Impact of Energy Drink Consumption on Kidney Function and Its Association with Helicobacter pylori Infection in Iraqi Youth

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Abstract
This study examined the impact of energy drink consumption on kidney function among Iraqi youth. It found that heavy consumption, particularly more than seven cans per week, was associated with a significant increase in uric acid levels, while serum creatinine showed no significant change. Moderate and low consumption were linked to reduced urea and blood urea nitrogen levels. The study also suggests that energy drinks may aggravate gastric irritation in individuals with Helicobacter pylori infection because of their high caffeine, sugar, and acid content. Overall, the findings indicate potential renal and gastrointestinal risks and highlight the need for further long-term investigation.

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Keywords: Energy drinks, renal function, uric acid, creatinine, Iraqi youth, Helicobacter pylori

1. Introduction

When bacteria infiltrate normally sterile organs like the kidneys, they can have a major impact on the human body [1]. Urinary tract infections (UTIs) and other bacterial infections can spread to the kidneys and result in pyelonephritis [2]. Fever, discomfort, and in extreme situations, renal failure or damage, may result from this. In order to avoid long-term complications, early diagnosis and treatment are crucial [3].

Non-alcoholic beverages known as energy drinks (EDs) are high in caffeine and a number of other psychoactive ingredients, such as the amino acid taurine, the glucose derivative glucuronolactone, and herbal extracts like ginseng and guaranà (an additional source of caffeine with effects similar to those of caffeine), which are frequently present in varying amounts [4]. EDs were first introduced to the market in Europe and Asia in the 1960s, and since the end of the previous century, they have proliferated all over the world [5]. Numerous studies have been conducted on the immediate and long-term health effects of ED use on the central nervous system and cardiovascular system. It has been demonstrated that eating disorders have a number of negative effects on people, especially young people. These effects include high blood pressure, severe cardiovascular events, kidney problems, metabolic problems, poor sleep, seizures, and neuropsychiatric problems [6]. About 30% of young people regularly use energy drinks, which are the second most popular dietary supplement among them in the United States [7]. About half of the Saudi University students who took part in a survey acknowledged regularly consuming energy drinks, suggesting that the popularity of these beverages in the Kingdom of Saudi Arabia is similar to that of other countries [8]. Over the past 20 years, there has been a sharp rise in the use of EDs, especially among teenagers and young adults. EDs are aggressively marketed as energy boosters that enhance cognitive and physical performance. There aren't many studies to back up these assertions, though. The safety of these drinks has been called into question because ED has been linked to a number of negative health effects [9]. The components found in EDs are stimulants and are not on the list of substances that the US Food and Drug Administration (FDA) regulates. Different brands of EDs have varying amounts of these stimulants, and most of the time, they are higher than what is permitted [10]. According to a study, EDs contain 50–505 mg of caffeine per can, which is significantly more than the 34 mg found in a single Coke can [11]. In recent years, there have been more reports of serious, detrimental health issues brought on by ED consumption. In fact, according to the US Substance Abuse and Mental Health Services Administration, the number of ED-associated emergency interventions doubled in 2013 [12], rising from 10,068 in 2017 to over 20,000 in 2011.

Within one to two hours of consuming an energy drink, healthy individuals experienced elevated systolic heart pressure (from 6 to 10 mm Hg), elevated diastolic heart pressure (from 3 to 6 mm Hg), and elevated heart rate (from 3 to 7 bpm). Atrial brillation was observed in healthy individuals.

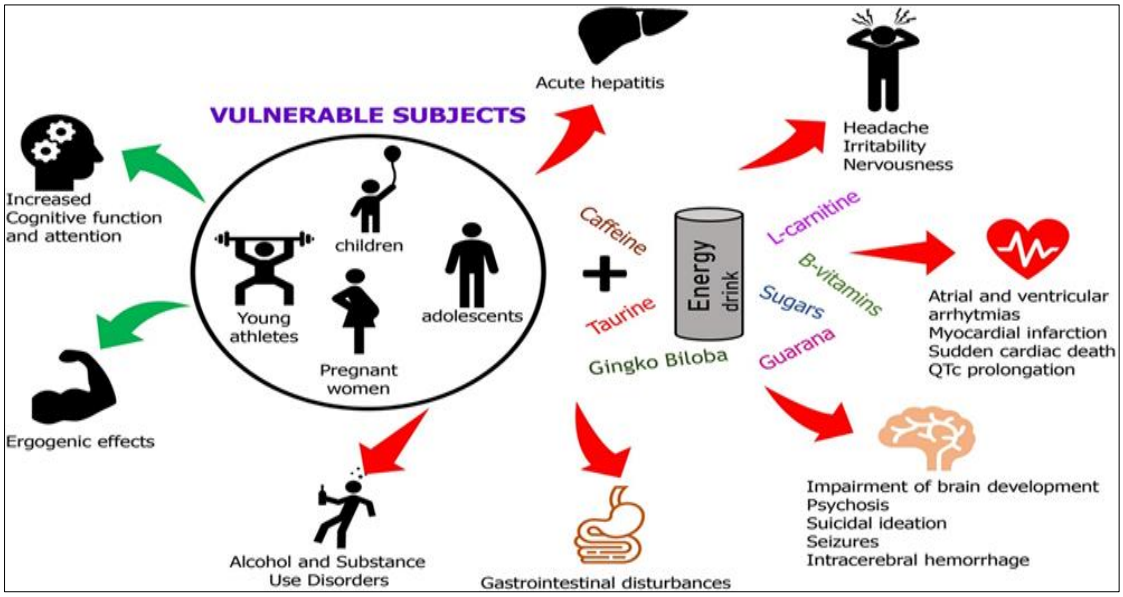

Fig 1

Caffeine and caffeine-containing beverages have been shown to have a variety of effects on the gastrointestinal tract, but their potential link to inflammation or immune cell activation has received less attention. indicating that EDs may impact immunological response and inflammation [13].

Energy drinks have between 0 and 67 grammes of glucose and fructose per 240 millilitres. Energy drinks are classified as high-sugar foods and beverages based on the British Food Standards Agency's (FSA) criteria. This category typically includes foods and drinks with more than 10 grammes of sugar per 100 grammes of product. The most popular energy drink has 11 grammes of sugar per 100 millilitres, or six or seven teaspoons for a 250 millilitre can [14]. Consuming sugary drinks is linked to cardiovascular disease, type II diabetes, dental cavities, and obesity [15]. According to Khayyat *et al*. (2014), the administration of ED resulted in renal toxicity, which was evidenced by a time-dependent increase in urea, uric acid, and creatinine [16]. This is consistent with the findings of Ugwuja (2014), who found that rats' serum levels of urea, uric acid, and creatinine increased when they consumed the energy drink Bullet® either by itself or in combination with alcohol [17]. One of the primary ingredients in energy drinks, caffeine, was blamed by the authors for the impact of energy drinks on renal function. Numerous studies have demonstrated that caffeine can raise the levels of creatinine and serum urea [18]. Additionally, caffeine encourages natriuresis, or the loss of sodium in the urine, which affects plasma volume and significantly changes cardiovascular function during exercise [19]. Furthermore, prolonged exercise in a hot environment may cause a sodium imbalance that lowers the legs' isometric force [20, 21]. Energy supplements contain higher levels of caffeine and niacin than vitamins and minerals. Like nicotine in cigarettes, caffeine in energy supplements can cause dependence [22]. Caffeine and niacin compounds only serve as simulants; they are not molecules that provide energy. Energy supplements containing niacin and caffeine will stimulate the central nervous system, causing the muscle to undergo a catabolism reaction, which is a reaction that produces energy [23].

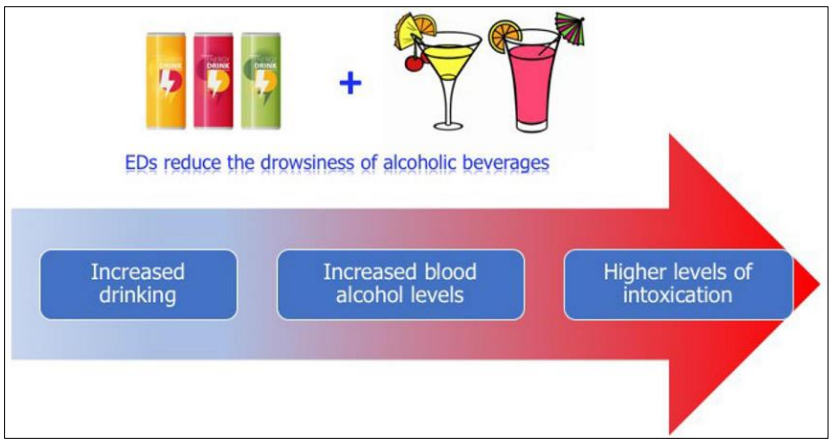

Fig 2

Medications In a healthy state, the body will process excess substances in energy supplements in the liver before excreting them through sweat, urine, or faeces [24]. The liver's job becomes considerably more challenging when energy supplements contain stimulant ingredients like taurine and caffeine. While the toxicity effect does not occur directly due to long-term accumulation by slowly causing liver damage, there are a number of factors that can cause damage to liver function, such as a drinking habit, viral infections, and long-term use of certain drugs [25]. Direct toxicity will occur in a matter of hours and is fatal. An increasing number of people are experiencing liver damage as a result of their energy drink addiction. The equivalent of 40 mg of niacin is found in one bottle of energy drinks [26]. Niacin has an LD50 limit of 50 mg/kg BB, which indicates whether consuming too much of it will harm the liver. The Nutrition Adequacy Rate (RDA), which suggests that adult women consume 14 mg of niacin per day and adult men consume 16 mg per day, determines how much niacin the body needs [27].

Materials and Methods

Study population and design: This cross-sectional analytical cohort study intends to assess how energy drink (ED) consumption affects kidney function tests. Fifty employees and students from the Applied Medical technique for the study, college students who drank more than one can of ED a day were specifically recruited. tests for kidney function (Creatinine, Urea, Uric Acid). An auto-mated Genx instrument and a semi-automated test were used to analyse the blood samples at the Applied Medical Technique College's biochemistry lab. Colorimetric and kinetic methods were estimated using human reagent kits.

Results

There was no difference in creatinine and uric acid levels between the control group and energy drink consumers, according to blood samples from 25 participants in the study, whose ages ranged from 18 to 34. The mean kidney function test results were 20.98 and the standard deviation was 2.6. Nonetheless, there were notable variations in urea levels, with energy drinks showing a decline.

specimens	uric acid	urea	creatinine
1- patient	8.37mg/dl	30.3mg/dl	0.3mg/dl
2- patient	6.83mg/dl	31.6mg/dl	0.9mg/dl
3- patient	7.04mg/dl	11.9mg/dl	0.7mg/dl
4-patient	6.99mg/dl	11.4mg/dl	0.7mg/dl
5-patient	9.33mg/dl	9.9mg/dl	0.7mg/dl
6-patient	6.90mg/dl	31.0mg/dl	0.8mg/dl
7-patient	7.08mg/dl	28.4mg/dl	1.2mg/dl
8-patient	7.97mg/dl	29.3mg/dl	0.9mg/dl
9-patient	8.22mg/dl	30.4mg/dl	0.5mg/dl
10-patient	6.47mg/dl	71mg/dl	1.0mg/dl
11.patient	5.36mg/dl	38mg/dl	0.9mg/dl
12.patient	5.07mg/dl	26mg/dl	1.1mg/dl
13.patient	5.86mg/dl	24mg/dl	1.6mg/dl
14.patient	6.23mg/dl	29mg/dl	1.2mg/dl
15.patient	5.76mg/dl	76mg/dl	1.0mg/dl
16.patient	6.55mg/dl	64mg/dl	1.2mg/dl
17.patient	6.58mg/dl	49mg/dl	0.7mg/dl
18.patient	5.04mg/dl	51mg/dl	1.8mg/dl
19.patient	6.18mg/dl	98mg/dl	1.5mg/dl
20.patient	7.58mg/dl	55mg/dl	1.5mg/dl
21.patient	11.16mg/dl		0.8mg/dl
22.patient	4.96mg/dl		0.9mg/dl
23.patient	3.84mg/dl		0.8mg/dl
24.patient	5.87mg/dl		0.9mg/dl
25.patient	4.44mg/dl		0.9mg/dl

Fig 3

The following was noted when the energy drink consumers were split into three groups according to how frequently they drank them: A kidney function analysis revealed that group 3's uric acid levels were significantly higher ($P < 0.05$) than those of the control group (mean of 7.33 ± 0.956). However, there was no significance in group 1 (with a mean of 4.87 ± 0.299) and group 2 (with a mean of 4.86 ± 0.312). Urea levels were significantly decreased ($P < 0.05$) in group 1 and 2 (with means of 30.61 ± 2.16 and 30.07 ± 2.16 respectively) compared to the control group, but there was no significance in group 3 (with a mean of 38 ± 1.84). Additionally, group 1 and group 2 had significantly lower BUN levels ($P < 0.05$) with means of 17.76 ± 0.861 and 14.30 ± 1.01, respectively; however, group

According to Table 1, creatinine analysis revealed no significant relationship ($P > 0.05$) between any of the groups and the control group (means of 0.60 ± 0.048, 0.64 ± 0.038, and 0.65 ± 0.036, respectively).

ble 1. Kidney function analysis.

		Mean ± SE	significanc
Creatinine	Control	0.62±0.026	
	Group 1	0.60±0.048	NS
	Group 2	0.64±0.038	NS
	Group 3	0.65±0.036	NS
Uric	Control	4.88±0.474	
	Group 1	4.87±0.299	NS
	Group 2	4.86±0.312	NS
	Group 3	7.33±0.956	P< 0.05
Urea	Control	38 ± 1.84	
	Group 1	30.61 ± 2.16	P< 0.05
	Group 2	30.07 ± 2.16	P< 0.05
	Group 3	32 ± 4.56	NS

Fig 4

Creatinine levels were found to rise very slowly as energy drink consumption increased; group 3, which drank more than seven cans per week, showed the biggest increase. Group 3's uric acid levels were found to be significantly higher than those of the control group.

Criteria for Inclusion

Individuals who, for a minimum of two years, drank at least two cans of ED every week. Participants with hepatitis B or C, pregnant women, people with high blood pressure, and those who drank fewer than two cans of ED per week were excluded.

Discussion

With an emphasis on serum creatinine, urea, and uric acid levels, the current study sought to assess how energy drink consumption affected kidney function in young Iraqis. The creatinine levels of energy drink users and the control group did not differ significantly, according to the results. On the other hand, people who drank more than seven cans a week showed markedly higher uric acid levels, whereas people who drank moderate or low amounts showed markedly lower urea levels.

These results are somewhat in line with earlier research. Energy drink consumption, for instance, was found to cause renal toxicity by Khayyat *et al*. (2014), as evidenced by increased levels of urea, uric acid, and creatinine in rats. This finding raises the possibility that toxicity is dose- and time-dependent [16]. In a similar vein, Ugwuja (2014) found that rats who drank energy drinks had significantly higher levels of serum urea, uric acid, and creatinine. He ascribed this to energy drinks' caffeine content, which is known to have nephrotoxic and diuretic effects when taken in excess [17].

In contrast to the aforementioned results, the current study's lack of a discernible rise in creatinine, even among heavy energy drink users, raises the possibility that the short-term impact on renal filtration capacity may be minimal in young, healthy people. The observed rise in uric acid, however, is in line with research by Tofovic *et al*. (2002), which showed that chronic caffeine use worsens kidney disease in diabetic rats [20]. Uric acid buildup is probably caused by a combination of increased purine metabolism and impaired excretion.

Recent studies have examined the connection between Helicobacter pylori (H. pylori) infection and a number of dietary and lifestyle choices, such as smoking and drinking alcohol. Remarkably, some research revealed a negative correlation between H. pylori infection and these behaviours, indicating that drugs such as alcohol and nicotine may decrease bacterial colonisation by either directly inhibiting bacteria or by raising stomach acidity [28].

Energy drinks, which are popular because they are stimulating, can have negative effects on people who have Helicobacter pylori (H. pylori) infections. These drinks usually contain a lot of sugar, caffeine, and acidic substances like citric acid, which all increase the production of gastric acid and irritate the stomach mucosa. The inflammation and ulceration brought on by H may worsen in this setting. Additionally, the high sugar content of energy drinks may disturb the gut microbiota, weakening host defences and encouraging bacterial persistence [30]. pylori, potentially postponing healing and decreasing the effectiveness of antibiotic treatment [29]. Additionally, studies indicate that caffeine may disrupt the mucosal barrier, increasing the vulnerability of the stomach lining to bacterial harm [31]. As a result, patients with H. Energy drinks should be avoided by people with pylori infections as part of a therapeutic diet meant to lessen stomach irritation and encourage healing.

It's interesting to note that this study found that energy drink users with mild to moderate renal impairment had lower blood urea and urea nitrogen levels, which hasn't been commonly documented in other research. A reduction in protein metabolism or changed hepatic processing may be the cause of some of the urea drop, but it could also be the result of individual or methodological variations. In contrast, studies like [26] and [27] typically found that ED consumption was associated with higher nitrogenous waste indices.

The results' generalisability may have been limited by the relatively brief duration of consumption or the exclusion of people with pre-existing renal or metabolic disorders, which could also be the reason for the lack of significant change in creatinine across all groups. The degree of nephrotoxicity

may also be influenced by variations in the composition of energy drinks, such as the concentrations of taurine and niacin. For example, Farihatun *et al*. (2019) connected excessive niacin intake to kidney and liver stress [23].

Overall, even though this study offers insightful information about how eating disorders impact kidney function, specifically in raising uric acid, it also emphasises the need for larger, longer-term studies with more thorough dietary and lifestyle controls in order to completely comprehend the long-term renal effects of energy drink consumption.

Conclusion

The possible impacts of energy drink consumption on kidney function in young Iraqis are highlighted in this study. Participants who consumed more than seven cans per week showed elevated uric acid levels, suggesting potential renal stress, but serum creatinine levels did not change significantly. Furthermore, in contrast to some earlier studies, a significant drop in urea and blood urea nitrogen (BUN) levels was observed among those with moderate and low consumption.

Additionally, energy drinks may exacerbate gastric irritation and inflammation, especially in people with Helicobacter pylori (H. pylori) infections, because of their high caffeine, sugar, and acid content. These drinks have the potential to decrease treatment efficacy and postpone recovery by increasing the production of gastric acid and rupturing the mucosal barrier.

Consequently, it is highly advised that people with H. Energy drinks should be avoided as part of a treatment plan for pylori infection in order to promote stomach healing and safeguard renal function. To completely comprehend the long-term health risks connected to energy drink consumption, particularly in people with underlying infections or metabolic disorders, more extensive long-term research is required.

References

1. Sachit HG, Almahbobi TF, Ali ZMM, Ali SHM, Al-Alwany SHM. A molecular implicatory propositioning roles for human cytomegalovirus and p16 gene expression in oral squamous cellular carcinogenesis. J Pure Appl Microbiol. 2019;13:2333-42.
2. Turki HK, Ali ZMM, Saleem AH. The effect of different decontaminants on green vegetable foods collected from Iraqi stores. 2021.
3. Alghazali MW, Al-Hetty HRAK, Ali ZMM, Saleh MM, Suleiman AA, Jalil AT. Non-coding RNAs, another side of immune regulation during triple-negative breast cancer. Pathol Res Pract. 2022;239:154132.
4. Mattioli AV, Pennella S, Manenti A, Puviani MB, Farinetti A. Influence of energy drinks on obesity: a preliminary experimental study. Prog Nutr. 2017;19:369-72.
5. Valle MTC, *et al*. Energy drinks and their component modulate attention, memory, and antioxidant defences in rats. Eur J Nutr. 2018;57:2501-11. doi:10.1007/s00394-017-1522-z.
6. Subaiea GM, Altebainawi AF, Alshammari TM. Energy drinks and population health: consumption pattern and adverse effects among Saudi population. BMC Public Health. 2019;19:1539. doi:10.1186/s12889-019-7731-z.
7. Simon MR, Mosher JF. Alcohol, energy drinks, and youth: a dangerous mix. San Rafael (CA): Marin Institute; 2007.
8. Alsunni AA, Badar A. Energy drinks consumption pattern, perceived benefits and associated adverse effects amongst students of University of Dammam, Saudi Arabia. J Ayub Med Coll Abbottabad. 2011;23:3-9.
9. Alsunni AA. Energy drink consumption: beneficial and adverse health effects. Int J Health Sci (Qassim). 2015;9:468-74. doi:10.12816/0031237.
10. Tanne JH. New York Attorney General investigates energy drink makers. BMJ. 2012;345:e6108. doi:10.1136/bmj.e6108.
11. Burrows T, Pursey K, Neve M, Stanwell P. What are the health implications associated with the consumption of energy drinks? A systematic review. Nutr Rev. 2013;71:135-48. doi:10.1111/nure.12005.
12. Ali F, Rehman H, Babayan Z, Stapleton D, Joshi DD. Energy drinks and their adverse health effects: a systematic review of the current evidence. Postgrad Med. 2015;127:308-22. doi:10.1080/00325481.2015.1001712.
13. Higgins JP, Yarlagadda S, Yang B. Cardiovascular complications of energy drinks. Beverages. 2015;1:104-26. doi:10.3390/beverages1020104.
14. Wolk BJ, Ganetsky M, Babu KM. Toxicity of energy drinks. Curr Opin Pediatr. 2012;24:243-51. doi:10.1097/MOP.0b013e3283506827.
15. Manzini R, *et al*. Energy drink administration ameliorates intestinal epithelial barrier defects and reduces acute DSS colitis. Inflamm Bowel Dis. 2021;27:1139-52. doi:10.1093/ibd/izaa328.
16. Gonzalez-Palacios S, *et al*. Sugar-containing beverages consumption and obesity in children aged 4-5 years in Spain: the INMA study. Nutrients. 2019;11:1772. doi:10.3390/nu11081772.
17. Volčanšek Š, Lunder M, Janić M, Janež A. Problems of sugar-added beverage consumption in Slovenia and the world. Zdrav Vestn. 2018;87:587-98. doi:10.6016/ZdravVestn.2703.
18. Khayyat LI, Essawy AE, Al Rawy MM, Sorour JM. Comparative study on the effect of energy drinks on haematopoietic system in Wistar albino rats. J Environ Biol. 2014;35:883-91.
19. Ugwuja E. Biochemical effects of energy drinks alone or in combination with alcohol in normal albino rats. Adv Pharm Bull. 2014;4:69-74.
20. Tofovic SP, Kost CK Jr, Jackson EK, Bastacky SI. Long-term caffeine consumption exacerbates renal failure in obese, diabetic, ZSF1 (fa-facp) rats. Kidney Int. 2002;61:1433-44. doi:10.1046/j.1523-1755.2002.00278.x.
21. Mora-Rodriguez R, Pallarés JG. Performance outcomes and unwanted side effects associated with energy drinks. Nutr Rev. 2014;72:108-20. doi:10.1111/nure.12132.
22. del Coso J, Estevez E, Baquero RA, Mora-Rodriguez R. Anaerobic performance when rehydrating with water or commercially available sports drinks during prolonged exercise in the heat. Appl Physiol Nutr Metab. 2008;33:290-8. doi:10.1139/H07-188.
23. Farihatun A, Kania D, Nurmalasari A, Nurliani L. The effect of energy supplements on the levels of gamma glutamyl transferase (GGT) enzymes. J Phys Conf Ser. 2019;1179:012189. doi:10.1088/1742-6596/1179/1/012189.
24. Marinoni M, Parpinel M, Gasparini A, Ferraroni M, Edefonti V. Psychological and socio-educational

correlates of energy drink consumption in children and adolescents: a systematic review. Eur J Pediatr. 2022;181:889-901. doi:10.1007/s00431-021-04321-7.
25. Bawazeer NA, AlSobahi NA. Prevalence and side effects of energy drink consumption among medical students at Umm AL-Qura University, Saudi Arabia. Int J Med Stud. 2013;1:104-8. doi:10.5195/ijms.2013.215.
26. Akande IS, Banjoko OA. Assessment of biochemical effect of "Power Horse" energy drink on hepatic, renal and histological functions in Sprague Dawley rats. Annu Res Rev Biol. 2011;1:45-56.
27. Ebuehi OAT, Ajayi OE, Onyeulor AL, Awelimobor D. Effects of oral administration of energy drinks on blood chemistry, tissue histology and brain acetylcholine in rabbits. Niger Q J Hosp Med. 2011;21:29-34.
28. Yoshihara M, Sumii K, Haruma K, Kajiyama G, Shimamoto F. Relationship between Helicobacter pylori infection and smoking and drinking habits.
29. UCF Health. H. pylori diet: What to eat and what to avoid [Internet]. 2024.
30. Ghosh TS, Rampelli S, Jeffery IB, Santoro A, Neto M, Capri M, *et al*. Mediterranean diet intervention alters the gut microbiome in older people reducing frailty and improving health status: the NU-AGE 1-year dietary intervention across five European countries. Gut. 2021;70(7):1218-28.
31. Balmadrid B, Kim J. Helicobacter pylori: physiology and genetics. In: Helicobacter pylori pathogenesis. Treasure Island (FL): StatPearls Publishing; 2017.

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