



Peptic ulcer disease: A look into diet therapy

VD Sheneni ^{1*} and IE Shaibu²

¹Department of Biochemistry, Federal University Lokoja, Lokoja, Nigeria

²Department of Biochemistry, Prince Abubakar Audu University, Ayingba, Nigeria

*Corresponding author. E-mail: victor.sheneni@fulokoja.edu.ng

Received: 05-Sep-2023, Manuscript No. GJGC-24-112648; **Editor assigned:** 08-Sep-2023, PreQC No. GJGC-24-112648 (PQ); **Reviewed:** 22-Sep-2023, QC No. GJGC-24-112648; **Revised:** 16-May-2024, Manuscript No. GJGC-24-112648 (R); **Published:** 23-May-2024, DOI: 10.15651/GJGC.24.12.016

ABSTRACT

Peptic ulceration is a lesion of the higher gastrointestinal tract's mucosal lining that involves a disparity of proactive and protective mucosal components, with *H. pylori* as the number one causative purpose. Dietary supplements are beneficial within the prevention and remedy of this situation. The aim of this take a look at is to beautify the usage of nutritional supplements for individuals with peptic ulcers. A non-restrained exploratory evaluation was performed using firsthand information from the Scielo, PubMed, Medline, ISI, and Scopus databases. Dietotherapy and power dispersion must be tailor-made to the affected person's desires a good way to normalize dietary popularity and facilitate recovery. The advocated nutrients alters among the extreme and restore tiers, with the healing phase requiring extra protein and several micronutrients along with vitamin A, zinc, selenium, and diet C. Moreover, several research have suggested that nutrition C can resource within the eradication of *H. pylori*. Fibers and probiotics are mainly crucial inside the treatment of peptic ulcers because they reduce antibiotic negative results and assist shorten treatment time. A nutritious food plan is crucial within the treatment of peptic ulcers considering food can prevent, deal with, or maybe alleviate signs and symptoms related to this illness. Nevertheless, there are few guides that reinvent dietotherapy; so, new investigations addressing extra specially dietotherapy for peptic ulcer remedy are required.

Keywords: Peptic ulcer, Dietotherapy, *H. pylori*, Vitamin A, Selenium

INTRODUCTION

Peptic ulcer is a persistent circumstance characterised by way of an imbalance between the substances that wreck the mucosa and those that shield it, resulting in a higher digestive tract lining lesion (Nieto, 2022). It's been one of the international's most frequent illnesses, with a number of its results being essential assets of morbidity and mortality (Sung et al., 2012). The superiority of duodenal and stomach ulcers ranges within the worldwide population, and the common age of human beings with the situation is among 30 and 60 years, however it can occur at any age. Racial differences have also been observed; in Africa, duodenal ulcers are rare in black people, however in the U.S.A., the superiority is the equal for blacks and whites; in phrases of gender, men are much more likely to get ulcers (sixteen). Peptic ulcers are due to a ramification of things. Environmental factors consisting of alcohol and nicotine can limit or lessen mucus and bicarbonate secretion, growing acid secretion.

Youngsters of dad and mom with duodenal ulcers are three instances more likely to have ulcer than the overall population (Lafortuna et al., 2004). Over the last several decades, the identity of *Helicobacter pylori* and ulcers related to persistent drug utilization has contributed to a higher information of the activities that cause the improvement of peptic ulcers. Vitamins and its suggestions define functions of a balanced weight-reduction plan, and the necessity to increase dietary standards as an approach to enhance fitness and prevent and deal with sicknesses has long been recognized. As a result, dietotherapy has performed an important function inside the prevention and treatment of Peptic ulcer, with the primary aim of regenerating and shielding the gastrointestinal lining, improving digestion, reducing pain, and contributing to an awesome dietary status. Peptic ulcer contamination has been recognized on account that antiquity, even though there have been few researches which have innovated dietotherapy as a treatment for this condition. As a result, the aim of this have a look at

changed into to take a look at nutritional therapy for peptic ulcers in adults.

LITERATURE REVIEW

Review of the scientific literature on nutritional therapy for peptic ulcers, with no date constraints, using the Scielo, PubMed, Medline, ISI, and Scopus databases. There was also information from national and international health bodies. Dietotherapy, nutrition, peptic ulcer, *Helicobacter pylori*, pepper, iron, protein, antioxidants, bioavailability of nutrients, dietary fibers, zinc, probiotics, vitamin C and E were used for database searches.

Etiology and Physiopathology

Peptic ulcer is defined via a non-stop solution of the better digestive tract mucosa exposed to chloride peptic discharge. It's far most usually found inside the duodenum (5-10% of the populace), belly, or esophagus. It is a chronic state of affairs with periods of activation and remission, and its pathophysiology is characterized with the aid of an imbalance a few of the marketers that harm the mucosa (chloride acid, pepsin, and ulcerogenic medications) and people that defend it (mucosal barrier, prostaglandins, and mucosal secretion) (Marotta et al., 1993). Clinical signs and symptoms encompass epigastric ache, burning, or acute and persistent ache, that is worst at night time time. Pain generally takes place one to three hours after consuming and is followed with the resource of nausea, vomiting, gastrointestinal soreness, flatulence, and large lack of frame weight.

Tobacco, alcohol, and *Helicobacter pylori*, which might also moreover flow in high viscosity medium and adhere to the mucosa epithelium, wherein it remains protected, are essential elements in the etiopathogenesis. Various assays with sensitivity and specificity more than eighty% can be used to diagnose this contamination. Pinnacle endoscopy is the gold fashionable check, permitting the clinician to acquire material to test for the presence of *H. pylori* further to other healing strategies.

Nutritional Evaluation of the Peptic Ulcer

Its aim is to find out potential dietary changes and pick the correct approach to make certain the men and women' health. Malnutrition may arise in this example, specifically if there's stenosis, which hinders regular meals ingestion.

Some substantial indicators, which include anthropometric, biochemical, and scientific evaluations, are employed in dietary evaluation. The anthropometric exam incorporates of weight and height measurements that can be used at the side of BMI (Body Mass Index) to determine nutritional fame, despite the fact that this method does now not distinguish between fat and lean mass losses. Furthermore, weight can be disguised by way of hyper or

de-hydration, resulting in an misguided estimate of dietary reputation in those unique instances.

Overall body bioelectrical impedance is a methodology used to assess frame mass, liquid extent, and frame fats that has been recognized as a precious technique for this reason by the Brazilian ministry of health and the meals and drug management. Oblique calorimetry is a non-invasive approach for figuring out dietary needs and the utilization charge of energy sources based totally on oxygen consumption and carbon dioxide era derived from lungs exam of breathed and exhaled air. The upper arm muscle circumference is a measure used to look at somatic protein booths, and the corrected muscular arm vicinity is a greater accurate technique because it as it should be displays the real quantity of muscle groups modifications. The triceps skinfold is the maximum commonly utilized skinfold as it satisfactory reflects the adipose subcutaneous layer (Ravasco et al., 2002).

Biochemical assessments, which include serum albumin, which performs a key function in nutritional assessment-serum pre-albumin, a touchy indicator of protein deficiency, have numerous advantages in figuring out nutritional reputation and intervention needs. A entire blood take a look at is frequently executed in this example since it includes counts of white and crimson blood cells, reticulocytes and platelets, hematological indices, and so allows to reveal blood changes and ailment progression. Nitrogen stability is a noninvasive and handy technique that assesses metabolic stress via measuring the difference among taken-in oxygen and expelled oxygen, and it's far an incredible metric to quantify protein consumption and protein degradation.

Nutritional Treatment Characteristics

The intention of peptic ulcer dietotherapy is to save you peptic chloride hypersecretion if you want to alleviate discomfort and ache within the gastric and duodenal mucosa. Furthermore, nutritional therapy tries to promote recuperation, that's based on a complex chain of events that starts off evolved with the authentic trauma and ends with the repair of the broken tissue. The investigation of dietary deficits is crucial in making ready an ok rehabilitation diet. Sippy encouraged a diet centered on milk and milk cream, alongside antacids, for the treatment of gastrointestinal ulcers inside the early twentieth century, on the basis that milk might give gastric alkalization and pain alleviation. Milk is not advised because of its buffering function and great effect on belly acid secretion.

In keeping with Marrota and Floch, the calorie distribution for peptic ulcer patients need to be every day, with values starting from 50-60% carbs, 10-15% proteins, and 25-30% lipids, with general power price enough to hold or restore nutritional reputation.

To normalize the nutritional fame, Reis recommended that energy be dispensed consistent with the patient's

needs, with protein intake of up to at least one. 2 g/kg/weight/day in the acute degree (5th to 8th week) and up to 1.5 g/kg/weight/day in the healing level. Carbohydrates need to be matched to the patient's demands, with no awareness of disaccharides to avoid fermentation, and lipids without a attention of saturated fats.

Further to protein, particular micronutrients together with zinc, that is required to maintain immune system function, respond to oxidative strain, and restore wounds, can assist to speed up the healing system. Selenium has been shown to minimize infection headaches and decorate healing.

Furthermore, diet may be used as a supplement, although the evidence assisting this technique is limited

in its efficacy, due to the fact very high dosages do not enhance remedy, and excessive intake can be toxic. Desk 1 describes nutritional advice for peptic ulcer sufferers.

No matter the modest variety of references protecting the specified degrees of vitamins in the treatment of peptic ulcer, the authors agree at the tips to resource restoration, with the best difference being whether the patient is within the energetic or remission segment. As a result, with a purpose to put together a greater unique and secure response, it is vital to investigate the individual's nutritional nation as well as whether the patient has any related pathology (Table 1).

Table 1: Recommended daily diet for peptic ulcer.

Characteristics	Recommendations	
Daily Energy Needs (DEN)	Sufficient to maintain or recover the nutritional status	
	20-25 Kcal/Kg: Weight loss	
	25-30 Kcal/Kg: Maintenance	
	30-35 Kcal/Kg: weight gain (31)	
	Acute phase	Recovery phase
Carbohydrate (%)	50-60	50-60
Protein (g/Kg/weight)	1.2	1.5
Lipid (%)	25-30	25-30
Zinc (mg)	11	40
Selenium (µg)	55	400
Vitamin A (µg)	900	3000
Vitamin C (mg)	75	500
Vitamin B ₁₂ (µg)	2.4	2.4
Folic acid (µg)	400	400
Iron (mg)	45	45
Fibers (g)	20 to 30	20 to 30
Probiotics (UFC/day) (18)	10 ⁹ to 10 ¹¹ lactic acid bacteria	10 ⁹ to 10 ¹¹ lactic acid bacteria

DISCUSSION

Using Dietary Fibers to Heal Peptic Ulcers

One of a kind physiological influences on the organism are as a result of the physicochemical traits of fiber fractions. for instance, soluble fibers in pears, oats, and apples reason the digestive fluid to emerge as extra viscous. Whole grains, granola, and flaxseed are

examples of insoluble fibers that boom stool size, shorten the duration of time food travels thru the big gut, and facilitate fecal clearance. Fibers manage intestinal characteristic, making them essential for healthful people's wellbeing and within the dietary control of numerous illnesses (Mattos et al., 2000).

According to Raiha et al. many peptic ulcer sufferers had diets that have been deficient in fiber and antioxidants. In

keeping with the sector fitness organisation, people with peptic ulcers need to devour 20 to 30 grams of fiber in keeping with day due to the fact fibers act as buffers, lowering bile acid concentrations in the belly and decreasing intestinal transit time. This reduces belly bloating and eases pain and soreness inside the gastrointestinal tract.

Probiotic Use for Peptic Ulcer

Probiotics are defined as a nutritional supplement based on live microorganisms that impacts the human frame definitely by means of restoring a healthy microbial stability (Stefe et al., 2008). *H. pylori* contamination is of specific relevance because it contributes extensively to the etiology of chronic gastritis and peptic ulcer in adults. scientific proof demonstrating the effectiveness of diverse probiotics in treating a selection of gastrointestinal problems, in addition to the rising antibiotic resistance of pathogenic microorganism, show that probiotics contain healing sellers against *H. pylori* (Suerbaum, 2002).

Nutritional amendment with the addition of probiotics is one of the processes which can help to lower the contamination price with the aid of *H. pylori*. Probiotic organisms can lessen bacterial hundreds and infections in each humans and animals, but they do not appear to completely eradicate *H. pylori* (Sgouras et al., 2005). Probiotics are beneficial to reduce the bacterial load and are probably to relieve dyspeptic symptoms, in step with human research that show a small improvement in the removal rate in the treatment in opposition to *H. pylori* (Vasiljevic et al., 2008). Therefore, it's far cautioned to devour between 10^9 and 10^{11} CFU of lactic acid bacteria every day.

The fine evidence for using probiotics in scientific settings is the lower in antibiotic-associated facet results. 14 patients with *H. pylori* infections have been given *L. acidophilus* (10^8 CFU) for 3 weeks, consistent with Cats et al. who carried out intervention research. This remedy changed into capable of forestall the increase of *H. pylori* in 64% of the volunteers. Similar to this, Wang et al. discovered that everyday intake of yogurt containing *Bifidobacterium animalis* and *L. acidophilus* can efficaciously suppress the infection as a result of *H. pylori* in humans. Of their take a look at, fifty nine volunteers acquired 10^{10} CFU of *Bifidobacterium animalis* and *L. acidophilus* twice daily for six weeks.

Antioxidants are used to Get Rid of *Helicobacter pylori*

In keeping with some authors, killing the bacteria is the satisfactory form of remedy. For that reason, some human research employed antioxidants to eliminate *H. pylori* and found that vitamin C has a big impact on doing

away with the bacterium in peptic ulcer patients (Zojaji et al., 2009). However, those trials found out that smaller diet C doses taken over a longer time frame had a better impact than bigger stages. As a result, it has been found that individuals with peptic ulcers caused by *H. pylori* can absorb to 500 mg of nutrition C in line with day for a period of three months as long as they do now not pass above the UL of 2000 mg as counseled *via* DRIs.

The capsaicin located in pepper and chilies is any other antioxidant this is utilized to put off *H. pylori*. Animal research found out that capsaicin has a healing effect on gastrointestinal sores. Further, other researchers (Yeho et al., 2002) investigated the consequences of capsaicinoids in sufferers with *H. pylori*-brought on peptic ulcers or aspirin-brought on lesions and determined that those compounds are gastroprotective exclusively in sufferers with aspirin-prompted lesions. Peppers may cause gastrointestinal mucosal irritations, and some humans with peptic ulcers might not revel in any gastroprotective benefits from them.

Substances That Can Exacerbate the Symptoms of a Stomach Ulcer

In keeping with Cesar et al. changing meals and way of life can typically reverse ulcer harm after remedy for an infection because of *H. pylori*. According to Ferri-De-Barros et al. ingesting alcohol harms the digestive tract and may induce ulcers and other alcohol-associated problems such esophagitis, continual pancreatitis, and gastritis, amongst others.

Smoking decreases mucus and bicarbonate secretion, improving duodenal and gastric float and will increase the opportunity of ulcer formation, in line with Reis. Research conducted both prospectively and retroactively imply that smokers have a greater mortality rate from peptic ulcers than non-smokers. According to studies, nicotine, among other tobacco additives, is mostly accountable for the development of peptic ulcers as it harms the stomach epithelium's defensive mucus by way of changing its bicarbonate stages.

Even decaffeinated espresso increases stomach acid production, disturbing the mucosa. The identical is genuine of tender beverages, which, similarly to raising acid production, are gaseous, cause belly distension, and are associated with dyspepsia. Person tolerances need to, but, be taken into consideration, as well as any fake beliefs which could exist concerning sure meals and the way they affect the body. Meals which might be forbidden and ought to be averted by way of those with peptic ulcers are indexed in Table 2.

Table 2: Allowed foods, foods that should be consumed with caution, and foods that must be avoided.

Food groups	Allowed	Use with caution	Prohibited
Dairy	Milk, low-fat cheeses, yogurt, fermented milk	Fatty cheeses (mascarpone, cream cheese, gorgonzola)	-
Oilseeds	Flaxseed, Brazilian nut, walnuts	-	-
Oils and olive oils	Vegetable oils, olive oil	-	Fried foods
Fruits	Apple, papaya, melon, banana	Orange, pineapple, acerola, passion fruit	Lemon
Vegetables	Leafy dark green vegetables, carrot, beet, green bean, spinach, kale, radish, zucchini, leek	Broccoli, cauliflower, cabbage, cucumber, onion, red pepper	Spicy peppers (black pepper, chilies)
Legumes	Bean soup, lentils, chickpeas, soybean	Beans	-
Meats	Lean meat (beef, pork, chicken, fish)	Fatty meats, organ meats and sausages	-
Sweets	-	Concentrated sweets	Chocolate
Beverages	Natural juices	Citrus/acidic fruit juices	Coffee, black tea, fizzy/cola drinks
Other foods	-	Industrialized seasonings, spices and condiments (Ketchup, mayonnaise, mustard)	Mustard grain

Bioavailability of Nutrients versus Antacids

Because of the extended use of antacids, vitamin B₁₂ deficiency is common in peptic ulcer sufferers and makes this vitamin's bioavailability difficult. Even though it cannot be absorbed, diet B₁₂ may be synthesized through the intestinal plant life inside the colon. Megaloblastic anemia and poor cellular division are introduced on by way of this diet deficiency. If untreated, it is predicted that 80–90% of people with diet B₁₂ deficiency may reveal in neurological changes (Paulino et al., 2008). Therefore, it's miles advised to consume 2.4 g of this nutrition every day, which may be found in animal merchandise like milk, meat, and eggs.

Because of antacids' tendency to boom the jejunum's alkaline pH, those who regularly take aluminum-based totally antacids (Pepsamar[®], Gastran[®], and Alca-Luftal[®]) may additionally have hassle soaking up folic acid (O'Neil-Cutting et al., 1986). In those instances, four hundred g of this nutrition should be consumed every day, which can be acquired *via* consuming meats and leguminous meals like lentils. The alteration of protein digestion and the effect on wholesome food digestion as a result of antacids or antiulcers (Lanzol[®], Prazol[®],

Omeoprazol[®]) that decrease gastric acidity should be emphasised (Mitchell et al., 2001).

Antacids can also lessen the absorption of iron, main to anemia from iron deficiency. Contamination with *H. pylori* and gastroduodenal ulcers can reason gastrointestinal bleeding, which may be related to the onset of anemia. A significant outcome of peptic ulcer is gastric bleeding. Because of the rising need for iron by using the same, infection by using *H. pylori* can also result in an imbalance of the body's iron homeostasis. Iron is important for the growth of *H. pylori*, similar to it's miles for different sorts of bacteria. An consumption of 45 mg of iron in keeping with day is advised to keep away from or maybe treat iron deficiency, which may be obtained *via* ingesting meats, which might be the principle source of heme iron. According to estimates, 100 g of meat and 1 kg (non-heme iron) of beans are equal. Diet C-wealthy fruit juice is fed on concurrently to enhance the absorption of non-heme iron from food (Annibale et al., 2000).

Alternative Therapies for Peptic Ulcers without a Track Record of Success

There's nevertheless lots room for scientific research into the opportunities for the usage of flowers as assets for novel medicines. Even whilst a great quantity of recognized flora have been determined, best a small part of them have undergone phytochemical studies, or even fewer yet have had their medicinal ability evaluated. There are nonetheless several traditional medicinal plant life that have now not been very well researched to decide their safety and efficacy in human beings.

That is visible in cases of peptic ulcers as properly. They observed that vegetation like *Symphytum officinale* L. (Comfrey), in addition to having no validated efficacy, may be dangerous because of their pyrrolizidine alkaloids, which have been proven to have hepatotoxic movement in a observe carried out by way of Mentz and Schenkel. Zantoxylon rhoifolium Lan, also known as "mamica de cadela," became another plant that has been researched, but its efficacy has not been established. Moreover, *Maytenus ilicifolia* Mart, additionally referred to as "espinheira-santa" in Brazil and used to treat gastric ulcers, has no longer tested this impact in studies.

Studied the results of two often used medications for ulcers and digestive issues: *Peumus boldus* ("boldo") and *Baccharis genistelloides* ("carqueja"). The remoted chemical constituents, such as, as an instance, flavonoids, antioxidants located in each boldo and carqueja leaves, are linked to the studies that proven a diffusion of features generally assigned to each flora. The effectiveness of these teas in treating peptic ulcers, but, has no longer been validated by using technology. Numerous research were conducted on the use of herbal treatments for ulcer treatment. But, most people of studies that tested an anti-ulcer effect have been conducted on animals, accordingly they lack validity for alternative healing procedures used to deal with peptic ulcers in human beings or to prevent relapses.

CONCLUSION

Given that food can prevent, treat, or even lessen the symptoms associated with this illness, a balanced diet is essential in the treatment of peptic ulcer. Due to the fact that there are few articles that specifically address dietotherapy for the treatment of peptic ulcers, a condition that affects a significant portion of the population, more research is required.

REFERENCES

- Cats A (2003). Effect of frequent consumption of a *Lactobacillus* case containing milk drink in *Helicobacter pylori*-colonized subjects. *Aliment Pharmacol Ther.* 17(3):429-435.
- Cesar ACG, Silva AE, Tajara EH (2002). Fatores genéticos e ambientais envolvidos na carcinogênese gástrica. *Arq Gastroenterol.* 39(4):253-259.
- Lafortuna CL, Agosti F, Marinone PG, Marazzi N, Sartorio A (2004). The relationship between body composition and muscle power output in men and women with obesity. *J Endocrinol Invest.* 27(9):854-861.
- Marotta K, Floch MH (1991). Diet and nutrition in ulcer disease. *Med Clin North Am.* 75(4):967-979.
- Mattos L, Martins I (2000). Consumo de fibras alimentares em população adulta. *Rev Saúde Pública.* 34(1):50-55.
- Nieto Y (2012). Protocolo terapéutico de la úlcera péptica. *Medicine.* 11(3):179-82.
- O'Neil-Cutting MA, Crosby WH (1986). The effect of antacids on the absorption of simultaneously ingested iron. *JAMA.* 255(11):1468-1470.
- Paulino E, Melo ACS, Cardoso MF, Schiavon LL, Narciso JL, Buzzoleti FC (2008). Demência e neuropatia periférica reversíveis com reposição parenteral de vitamina B 12. *Rev Soc Bra Clin Med.* 6:123-124.
- Raiha I, Kempainen H, Kaprio J, Koskenvuo M, Sourander L (1998). Lifestyle, Stress, and Genes in Peptic Ulcer Disease: A Nationwide Twin Cohort Study. *Arch Intern Med.* 158(7):698-704.
- Ravasco P, Camilo ME, Gouveia-Oliveira A, Adam S, Brum G (2002). A critical approach to nutritional assessment in critically ill patients. *Clin Nutr.* 21(1):73-77.
- Sgouras DN, Panayotopoulou EG, Martinez-Gonzalez B, Petraki K, Michopoulos S, Mentis A (2005). *Lactobacillus johnsonii* La1 attenuates *Helicobacter pylori*-associated gastritis and reduces levels of proinflammatory chemokines in C57BL/6 mice. *Clin Diagn Lab Immunol.* 12(12):1378-1386.
- Stefe C, Alves M, Ribeiro R (2008). Probióticos, prebióticos e simbióticos – Artigo de revisão. *Saúde e Ambiente.* 3(1): 16-33.
- Sung JJ, Tsoi KK, Ma TK, Yung MY, Lau JY, Chiu PW (2012). Causes of mortality in patients with peptic ulcer bleeding: a prospective cohort study of 10,428 cases. *Am J Gastroenterol.* 105(1):84-89.
- Suerbaum S, Michetti P (2002). *Helicobacter pylori* infection. *N Engl J Med.* 347(15):117-586.
- Vasiljevic T, Shah NP (2008). Probiotics From Metchnikoff bioactive. *Int Dairy J.* 18(7):714-728.
- Wang KY, Li SN, Liu CS, Perng DS, Su YC, Wu DC, Jan CM, Lai CH, Wang TN, Wang WM (2004). Effects of ingesting *Lactobacillus* and *Bifidobacterium*-containing yogurt in subjects with colonized *Helicobacter pylori*. *Am J Clin Nutr.* 80(3):737-741.
- Yeho EJ, Ross ME, Shurteff AS, Williams WK, Patel D, Mahfouz R, Behn FG, Raimond, SA, Relling MV, Patel A, Cheng C, Campana D, wilkins D, Zhou X, Li J, Liu H, Pui CH, Evans We, Neave C, Wong L, Downing JR (2002). Classification, subtype discovery, and prediction of outcome in pediatric acute lymphoblastic leukemia by gene expression profiling. *Cancer Cell.* 1(2):133-143.
- Zojaji H, Talaie R, Mirsattari D, Haghazali M, Molaei M, Mohsenian N, Derakhshan F, Zali MR (2009). The efficacy of *Helicobacter pylori* eradication regimen with and without vitamin C supplementation. *Dig Liver Dis.* 41(9):644-647.
- Annibale B, Marignani M, Monarca B, Antonelli G, Marcheggiano A, Martino G, Mandelli F, Caprilli R, Delle Fave G (2000).

Iron deficiency anemia and *Helicobacter pylori* infection. Int J Antimicrob Agents. 16(4):515-519.

Mitchell SL, Rockwood K (2001). The association between antiulcer medication and initiation of cobalamin

replacement in older persons. J Clin Epidemiol. 54(5): 531-534.