Oxide (NO) by macrophage and other inflammatory cells in response to the *H. pylori* lipopolysaccharide and direct

mucosal damage caused by urease and cytotoxins. In addition to that, platelet activation and aggregation in the mucosa can lead to formation of microthrombi epithelium causing infarction and development of ulcers.^{17,19} Other study showed that *H. pylori* may be an alleviation factor in acute and chronic colitis following infection. This may be due to the role of regulatory B cells that increased in number of CD19⁺IL-10⁺Breg cells and down regulation of proinflammatory cytokines mRNA expression in colonic mucosa.²⁰

This differences of this study with other studies may be due to method of detection the bacteria with variable sensitivity and specificity, sample size, stage of the disease, methodologic and population heterogeneity.^{21,22} The most perfect method for detection this bacterium is by visualizing it in colonic tissue using the two most dependable methods, Giemsa staining and immunohistochemical staining for *H. pylori*.

Conclusions

Obesity and infection with *H. pylori* may predispose to non specific colitis.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

- Salma RI, Emara MH, Amer I, Elsharawy S. Prevalence of amebiasis among histologically confirmed colitis patients. *J Gastroenterol Hepatol Res*. 2018;7:2604–8.
- Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA*. 2014;311:806–14.
- Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*. 2014;384:766–81.
- Shapiro L, Scherer PE. The crystal structure of a complement-1q family protein suggests an evolutionary link to tumor necrosis factor. *Curr Biol*. 1998;8:335–8.
- Usmani K, Morganstern J. Is there a relationship between Ulcerative Colitis and obesity. *Inflamm Bowel Dis*. 2011;17:S63–167.
- Nic Suibhne T, Raftery TC, McMahon O, Walsh C, O'Morain C, O'Sullivan M. High prevalence of overweight and obesity in adults with Crohn's disease: associations with disease and lifestyle factors. *J Crohns Colitis*. 2013;7:e241–8.
- Szilagyi A. Relationship(s) between obesity and inflammatory bowel diseases: possible intertwined pathogenic mechanisms. *Clin J Gastroenterol*. 2019 [Online ahead of print]. DOI: 10.1007/s12328-019-01037-y.
- Smythies LE, Waites KB, Lindsey JR, Harris PR, Ghiara P, Smith PD. *Helicobacter pylori*-induced mucosal inflammation is Th1 mediated and exacerbated in IL-4, but not IFN-gamma, gene-deficient mice. *J Immunol*. 2000;165:1022–9.
- Papamichael K, Konstantopoulos P, Mantzaris GJ. *Helicobacter pylori* infection and inflammatory bowel disease: is there a link? *World J Gastroenterol*. 2014;20:6374–85.
- Branco BC, Harpaz N, Sachar DB, Greenstein AJ, Tabrizian P, Bauer JJ, et al. Colorectal carcinoma in indeterminate colitis. *Inflamm Bowel Dis*. 2009;15:1076–81.
- Dambal SS, Suchetha Kumari N. Evaluation of lipid peroxidation and total antioxidant status in human obesity. *International J Institutional Pharmacy Life Sciences*. 2012;2:2249–6807.
- World Health Organization. Fact Sheet No. 297 2009. <http://www.who.int/mediacentre/factsheets/fs297/en/print.html>.
- Monk JM, Hou TY, Turk HF, Weeks B, Wu C, McMurray DN, et al. Dietary n-3 Polyunsaturated Fatty Acids (PUFA) Decrease Obesity-Associated Th17 Cell-Mediated Inflammation during Colitis. *Plos One*. 2012;7, e49739-e49739.
- Wunderlich CM, Ackermann PJ, Ostermann AL, Adams-Quack P, Vogt MC, Tran ML, et al. Obesity exacerbates colitis-associated cancer via IL-6-regulated macrophage polarisation and CCL-20/CCR-6-mediated lymphocyte recruitment. *Nat Commun*. 2018;25:1646.
- Papamichael K, Konstantopoulos P, Mantzaris GJ. *Helicobacter pylori* infection and inflammatory bowel disease: is there a link? *World J Gastroenterol*. 2014;20:6374–85.
- Oertli M, Engler DB, Kohler E, Koch M, Meyer TF, Müller A. MicroRNA-155 is essential for the t cell-mediated control of helicobacter pylori infection and for the induction of chronic gastritis and colitis. *J Immunol*. 2011;187:3578–86.
- Mansour L, El-Kalla F, Kobtan A, Abd-Elsalam S, Yousef M, Soliman S, et al. *Helicobacter pylori* may be an initiating factor in newly diagnosed ulcerative colitis patients: a pilot study. *World J Clin Cases*. 2018;6:641–9.
- Kayali S, Gaiani F, Manfredi M, Minelli R, Nervi G, Nouvenne A, et al. Inverse association between *Helicobacter pylori* and inflammatory bowel disease: myth or fact? *Acta Biomed*. 2018;89:81–6.
- Chin MP, Schauer DB, Deen WM. Prediction of nitric oxide concentrations in colonic crypts during inflammation. *Nitric Oxide*. 2008;19:266–75.
- Li X, Tan J, Zhang F, Xue Q, Wang N, Cong X, et al. *H. pylori* infection alleviates acute and chronic colitis with the expansion of regulatory B cells in mice. *Inflammation*. 2019;42:1611–21.
- Rokkas T, Gisbert JP, Niv Y, O'Morain C. The association between *Helicobacter pylori* infection and inflammatory bowel disease based on meta-analysis. *United European Gastroenterol J*. 2015;3:539–50.
- Gong YH, Sun LP, Jin SG, Yuan Y. Comparative study of serology and histology based detection of *Helicobacter pylori* infections: a large population-based study of 7,241 subjects from China. *Eur J Clin Microbiol Infect Dis*. 2010;29:907–11.