Study on prevalence of Helicobacter pylori infection in adolescents with failure to thrive to compare with control group

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Abstract: About 20-80% of the world population is infected with Helicobacter pylori (HP) infection in developing countries can be acquired at an early age, and this may lead to chronic diarrhea, malnutrition and growth retardation. The aim of this study was evaluating the prevalence of HP infection in the students of Tabriz which was in the age range of 13 to 15 yrs old and its correlation with physical growth factors. In a cross sectional and descriptive analytical study in Pediatric medicine department of Tabriz University of medical sciences on students in the age range of 13 to 15 yrs old in Tabriz we evaluated the prevalence of HP infection and its correlation with physical growth factors. Of 806 adolescents, 386 of them were male and 420 of then were female. The mean age of the boys was 175.87 ± 4.72 months and girls was 175.32 ± 4.51 months (P=0.095). The stool HP antigen was positive in 35.2% of adolescents with a mean level of 0.65±0.48.The HP stool antigen level was 0.70±0.49 in the adolescents with low socioeconomic and 0.55±0.42 in adolescents with high socioeconomic group (P<0.001). There was a negative reverse linear correlation between the level of income and HP stool antigen titers (P<0.001, R=-0.129). The HP stool antigen is higher in patients with lower socioeconomic level. There was a negative reverse linear correlation between the HP stool antigen titers and adolescent's, Height Percentile-for-age, Height z-score-for-age, Weight (*K gr*), Weight Percentile-for-age, Weight z-score-for-age, BMI ،BMI Percentile-for-age and BMI z-score-for-age, but there was not a meaningful linear correlation between the HP stool antigen titer and age of the adolescents.

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1. Introduction

Helicobacter pylorus is a spiral gram-negative bacillus that causes gastritis, peptic ulcer and gastric carcinoma and has a role in etiology of MALT type lymphoma and has been identified as carcinogenic by the WHO (Tsar, 2006).

About 20-80% of the world population is infected with Helicobacter pylori (HP) infection in developing countries can be acquired at an early age, and this may lead to chronic diarrhea, malnutrition and growth retardation (Tsar, 2006).

Perri and colleague have stated that infection with Helicobacter pylori can cause malnutrition by releasing the certain cytokines and beside all of these Helicobacter pylori infection can cause growth deficiency like all other chronic diseases (Perri, 1997).

Protein exertioning enteropathies, gastroenteritis, malnutrition and iron deficiency anemia have been reported in children with Helicobacter pylori infection (Perri, 1997).

Perri and colleagues studied 216 children in the range of 2–14 years which Helicobacter pylori infection was confirmed in them by Urea Breath Test (UBT) they concluded that Helicobacter pylori infection is more prevalent in large families and is more common in lower socioeconomic levels and is associated with impaired growth (Perri, 1997).

Kuipers and his colleagues stated that there is a meaningful correlation between high titers of anti-Helicobacter pylori IgG antibody and height growth retardation (Kuipers, 1993).

Tatsuguchi and his colleague had stated that there is a reverse correlation between Gherlin levels and the severity of gastritis caused by Helicobacter pylori, this can cause loss of appetite and physical growth retardations in children(Tatsuguchi, 2004).

In the other site the infection with Helicobacter pylori may cause impaired physical growth by causing the impaired absorption of trace elements (i.e Iron,Vit B12,Vit C, Vit A, Vit E, folate, Zinc and selenium) (Cardenas, 2006).

With considering the high and global prevalence of Helicobacter pylori infection which affects more than 50 % of world population and since this infection is majorly asymptomatic. We designed a study for evaluating the prevalence of Helicobacter pylori infection in the students of Tabriz which was

in the age range of 13 to 15 yrs old and its correlation with physical growth factors.

2. Material and Methods

In a cross sectional and descriptive analytical study in Pediatric medicine department of Tabriz University of medical sciences on students in the age range of 13 to 15 yrs old in Tabriz we evaluated the prevalence of Helicobacter pylori infection and its correlation with physical growth factors.

With cluster sampling we enrolled 806 students between 13 to 15 yrs old who have referred to Tabriz health centers for assessment of student health plan in 2010 after achieving the inclusion criterias and obtaining informed consent.

Inclusion criteria include:

1- No known history of growth hormone deficiency.
2- No history of underlying, acute and chronic disease.
3- No history of using of antibiotics in recent 4 weeks.

After achieving the inclusion criteria we studied the students and the required information such as age, weight, parent's familial relation, parental education, and family income level, the milk supply in the first 2 years of life and during the first 2 years life was gathered. Accurate measurements of height and weight were performed with Seca stadiometer.

Adolescent's height and weight percentiles were determined with NCHS curves. Stool specimens obtained and were examined with ACON Helicobacter pylori stool ELISA Kit for the presence or absence of Helicobacter pylori.

Adolescents who the infection with HP was diagnosed for them were treated appropriately by the researcher.

Statistical analysis:

All data were analyzed using descriptive and deductive statistics methods by SPSS Ver. 15. The relation between qualitative data was evaluated using Chi-square test. And the relation between quality and quantity data were evaluated using T-test, ANOVA tests and the relation between the variables were evaluated using Pearson and Spearman correlation coefficient. P< 0.05 was considered meaningful.

3. Results

We studied 806 adolescents in the age range of 13 -15 yrs old in Tabriz that 386 of them were male and 420 of then were female.

The mean age of the boys was 175.87 ± 4.72 months and the mean age of the girls was 175.32 ± 4.51 which there was not significant difference between the mean ages in two gender(P=0.095).

The stool Helicobacter pylori antigen was positive in 284(35.2%) of adolescents with a mean level of 0.65±0.48. the Helicobacter pylori antigen levels is shown upon gender in figure 1.

Table 1. Demographic finding of patients based on gender

	Gender		P
	Male	Female	
Age(*month*)	175.87 ± 4.72	175.32 ± 4.51	0.095
Height(*cm*)	170.40 ± 6.38	163.30 ± 4.55	<0.001
Height Percentile-for-age	60.45 ± 25.36	59.02 ± 21.59	0.393
Height z-score-for-age	0.34 ± 0.85	0.29 ± 0.68	0.277
Weight(*K gr*)	61.01 ± 11.37	56.71 ± 9.14	<0.001
Weight Percentile-for-age	62.61 ± 27.24	63.71 ± 25.25	0.554
Weight z-score-for-age	0.43 ± 0.92	0.43 ± 0.80	0.979
BMI	20.88 ± 3.18	21.28 ± 3.14	0.076
BMI Percentile-for-age	57.67 ± 28.65	60.41 ± 26.70	0.160
BMI z-score-for-age	0.21 ± 10.00	0.30 ± 0.87	0.146

Table 2. Demographic finding of patients based on HP stool antigen titer

	HP stool antigen titer		P
	Positive	Negative	
Age(*month*)	175.74 ± 4.75	175.49 ± 4.54	0.465
Height(*cm*)	163.45 ± 5.82	168.47 ± 6.24	<0.001
Height Percentile-for-age	49.47 ± 23.99	65.27 ± 21.21	<0.001
Height z-score-for-age	-0.02 ± 0.76	0.49 ± 0.71	<0.001
Weight(*K gr*)	48.43 ± 4.38	64.39 ± 8.33	<0.001
Weight Percentile-for-age	38.78 ± 22.24	76.46 ± 17.08	<0.001
Weight z-score-for-age	-0.32 ± 0.71	0.83 ± 0.63	<0.001
BMI	18.72 ± 2.32	22.37 ± 2.80	<0.001
BMI Percentile-for-age	34.59 ± 24.17	72.43 ± 18.97	<0.001
BMI z-score-for-age	-0.53 ± 0.88	0.68 ± 0.65	<00.001

The Helicobacter pylori stool antigen level was 0.70±0.49 in the adolescents with low socioeconomic and 0.55±0.42 in adolescents with high socioeconomic group respectively which was significantly higher in low socio-economic levels(P<0.001).

Table 3. History of infection and treatment for infection in parents, Abdominal pain, Anorexia and Diarrhea based on gender

	Gender		P
	Male	Female	
History of infection in parents	13	23	0.148
History of treatment for infection in parents	11	20	0.158
Abdominal pains	14	35	0.005
Anorexia	16	23	0.379
Diarrhea	4	4	0.590

There was a negative reverse linear correlation between the level of income and Helicobacter pylori stool antigen titers(P<0.001 ,R=-0.129).

There was a negative reverse linear correlation between the Helicobacter pylori stool antigen titers and adolescent's, Height Percentile-for-age, Height z-score-for-age, Weight(*K gr*), Weight Percentile-for-age, Weight z-score-for-age, BMI ،BMI Percentile-

for-age and BMI z-score-for-age, but there was not a meaningful linear correlation between the Helicobacter pylori stool antigen titer and age of the adolescents.

The demographic findings of adolescents is shown in table 1 ,the mean weight an height in boys was significantly higher than those of girls but there was not significant difference in Age ،Height Percentile-for-age، Height z-score-for-age، Weight Percentile-for-age ، Weight z-score-for-age ، BMI ، BMI Percentile-for-age و BMI z-score-for-age between boys and girls.

The demographic findings of adolescents upon their stool antigen levels is shown in table 2 .this indicates that the demographic parameters of adolescents other than age was significantly lower in adolescents with positive Helicobacter pylori antigen.

History of infection in parents, History of treatment for infection in parents, Abdominal pains, Anorexia and Diarrhea upon age and gender is shown in tables 3 and 4 respectively. These findings indicate that, except Abdominal pains that significantly high in female patients, there is not significant difference in other parameters between two genders of adolescents whereas these parameters are different between Helicobacter pylori antigen positive group and Helicobacter pylori antigen negative group.

The demographic findings are shown in tables 5 and 6 based on parents education levels and based on, History of treatment for infection in parents, Abdominal pains, Anorexia, Diarrhea and History of infection in parents in tables 7 and 8 respectively that indicates that the growth rate of adolescents with positive symptoms are worse than those of adolescents with negative symptoms.

The Helicobacter pylori stool antigen levels is shown in figure 2 based on incomes and socioeconomic level and shows that the Helicobacter pylori stool antigen is higher in patients with lower socioeconomic level.

Table 4. History of infection and treatment for infection in parents, Abdominal pain, Anorexia and Diarrhea based on HP stool antigen titer

	HP stool antigen titer		P
	Positive	Negative	
History of infection in parents	23	13	<0.001
History of treatment for infection in parents	19	12	0.002
Abdominal pains	46	3	<0.001
Anorexia	37	2	<0.001
Diarrhea	7	1	0.002

4. Discussions

Helicobacter pylori infection is probably the most common bacterial infection in the world (Czinn, 2005). Approximately 50% of the world population is infected with Helicobacter pylori, with the highest prevalence rates in developing countries (Czinn, 2005). These are conditions which usually occur in adult life. However, Helicobacter pylori are an infection which is mainly acquired in childhood (Rowland and Drumm, 1998).

Helicobacter pylori was significantly linked to duodenal ulcer and gastric ulcers in the age group of 10-16 years, but not in the age group of 9 years and under (Kato, 2004).

The age at which children are most likely to become infected is still unclear, but findings in a number of cross-sectional studies suggest that infection is acquired before the age of five (Rowland, 1999). Helicobacter pylori infection in pregnant women may affect fetal intrauterine growth (Eslick, 2002).

Helicobacter pylori infection was linked to age, sex and deprived socioeconomic environments, and was more frequent in children with recurrent abdominal pain and in those whose parents suffered from gastro duodenal disease (Leandro, 2005).

Zhang et al showed that, the prevalence of Helicobacter pylori infection varies by geographic locations (Zhang, 2009).

Rowland et al demonstrated that the overall prevalence of Helicobacter pylori in children is 10% in developed countries but can be as high as 30-40% in children from lower socio-economic groups (Rowland and Drumm, 1998).

In our study, positivity rate of helicobacter pylori infection in the adolescents under study was 35.2% which had a significant inverse relationship with economic level of the family.

The prevalence of infection is highest in children in the developing world where up to 75% of children may be infected by the age of 10(Rowland, 1999).

The prevalence of helicobacter pylori infection in our study was similar to the results of the above mentioned studies.

Chong et al indicate that screening for the serum IgG antibody to Helicobacter pylori is a practical method for diagnosing Helicobacter pylori infection in children, and that serial measurements of the Helicobacter pylori IgG antibody are useful for monitoring treatment of Helicobacter pylori because of its high sensitivity and ease of performance (Chong, 1995).

The HpSA is an accurate test for the detection of Helicobacter pylori infection in all age groups of children (Kato, 2003).

Table 5. Demographic finding of patients based on father Education level

	Education level						P
	1	2	3	4	5	6	
Age(*month*)	176.02 ± 4.86	175.39 ± 4.49	175.80 ± 4.44	174.39 ± 4.06	176.44 ± 4.03	171.00 ± 1.41	0.037
Height	166.52 ± 6.25	166.96 ± 6.85	166.36 ± 5.99	166.20 ± 6.78	169.63 ± 6.64	164.75 ± 4.60	0.450
Height Percentile-for-age	59.27 ± 23.11	60.01 ± 24.08	60.50 ± 21.11	58.09 ± 24.84	70.44 ± 16.51	46.23 ± 18.20	0.463
Height z-score-for-age	0.29 ± 0.73	0.34 ± 0.81	0.34 ± 0.69	0.28 ± 0.80	0.66 ± 0.67	-0.10 ± 0.47	0.436
Weight	57.85 ± 10.11	59.66 ±11.15	59.42 ± 8.51	58.65 ± 10.02	61.19 ± 8.93	54.75 ± 6.72	0.282
Weight Percentile-for-age	60.47 ± 26.83	65.42 ± 26.18	67.12 ± 21.14	62.72 ± 26.28	69.69 ± 23.27	57.04 ± 26.09	0.154
Weight z-score-for-age	0.34 ± 0.86	0.51 ± 0.89	0.51 ± 0.68	0.41 ± 0.83	0.62 ± 0.75	0.20 ± 0.70	0.160
BMI	20.76 ± 3.13	21.42 ± 3.34	21.34 ± 2.62	20.95 ± 2.81	21.32 ± 3.29	20.26 ± 3.60	0.176
BMI Percentile-for-age	55.73 ± 28.48	62.01 ± 27.46	63.63 ± 21.98	58.95 ± 26.84	61.13 ± 29.60	54.45 ± 43.65	0.081
BMI z-score-for-age	0.15 ± 0.95	0.35 ± 0.96	0.39 ± 0.71	0.26 ± 0.86	0.27 ± 1.15	0.16 ± 1.25	0.167
Number of family members	4.80 ± 1	4.29 ± 1	4.00 ± 1	4.14 ± 1	4.13 ± 1	4.00 ± 0	<0.001
HP stool antigen titer	0.70 ± 0.49	0.63 ± 0.48	0.59 ± 0.47	0.62 ± 0.48	0.60 ± 0.42	0.95 ± 0.64	0.255

Table 6. Demographic finding of patients based on mother Education level

	Education level						P
	1	2	3	4	5	6	
Age(*month*)	176.12 ± 4.81	175.02 ± 4.37	176.33 ± 4.16	173.84 ± 3.98	177.33 ± 2.52	176.50 ± 6.36	0.003
Height	166.70 ± 6.29	166.28 ± 6.62	166.96 ± 7.49	168.94 ± 7.44	174.00 ± 8.54	168.50 ± .71	0.062
Height Percentile-for-age	59.09 ± 23.28	59.50 ± 23.43	56.35 ± 25.47	67.13 ± 23.63	87.53 ± 15.41	51.18 ± 11.21	0.081
Height z-score-for-age	0.29 ± 0.76	0.31 ± 0.75	0.24 ± 0.89	0.59 ± 0.86	1.41 ± 0.80	0.03 ± 0.28	0.035
Weight	58.02 ± 9.96	58.95 ± 11.03	59.85 ± 9.43	63.63 ± 11.08	65.67 ± 5.51	55.00 ± 7.07	0.017
Weight Percentile-for-age	61.79 ± 26.40	63.48 ± 26.35	65.14 ± 25.80	72.33 ± 22.78	85.23 ± 3.86	50.38 ± 16.67	0.092
Weight z-score-for-age	0.37 ± 0.85	0.44 ± 0.88	0.48 ± 0.80	0.74 ± 0.82	1.06 ± 0.17	0.01 ± 0.42	0.080
BMI	20.92 ± 3.04	21.18 ± 3.28	21.33 ± 2.75	21.95 ± 3.76	21.69 ± 1.10	19.36 ± 2.33	0.339
BMI Percentile-for-age	57.55 ± 27.95	59.72 ± 28.04	64.22 ± 24.06	66.55 ± 23.80	71.22 ± 9.35	44.19 ± 29.15	0.242
BMI z-score-for-age	0.21 ± 0.93	0.28 ± 0.96	0.38 ± 0.84	0.51 ± 0.90	0.57 ± 0.27	-0.17 ± 0.78	0.310
Number of family members	4.78 ± 1	4.14 ± 1	4.04 ± 0	3.98 ± 0	3.67 ± 1	4.00 ± 0	<0.001
HP stool antigen titer	0.69 ± 0.49	0.64 ± 0.49	0.63 ± 0.48	0.50 ± 0.39	0.23 ± 0.12	0.80 ± 0.85	0.078

Table 7. Demographic finding of patients based on Abdominal pains, Anorexia and Diarrhea

	Abdominal pains		P	Anorexia		P	Diarrhea		P
	Yes	No		Yes	No		Yes	No	
Age(*month*)	175.12 ± 4.88	175.61 ± 4.60	0.472	174.33 ± 4.40	175.65 ± 4.62	0.083	175.63 ± 4.63	175.58 ± 4.62	0.979
HP stool antigen titer	1.21 ± 0.29	0.62 ± 0.47	0.009	1.23 ± 0.24	0.63 ± 0.48	<0.001	1.15 ± .39	0.65 ± 0.48	<0.001
Height	161.50 ± 4.93	167.04 ± 6.50	<0.001	162.22 ± 4.54	166.93 ± 6.55	<0.001	163.56 ± 4.32	166.73 ± 6.56	0.173
Height Percentile-for-age	48.14 ± 23.12	60.45 ± 23.31	<0.001	47.16 ± 23.85	60.34 ± 23.28	0.001	52.62 ± 23.06	59.77 ± 23.47	0.931
Height z-score-for-age	-0.07 ± 0.72	0.34 ± 0.77	<0.001	-0.10 ± 0.75	0.33 ± 0.77	0.001	0.11 ± 0.69	0.32 ± 0.77	0.450
Weight	48.81 ± 4.38	59.41 ± 10.44	<0.001	47.63 ± 3.87	59.33 ± 10.40	<0.001	49.63 ± 5.24	58.86 ± 10.48	0.013
Weight Percentile-for-age	46.31 ± 25.89	64.28 ± 25.87	<0.001	38.44 ± 25.14	64.44 ± 25.65	<0.001	49.42 ± 26.91	63.32 ± 26.18	0.136
Weight z-score-for-age	-0.09 ± 0.87	0.46 ± 0.85	<0.001	-0.33 ± 0.84	0.46 ± 0.85	<0.001	0.06 ± 0.97	0.43 ± 0.86	0.228
BMI	19.73 ± 3.07	21.17 ± 3.15	0.002	18.85 ± 2.90	21.20 ± 3.14	<0.001	20.03 ± 3.81	21.10 ± 3.16	0.344
BMI Percentile-for-age	44.35 ± 27.17	60.05 ± 27.45	<0.001	35.45 ± 25.33	60.30 ± 27.25	<0.001	45.83 ± 29.71	59.23 ± 27.64	0.173
BMI z-score-for-age	-0.17 ± 0.91	0.29 ± 0.93	<0.001	-0.49 ± 0.92	0.30 ± 0.92	<0.001	-0.12 ± 1.11	0.26 ± 0.94	0.185

Table 8. Demographic finding of patients based on History of infection and treatment for infection in parents

	History of infection in parents		P	History of treatment for infection in parents		P
	Yes	No		Yes	No	
Age(*month*)	176.39 ± 5.43	175.54 ± 4.57	0.283	176.35 ± 5.25	175.55 ± 4.59	0.342
HP stool antigen titer	0.93 ± 0.47	0.65 ± 0.48	<0.001	0.90 ± 0.49	0.65 ± 0.48	0.005
Height	164.93 ± 5.96	166.79 ± 6.56	0.097	165.47 ± 6.17	166.75 ± 6.56	0.284
Height Percentile-for-age	61.40 ± 21.12	59.62 ± 23.58	0.656	64.09 ± 20.91	59.53 ± 23.56	0.289
Height z-score-for-age	0.37 ± 0.70	0.31 ± 0.77	0.647	0.45 ± 0.70	0.31 ± 0.77	0.300
Weight	55.42 ± 11.79	58.92 ± 10.40	0.050	56.48 ± 12.17	58.86 ± 10.41	0.216
Weight Percentile-for-age	59.96 ± 29.06	63.33 ± 26.08	0.451	60.14 ± 28.55	63.31 ± 26.12	0.510
Weight z-score-for-age	0.38 ± 0.97	0.43 ± 0.86	0.751	0.38 ± 0.95	0.43 ± 0.86	0.787
BMI	21.12 ± 4.68	21.08 ± 3.08	0.941	21.04 ± 4.78	21.09 ± 3.09	0.928
BMI Percentile-for-age	51.63 ± 35.96	59.45 ± 27.20	0.098	50.59 ± 36.03	59.44 ± 27.26	0.081
BMI z-score-for-age	0.07 ± 1.23	0.27 ± 0.92	0.215	0.03 ± 1.24	0.27 ± 0.92	0.166

Konstantopoulos et al demonstrated that, the HpSA performed as well as the 13C-UBT with excellent concordance between the two noninvasive tests. There was no age dependency of the stool test results, and changing the cutoff would not have improved accuracy. Thus, the HpSA test seems suitable to monitor the success of anti- Helicobacter pylori therapy (Konstantopoulos, 2001).

In our study, stool antigen of Helicobacter pylori is studied evaluate the infection rate of Helicobacter pylori in adolescents under study.

Helicobacter pylori infection seems to be the primary event for chronic malnutrition and diarrhea syndrome with failure to thrive (Guisset, 1997).

Hp does not seem to be commonly associated with RAP in our patient population as Hp colonization was detected in only 23% of cases which was not significantly higher than the seroprevalence of anti Hp IgG antibodies in the controls (Bansal, 1998).

In our study, infection rate of Helicobacter pylori was significantly higher in symptomatic patients.

Czinn et al demonstrated that Helicobacter pylori infection is acquired during childhood with those of low socioeconomic means and having infected family members being at highest risk for early childhood acquisition (Czinn, 2005).

Maherzi et al demonstrated that recurrent abdominal pain, anorexia, weight loss and family history of peptic diseases were significantly associated with HP infection ($p<0.05$) (Maherzi, 1996).

In our study, 90% of adolescents with abdominal pain, 95% of adolescents with anorexia and 5/87% of

adolescents with diarrhea were infected with Helicobacter pylori, the rate which was significantly correlated with patients' symptoms.

Helicobacter pylori infection is not associated with specific symptoms in children; however, it is consistently associated with antral gastritis, although its clinical significance is unclear (Torres, 2000).

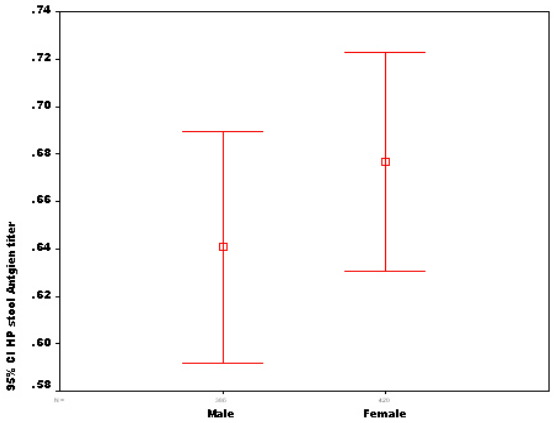

Figure 1. Distribution of Helicobacter pylori antigen levels between two genders

Ertem et al demonstrate that there was no significant association between Helicobacter pylori infection and height and weight percentiles, history of abdominal pain or family history of dyspepsia in the study group (Ertem, 2003).

Malaty et al demonstrated that Helicobacter pylori infection prevalence increased with age ($p < 0.001$) (Malaty, 1996).

In our study, the rate of Helicobacter pylori infection increases with age, but this relationship was not significant.

Bravo et al demonstrate that Helicobacter pylori infection caused significant growth retardation (Bravo 2003).

In our study, the growth rate of adolescents with Helicobacter pylori infection which was significantly slower.

Mera et al demonstrate that Helicobacter pylori infection had a significant and nontransient effect on height and weight (Mera, 2006).

Helicobacter pylori infection is associated with growth delay, growth retardation, or both in affected children(Richter, 2001).

Chronic Helicobacter pylori infection is accompanied by slowed growth in school-age Andean children(Goodman, 2011).

In our study, mean weight, Weight Percentile-for-age, and Weight z-score-for-age in adolescents with Helicobacter pylori infection were significantly lower. As well, other physical growth parameters in adolescents with Helicobacter pylori infection were significantly lower.

The number of children (both boys and girls) falling below the 5th percentile of height-for-age was significantly higher in infected than non-infected children ($P = 0.001$), similarly for Z-scores for height-for-age below -2.0 ($p = 0.003$) (Mohammad, 2008).

Also in our study, Height Percentile-for-age, Height z-score-for-age, Weight Percentile-for-age, and Weight z-score-for-age in infected adolescents was significantly lower than in other adolescents.

In the study of Fialho and et al, 80% patients aged 8-14 years with Helicobacter pylori infection were <25th centile for height as compared to 63% patients aged 8-14 years without Helicobacter pylori infection were <25th centile for height ($p=0.01$)(Fialho, 2007).

Ertem and et al, show that a significant correlation was found between Low socioeconomic status and Helicobacter pylori infection in the children (Ertem, 2003).

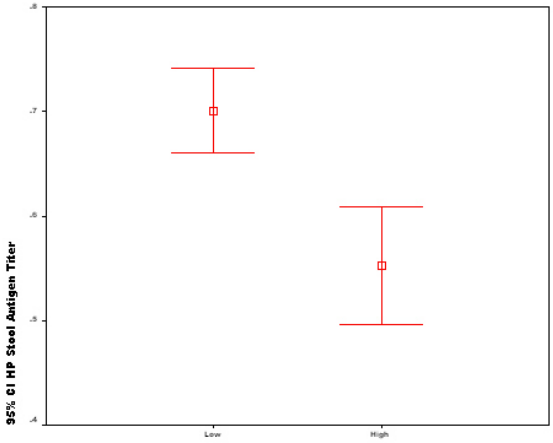

Figure 2. Distribution of Helicobacter pylori antigen levels based on incomes and socioeconomic level

Perri et al demonstrate that Helicobacter pylori infection was associated with growth delay in older children, poor socioeconomic conditions, and household overcrowding (Perri, 1997).

Malaty et al demonstrated that Helicobacter pylori infection prevalence was inversely related to the socioeconomic class of the child's family (Malaty, 1996).

Malaty et al demonstrated that type of housing, whether owned or rented, number of family members living in the same household, water source, and type of community in which a child grew up were not found to be risk factors influencing Helicobacter pylori infection prevalence (Malaty, 1996).

Veldhuyzen van Zanten et al demonstrated that lower socio-economic status and/or a low level of education are associated with an increase in the prevalence of Helicobacter pylori infection (Veldhuyzen van Zanten, 1995).

In our study, Helicobacter pylori stool antigen titers in adolescents from lower socio-economic levels were significantly higher.

Conclusion

The stool Helicobacter pylori antigen was positive in 35.2% of adolescents with a mean level of 0.65±0.48.

There was a negative reverse linear correlation between the Helicobacter pylori stool antigen titers and adolescent's, Height Percentile-for-age, Height z-score-for-age, Weight(*K gr*), Weight Percentile-for-age, Weight z-score-for-age, BMI ،BMI Percentile-for-age and BMI z-score-for-age, but there was not a meaningful linear correlation between the Helicobacter pylori stool antigen titer and age of the adolescents.

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