Research Article

Serum Levels of Vitamin B12 in Helicobacter pylori positive Children on Chronic Hemodialysis

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Abstract
Introduction: Chronic kidney disease (CKD) is characterized by an irreversible deterioration of renal function that gradually progresses to end-stage renal disease (ESRD), In the past 2 decades, the incidence of the chronic kidney disease in children has steadily increased, with poor and ethnic minority children disproportionately affected (USRDS, 2010). The number of dialysis patients increases by 7% annually (Choi et al., 2009). About 25% to 75% of chronic renal failure (CRF) patients who receive hemodialysis or continuous ambulatory peritoneal dialysis (CAPD) for long periods experience gastrointestinal troubles (Min et al., 2013). **Aim of the work:** The aim of the study to determine Vitamin B12 levels in Helicobacter pylori infected chronic kidney disease paediatric patients. **Subjects and Methods: Subjects:** *Study design and population: This prospective study was conducted at Minia University Hospital, Faculty of Medicine, Minia University Pediatric Hemodialysis Unit and Minia General Hospital ,during the period from April 2016 to May 2017. **Results:** This prospective study was conducted at Minia University Hospital, Faculty of Medicine, Minia University Pediatric Hemodialysis Unit, Minia General Hospital, during the period from April 2016 to May 2017. Twenty five children were included in this study with chronic kidney disease under dialysis in the age groups between 6-16 years old, 60% males and 40 % females.
Keywords: Chronic kidney disease, Vitamin B12, Helicobacter pylori

Introduction
Chronic kidney disease (CKD) is characterized by an irreversible deterioration of renal function that gradually progresses to end-stage renal disease (ESRD), In the past 2 decades, the incidence of the chronic kidney disease in children has steadily increased, with poor and ethnic minority children disproportionately affected[(1)]. The number of dialysis patients increases by 7% annually[(2)]. About 25% to 75% of chronic renal failure (CRF) patients who receive hemodialysis or continuous ambulatory peritoneal dialysis (CAPD) for long periods experience gastrointestinal troubles[(3)].

Helicobacter pylori, previously Campylobacter pylori, is a gram-negative, microaerophilic bacterium found usually in the stomach. It was identified in 1982 by Australian scientists Barry Marshall and Robin Warren, who found that it was present in a person with chronic gastritis and gastric ulcers , It is also linked to the development of duodenal ulcers and stomach cancer, and is more prevalent in developing countries[(4)].

Infection with H. pylori has been implicated not only in the etiopathogenesis of gastrointestinal disease, such as gastritis, ulcerative disease, and gastric malignancies, but also in various extra-gastrointestinal conditions, among them chronic renal disease[(5)].

Vitamin B12 (B12; also known as cobalamin) is one of eight B vitamins and its role in cellular metabolism is closely intertwined with that of folate, another B vitamin[(6)].Vitamin B12 is an essential water-soluble micronutrient required by all cells in the body and it is a complex molecule that cannot be synthesized in the human body and must be supplied in a diet[(7)]. It has important functions in DNA replication, in the synthesis of red blood cells, and in maintaining the myelin sheath that surrounds nerve cells[(8)]

The effects of B12 deficiency are mainly seen in the blood and nervous system. The classic manifestations of B12 deficiency were first

identified in pernicious anaemia, the cause of which was then unknown[9].
In some studies, H. Pylori infection is known as the causative factor of vitamin B12 deficiency (Carmel et al., 2001). In addition, it has been reported that low levels of vitamin B12 were found in HP infected CKD patients[10].

Aim of the work

The aim of the study to determine Vitamin B12 levels in Helicobacter pylori infected chronic kidney disease paediatric patients.

Subjects and Methods

Subjects:

***Study design and population:**

This prospective study was conducted at Minia University Hospital, Faculty of Medicine, Minia University Pediatric Hemodialysis Unit and Minia General Hospital, during the period from April 2016 to May 2017.
Twenty five children were included in this study with chronic kidney disease under dialysis in the age groups between 6-16 years old, 60% males and 40% females.
The study was approved by the hospital and ethical committee and parenteral consents were obtained.
The patients were selected on the basics of the following inclusion and exclusion criteria.

Inclusion Criteria:

- Children with CKD stage 5 on chronic hemodialysis in age between 6-16 years.

Exclusion Criteria:

- Patients who used antibiotics except our eradication regimen.
- Patients with comorbid diseases such as malabsorption diseases.

Methodology:

All patients subjected to:

1- Full history taking including:

-Name, age, sex and duration of dialysis .

2- Examination:

1. General examination, local, physical examination and measurements (weight, length, respiration rate, Heart rate, blood pressure).
2. Systematic examination.

3- Investigations:

- CBC.
- Renal function tests including:

* Serum urea: urea analysis was done by urease end point method (Modified Berthelot reaction).
* Serum Creatinine: Creatinine was done by creatinine Jaffe kinetic method.

- Serum level of Vitamin B12:

* Measured by Accu Diag TM, Vitamin B 12 ELISA Kit-USA by delayed linked immune-sorbent ELISA.
* Measured before and after eradication of H pylori.
* The normal range for vitamin b12 in the blood is between 200 and 900 nanograms per milliliter (ng/ml).

- Serum IgG AB of Helicobacter pylori:

Done by RIDASCREEN Helicobacter IgG (K2321), this test is an enzyme immune-assay for the semi-quantitative determination of IgG antibodies against Helicobacter pylori in human serum.

Results

This prospective study was conducted at Minia University Hospital, Faculty of Medicine, Minia University Pediatric Hemodialysis Unit, Minia General Hospital, during the period from April 2016 to May 2017.

Twenty five children were included in this study with chronic kidney disease under dialysis in the age groups between 6-16 years old, 60% males and 40 % females.

Table 1:Demographic data of studied cases.

	Descriptive statistics (n=25)
Age (year)	
Range	(6-16)
Mean ± SD	13.8±2.7
Sex	
Male	15(60%)
Female	10(40%)
Weight (kg)	
Range	(15-38)
Mean ± SD	28.2±6.1
Duration of dialysis (month)	
Range	(3-84)
Mean ± SD	40.4±29.3
Median	36
IQR	(12-71)

Table 2:Laboratory data of studied cases.

	Descriptive statistics (n=25)
HB (gm/dl)	
Range	(6.9-13.4)
Mean ± SD	9.5±1.6
TLC ($x10^3$)	
Range	(3-8)
Mean ± SD	4.8±1.4
Platelets ($x10^3$)	
Range	(83-416)
Mean ± SD	215.1±76.7
Urea (mg/dl)	
Range	(77-211)
Mean ± SD	141.4±37.6
Creatinine (mg/dl)	
Range	(2.2-8.3)
Mean ± SD	5.6±1.6

Table 3:comparison between Vitamin B12 before and after eradication of Helicobacter pylori.

	Before eradication	**After eradication**	**P value**
Vitamin B12(pg/ml)			
Range	(289-720)	(400-780)	**<0.001***
Mean ± SD	504.8±142.4	617.2±97.5	

- **paired sample t test for parametric quantitative data within the same group**
- ***: Significant difference at P value < 0.05**

This table demonstrated results of vitamin B12 before and after eradication, it demonstrated that there is a significant increase in vitamin B12 levels after eradication. it was 504.8 (pg/ml) before eradication and increased significantly to 617.2 (pg/ml) after eradication.

Discussion

Chronic kidney disease (CKD) is characterized by an irreversible deterioration of renal function that gradually progresses to end-stage renal disease (ESRD), In the past 2 decades, the incidence of the chronic kidney disease in children has steadily increased, with poor and ethnic minority children disproportionately affected[9]. The number of dialysis patients increases by 7% annually[10]. About 25% to 75% of chronic renal failure **(CRF)** patients who receive hemodialysis or continuous ambulatory peritoneal dialysis **(CAPD)** for long periods experience gastrointestinal troubles[11].

It has been postulated that high urea concentration makes the gastric mucosa of these patients more susceptible to colonization by H. pylori, however, an etiological association between H. pylori and either symptomatic or asymptomatic dialysis patients remains inconclusive[12]. The prevalence of H. pylori infection in CRF patients may be as high as 64% and significantly higher in dialysis patients than in normal controls[13].

Helicobacter pylori is a gram negative infectious pathogen which known as one of the most common gastric infections and involves more than 50% of the people in the world[14] with a predominant distribution in developing countries (up to 80%) compared to industrialized ones (20%-80%)[15]. Infection with H. pylori has been implicated not only in the etiopathogenesis of gastrointestinal disease, such as gastritis, ulcerative diseases, low-grade

mucosa-associated lymphoid tissue lymphoma, and gastric malignancies, but also in various extragastrointestinal conditions, among them chronic renal disease[16].

Vitamin B12 is an essential water-soluble micronutrient required by all cells in the body and it is a complex molecule that cannot be synthesized in the human body and must be supplied in a diet[17]. B12 is released from food and complexes upon digestion, with gastric intrinsic factor (IF), the B12-IF complex binds to specific receptors in the ileum where it is absorbed[18]. It has important functions in DNA replication, in the synthesis of red blood, and in maintaining the myelin sheath that surrounds nerve cells[19].

Recommendation

- We recommend the assessment of H. Pylori infection and Vitamin B12 concentration of dialysis patients.
- Further investigations are needed with bigger sample size to evaluate the relation between vitamin B12 levels and Helicobacter Pylori infected chronic hemodialysis pediatric patients.

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