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# Glycaemic Status of Type 2 Diabetic Mellitus Patients Improved By Eradicating H. Pylori Infection, Results from a Tertiary Care Hospital of Kolkata.

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***Abstract:***
***Introduction-****Type 2 diabetes mellitus has become a menace for India as well as the world. H. pylori infection is highly prevalent in developing countries. In India, studies report its prevalence in up to 88% of the adult population. H. Pylori may have metabolic consequences affecting obesity and diabetes by altering the energy homeostasis and metabolism.*
***Objective-****To determine the prevalence of H. pylori infection in Type 2 Diabetes Mellitus patients with dyspepsia and to find out if there is any association between H. Pylori eradication and glycaemic status of the study subjects.*
***Materials and methods-****A cross sectional case control study with a prospective interventional study arm conducted in Medical College and Hospital, Kolkata by consecutive sampling method during the time period Feb 2014- Dec 2015.*
***Results-****Diabetics have significantly higher proportion of H.pylori (77%) than Non-diabetics(60%) shown in Table 1.H.pylori infection was prevalent in type2 diabetics with higher BMI ($p<0.05$).There was significant improvement in the fasting, postprandial plasma glucose and HbA1c levels after 3 months following eradication of H.pylori in the T2DM patients. There was no significant association between H.pylori infection and type of anti-diabetic therapy(Table 3).There was no significant change in the fasting, postprandial plasma glucose and HbA1c levels after 3 months of follow up of H.pylori non-infected T2DM patients.*
***Conclusion-****The present study indicates that eradication of H. Pylori infection is strongly associated with improvement in glycaemic status of the type 2 Diabetes Mellitus patients.*
***Keywords-*** *Glycaemic status, H. Pylori infection, Type 2 Diabetes Mellitus*

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## I. Introduction

Type 2 diabetes mellitus has become the most frequently encountered metabolic disorder in the world. H.pylori is a Gram negative bacteria that frequently colonise human stomach. It is highly prevalent in developing countries. Global prevalence of H.pylori is more than 50%.In India studies report its prevalence in up to 88% of the adult population[1]. H. Pylori may have metabolic consequences affecting obesity and diabetes by influencing the production of gastric leptin and ghrelin [2-6] which are central to energy homeostasis and metabolism. In a large cross-sectional study with population from NHANES Yu Chen and Martin J. Blaser,[7] found a positive association between H.pylori positive status and HbA1c levels. H.pylori induces gastric inflammation with the production of pro-inflammatory cytokines which may have local and systemic effects. Some studies have reported higher prevalence of H.pylori in diabetics with dyspepsia than non-diabetic subjects[8-11]. Different studied also revealed no difference in prevalence of of H.pylori between diabetics and non-diabetics[12]. Given the current scenario in India, it has important clinical and public health benefits using anti H. pylori therapy to control Type 2 Diabetes Mellitus. There are very few studies to support the association. This study was undertaken to find out the prevalence of H.pylori infection in Type 2 Diabetes Mellitus with dyspepsia, its effect on glycaemic control in those patients and if there is any association between H. Pylori eradication and Glycaemic status of the study population.

## II. Materials and Methods

It was a cross sectional case control study with a prospective interventional study arm conducted in Medical College and Hospital, Kolkata. The study period was during Feb 2014- Dec 2015 after obtaining due permission from Institutional Ethics Committee and informed written consent of the study participants .The study population i.e. 100 consecutive cases of T2DM patients with dyspepsia and 50 age and sex matched non-diabetic patients with dyspepsia were enrolled as controls from patients attending Diabetic clinic and Gastroenterology Clinic. Those who had history of taking NSAIDS, corticosteroid ,statin or fibrates within last 3 months, antibiotics, proton pump inhibitors, H2 blockers, within last 4 weeks were excluded from the study. Patients with active gastro intestinal bleed, chronic alcoholism, Chronic liver disease and jaundice, renal failure, Type 1 diabetes, Post gastrointestinal surgery and pregnant women were also excluded.

All cases and controls underwent upper GI endoscopy with rapid urease test of the gastric mucosal biopsy for detection of H.pylori infection. The prevalence of H.pylori infection in cases and controls were compared. The cases (T2DM with dyspepsia) were further subdivided into 2 groups depending upon the presence or absence of H.pylori. Comparison was done among the 2 subgroups depending on age, sex, duration of diabetes, antidiabetic medication, glycemic control. Both groups were followed up for 3 months. The group of patients with H.pylori infection were given eradication therapy followed by repeat upper GI endoscopy and rapid urease test after 3 months to confirm eradication. Their glycemic status was compared before and after 3 months of therapy The H.pylori negative diabetic patients were also followed up for 3 months and change in fasting and postprandial plasma glucose and HbA1c from the baseline were compared. The antidiabetic drugs and their doses were unchanged in all the diabetics during the study period. Only one case required reduction in drug dose due to recurrent hypoglycaemia.

Results on continuous measurements are presented on Mean ± SD (Min-Median-Max) and results on categorical measurements are presented in frequency and percentages. Significance is assessed at 5 % level of significance. The Statistical software namely SPSS 21.0, Stata 10.1, MedCalc 9.0.1, were used for the calculation of sample size, analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

## III. Results and analysis

Diabetics have significantly higher proportion of H.Pylori (77%) than Non-diabetics (60%) as shown in Table 1. The H.pylori infected T2DM patients had significantly higher BMI compared to H.pylori uninfected T2DM patients, shown in Table 2.There was no significant association between H.pylori infection and type of anti-diabetic therapy (Table 3).There was significant improvement in the fasting, postprandial plasma glucose and HbA1c levels after 3 months following eradication of H.pylori in the T2DM patients (Table 4 & Figure 1). There was no significant change in the fasting, postprandial plasma glucose and HbA1c levels after 3 months of follow up of H.pylori non-infected T2DM patients (Table 5 & Figure 2).

**Table 1:** Prevalence of H.Pylori in Diabetic (cases) and Non-diabetic (controls) computed by Fischer's exact test(n=150)

| **Cohort** | **H. Pylori** | | **Total Number Of patients** | **p value (level of significance at 0.05)** |
|---|---|---|---|---|
| | **Absent** | **Present** | | |
| **Diabetic** | 23% | 77% | 100 | 0.036 |
| **Non-diabetic** | 40% | 60% | 50 | |

**Table 2:** Comparison of H.pylori positive and negative subgroups(n=150)

| **Parameter** | **H.pylori negative subset** | **H.pylori positive subset** | **p value( level of significance at 0.05)** |
|---|---|---|---|
| **Females** | 23.53% (n=12) | 76.47% (n=39) | |
| **Males** | 22.45% (n=11) | 77.55% (n=38) | 0.89 |
| **Mean age in years (SD)** | 50.26 (10.46) | 48.66 (9.47) | 0.47 |
| **BMI kg/m2** | 25.42 (9.27) | 27.29 (4.28) | <0.05 |
| **Median duration of diabetes in years** | 3 | 5 | 0.27 |
| **Mean Fasting plasma glucose (SD) in mg/dl** | 115.57(22.94) | 119.78 (26.37) | 0.49 |
| **Mean post prandial plasma glucose (SD) in mg/dl** | 166.52 (31.31) | 178.52 (48.79) | 0.26 |
| **Mean HbA1c % (SD)** | 6.97 (0.93) | 7.1 (0.76) | 0.51 |

**Table 3:** Association between Diabetes Therapy and H.pylori (n=150)

| H. Pylori | Therapy | | | | Total | p value(level of significance at 0.05) |
|---|---|---|---|---|---|---|
| | | INSULIN | MNT | OHA | | |
| Absent (n) | | 3 | 1 | 19 | 23 | |
| (%) | | 13.04 | 4.35 | 82.61 | | |
| Present (n) | | 13 | 3 | 61 | 77 | |
| (%) | | 16.88 | 3.9 | 79.22 | | 0.21 |
| Total | | 16 | 4 | 80 | 100 | |

**Table 4:** Glycemic Status of T2DM Patients with H.Pylori before and after Eradication Therapy (on same dose of medication) computed by paired t-test(n=150)

| Variable | Baseline | | After Eradication Therapy | | p value (level of significance at 0.05) |
|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | |
| FPG | 119.78 | 26.37 | 103.87 | 15.61 | <0.001 |
| PPG | 178.52 | 48.79 | 144.83 | 28.52 | <0.001 |
| HBA1C | 7.10 | 0.76 | 6.71 | 0.50 | <0.001 |

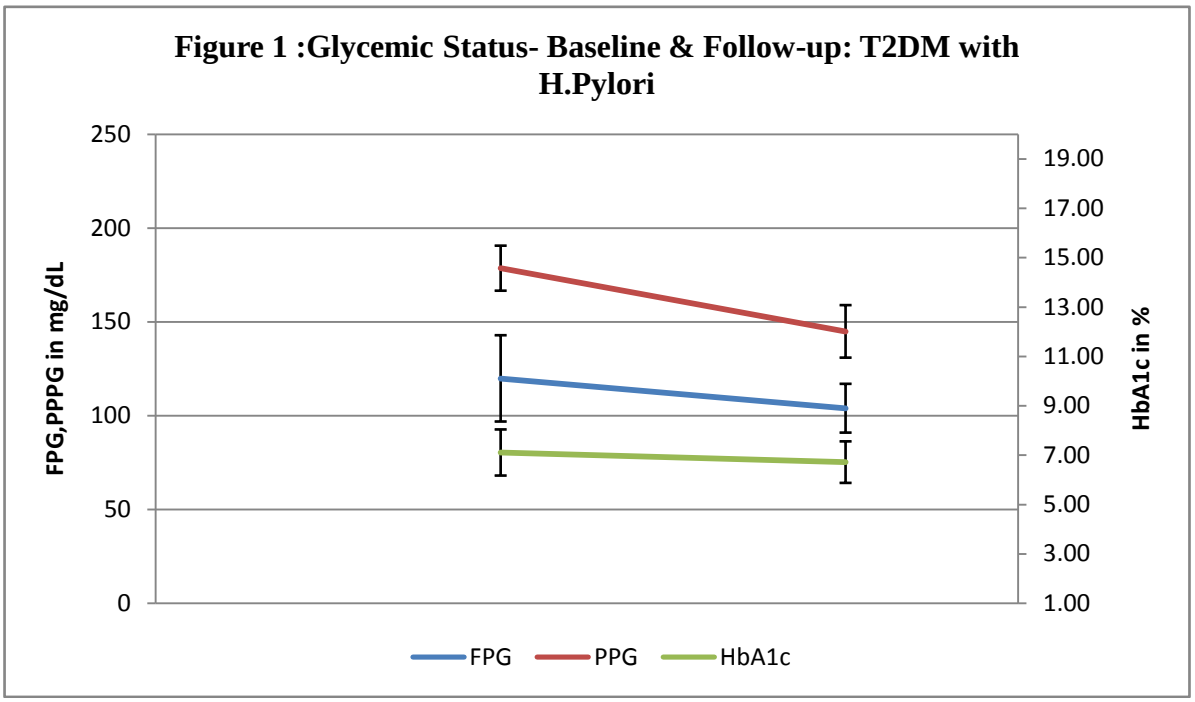
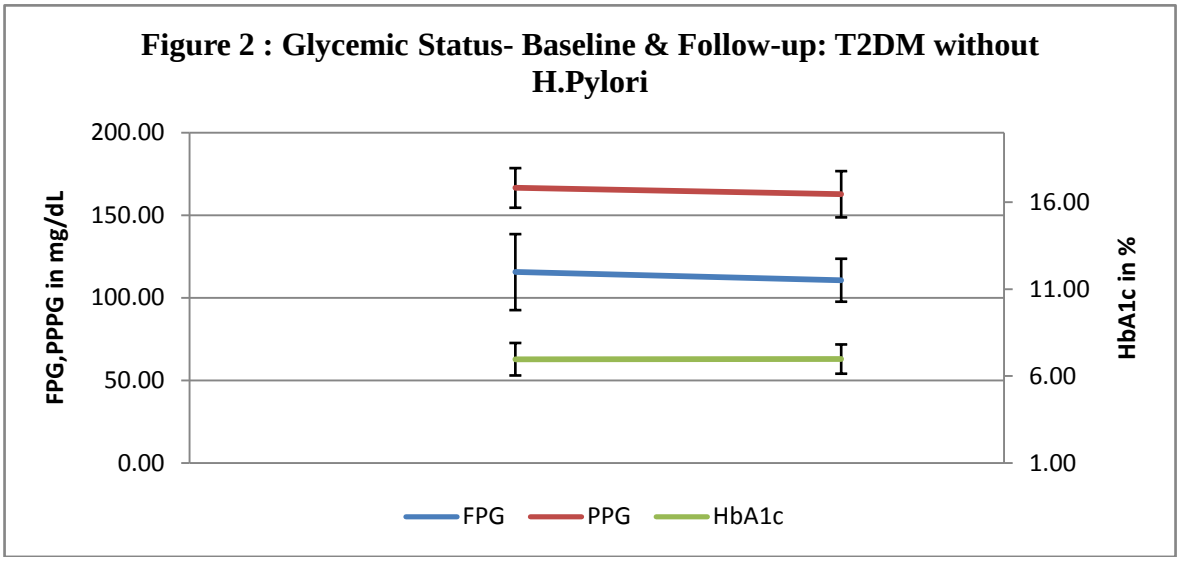



**Table 5:** Glycemic Status of T2DM Patients without H.pylori at baseline and after 3months computed by paired t-test

| Variable | Baseline | | Follow-up | | P |
|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | |
| FPG | 115.57 | 22.94 | 110.65 | 21.49 | 0.46 |
| PPG | 166.52 | 31.31 | 162.70 | 37.29 | 0.177 |
| HBA1C | 6.97 | 0.93 | 6.98 | 0.84 | 0.89 |

**Figure 2 : Glycemic Status- Baseline & Follow-up: T2DM without H.Pylori**




## IV. Discussion

In our present study we have attempted to establish a link between H.pylori and dyspepsia in T2DM patients and the impact of eradication of H.pylori on glycemic control.

In present study H.pylori was present in 77% of the patients with Type2 Diabetics with dyspepsia which was significantly higher than in age and sex matched non-diabetic controls (60%)(p=0.036).

Similar findings were reported in several other studies[13-18] including a meta-analysis conducted by Zhou et al[19]. On the contrary Mohamady et al reported no significant association between T2DM and H. pylori infection.[20]The disparities in the different studies are likely to be due to inconsistencies in the methods used to detect H. Pylori positivity (serology, stool antigen, histopathology, rapid urease test) , the limited sample sizes, and adjustments for potential confounders such as age and socioeconomic status.[21]

The increased of H.pylori infection in diabetic patients may be explained by the following hypotheses. Firstly, a diabetes-induced impairment of cellular and humoral immunity may enhance an individual's susceptibility to H. pylori infection[22]. Secondly, diabetes-induced reduction of gastrointestinal motility and acid secretion may promote pathogen colonization in the gut.[23] Thirdly, altered glucose metabolism may produce chemical changes in the gastric mucosa promote H.pylori colonization.[24]Fourthly, individuals with diabetes are more frequently exposed to pathogens than their healthy counterparts as they regularly attend hospital settings.[11] Finally there are studies indicating that chronic inflammation due to H. pylori infection may contribute to the worsening of diabetes by promoting as insulin resistance β-cell dysfunction.[25,26,27]

We divided the the diabetic cases based on H.pylori status and compared different parameters among the 2 subgroups. We did not find any association between gender (p=0.89), or age (p=0.47) and H.pylori status among the diabetic cases which is similar to the findings of El Hadidy et al.[28]

H.pylori infection was prevalent in type2 diabetics with higher BMI ($p<0.05$). Several studies [7,29,30] have also demonstrated that adults infected with H. pylori had higher BMI levels whereas others[31,32]have found no association. Obesity may be associated with an increased incidence of H. pylori colonization, resulting from reduced gastric motility .

There was no statistically significant difference in baseline fasting plasma glucose (p=0.49) , post prandial plasma glucose (p=0.269) and mean HbA1C (p=0.51) levels among the H.pylori positive or negative diabetic cases. Our findings are similar to that of El Hadidy et al who reported H. pylori infection was not related to degree of glycaemic control .[28]

There was significant improvement in fasting and postprandial plasma glucose as well as HbA1c levels following eradication therapy in diabetic patients with H.pylori infection. There was no alteration in the anti-diabetic medication during this period. The mean fasting plasma glucose decreased from 119.78gm/dl(SD26.37) to 103.87gm/dl (SD15.61) ($p<0.001$) The mean postprandial plasma glucose decreased from 178.52gm/dl(SD4.79) to 144.83gm/dl (SD28.52) ($p<0.001$) The mean HbA1c decreased from 7.1%(SD0.76) to 6.71 (SD0.5) ($p<0.001$)

Whereas in the patients with type 2 diabetes without H.pylori infection the change in the glycemic parameters from the baseline till the end of the study were negligible.

The results of our study are similar to the findings of a study by Zojaji et al[33] who showed that H. pylori treatment can improve the mean HbA1c in patients with T2DM. However, there are also reports showing no effect of H. pylori eradication on HbA1c levels.[34, 35] There are several mechanisms by which H.pylori can influence glycaemic status. Following eradication of H.pylori these factors are negated and improvement in the glycaemic status occurs.

## V. Conclusion & Limitations

The results of our study indicate that by eradicating H.pylori infection the involved pathologic mechanisms can be terminated thus improving glycemic control. However, our study had a few limitations due to small sample size and inability to isolate the different toxigenic strains of H.pylori which could have enhanced our knowledge regarding pathogenesis.

## References


[1]. World Gastroenterology Organisation Global Guidelines: Helicobacter pylori in developing countries August 2010
[2]. Francois F, Roper J, Joseph N et al, The effect of H.pylori eradication on meal associated changes in plasms ghrelin and leptin. BMC Gastroenterol 2011;11:37
[3]. Leptin and Ghrelin in relation to H.pylori status in adult males.Roper J. Et al.Journal of Clinical Endocrinology And Metabolism.2008Jun 93(6);2350-7
[4]. Ghrelin in disease of Gastric Mucosa associated with chronic H.pylori infection.Zub Pokrowiecha et.al.Med.Sci.Monit.Oct 16910)CR 493-500
[5]. Impact of H.pylori infection on gastric and plasma ghrelin dynamics in humans. Ishimoto.H.et.al.Am.J.of Gastroenterology 2005 Ag 100(80:1711-20
[6]. Ghrelin Expression in patients with Gastris.Jun D.W.et.al.Digestive Science 2007 Oct 52(10)2866-72
[7]. Yu Chen, Martin J Blaser, Association between gastric H.pylori colonisation and glycated haemoglobin levels. Journal of Infectious Diseases ,march 13, 2012;205:1195-202
[8]. Gulcelik NE, Kaya E,et.al.Helicobacter pylori prevalence in diabetic patients and its relationship with dyspepsia and autonomic neuropathy,J. Endocrinol Invest. 2005;Mar; 28(3);214-7
[9]. Agarwal RP, Sharma R et.al.J. Indian Medical Association 2010 Mar;108(3):140-3
[10]. Abdulbari Bener, Rosetta Micallef et.al. Association between type 2 Diabetes mellitus and Helicobacter pylori infection.Turk j. Gastroenterol 2007;18(40:225-229
[11]. Gentile s, Turco S,et.al.The role of autonomic neuropathy as a risk factor of Helicobacter pylori infection in dyspeptic patients with type 2 diabetes mellitus, Diabetes Res Clin Pract.1998 Oct;42(1):41-8.
[12]. Demir M,Gorturk HS,Helicobacter pylori prevalence in diabetes mellitus patients with dyspeptic symptoms and its relationship to glucemic control and late complications.Dig Dis.Sci.2008;Oct 53(10)2646-9.
[13]. Mearin F,et al Rev Esp Enferm Dig.2011 Dec;103(12):640-7 PMID22217348)
[14]. .Simon L, Tornóczky J, Tóth M, Jámbor M, Sudár Z. [The significance of Campylobacter pylori infection in gastroenterologic and diabetic practice]. Orv Hetil 1989; 130: 1325-1329 [PMID: 2664637]
[15]. Oldenburg B, Diepersloot RJ, Hoekstra JB. High seroprevalence of Helicobacter pylori in diabetes mellitus patients. DigDis Sci 1996; 41: 458-461 [PMID: 8617115]31
[16]. Quadri R, Rossi C, Catalfamo E, Masoero G, Lombardo L, Della Monica P, Rovera L, Pera A, Cavello Perin P. Helicobacter pylori infection in type 2 diabetic patients. Nutr MetabCardiovasc Dis 2000; 10: 263-266 [PMID: 11213535]
[17]. Longo-Mbenza B, Nkondi Nsenga J, Vangu Ngoma D. Prevention of the metabolic syndrome insulin resistance and the atherosclerotic diseases in Africans infected by Helicobacter pylori infection and treated by antibiotics. IntJ Cardiol 2007; 121: 229-238 [PMID: 17368586 DOI: 10.1016/ j.ijcard.2006.12.003].
[18]. Sarita Bajaj, Lokendra Rekwal, S.P. Misra,[1] Vatsala Misra,[2] Rakesh Kumar Yadav, and Anubha SrivastavaAssociation of *helicobacter pylori* infection with type 2 diabetesIndian J Endocrinol Metab. 2014 Sep-Oct; 18(5): 694–699.
[19]. Zhou X, Zhang C, Wu J, Zhang G. Association between Helicobacter pylori infection and diabetes mellitus: a meta-analysis of observational studies. Diabetes Res Clin Pract 2013; 99: 200-208 [PMID: 23395214 DOI: 10.1016/j.diabres.2012.11.012]34]
[20]. Osama Mohamady¹, Nagwa Ramadan², Heba Arnaout The prevalence of Helicobacter pylori infection in diabetic patients and its relation to the presence of gastrointestinal tract complications. International Journal Of Academic Research, Vol. 5. No. 4. July, 2013
[21]. Xia HH, Talley NJ, Kam EP, Young LJ, Hammer J, Horowitz M. Helicobacter pylori infection is not associated with diabetes mellitus, nor with upper gastrointestinal symptoms in diabetes mellitus. Am J Gastroenterol 2001; 96: 1039-1046 [PMID: 11316144 DOI: 10.1111/j.1572-0241.2001.03604.
[22]. Borody T, Ren Z, Pang G, Clancy R. Impaired host immunity contributes to Helicobacter pylori eradication failure. Am J Gastroenterol 2002; 97: 3032-3037 [PMID: 12492186 DOI: 10.1111/j.1572-0241.2002.07121
[23]. . Jeon CY, Haan MN, Cheng C, Clayton ER, Mayeda ER,Miller JW, Aiello AE. Helicobacter pylori infection is associated with an increased rate of diabetes. Diabetes Care 2012;35: 520-525 [PMID: 22279028 DOI: 10.2337/dc11-1043
[24]. de Luis DA, de la Calle H, Roy G, de Argila CM, Valdezate S, Canton R, Boixeda D. Helicobacter pylori infection and insulin-dependent diabetes mellitus. Diabetes Res Clin Pract 1998; 39: 143-146 [PMID: 9597384].
[25]. Donath MY, Shoelson SE. Type 2 diabetes as an inflammatory disease. Nat Rev Immunol 2011; 11: 98-107 [PMID: 21233852 DOI: 10.1038/nri2925
[26]. Stumvoll M, Goldstein BJ, van Haeften TW. Type 2 diabetes: principles of pathogenesis and therapy. Lancet 2005;365: 1333-1346
[27]. Cong He, Zhen Yang, Nong-Hua LuHelicobacter pylori infection and diabetes: is it a myth or fact World J Gastroenterol 2014 April 28; 20(16): 4607-4617)
[28]. El Hadidy M El Hadidy, Mohamed Y Abdul-Aziz, Abdul-Rahman A Mokhtar, Mohammed M. Abo El Ata, Soma S Abd El GwadHelicobacter Pylori Infection and Vascular Complications in Patients with Type 2 Diabetes Mellitus Journal of Taibah University Medical Sciences 2009; 4(1): 62-72)

[29]. Cohen D, Muhsen K. Association between Helicobacter pylori colonization and glycated hemoglobin levels: is this another reason to eradicate H. pylori in adulthood? J Infect Dis 2012; 205: 1183-1185
[30]. Gunji T, Matsuhashi N, Sato H, Fujibayashi K, Okumura M, Sasabe N, Urabe A. Helicobacter pylori infection is significantly associated with metabolic syndrome in the Japanese population. Am J Gastroenterol 2008; 103: 3005-3010
[31]. Ioannou GN, Weiss NS, Kearney DJ. Is Helicobacter pylori seropositivity related to body mass index in the United States? Aliment Pharmacol Ther 2005; 21: 765-772
[32]. Cho I, Blaser MJ, François F, Mathew JP, Ye XY, Goldberg JD, Bini EJ. Helicobacter pylori and overweight status in the United States: data from the Third National Health and Nutrition Examination Survey. Am J Epidemiol 2005; 162: 579-584
[33]. Zojaji H, Ataei E, Sherafat SJ, Ghobakhlou M, SR F. The effect of the treatment of Helicobacter pylori infection on the glycemic control in type 2 diabetes mellitus. GastroenterolHepatol Bed Bench 2013; 6: 36-40 137
[34]. Wada Y, Hamamoto Y, Kawasaki Y, Honjo S, Fujimoto K, Tatsuoka H, Matsuoka A, Ikeda H, Fujikawa J, Koshiyama H.The Eradication of Helicobacter pylori does not Affect Glycemic Control in Japanese Subjects with Type 2 Diabetes. JpnClin Med 2013; 4: 41-43 [PMID: 23966817 DOI: 10.4137/JCM. S10828
[35]. Vafaeimanesh J, Rajabzadeh R, Ahmadi A, Moshtaghi M,Banikarim S, Hajiebrahimi S, Seyyedmajidi M. Effect of Helicobacter pylori eradication on glycaemia control in patients with type 2 diabetes mellitus and comparison of two therapeutic regimens. Arab J Gastroenterol 2013; 14: 55-58

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