Original Article

Response of H. Pylori Eradication Treatment in Patients with Normal and Below Normal Serum Vitamin D Levels

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ABSTRACT

OBJECTIVE: To determine the response of H. pylori eradication treatment in patients with normal and below normal serum vitamin D levels at medical wards of Liaquat University Hospital, Jamshoro.

METHODOLOGY: This retrospective, self-funded study includes data from 100 patients from March - September 2019. Patient with H. Pylori gastritis were included and exclusion criteria was use of Proton Pump Inhibitors or Vitamin D supplements, and H. Pylori eradication therapy in the past 2 months. H. Pylori was confirmed on serology and stool antigen. Patients were given triple regime eradication therapy and then treatment response was observed by stool antigen. Vitamin D levels were tested and participants divided into Sufficient and Deficient groups. The data was then gathered on a predesigned proforma and analyzed using SPSS version 20.0.

RESULTS: Total 55% patients were female and 45% were male and belongs to 18 to 60 years of age. The eradication was successful in 62% and unsuccessful in 38%. The mean vitamin D level was lower in the eradication failure population compared to the eradication successful population (12.6±4.31 vs 32.75±6.63; P<0.01). Amongst the treatment failure group, 78.9% (30) of patients were deficient in vitamin D, as compared to 12.4% (20) of patients being vitamin D deficient in treatment successful group.

CONCLUSION: Our results demonstrated that vitamin D deficiency is a factor associated with eradication failure of H. pylori infection.

KEYWORDS: Helicobacter pylori, serology, stool antigen, eradication therapy, vitamin D.

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INTRODUCTION

The gram negative, spiral shaped organism called Helicobacter Pylori (H. Pylori) was discovered in 1982 by Robin Warren and Barry Marshall, and was recognized as an important cause of chronic gastritis with the help of its helical shape, this organism gains entry into the stomach by piercing its mucoid lining and establishing infection. Helicobacter pylori is transmitted through the fecal–oral route and can infect individuals of all age groups around the world[1,2]. The prevalence of H. pylori infection varies depending on the living environment i.e. home or nursing home), and can range from 85% to 95% in developing countries[3].

In addition to causing gastrointestinal diseases such as peptic ulcer disease and atrophic gastritis, H. pylori infection is also associated with malignant diseases, including gastric adenocarcinoma and lymphoma. Diseases linked to H. pylori infection are not limited to the gastrointestinal system. It is also associated with various systemic diseases, such as coronary artery disease, Alzheimer's disease, iron-deficiency anemia, and cobalamin deficiency. Local and systemic inflammation caused by H. pylori infection may be at least partly responsible for the systemic effects of H. pylori[4-6].

Vitamin D controls hundreds of genes directly or indirectly that are related to cell proliferation, differentiation, apoptosis, and angiogenesis. Along with osteoporosis, muscle weakness, and increased risk of fractures, vitamin D deficiency has also been shown to be associated with increased risk of various infections and autoimmune, malignant, and chronic diseases. Recent data suggest that risk of infection such as urinary tract infections, tuberculosis, and other respiratory infections increases with vitamin D deficiency. However, the effect of vitamin D level on H. pylori infection remains to be determined[7-10].

There are several investigational tools to detect the presence of H. pylori in an individual, and include both invasive as well as noninvasive tests. To eradicate the H. pylori successfully, a popular combination of two antibiotics, namely amoxicillin and clarithromycin is used along with a proton pump inhibitor for 14 days and is considered as a first line therapy[11].

The eradication therapy is not always successful and leads to failure in several instances. In some parts of the world the efficacy is declining[12]. Since serum vitamin D level is associated with several health

related problems, and there is not enough evidence and data showing influence of low serum vitamin D levels in the management of eradication of H. pylori infection eradication in patients treated at medical wards of Liaquat University Hospital, Jamshoro.

METHODOLOGY

During the initial stage of study, a total of 100 patients were recruited through retrospective study design by using consecutive sampling technique from March – September 2019 presented and or admitted in the medical ward of Liaquat University Hospital, Jamshoro. In this study, we included patients between the ages of 18 and 60 years of either gender receiving H. pylori eradication therapy. Any patient who was already on antibiotics, proton pump inhibitors or vitamin D supplements were excluded from the study.
The included patients were diagnosed as having gastritis due to H. pylori infection, on the basis of history, examination and laboratory findings using standard protocol by histopathological examination of Giemsa-stained gastric biopsy specimens. A 10cc disposable syringe was used for the collection of blood sample and estimation of serum vitamin D levels. Vitamin D levels of less than 30 ng/ml is considered as vitamin D insufficiency and above 30 ng/ml is considered as sufficient serum vitamin D level. The cut off value of vitamin D level was taken from the Diagnostic & Research laboratory of Liaquat University Hospital.
Patients with positive H. pylori infection were prescribed the first line triple eradication therapy(11) including omeprazole, amoxicillin, and clarithromycin for 14 days, and were followed up with H. Pylori stool antigen to ascertain eradication. A structured questionnaire was used to record the data of patients including age, gender, and serum vitamin D levels. The Statistical Package for the Social Sciences (SPSS)version 20.0 was used to analyze the collected data.

RESULTS

A total of 100 patients were enrolled for the study after meeting the already mentioned inclusion and exclusion criteria, out of which majority were females (N = 55, 55%) as compared to males (N = 45, 45%) and most of them belonged to rural area than urban 71% and 29%, respectively.
The main objective of our study was to ascertain the association of serum vitamin D levels with the treatment of H. pylori infection. In patients who received triple regime for the eradication of H. pylori infection and having sufficient levels of serum vitamin D levels (≥30 ng/ml) were significantly associated with treatment successful rates (successful rate = 62%) as compared to patients having insufficient levels of serum vitamin D levels (treatment failure rate = 38%). This description is shown in Graph I.
The mean vitamin D level was remarkably lower in the H. pylori eradication treatment failure patients as compared to the successful H. pylori eradication treatment patients (12.6±4.31 vs. 32.75±6.63; P<0.01) (Table I).
Furthermore, more than 78% of the patients (N = 30 out of 38) who did not respond to first line therapy for the eradication of H. pylori infection were deficient of vitamin D levels (< 30ng/ml). Rest of the detailed description has shown in Graph II & III.

GRAPH I: SUCCESS RATE OF H. PYLORI INFECTION ERADICATION IN TREATMENT RECEIVERS (n= 100)

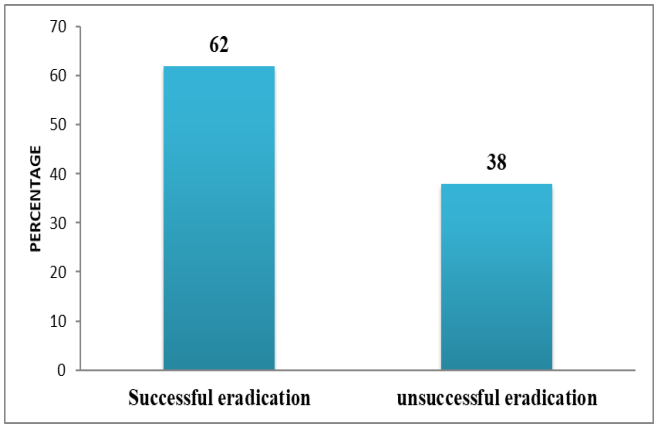
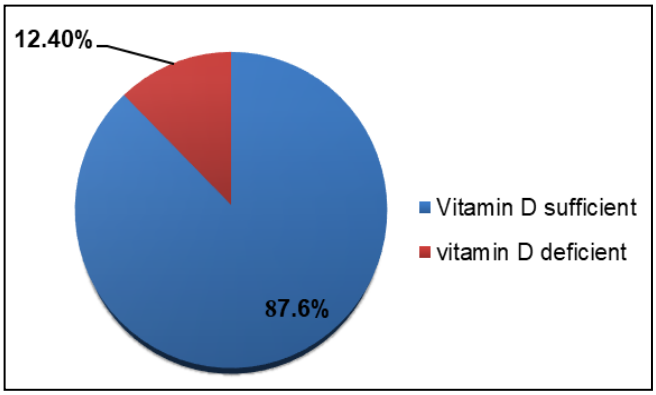


TABLE I: COMPARISON OF MEANS OF SERUM VITAMIN D LEVELS AMONG TREATMENT RECEIVERS OF H. PYLORI INFECTION (n = 100)

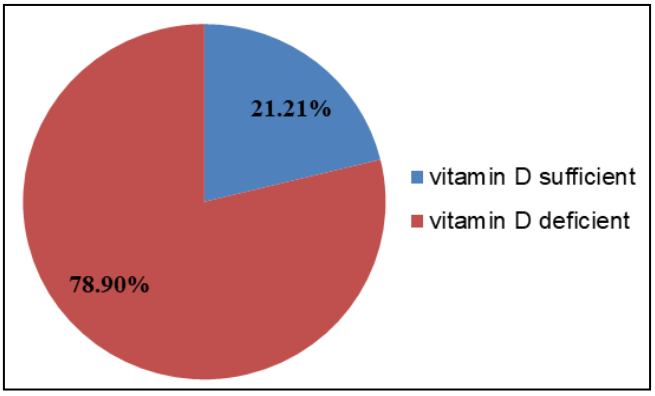
Vitamin D Levels - ng/mL	Treatment Response		p- value
	Successful (n = 62)	Failed (n = 38)	
Vitamin D level - Mean±SD	32.75±6.63	12.6±4.31	<0.01*

** p value of <0.05 is considered to be statistically significant*

GRAPH II: COMPARISON OF VITAMIN D LEVEL IN PATIENTS WITH TREATMENT SUCCESS OF H. PYLORI ERADICATION (n = 62)



GRAPH III: COMPARISON OF VITAMIN D LEVEL IN PATIENTS WITH TREATMENT FAILURE OF H. PYLORI ERADICATION (n = 38)



DISCUSSION

Helicobacter Pylori is a helical shaped, gram negative bacterium that colonizes in the digestive tract. Once there, it begins the disease process by causing chronic inflammation and immune responses[5]. Interestingly, majority of individuals infected with H. pylori remain symptomless, but the risk of developing peptic ulcer in their entire lifetime is around 10 to 20%. However, those who do have symptoms, present with dyspepsia, abdominal pain, nausea and vomiting[13-15].

Although infection rates for male and female children are similar there may be a slight male preponderance of the infection in adulthood. In a meta-analysis of observational, population-based studies, men were slightly more likely to be H. pylori-positive than women; OR=1.16 (95% CI 1.11–1.22)[16]. This was confirmed in a study of adults in Ontario, Canada, in which the overall seroprevalence was 23.1% but higher in men (29.4%) than women (14.9%)[17]. One explanation that has been proposed for the lower seroprevalence in women is that they may be more likely to clear H. pylori infection because of higher rates of incidental antibiotic use for other indication. On the other hand, our study has shown gender differences in the distribution of H. pylori infection and in our study females are predominantly associated with H. pylori infection than males

Helicobacter pylori infection remains one of the most common chronic bacterial infections affecting humans. Since publication of the last American College of Gastroenterology (ACG) Clinical Guideline in 2007, significant scientific advances have been made regarding the management of H. pylori infection and it is considered to be the most common cause of gastritis and the eradication of H. pylori may result in decreased rate of recurrence of peptic ulcer therefore, all patients with the infection should be treated[18].

Unfortunately, the therapy is not always successful. Several studies have been carried out on various aspects of H. pylori, especially regarding factors that result in failure of eradication therapy. One such factor is low serum vitamin D levels[19]. Numerous research studies have suggested Vitamin D possesses anti-inflammatory and immunoregulatory properties, providing protection from a number of chronic diseases, such as infectious processes, malignancies, cardiovascular problems and autoimmune disorders[20]. In one such retrospective study, the relationship between low serum vitamin D levels and rate of H. pylori eradication was observed. It was suggested that serum vitamin D deficiency hinders clearance of H. Pylori infection and may result in eradication failure[17].

In this study, we found the H. pylori eradication rates to be significantly lower in patients with low vitamin D levels. In addition, the number of patients with deficient vitamin D levels was significantly higher in the eradication failure group compared to the successful group. A potential pathogenic mechanism explaining the observed association between vitamin D status and eradication rates is the impairment of the vitamin D signal immune function, which may lead to inadequate immune response. Vitamin D deficiency may be a risk factor associated with H. pylori infection treatment failure and may lead to a need for supplementation of vitamin D before H. pylori eradication therapy.

The link between vitamin D deficiency and susceptibility to infection has been suggested for longer than a century, with the early observation that children with nutritional rickets were more likely to experience infections of the respiratory system, leading to the coining of the phrase “rachitic lung”. Recently, one of the most interesting reports on vitamin D by Guo L et al [22] has shown that vitamin D demonstrates an antimicrobial effect against H. pylori.

Guo L et al[22] found that vitamin D plays an important role in gastric mucosa homeostasis and host protection from H. pylori infection. Several studies around the world have shown vitamin D to be protective against the bacterium. Therefore, low levels of vitamin D are not sufficient enough to protect against this gram negative bacterium[7,8], which our study has also proved.

CONCLUSION

In conclusion, our study showed that the success rate of H. Pylori eradication therapy is lower in patients who are deficient in vitamin D. Further studies are required to see efficacy of vitamin D supplementation along with H. pylori eradication therapy

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AUTHOR CONTRIBUTIONS

Almani SA: Drafting of manuscript, expert opinion.
Nazia S: Concept, Data collection & interpretation.
Shah MI: Data collection & analysis, interpretation of data
Kumar S: Final proof reading, literature review
Shaikh F: Concept, interpretation and analysis of data

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