

Eradication of Helicobacter Pylori Bacteria Using Probiotics and Prebiotics in Compare with Antibiotics in Al-Jumail city

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Abstract:

Background: Helicobacter pylori bacteria is a bacteria that colonize gastric mucosa, it can cause gastritis and may also lead to serious complications such as ulcers and even stomach cancer. Probiotics are living beneficial bacteria that contribute to the eradication of H. Pylori bacteria by several mechanisms. Prebiotics are non-digestible carbohydrates and it is the complement to probiotics, they are the feed for probiotics. Synbiotic is a term used to describe the food that contains both probiotics and prebiotics, this combination work better in the eradication of H. Pylori bacteria.

Aims: the main aim of this research is to compare between the probiotics, prebiotics, synbiotics, and antibiotics in the eradication of H. Pylori bacteria, another aim is to evaluate the role of probiotics in the standard triple Helicobacter pylori therapy.

Methods: in current research which was conducted in Al-Jumail city, 13 adult volunteers were enrolled. 3 of them underwent triple therapy for 7-10 days, as control subjects. The others were grouped into three groups, group (a) received the same 7-10 days triple therapy plus yogurt for 3 weeks, group (b) received a prebiotic supplement for one week, the group (c) received yogurt with garlic (Synbiotic) for one week. H. Pylori eradication was checked by a blood test (IgG). Data was analyzed by SPSS program.

Results: reduction rate of blood IgG level, which represents the eradication rate of H. pylori bacteria, was higher in synbiotics group (1.12) (p=0.068), compared to other groups, which were:

(0.98) for antibiotic + yogurt (p=0.285).

(0.79) for antibiotics (p=0.109).

(0.17) for prebiotics (p=0.593).

Conclusion: Synbiotic therapy, represented by yogurt with garlic, is the best choice to eradicate H. Pylori bacteria when taken regularly.

Keywords: Eradication, H. Pylori, Probiotics, Prebiotics, Synbiotics, Antibiotics.

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القضاء على بكتيريا هيليكوباكتر بيلوري باستخدام البروبيوتيك والبريبايوتكس مقارنة بالمضادات الحيوية في مدينة الجميل

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الملخص

الخلفية: البكتيريا البوابية الحلزونية هي بكتيريا تستعمر الغشاء المخاطي في المعدة، ويمكن أن تسبب التهاب المعدة وقد تؤدي أيضاً إلى مضاعفات خطيرة مثل القرحة وحتى سرطان المعدة. البروبيوتيك هي بكتيريا حية مفيدة تساهم في القضاء على بكتيريا الملوية البوابية بعدة آليات. البريبايوتكس هي كربوهيدرات غير قابلة للهضم وهي مكمل للبروبيوتيك، فهي تغذي البروبيوتيك. بينما السينبيوتك مصطلح يستخدم لوصف الطعام الذي يحتوي على كل من البروبيوتيك والبريبايوتكس، ويعمل هذا المزيج بشكل أفضل في القضاء على بكتيريا الملوية البوابية.

الأهداف: الهدف الرئيسي من هذا البحث هو المقارنة بين البروبيوتيك والبريبايوتكس والمضادات الحيوية في القضاء على بكتيريا الملوية البوابية، والهدف الآخر هو تقييم دور البروبيوتيك في العلاج القياسي الثلاثي للبكتيريا الملوية البوابية.

الطرق: البحث الحالي تم إجراؤه في مدينة الجميل، حيث التحق 13 متطوعاً بالغا. خضع 3 منهم للعلاج الثلاثي لمدة تتراوح من 7-10 أيام، كمواضع تحكم. تم تجميع المجموعات الأخرى في ثلاث مجموعات، المجموعة (أ) تلقت نفس العلاج الثلاثي من 7-10 أيام بالإضافة إلى الزبادي لمدة 3 أسابيع، المجموعة (ب) تلقت مكمل بريبيوتيك لمدة أسبوع، المجموعة (ج) تلقت الزبادي بالثوم (Synbiotic) لمدة أسبوع. تم فحص استئصال بكتيريا الملوية البوابية عن طريق فحص الدم (IgG). تم تحليل البيانات بواسطة برنامج SPSS.

النتائج: كان معدل خفض مستوى IgG في الدم، والذي يمثل معدل القضاء على بكتيريا الملوية البوابية، أعلى في مجموعة (synbiotics (1.12) (p = 0.068)، مقارنة بالمجموعات الأخرى، والتي كانت:

- (0.98) للمضادات الحيوية مع الزبادي (p = 0.285)

- (0.79) للمضادات الحيوية (p = 0.109)

- (0.17) للبريبايوتيك (p = 0.593)

الخلاصة: العلاج الذي يمثلته الزبادي مع الثوم، هو أفضل خيار للقضاء على بكتيريا الملوية البوابية عند تناوله بانتظام.

الكلمات المفتاحية: استئصال، جرثومة المعدة الحلزونية، البروبيوتيك، البريبايوتكس، السينبيوتكس، المضادات الحيوية.

Introduction

Helicobacter pylori bacteria is a pathogenic bacterium that colonize stomach mucosa [1]. It causes gastritis, and may result in serious complications such as an ulcers and also stomach cancer [2,3]. This bacteria must be eradicated as soon as it discovered, to avoid these complications [4]. Antibiotics used for the eradication of this bacteria is effective, but not for all cases. This may be due to bacterial resistance against antibiotics [5,6]. So that, probiotics which is beneficial bacteria that keep gut balance, can be used in the eradication of *H. pylori* bacteria [7]. Probiotics comes from many sources include some foods like yogurt. Some strains like lactobacilli have an inhibitory effect on *h.pylori* bacteria, others can produce anti-microbial substances or stabilize the gut barrier[8]. These ingredients work better when consumed with prebiotics, which is indigestible ingredients that stimulate the growth of beneficial bacteria and keep them healthy [7,9]. Prebiotics found in many foods like garlic. A combination of prebiotics with probiotics known as synbiotics [9]. This what we will discuss in our research.

Research problem: Antibiotic used for the eradication of *H. pylori* bacteria may not highly effective, and sometimes the bacteria are resistible.

Research Importance: Introduce nutritional therapy for cases with *H.pylori* infection, which have no side effect. Avoid the complications caused by *H. pylori* infection.

Research Aims

1. Support the medical therapy by probiotics to increase the eradication rate of *H. pylori* bacteria.
2. Comparison between the effectiveness of medical therapy and nutritional therapy in the eradication of *H. pylori* bacteria.

Research Hypothesis

1. Can probiotics support medical therapy to increase the eradication rate of the bacteria?
2. Is nutritional therapy more effective than medical therapy in the eradication of *h. Pylori* bacteria?

Research methodology

The students will follow the experimental method in their research.

Sample community: private clinics.

The sample: simple sample, 13 patients.

Measurement tool: laboratory investigation.

Research limits

Spatial limits: Al-Jumail city.

Temporal limits: one month.

Literature Review

1. The Effects of Synbiotic "*Bifidobacterium lactis* B94 plus Inulin" Addition on Standard Triple Therapy of *Helicobacter pylori* Eradication in Children. Ustundag GH, Altuntas H, Soysal YD, Kokturk F, pub 2017, Jun, 1.

Aim: The aim of this study is to evaluate the effects of the synbiotic *Bifidobacterium lactis* B94 plus inulin addition to the standard triple therapy on *Helicobacter pylori* (*H. pylori*) infection eradication rates. **Methods:** Children aged 6-16 years who had biopsy proven *H. pylori* infection were randomly classified into two groups. The first group received the standard triple therapy consisting of amoxicillin + clarithromycin + omeprazole. The second group was treated with the standard triple therapy and *Bifidobacterium lactis* B94 (5×10^9 CFU/dose) plus inulin (900 mg) for 14 days, concurrently. Eradication was determined by ^{14}C -urea breath test 4-6 weeks after therapy discontinuation. **Results:** From a total of 69 *H. pylori* infected children (F/M = 36/33; mean \pm SD = 11.2 \pm 3.0 years), eradication was achieved in 20/34 participants in the standard therapy group and 27/35 participants in the synbiotic group. The eradication rates were not significantly different between the standard therapy and the synbiotic groups [intent-to-treat, 58.8% and 77.1%, resp., $p = 0.16$; per-protocol, 64.5% and 81.8%, resp., $p = 0.19$]. There was no difference between the groups in terms of symptom relief ($p = 0.193$). The reported side effects were ignorable. **Conclusion:** Considering the eradication rates, synbiotic addition to therapy showed no superiority over the standard triple therapy conducted alone.

2. Double strain probiotic effect on *Helicobacter pylori* infection treatment: A double-blinded randomized controlled trial. Mehdi Haghdost (MD) Sepehr Taghizadeh (MD) Majid Montazer (MD) Parinaz Poorshahverdi (MD) Ali Ramouz (MD) Sanam Fakour (MD) 29 April 2017.

Background: A decreased rate of successful helicobacter pylori (*H. pylori*) infection treatment has revealed serious demand for more effective regimens to eradicate infection. Therefore, probiotics have recently been considered to increase the rate of antibiotic regimens efficacy in *H. pylori* infections. In current randomized controlled trial, we evaluated the effect of double strain probiotic combination with standard triple therapy (STT), in the eradication rate of *H. pylori* infection.

Methods: In current randomized placebo-control study, all patients (176 subjects) underwent the STT for 10 days. However, the study group received triple therapy for the eradication of *H. pylori* with supplement of Lactobacillus probiotic for 4 weeks and placebo was administered to control group, as well. Adverse effects of the antibiotic regimen were recorded for all patients. Six weeks after the cessation of probiotic intake, all patients underwent *H. Pylori* with fecal antigen of test, followed by a recurrence evaluation six months later.

Results: There was no significant difference in demographic data and presenting symptoms between the study groups. The eradication rate of *H. pylori* infection was significantly higher in probiotic group (78.4%), compared to that of placebo group (64.8%) ($P=0.033$). In addition, adverse events were significantly less prevalent in patients that received probiotic ($P=0.047$). Nonetheless, there was no significant difference in terms of infection recurrence during a 6-month follow-up ($P=0.07$).

Conclusion: Double strain probiotic in combination with STT increased the eradication rate of *H. pylori* infection, while the adverse events due to antibiotic therapy decreased.

3. Assessment of antibacterial effect of garlic in patients infected with *Helicobacter pylori* using urease breath test Mahmoud Zardast, Kokab Namakin, Jamil Esmaelian Kaho, Sarira Sadat Hashemi, Accepted: Aug 27, 2015.

Objective: *Helicobacter pylori* (*H. pylori*) is the most common pathogenic bacteria in the stomach. The aim of the current study was to explore the effect of oral garlic administration on bacterial urease activity inside the stomach and its contribution to the treatment of *H. pylori* infection.

Materials and Methods: In this clinical trial, 15 patients were studied quantitatively with Urease Breath Test (UBT). The patients with gastrointestinal symptoms and a positive serum *H. pylori* IgG were enrolled. UBT was performed for each patient in three sessions as follows: at the beginning of the study, an initial UBT was performed based on which, the positive cases entered the study and the negative ones were excluded. Second UBT was done three days later in patients who were not receiving any treatment and were considered as the control, whereas the third UBT was performed three days after prescribing two medium-sized cloves of garlic (3 g) with their meal, twice a day (at noon and in the evening). The collected data were analyzed using ANOVA and Bonferroni tests and the significance level was set at $p < 0.05$.

Results: the mean UBT significantly differed before and after treatment with garlic cloves, being significantly lower after garlic consumption. No meaningful difference was observed in the mean UBT without garlic consumption between the first and second steps.

Material and Methods

Sample collection:

Sample of 13 patients, whose ages ranges from 23 to 85 years old, was taken from different clinics in al-jumail city during the period of 26/8 to 14/9 /2019. All the patients have been tested for H. pylori using blood test and they have been divided into four groups:

- First group includes 3 patients: received antibiotic for 7-10 days.
- The second group includes 3 patients: received antibiotic for one week, with yogurt for 3 weeks, twice a day.
- Third group includes 3 patients: received a probiotic supplement for one week, twice a day.
- Fourth group includes 4 patients: received yoghurt with garlic for one week, once a day.

Results & Discussion

In this chapter, we will present, discuss and analyze data that have been collected from a group of patients suffering from H. pylori infection, according to the research sample.

The sample of the study:

The sample consists of 13 patients divided into four groups, they have been tested for H. pylori using blood test before and after the specific therapy for each group. First group, includes 3 patients, received the triple therapy. Second group, includes 3 patients, received antibiotic plus yogurt. Third group, includes 3 patients also, received prebiotic supplement. Fourth group, includes 4 patients received yogurt with garlic.

After a specific duration for each group, the results of blood tests have been collected from all the patients in order to compare between medical therapy and nutritional therapy. This study depends on data obtained from patients in different clinics in Al-Jumail city, in the defined period from 26 August to 11 September 2019.

Statistical Hypothesis

Zero hypothesis: there is no statistically significant differences at 5% level, between IgG mean before and after the specific therapy.

Alternative hypothesis: there is statistically significant differences at 5% level, between IgG mean before and after the specific therapy.

Note that each therapy approach will be tested separately. Data have been analyzed using statistical program SPSS, and the results were as follows:

Repetitive tables and Statistical measurements for sample members of the research:

Table (1): the proportion of sample members classified by sex.

Gender	Frequency	Percent
Male	7	53.8
Female	6	46.2
Total	13	100.0

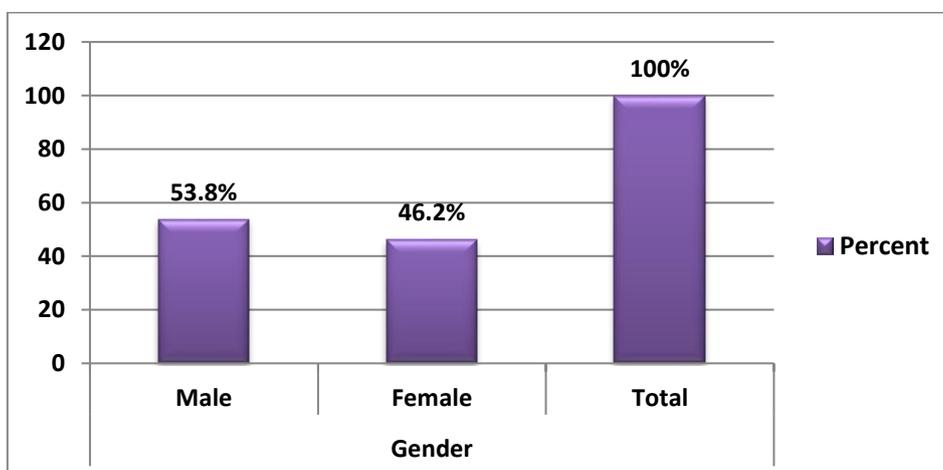


Figure (1): the proportion of sample members classified by sex.

From figure (1), proportion of male in sample is 53.8 %, higher than female which is 46.2%, from total sample members.

Table (2): demonstrate mean and std. deviation of the age sample members.

	N	Mean	Std. Deviation
Age	13	41.8	4.61
Male	7	38.1	4.63
Female	6	46.2	8.6

Statistical analysis of the sample groups:

First: repetitive tables:

A- Proportion of patients classified according to sex

1- antibiotic group

Table (3): antibiotic group

Gender	Frequency	Percent
Male	1	33.3
Female	2	66.7
Total	3	100.0

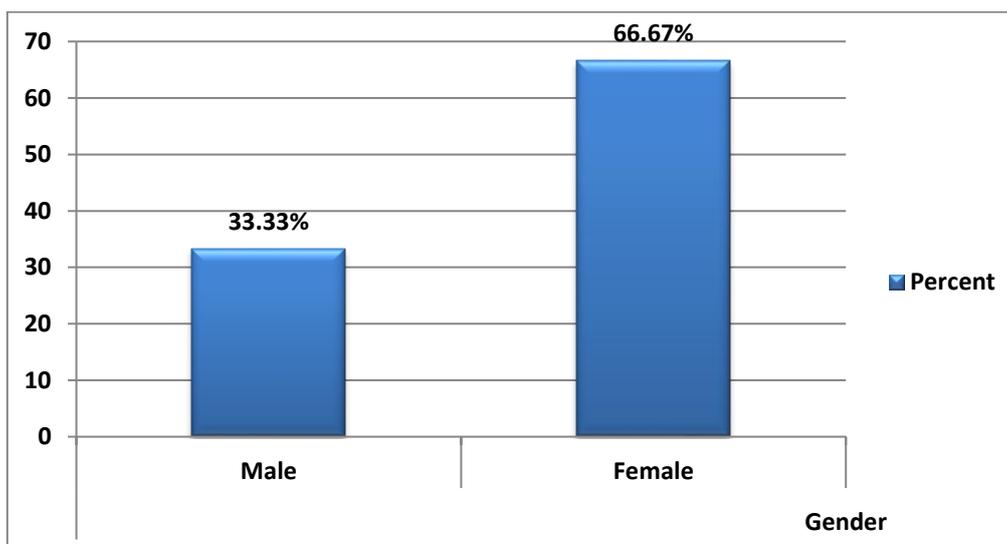


Figure (2): antibiotic group.

2- antibiotic plus yoghurt group

Table (4): antibiotic plus yoghurt

Gender	Frequency	Percent
Male	0	0.0
Female	3	100.0
Total	3	100.0

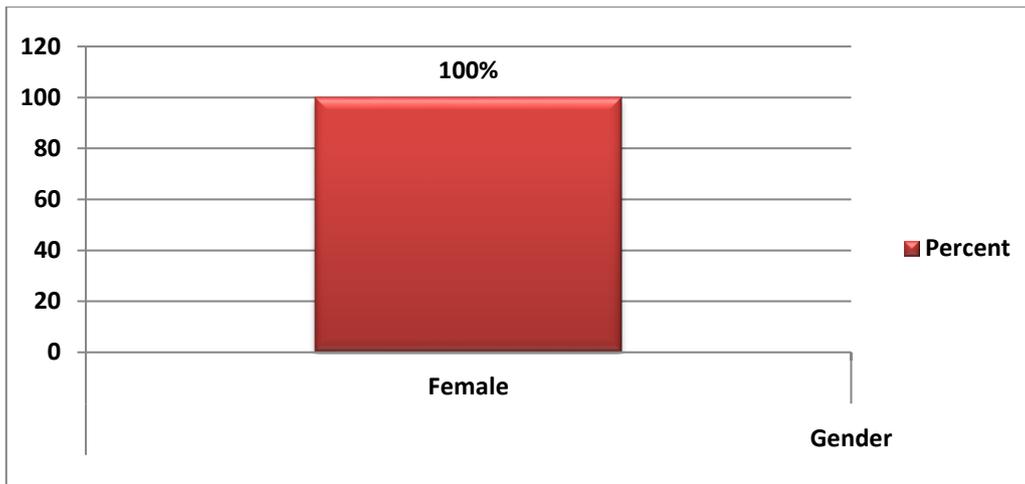


Figure (3): antibiotic plus yoghurt.

3- prebiotic supplement

Table (5): prebiotic group

Gender	Frequency	Percent
Male	2	66.7
Female	1	33.3
Total	3	100.0

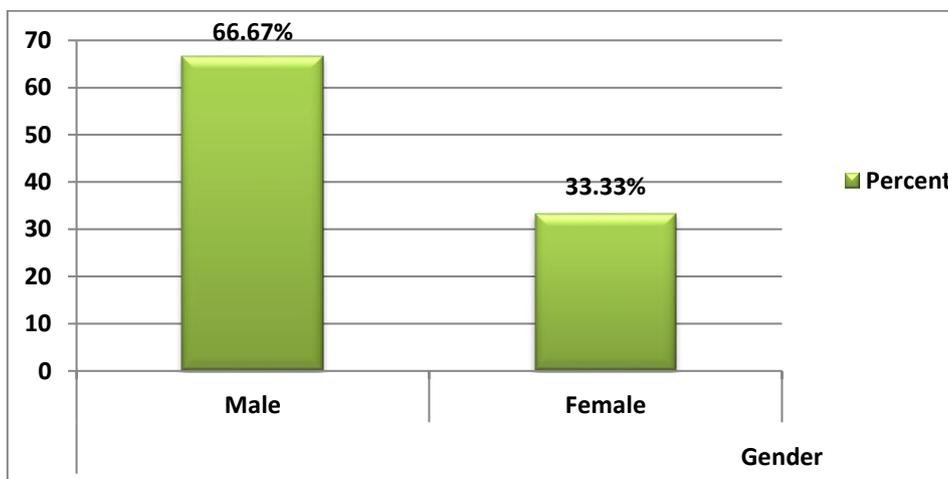


Figure (4): prebiotic group.

4-synbiotic group

Table (6): synbiotic group

Gender	Frequency	Percent
Male	4	100.0
Female	0	0.0
Total	4	100.0

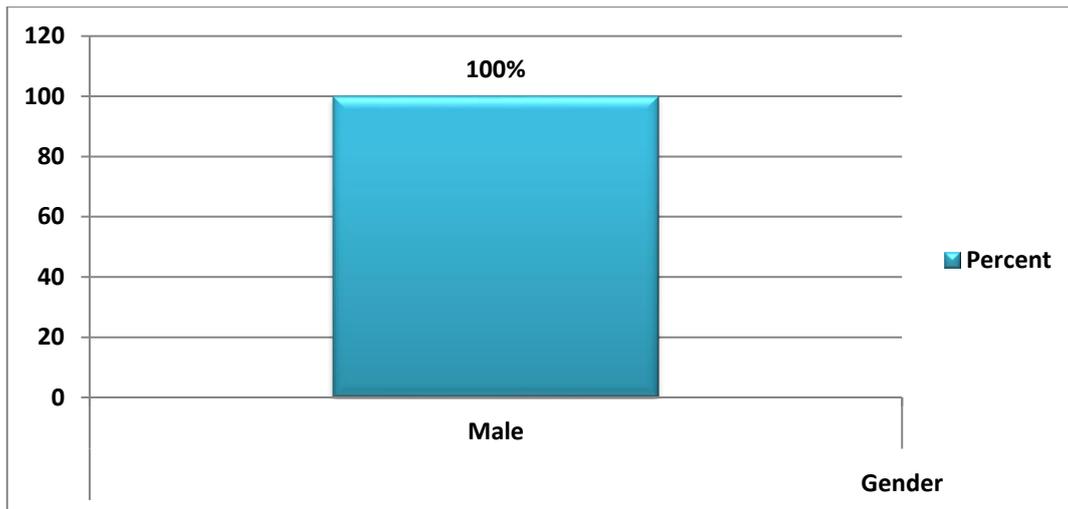


Figure (5): synbiotic group.

comment: according to the above tables and figures, it is clear that:

- Antibiotic group consists of 33.33% males, 66.67% females.
- Antibiotic plus yogurt group consists of 100% females.
- Prebiotic supplement group consists of 66.67% males, 33.33% females.
- Synbiotics group consists of 100% males.

B- Mean & Std.deviation of patient's age

1- Antibiotic group:

Table (7): antibiotic group

	N	Mean	Std. Deviation
Age	3	43.67	5.17
Male	1	39.00	
Female	2	46.00	8.00

2- antibiotic plus yogurt group:

Table (8): antibiotic plus yogurt group

	N	Mean	Std. Deviation
Age	3	33.33	3.53
Male	0	0	
Female	3	33.33	3.53

3- prebiotic supplement group:

Table (9): prebiotic group

	N	Mean	Std. Deviation
Age	3	50.33	18.27
Male	2	33.00	10.0
Female	1	85.0	

4- synbiotic group:

Table (10): synbiotics group

	N	Mean	Std. Deviation
Age	4	40.5	7.22
Male	4	40.5	7.22
Female	0	0	

Comment: the tables above demonstrate that the mean of the patients age was approximately:

- 43 years in antibiotic group
- 33 years in antibiotic plus yogurt group
- 50 years in prebiotics group
- 40.5 years in synbiotic group

C- Mean & Std.deviation of blood IgG before and after the specific therapy approach

1- antibiotic group

Table (11): antibiotic therapy

		Patients no.	mean	Std.deviation
Pair 1	IgG Before	3	5.50	2.35
	IgG After	3	4.71	2.48

2- antibiotic plus yogurt group

Table (12): antibiotic plus yogurt therapy

		Patients no.	mean	Std.deviation
Pair 1	IgG Before	3	3.45	1.38
	IgG After	3	2.47	1.12

3- prebiotics group

Table (13): prebiotics therapy

		Patients no.	mean	Std.deviation
Pair 1	IgG Before	3	3.53	1.89
	IgG After	3	3.36	2.23

4- Synbiotics group

Table (14): synbiotic therapy

		Patients no.	mean	Std.deviation
Pair 1	IgG Before	4	3.09	1.57
	IgG After	4	1.97	0.74

Comment:

The tables above show that:

- Antibiotic therapy decreases the IgG level, the rate was 0.79 IU.
- Antibiotic plus yogurt decreases the IgG level, the rate was 0.98 IU.
- Prebiotics supplements decrease the IgG level, the rate was 0.17 IU.
- Synbiotics (Yogurt with garlic) decreases the IgG level, the rate was 1.12 IU.

Therefore, we conclude that all these approaches have positive effect on the IgG mean according to the sample data. to make sure, we must test whether this effect is significant or no.

Note that the normal range of blood IgG must be less than 1 IU.

Second: Statistical Hypothesis

To test the hypothesis, we will use (Wilcoxon) test at moral level $\alpha=5\%$, and the zero hypothesis will be rejected if (p-value $\leq \alpha$), as it shown in the following tables:

1- Antibiotic group**Table (15):** (test of hypothesis) antibiotic group

Pair	Z	P-Value
IgG Before - IgG After	1.604	0.109

2- antibiotic plus yogurt group**Table (16):** (test of hypothesis) Antibiotic plus yogurt group

Pair	Z	P-Value
IgG Before - IgG After	1.069	0.285

3- prebiotic group**Table (17):** (test of hypothesis) prebiotic group

Pair	Z	P-Value
IgG Before - IgG After	0.535	0.593

4- synbiotic group**Table (18):** (test of hypothesis) synbiotic group

Pair	Z	P-Value
IgG Before - IgG After	1.826	0.068

Comment: according to (Wilcoxon) test, the tables above shows that there are no statistically significant differences between the means of blood IgG before and after using each therapy, where the p-value was higher than the moral level (0.05). Therefore, zero hypothesis cannot be rejected. This means, using all of these therapy approaches has no effect on blood IgG level at moral level 5%.

Comparison between the therapy approaches:**Table (19):** comparison between therapy approaches according to the effect on the blood IgG level.

Therapy approach	IgG level		Difference in rate	Result	Effect
	Before	After			
Antibiotics	5.50	4.71	0.79	Decline	Positive
Antibiotic + yogurt	3.45	2.47	0.98	Decline	Positive
Prebiotics	3.53	3.36	0.17	Decline	Positive
Yogurt + garlic	3.09	1.97	1.12	decline	Positive

Comment:

The table above demonstrates that all these therapy approaches have positive effect on the IgG level. Also, we notice that synbiotic (yogurt with garlic) therapy is the best one, the decline rate is (1.12), then yogurt plus antibiotic therapy, decline rate is (0.98), then antibiotic therapy, the decline rate is (0.79) and the last and least one is prebiotic supplement, which is (0.17).

Conclusion and Recommendation

Conclusion: From the above data, we conclude the following points:

1. The percentage of males in the sample is 53.8%, females are 46.2%. also, the average age of patients was approximately 41 years, the average age of males was 38years, and the females was approximately 46 years.
2. There is no statistically significant differences in the IgG mean before and after using each approach, at moral level 5%.
3. All the used therapy approaches lead to decline in blood IgG rate, synbiotics therapy was the best approach among them, the decline rate is (1.12), followed by yogurt plus antibiotic therapy, the decline rate is (0.98). note that the duration was short and limited. so, if these therapies taken for sufficient duration, they could lead to higher decline rate in the blood IgG until it reaches the normal range, which is less than 1 IU.
4. Synbiotic (yogurt with garlic) therapy is more effective than other approaches, when used as an alternative therapeutic substance for the eradication of *H. pylori* bacteria.
5. We conclude also, that nutritional therapy (yogurt) can support medical therapy (antibiotic) and increase the eradication rate of *H. pylori* bacteria.

Recommendation:

From the above, we recommend the following:

1. Using yogurt with garlic as therapeutic substance for sufficient period of time to eradicate *H. pylori* bacteria and to avoid the side effects of medical therapy.
2. Support antibiotic with yogurt to increase the eradication rate of *H. pylori* bacteria.
3. Practicing good hygiene to prevent the transmission of *H. pylori* bacteria.
4. We recommend further studies to be conducted about the relation between *H. pylori*, probiotic, prebiotics for sufficient period of time, and applying these studies on large number of patients, to get more accurate results.

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