Cancer Treatment 2020 - Influence of Helicobacter pylori infection on HbA1c (Glycated Haemoglobin) Levels: SYSTEMATIC REVIEW

Lakshman Manoranjan- Department of Public Health, St. Elizabeth University, Bratislava

Abstract:

Research title: Influence of Helicobacter pylori infection on HbA1c (Glycated Haemoglobin) Levels: SYSTEMATIC REVIEW

Aim: Influence of H. pylori infection on HbA1c levels, how importance to eradicate the Infection and control the glucose levels

Objectives: An early discovery of the changes in blood glucose help to prevent or delay the of development of type 2 diabetes and complications. H. Pylori treatment could have an important role in improving insulin resistance.

Hypothesis
We performed a research literature of the PubMed, Cochrane Library, and Chinese BioMedicine. Web Base and Chinese Science and Technology Journals databases databases for studies of the Influence of H pylori infection on HbA1c levels from the last 10 years. This study focuses on.

Methodology
The data from this study are taken from PubMed, Cochrane Library, and Chinese BioMedicine databases for studies of the Influence of H pylori infection on HbA1c levels from the last 10 years. We selected 5 studies that included 2456 Patients.

Introduction
Helicobacter pylori is a microaerophilic bacterium that is commonly found in patients with gastrointestinal disorders. It is present in approximately one half of the world's population.

The most of the people who are infected have no symptoms however Helicobacter pylori is capable of causing some digestive problems such as Abdominal Pain (mild to severe), Belching and Gastric reflux, Mild nausea, Irritable Bowel Syndrome, Bloating and distension, Constant bad breath, Hypochlorhydria. Most commonly associated with Peptic Ulcer Disease (PUD) is responsible for the development of 70% of Gastric and 80 to 95% of Duodenal Ulcers, that can may lead to the development of Cancers (Traci L Testerman 2014).

Helicobacter pylori were found high percentage in the polluted well water, contaminated food, faeces, Dental plaque/saliva (Popescu D et al. 2017). Transmission through unclean water person to person, faecal-oral by poor hygiene not properly washing hands after using the toilets, oral-oral by kissing or gastro-oral. This continues to cause inflammation in mononuclear cells that stimulate an initial inflammatory effect, which can lead to duodenal and stomach ulcer.

H. Pylori and diabetes mellitus can increase gastrointestinal problems such as dyspepsia, etc. worsening the blood glucose levels and metabolic control by decrease levels of immunity increase risk of H. pylori infections.

Diabetes mellitus is a chronic endocrine disorder characterised by high levels of blood glucose (hyperglycaemia) occurring from lacks in insulin secretion, insulin action, or both that globally affected 422million adult people according to World Health Organization (WHO). Diabetes has a global impact that rises from 4.7% to 8.5% since 1980 in Population. Past year's diabetes has increased in low levels and middle-level income countries.
According to Robert Koch Institute (RKI) in Germany data shows that 6.7 million

adults are affected by Diabetes Mellitus in the whole of Germany. The German Federal Ministry of Health (BMG) funds this research to collect data's to develop of health care policy for the treatment and prevention of diabetes.

Helicobacter pylori and Diabetes :

Diabetes-induced impairment of cellular and humoral immunity may improve a unique sensibility to H. Pylori infection (Borody T et al. 2002). There is no evidence showing that H. Pylori plays a significant role in diabetes, there is more possibility for increased susceptibility to infection in diabetic patients.

diabetes-induced reduction of gastrointestinal motility and acid secretion may promote pathogen colonisation and infection rate in the gut. (Jeon CY et al. 2012).

Changed glucose metabolism may produce chemical changes in the gastric mucosa that promote H. pylori colonisation (de Luis DA et al.1998). All these factors can contribute to H. pylori infection to development of diabetes.

H. Pylori and Insulin secretion :

Decreased insulin secretion is one of the significant causes In Type II Diabetes. Defects in ß cell function characterise progression from normal glucose tolerance to prediabetes and Typ II Diabetes Mellitus (Weyer C et al. 1999). According to the study by Hsieh et al. the Patients with H. pylori infection was more likely to have impaired insulin secretion which may increase the risk for type II Diabetes (Hsieh MC et al. 2013).

Associated factors: H. pylori and Diabetes :

Lifestyle is a significant factor influencing both chronic H. pylori infection and Typ II Diabetes. H. Pylori infection could delay gastric emptying, which can be assumed to cause a mismatch between the onset of insulin action and absorption of carbohydrates in insulin-dependent with diabetes. (Ojetti V et al. 2010)(Burghen GA et al.1992). H. pylori infection has also been associated with platelet activation and aggregation, increases in pro-atherogenic factors such as homocysteine, generation of reactive oxygen species, and increases in lipid peroxides (Stergios A et al. 2012)

Obesity :

Obesity is the primary etiological cause of Type II Diabetes Mellitus with controlled clinical trials determining that a weight loss is sufficient to prevent most obese subjects with impaired glucose tolerance from contracting the disease. (Astrup A et al. 2000)

According to some studies High BMI, Obesity may be associated with an increased incidence of H. pylori colonisation from reduced gastric motility. (Perdichizzi G et al. 1996)

Dyslipidaemia :

In type II Diabetes Obesity, Insulin resistant by defects in Insulin action and hyperglycemia leads to changes in lipoproteins plasma levels. Abnormalities in lipoprotein commonly in type II Diabetes. (Gen Yoshino 1996)

Hypertension :

Hypertension usually has no sign or symptoms. Increase levels of blood pressure are high risk to develop other diseases such as Kidney disease, Diabetic Retinopathy in long-term can cause blindness. Chronic cases with ageing can cause Alzheimer's disease or Dementia. There is a High risk of Stroke and Heart attack.

A strong association between obesity was shown in multiple studies. According to the study by D Segula 2014, One of the largest cohorts studied 82473 revealed a positive association between BMI and hypertension at the age of 18 years and midlife. There was also marked an increase in hypertension risk with weight gain. Framingham study showed that the relative risk in overweight men and women were 1.46 and 1.75, respectively, after adjusting for age. Furthermore, weight reduction of obese females at the age of 18 had led to a reduction in the risk of hypertension. In older populations, hypertension and obesity continue to relate predictably as has been shown in the Honolulu Heart

Program and Japanese data survey. (D Segula 2014)

What is Glycated Haemoglobin (Hemoglobin A1C)?

In red blood cells contains a Protein called Haemoglobin (Hb) which carries O2. Glucose in bloodstream connects to the protein Haemoglobin in red blood cells and forms glycated haemoglobin. Haemoglobin in red blood cells bind with the glucose and stays for 3 Months. HbA1c test shows average blood glucose levels in the past 3 Months.

Pathogenetic Mechanisms in H. Pylori and Diabetes

In Cong He, Zhen Yang, and Nong-Hua Lu 2014 studies wrote that " there is no concrete evidence demonstrating that H. pylori play a role in diabetes, the possibility for a causal relationship is an intriguing issue deserving discussion. There are several lines of evidence to implicate increased susceptibility to infection in diabetic patients. Firstly, a diabetes-induced impairment of cellular and humoral immunity may enhance an individual's sensitivity to H. pylori infection. (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited in Borody T, Ren Z, Pang G, Clancy R 2002 p. 3032-7) Secondly, diabetes-induced reduction of gastrointestinal motility and acid secretion may promote pathogen colonisation and infection rate in the gut. (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Christie Y. Jeon et al. 2012 p.520-525) Thirdly, altered glucose metabolism may produce chemical changes in the gastric mucosa that promote H. pylori colonisation (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited de Luis DA et al.1998 p 143-6).

Finally, individuals with diabetes are more frequently exposed to pathogens than their healthy counterparts as they regularly attend hospital settings (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Gentile S et al.1998 41-8). However, there are also indications that H. pylori infection may contribute to the development of diabetes. Whereas insulin insensitivity is an early phenomenon, pancreatic β-cell function declines gradually over time before the onset of clinical hyperglycemia, the result of many factors that can be influenced by infection, such as insulin resistance (IR), glucotoxicity, lipotoxicity, β-cell dysfunction, chronic inflammation, and genetic and epigenetic factors(Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Donath MY et al. 2011 p 98–107 & Stumvoll M et al. 2005 p 1333–1346).

H. PYLORI ERADICATION AND DIABETES

According to Cong He, Zhen Yang & Nong-Hua Lu 2014 studies "There are limited and conflicting data regarding the effect of H. pylori eradication on glucose metabolism and insulin sensitivity (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Park SH et al. 2005 p 508–513, Wada Y et al. 2013 p 41–43, Gen R et al 2010 p190–196). However, it may be beneficial for patients at risk of diabetes to be checked for the presence of H. pylori infection, as a report by Zojaji et al. (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Zojaji H et al. 2013 p36–40) showed that H. pylori treatment could improve the mean HbA1c and the metabolic abnormalities in patients with T2DM. Additionally, Gen et al. (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Gen R et al. 2010 p190–196) demonstrated that successful H. pylori eradication significantly decreased fasting insulin and HOMA-IR levels. Other studies focused on the effects of eradication on H. pylori-stimulated inflammatory cytokines. Some reports indicate that CRP levels are decreased after H. pylori eradication, suggesting a beneficial effect on low-grade inflammation (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Longo-Mbenza B et al. 2007 p229–238 & Gen R et al. 2010 p190–196) However, there are also reports showing no effect of H. pylori eradication on mean HOMA-IR and CRP levels (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Park SH et al. 2005 p 508–513) or HbA1c levels(Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Wada Y et al. 2013 p 41–43). Recently, Vafaeimanesh et al. (Cong He, Zhen Yang & Nong-Hua Lu 2014 cited Vafaeimanesh J et al. 2013 p 55–58) found that in patients with T2DM, the mean decrease in

HbA1c and fasting plasma glucose levels in eradicated cases was similar to non-eradicated subjects three and six months after treatment.

Conclusions

All patients infected with Helicobacter pylori should be monitored for glucose, HbA1c, lipid profile, BMI, blood pressure. Previous studies on the association between H. pylori and diabetes have had mixed results, however the results shows positive association between H. pylori status and HbA1c levels among adult participants free of diabetes. The increased levels of HbA1c associated with H. pylori were greater among those with higher BMI.

Traci L Testerman, James Morris 2014. Beyond the stomach: An updated view of Helicobacter pylori pathogenesis, diagnosis, and treatment. Vol. 20, no. 36, pp. 12781-12808.

Sioni, Supriya, and Kamayani Mathur. “An Analysis of Diabetes Distress among Type 1 Diabetics.” Indian Journal of Health and Wellbeing, vol. 8, no. 4, Indian Association of Health, Research and Welfare, Apr. 2017, p. 287.

Borody T, Ren Z, Pang G, Clancy R. 2002. Impaired host immunity contributes to Helicobacter pylori eradication failure. Vol. 97, no. 12, pp. 3032-7.

Jeon CY, Haan MN, Cheng C, Clayton ER, Mayeda ER, Miller JW, Aiello AE 2012. Helicobacter pylori infection is associated with an increased rate of diabetes, vol. 35, no.3, pp 520-5.

De Luis DA, de la Calle H, Roy G, de Argila CM, Valdezate S, Canton R, Boixeda D 1998. Helicobacter pylori infection and insulin-dependent diabetes mellitus. vol.39, no.2, pp. 143-6.

Christian Weyer, Clifton Bogardus, David M. Mott, and Richard E. Pratley 1999. The natural history of insulin secretory dysfunction and insulin resistance in the pathogenesis of type 2 diabetes mellitus. J Clin Invest. Vol .104, no. 6, pp. 787–794.

Hsieh MC, Wang SS, Hsieh YT, Kuo FC, Soon MS, Wu DC 2013.Helicobacter pylori infection associated with high HbA1c and type 2 diabetes. Vol. 43, no.9, pp. 949-56.

Ojetti V, Pellicano R, Fagoonee S, Migneco A, Berrutti M, Gasbarrini A 2010. Helicobacter pylori infection and diabetes. Vol. 101, no. 2, pp. 115-9.

Burghen GA, Murrell LR, Whitington GL, Klyce MK, Burstein S 1992. Acid peptic disease in children with type I diabetes mellitus. A complicating relationship. Vol. 146, no.6, pp. 718-22.

Stergios A. Polyzos, MD, PHD, corresponding author Jannis Kountouras, MD, PHD, Christos Zavos, MD, PhD, and Georgia Deretzi, MD, PHD 2012. Comment on: Jeon et al. Helicobacter pylori Infection Is Associated With an Increased Rate of Diabetes. Diabetes Care 2012; vol. 35, no. 7, pp. 520–525.

Astrup A, Finer N. 2000. Redefining type 2 diabetes: 'diabesity' or 'obesity dependent diabetes mellitus'? Vol .1, no.2, pp.57-9.

Perdichizzi G, Bottari M, Pallio S, Fera MT, Carbone M, Barresi G 1996. Gastric infection by Helicobacter pylori and antral gastritis in hyperglycemic obese and diabetic subjects. Vol .19, no.2, pp. 149-54.

Note : This work is presented at International Conference on Gastroenterology and Liver on March 18-19, 2020 at Amsterdam, Netherlands