Original Research Article

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SEROPREVALENCE OF HELICOBACTER PYLORI AMONG HUMAN IN ERBIL GOVERNORATE, KURDISTAN REGION, IRAQ

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ABSTRACT: The present work was conducted to survey the occurrence of H. pylori among human in Erbil Governorate. Three hundred and ten (310) blood samples were collected during the period from July to December 2017. Samples were collected from 170 male (comprised 75 and 95 samples from rural and urban area consecutively), and 140 female (included 65 and 75 samples from rural and urban area respectively). The prevalence of H. pylori in total samples were (39.4%). The rate of infection among females were (40.7%), compared with males infection rate were (38.2%). The prevalence of H. pylori in the age between 41-50 years were (51.2%), followed by the human with age > 61 years (46.5%), then from 31-40 years (44.4%) after that from 1-10 years 40.0%, from 51-60 years 35.6% and from 11-20 years 31.1%, finally the age between 21-30 years which found just (27.3%). The high prevalence of H. pylori antibodies among males was 41.3% and 35.8% in rural and urban area consecutively. Also, the prevalence rate of H. pylori antibodies was high 41.5% in female among rural area, whereas 40.0% in female among urban area. Results revealed that the occurrence increased in September (44.6%) and October (41.5%). We concluded that the prevalence of H. pylori among human in Erbil Governorate was high, and the infection occurred at different stages of life. The importance of public health hazards was discussed.

KEYWORDS: Seroprevalence, H. pylori, Human, Erbil governorate, Kurdistan region, Iraq.

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1. INTRODUCTION

The genus Helicobacter belongs to the family Helicobacteraceae, order Campylobacterales, subdivision of the Proteobacteria. This family also includes the genera Wolinella, Flexispira, Sulfurimonas, Thiomicrospira, and Thiovulum. To date, the genus Helicobacter comprises of 32 validly published species. Helicobacter winghamensis has not been included in the published taxonomy because it has no standing in nomenclature. Helicobacter pylori are the type species. Members of this family are able to colonize various ecological niches in the gastrointestinal tract in both humans and a broad range of animal hosts [1, 2]. With respect to their favored site of colonization, Helicobacter species are divided into two groups. The first group named gastric Helicobacter species, which preferably colonize the host's stomach of humans, sheep, cattle, dogs, cats, cheetahs, rhesus, monkeys, ferrets, whales, and dolphins, represent only one-third of the known species of Helicobacteraceae, while the remaining two-thirds of Helicobacter species are referred to as non-gastric or enterohepatic species (EHS), are more commonly found colonizing other kinds of animals such as mice, rats, rodents, and hamsters. Both groups demonstrate a high level of organ specificity, such that gastric Helicobacters, in general, are unable to colonize the intestine or liver, and vice versa [3, 4].

For a long time, the human stomach was considered to be an inhospitable environment for microorganisms mainly because of harsh acidic conditions. This changed in 1982 when Warren and Marshall confirmed that H. pylori are a unique bacteria able to colonize human stomach. It found under the mucus layer in the gastric pits in close apposition to gastric epithelial cells and the overlying gastric mucin, which is a highly specialized niche. Helicobacter bacteria are the only known microorganisms that can thrive in the highly acidic environment of the stomach. Currently, the oral cavity has been considered to be a suitable reservoir for H. pylori subsistence [5-7]. There is an age-related increase in the acquisition of infection with H. pylori. The general belief is that infection takes place mostly in children under the age of 5 years, that is mean most of the people obtain H. pylori infection during their early childhood. The epidemiological evidence has shown that H. pylori rates ranging from 20-50% in the adult populations of the developed world but the occurrence is much more in the developing countries with prevalence as high as 90% in some countries. The socioeconomic status of the family during childhood appears to be the major marker of infection. Higher prevalence exists in regions of low socioeconomic and poor sanitary conditions, and in rural as contrasted to urban areas. Overcrowding is a risk factor for acquisition of H. pylori infection in children. Contaminated water and food also act as sources of infection [8-10]. H. pylori is a Gram-negative, S curved, rod-like bacterium, about 2 μm to 3.5 μm long with a diameter of 0.5 μm to 1.0 μm. It is the helical shape (from which the genus name derives) is thought to have evolved to penetrate the mucoid lining of the stomach. This Bacterium is highly motile due to its multiple flagella that emerge from one of
the rounded ends. *H. pylori* typically has up to six polar sheathed flagella. Members of the genus *Helicobacter* are all microaerophilic organisms, and many but not all species are urease positive, also in most cases are catalase and oxidase positive[11-13]. Members of the family *Helicobacteraceae*, particularly the *Helicobacter* species, have been recognized as agents of gastrointestinal disease in both humans and a broad range of animal hosts, while not all species are pathogenic. Elshiekh et al.,[14] stated that the *H. pylori* has been strongly linked to gastritis, duodenal ulcer, gastric carcinoma and mucosa-associated lymphoid malignancies, and it was categorized as a class one(definite)carcinogen implicated in the etiopathogenesis of gastric malignancies in 1994 by the World Health Organization [15]. Jemilohon and Otegbayo [9] mentioned that there is an association between *H. pylori* and gastric lymphomas. Rana et al.[16] reported that 90% of duodenal ulcers and 70% of gastric ulcers are associated with *Helicobacter pylori* infections. It is the most general contagious human pathogen, infecting more than 50% of the peoples worldwide (just about 30% of children and 60% of adults), and is allied with 70% of benign gastric ulcers and 90% of duodenal ulcers. Gonzalez-Pons et al.[17] clarified that *H. pylori* are the major cause of peptic ulcer sickness and gastric cancer, besides it possesses the enzyme *urease*, which hydrolyzes urea to carbon dioxide and ammonia, and this enables survival of the bacterium in the acidic environment of the stomach. *H. pylori* are quite a frequent infection all over the world. It is one of the world’s most common human bacterial ubiquitous infections and associated with chronic gastritis, peptic ulceration, and gastric cancer. The occurrence of *Helicobacter pylori* (Hp) infection is still high in most countries. There were approximately 4.4 billion individuals among both developed and developing countries are infected with *H.pylori* worldwide in 2015 making it one of the most controversial bacteria in the world. Over 80% of individuals infected with the bacterium are asymptomatic, and it may play an important role in the natural stomach ecology [18,19]. *H.pylori* has been recognized in human by various researchers in different countries[20- 24]. Prevalence of *H. pylori* infection varies from 7.3 % to 92.0 % depending on age, geographic location, and socioeconomic status of the populations. Also, the epidemiology of *H.pylori* infection varies greatly among countries and even between population groups within the same country [25, 26]. Several studies have shown that the prevalence of *H.pylori* is still high in most countries. In the south and east Europe, South America, and Asia, the prevalence of *H.pylori* is often higher than 50%. Whereas, in north European and North American populations, about one-third of adults are still infected[27]. Presently, Al-Jiffri and Alsharif [28] mentioned that *H. pylori* constitute the universal infection among human being as it affects about 2/3 of the population worldwide. The occurrence of *H.pylori* infection in Kurdistan region is increased and primarily acquired in early childhood, therefore the aims of this research were to study the seroprevalence of *H. pylori* infection among human in Erbil Governorate, and to determine the prevalence of *H.pylori* in humans during the
months of study. Also the studying of the epidemiological data on *H. pylori* help in the establishing public health action that could halt transmission and therefore acquisition of the infection and aid the therapeutic program to get rid of the bacterium.

2. MATERIALS AND METHODS

2.1. Study Design and Sampling

Three hundred and ten (310) human blood samples were collected among Erbil Governorate, during the period from July 2017 to December 2017. Samples were collected from 170 male (comprised 75 and 95 samples from rural and urban area respectively), and 140 female (included 65 and 75 samples from rural and urban area consecutively). All males and females ranged in age from one (1) year to more than sixty-one (> 61) years. Five (5) ml blood samples were collected from every individual into vacutainer tube without anticoagulant. The samples collected were allowed to clot and forwarded by the sterile container to the Microbiology Laboratory/Department of Pathological Analysis/ College of Science/Knowledge University. In the laboratory the blood centrifuged, and serum was separated for used to detect *H. pylori* antibodies.

2.2. Personal information

Information about persons was recorded, including gender, age, and habitation site.

2.3. Detection of *H. pylori* antibodies in the blood

In the laboratory, the detection of *H. pylori* antibodies in blood samples was done by using *H. pylori* antibody test card (*Fastep® Rapid Diagnostic Test*). The test was carried out according to [21]. The subsequent steps were followed:

1- Brought the kit components to room temperature before testing.
2- Opened the pocket and removed the card.
3- The test used immediately.
4- Labeled the test card with patient identity.
5- Applied 3 drops (120-150 μL) of serum to the sample well marked.
6- Result was read at the end of 10 minutes.
7- A strong positive sample may show result earlier.

Interpretation of result

Positive result / Both control line and the test line appears. It indicates the antibodies of the *H. pylori* have been detected.

Negative result / Only control line appears.

2.4. Statistical Analysis

Data were analyzed using Chi-Square test and SPSS software version 15.

3. RESULTS AND DISCUSSION

3.1. Prevalence of *H. pylori* antibodies in human according to gender
The total prevalence of *H. pylori* in human blood was 122/310 (39.4%) (Table 1), also from this table, we noticed that the female is more exposed 57/140 (40.7%) to infection with *H. pylori*, compared with male infection rate 65/170 (38.2%).

**Table (1):** Prevalence of *H. pylori* antibodies for human according to gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>No of Samples examined</th>
<th>Positive</th>
<th>Negative</th>
<th>Chi Square</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>170</td>
<td>65</td>
<td>38.2</td>
<td>105</td>
<td>61.8</td>
</tr>
<tr>
<td>Female</td>
<td>140</td>
<td>57</td>
<td>40.7</td>
<td>83</td>
<td>59.3</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>122</td>
<td>39.4</td>
<td>188</td>
<td>60.6</td>
</tr>
</tbody>
</table>

3.2. **Prevalence of *H. pylori* antibodies in human according to age**

This study showed that the prevalence rate of *H. pylori* antibodies was high (51.2%) in the age group between 41-50 years, followed by the group with age more than sixty-one (> 61) years (46.5%) (Table 2).

**Table (2):** Prevalence of *H. pylori* antibodies for Human according to Age

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>No of Samples examined</th>
<th>Positive</th>
<th>Negative</th>
<th>Chi Square</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>1-10</td>
<td>45</td>
<td>18</td>
<td>40.0</td>
<td>27</td>
<td>60.0</td>
</tr>
<tr>
<td>11-20</td>
<td>45</td>
<td>14</td>
<td>31.1</td>
<td>31</td>
<td>68.9</td>
</tr>
<tr>
<td>21-30</td>
<td>44</td>
<td>12</td>
<td>27.3</td>
<td>32</td>
<td>72.7</td>
</tr>
<tr>
<td>31-40</td>
<td>45</td>
<td>20</td>
<td>44.4</td>
<td>25</td>
<td>55.6</td>
</tr>
<tr>
<td>41-50</td>
<td>43</td>
<td>22</td>
<td>51.2</td>
<td>21</td>
<td>48.8</td>
</tr>
<tr>
<td>51-60</td>
<td>45</td>
<td>16</td>
<td>35.6</td>
<td>29</td>
<td>64.4</td>
</tr>
<tr>
<td>&gt; 61</td>
<td>43</td>
<td>20</td>
<td>46.5</td>
<td>23</td>
<td>53.5</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>122</td>
<td>39.4</td>
<td>188</td>
<td>60.6</td>
</tr>
</tbody>
</table>

3.3. **Prevalence of *H. pylori* in male according to habitation site**

**Table (3):** Prevalence of *H. pylori* for male according to habitation site

<table>
<thead>
<tr>
<th>Habitation Site</th>
<th>No of Samples examined</th>
<th>Positive</th>
<th>Negative</th>
<th>Chi Square</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Area</td>
<td>75</td>
<td>31</td>
<td>41.3</td>
<td>44</td>
<td>58.7</td>
</tr>
<tr>
<td>Urban Area</td>
<td>95</td>
<td>34</td>
<td>35.8</td>
<td>61</td>
<td>64.2</td>
</tr>
<tr>
<td>Total</td>
<td>170</td>
<td>65</td>
<td>38.2</td>
<td>105</td>
<td>61.8</td>
</tr>
</tbody>
</table>

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According to the habitation site of the male participants, the high prevalence of H.pylori antibodies was 31/75 (41.3%) in a rural area, whereas 34/95 (35.8%) among urban area (Table 3).

3.4. Prevalence of H.pylori in female according to habitation site

From this study, we noticed that the prevalence rate of H.pylori antibodies was high 27/65 (41.5%) in female participants among rural area, whereas 30/75 (40.0%) in the female participants among urban area (Table 4).

Table (4): - Prevalence of H.pylori for Female according to habitation site

<table>
<thead>
<tr>
<th>Habitation Site</th>
<th>No of Samples examined</th>
<th>Positive</th>
<th>Negative</th>
<th>Chi Square</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Area</td>
<td>65</td>
<td>27</td>
<td>41.5</td>
<td>38</td>
<td>58.5</td>
</tr>
<tr>
<td>Urban Area</td>
<td>75</td>
<td>30</td>
<td>40.0</td>
<td>45</td>
<td>60.0</td>
</tr>
<tr>
<td>Total</td>
<td>140</td>
<td>57</td>
<td>40.7</td>
<td>83</td>
<td>59.3</td>
</tr>
</tbody>
</table>

3.5. The relationship between Months and prevalence of H.pylori antibodies during the period of Study

Table 5 points up the relationship between months and prevalence of H.pylori antibodies in human blood during the period of study. From this table we indicated that the highest rate of prevalence of H.pylori antibodies was found in September 25/56(44.6%), then in October 22/53 (41.5%), while the lowest rate was found in December and August 19/53(35.8%) and 16/45 (35.6%) respectively.

Table (5): -Relationship between Months and prevalence of H.pylori antibodies during the period of Study

<table>
<thead>
<tr>
<th>Month</th>
<th>No of Samples examined</th>
<th>Positive</th>
<th>Negative</th>
<th>Chi Square</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>July</td>
<td>47</td>
<td>18</td>
<td>38.3</td>
<td>29</td>
<td>9.4</td>
</tr>
<tr>
<td>August</td>
<td>45</td>
<td>16</td>
<td>35.6</td>
<td>29</td>
<td>9.4</td>
</tr>
<tr>
<td>September</td>
<td>56</td>
<td>25</td>
<td>44.6</td>
<td>31</td>
<td>10.0</td>
</tr>
<tr>
<td>October</td>
<td>53</td>
<td>22</td>
<td>41.5</td>
<td>31</td>
<td>10.0</td>
</tr>
<tr>
<td>November</td>
<td>56</td>
<td>22</td>
<td>39.3</td>
<td>34</td>
<td>11.0</td>
</tr>
<tr>
<td>December</td>
<td>53</td>
<td>19</td>
<td>35.8</td>
<td>34</td>
<td>11.0</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>122</td>
<td>39.4</td>
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<td>60.6</td>
</tr>
</tbody>
</table>

4. CONCLUSION

Gastric cancer is the fifth most common incident cancer and the third leading cause of cancer death worldwide, and H.pylori is a major risk factor for the increase of gastric cancer, so the epidemiological studying about H.pylori is essential because it provides necessary information regarding its prevalence rate, also help in the establishing public health action that could halt
transmission and then acquirement of the infection, besides aid the therapeutic program to eradicate the bacterium. Serological tests are more universally used, and it is the most practical method available to confirm diagnosis. *H. pylori* antibodies rapid test is used to monitor human sera in different places. This test is the easiest methods to apply and the most globally used for recognizing antibodies of infection with *H. pylori* [29,30].

In the work at hand, three hundred and ten (310) blood samples were collected among Erbil Governorate, Erbil, Kurdistan region, during the period from July 2017 to December 2017. The overall prevalence of *H. pylori* antibodies in total human samples were 122/310 (39.4%), which is an approach or slightly lower percentage of Sheikhian et al.[31]in Iran, who found the prevalence of *H. pylori* infection in the dyspeptic patient was 43%. The result of our study was non-agreement with a study in Egypt where the prevalence of *H. pylori* infection was 60% [32], also our result was inconsistent with Salih[33]in Saudi Arabia who found the prevalence of *H. pylori* infection was 75%. The prevalence of *H. pylori* among humans in Erbil Governorate showed a less rate compared with that reported from other studies in some developing countries. Bani-Hani and Hammouri [34] in Jordan indicated that the prevalence of *H. pylori* infection was 82 %. Perez -Perez et al.[35] mentioned that the prevalence of *H. pylori* infection among patients underwent upper gastrointestinal endoscopy in Yemen, Sana’a major hospital, was very high (78%), also Sasidharan et al.[36] in Nepal reported that the infection rate with *H. pylori* was 50.47%. While the result achieved in this study was more than those reported in some other countries, the prevalence of *H. pylori* infection in Australia was 21.5% [37], 30.4% in Malaysia [36], and 25% in Oman [38]. However, a recent study conducted by Shu et al.[39] showed that the prevalence of *H. pylori* infection was 3.1% and 18.6% in Japan and China consecutively. The changeability in the occurrence rate of *H. pylori* infection could be due to poor social and economic development, differences in socioeconomic condition, poor hygiene practices during childhood; absence of a sewage disposal facility during childhood; standard of hygiene and source of drinking water; also low education level; crowded families; and improper food handling [40]. Higher incidence exists in regions of low socioeconomic and poor sanitary conditions, and in rural as contrasted to urban areas. The socioeconomic status of the family during childhood appears to be the major marker of infection [41,42].

Also from Table 1, we noticed that the highest rate of frequency of *H. pylori* antibodies was found in female 57/140 (40.7%), while the lowest rate of occurrence was found in male 65/170 (38.2%). Statistically, the differences in the *H. pylori antibodies* test between male and female according to positive and negative examined were not significant (p>0.05). Our result was compatible with Yucel et al.[43] in Turkey, who found that the female was more exposed to infection with *H. pylori*, by using monoclonal *H. pylori* stool antigen test, and the rate of infection in female was 76.2%, compared with the rate of infection in male 23.8%. In the study conducted by Elshiekh et al.[14] in Egypt, reported that the rate of infection...
in female and male was 52% and 48% respectively. The result from this study doesn’t agree with Faisal et al. [44] in Pakistan, who found that the prevalence of H. pylori infection in male was 71.4%, while in female was 28.6%. The results from Table 2 show that the prevalence of H. pylori antibodies among humans in the age between 41-50 years were (51.2%), followed by the human with age more than sixty-one (>61) years (46.5%), then from 31-40 years (44.4%) after that from 1-10 years 40.0%, from 51-60 years 35.6%, and from 11-20 years 31.1%, finally the age between 21-30 years which found just 12/44 infected (27.3%). No significant differences in the H. pylori antibodies test between age groups according to positive and negative results (p>0.05). The result was non-agreement with result found by Yucel [43], whom they found 43.7% of the H. pylori infection with age from 20 years and under, 46.8% with age from 21-23 years, and 9.5% with age from 24 years and over. Also, our results were not agreement with research of Ahmed et al. [45] in Islamabad Suburbs (Pakistan), where they reported that the prevalence rate was 73.6% in 3-8 years' age group, 74.4% in 8-12 years' age group and 60.4% in children between 12-16 years of age. In another hand, results were consistent for somewhat with the result found by Bader et al. [46] in Egypt whom found that the prevalence of H. pylori antigen in stool from children < 5 years was 30%, followed by 5-10 years was 40%, finally age group >10 years the rate was 20%. The results obtained from this study are considered opposite of the results achieved by Al-shamahy [20] in Yemen, who found the seroprevalence of H. pylori antibodies was 9% by using Enzyme -labeled immunosorbent assay, and the occurrence according to age varied from 0.0% in children under 2 years to 12.5% in the age group 9-10 years, but our results agree with him in terms of the correlation between the rates of positive antibodies and increasing age. In a recent study designed by AL-Sinaniet al. [38] in Oman, the overall prevalence of H. pylori in Omani children increased from 7% in an age less than 5 years, to 33% in those aged between 5 and 10 years. Also, Awukuet al. [47] in Ghana, reported that the overall prevalence of H. pylori infection among children was 14.2%, and the age group with the minimum H. pylori infection rate was 14-16 years with the prevalence of 11.9%. The study population showed a female: male ratio of 1.3:1, with a higher proportion of females (16.8%) having H. pylori infection compared to males (10.7%). Mayass [21] and Al-Sinaniet al. [38] reported that the prevalence of H. pylori infection increased with age, but a slight decrease in prevalence in the oldest age group is probably due to decreasing specific immune response among older individuals and/or to the decreased number of microorganisms as a result of gastric atrophy. The high occurrence of H. pylori infection in adult life can possibly be clarified by the exposure of peoples to H. pylori early in life because of risk factors, like bad sanitation, lack of proper hygiene and increased susceptibility due to a genetic tendency. Overcrowding is a risk factor for acquisition of H. pylori infection in children, contaminated water and food also act as sources of infection. 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pylori are most common in impoverished areas with overcrowding and poor sanitation. Transmission occurs during childhood through an oral–oral or a fecal-oral route [48, 49]. There are a large number of researchers indicated a higher rate of H. pylori infection either in males or females, and there was an increase in the rate of H. pylori infection with increasing age. This may be due to weakened immune responses in elderly as compared with children who are better able to spontaneously eliminate this pathogen with a stronger immune response. Other reasons could be the more exposure of aged persons to the H. pylori in their lives as compared to children and youthful. In general, the occurrence of the infection is associated with age, and there is an age-related increase in prevalence in the developed countries which is a reflection of birth group effect. In any case, the broad idea is that infection takes place mostly in childhood and the rate of acquisition has reduced with the improved sanitary condition and probably antibiotic use among children in the developed countries. According to the Table 3, we noticed that the high prevalence of H. pylori antibodies among males were 41.3% and 38.2% in rural and urban area respectively. These observations indicate that H. pylori was prevalent in both of these areas. There is no significant difference in the H. pylori antibodies test for male according to habitation for positive and negative samples (p>0.05). Also, from this study (Table 4) we noticed that the prevalence rate of H. pylori antibody was high 27/65(41.5%) in female participants among rural area, whereas 30/75 (40.00%) in female participants among urban area. The obtained results indicated that there was no significant difference at the level of (p>0.05) in the H. pylori antibodies test for female according to habitation for positive and negative examined samples. In this work, the correlation between months and prevalence of H. pylori antibodies through a period of study in Erbil Governorate were followed up. Results which illustrated in Table 5, explain that the prevalence increased in September (44.6%), October (41.5%), and November 39.3%. Then in July, December and August, the prevalence rate was (38.3%), (35.8%), and (35.6%) consecutively. The statistical analysis of differences in the H. pylori antibodies test for six months according to our results were not significant (p>0.05). The results are consistent for somewhat with the study conducted by [21], who found that the incidence increased in March and September (100%). Then in May and February, the prevalence rate was (95.45 %) and (95.00 %) respectively. But the rate of dominance was decreasing whenever moved away from these months, in June (79.17 %), July (75.00 %), followed October (73.91 %), August (70.83 %), finally in April (56.52 %).

5. CONFLICT OF INTEREST
The authors have declared that they have no conflict of interest.

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