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The Harm of Dining Together Should not be Ignored for *H. Pylori* Prevention and Control

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Abstract

Objectives: To control *H. pylori* infection by changing the traditional shared meal pattern.

Study Design: Retrospective study *H. pylori* infection in the past decade.

Methods: This study analyzed the correlation between *H. pylori* control and the cognition or the financial condition by reviewing the change of catering patterns and *H. pylori* infection in the past decade. All of the 7,300 patients came from the outpatient and inpatient ward of Gastroenterology Department of First People's Hospital of Chengdu from January 2011 to December 2020. The study included two parts: The information about the *H. pylori* infection and the information regarding the treatment after infection and the adopting preventive measures. In the logistic regression analysis by stepwise approach, we analyzed the correlation between the Adopting Preventive Measures (APM) and the education or the economic income or the age or the residence in this study.

Results: Many people have realized the harm of *H. pylori* with enhancing education and income; they would break the traditional way of eating together and adopt the *H. pylori* preventive measures.

Conclusion: The cognition and the financial condition were the very important factors for *H. pylori* control.

Keywords: The harm of dining together; Adopt Preventive Measures (APM); *H. pylori*; Prevention; Control

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Introduction

Infection with *Helicobacter pylori* is the most common infections among the world [1-4]. It occurs worldwide, with substantial differences in prevalence both within and between countries [1,5-7]. Oral transmission is an important transmission route of *H. pylori*, which is found in saliva. It is more serious and worth attention that meals sharing is one of the important ways to infect *H. pylori*. It is transmitted through shared meals, which is more common in China. Chinese eating habit, where many people eat food on a plate, unlike the western separate system, leads to the spread of *H. pylori*. There are about 700 million people infected by *H. pylori* in China, where most people implement the meal sharing system. Therefore, to change traditional repast mode, execute separate meal system, or use public chopsticks and public spoon, clean and disinfect the tableware thoroughly are very important preventive measures [8].

Methods

Study location and patient population

All of the 7,300 patients came from the outpatient and inpatient ward of Gastroenterology Department of First People's Hospital of Chengdu from January 2011 to December 2020. Demographic information and overall Adopting Preventive Measures (APM) factors about *H. pylori* infection being controlled or prevented were analyzed.

Study design and data collection

This study analyzed the correlation between *H. pylori* control and the cognition or the financial condition by reviewing the change of catering patterns and *H. pylori* infection in the past decade. In the logistic regression analysis by stepwise approach, we analyzed the correlation between the Adopting Preventive Measures (APM) and the education or the economic income or the age or the

residence in this study.

Adopting Preventive Measure (APM) includes the Serving of Individual Dishes (SID), the Serving Chopsticks and Spoons (SCAS), the No-Group Meals (NGM), the allowing consumers to dine at staggered times, the Dine at Staggered Times (DAS) and the Disinfection after Each Serving (DAES).

A database was established by Excess Software for the study. Data collected on standardized case report forms included two parts: The information on the patient and his/her *H. pylori* infection history; the information regarding the evaluation of the *H. pylori* infection and Adopting Preventive Measures (APM).

Patient information

Information was collected regarding the education, the economic income, the age and the residence of the patient. The cognition was evaluated as low, medium or high, according to the patient's own evaluation and confirmed according to the following criteria: Level of education (none, primary school, secondary school, or higher), habitation (owner or non-owner and the housing category), the location of the patient's residence (rural or urban) and the patient's belongings.

The *H. pylori* infection history and adopting preventive measures

Patients (or their parents/guardians) were asked whether they had *H. pylori* infection and Adopting Preventive Measures (APM).

Information on *H. pylori* infection, treatment and preventing measures (SID, SCAS, NGM, DAS, or DAES) was documented by the patient interview (or the patient's parents/guardians for minors). Patients were asked to provide information regarding the treatment. The category of APM, re-infection and re-treatment were documented by the investigator.

Statistical analysis

All data from this study were obtained using SPSS 22.00 statistical software. In this study we compared differences in incidence of APM after *H. pylori* infection under certain classes of *H. pylori* infective patients, study the correlation analysis between incidence of APM and the financial condition of the patients, study the correlation analysis between incidence of APM and literacy degree of the patients and study the correlation analysis between incidence of APM and age. Rate per 100 cases was calculated. The corresponding 95% confidence intervals (95% CI) of incidence were calculated and interpreted by the normal approximate method or direct method. Differences in two proportions were compared with the Chi-square test or Fisher's exact test. Differences in multiple proportions were compared with Scheffe method. All P-values were 2-tailed, and $P \leq 0.05$ was considered statistically significant.

Results

Population

Among all patients, the male/female sex ratio was 1.43:1 (4300/5430), 3000 (41.10%) patients were from country, 4300 (58.90%) patients from city. Among these patients, 1.5% was from illiteracy, 27.40% from elementary school, 30.14% from junior high school and 40.96% from above senior high school (Table 1). There were two obviously different age stages: One is the adults between 30 to 45 years of age 2500 (34.25%) and the other between 45 to 60 years of age 2850 (39.04%) (Table 1). There were two obviously different age stages: One is children under 15 years of age 60 (0.82%), the other is the old over 75 years of age 150 (2.06%) (Table 1).

Table 1: Basic information for the subjects.

Categories	Total number	%
Sex	7300	100
Male	4300	58.9
Female	3000	41.1
Age	7300	100
<15	60	0.82
15~	740	10.13
30~	2500	34.25
45~	2850	39.04
60~	1000	13.7
75~	150	2.06
Education	7300	100
Illiteracy	110	1.5
Elementary	2000	27.4
Junior high school	2200	30.14
Above senior high school	2990	40.96
Income	7300	100
Low	1500	13.7
Middle	4800	65.75
High	1000	20.55
Living	7300	100
City	4300	58.9
Country	3000	41.1
APM	6500	89.04
SID	2000	30.77
SCAS	3500	53.85
NGM	1000	15.38
DAS	500	7.69
DAES	200	3.08
Recognition	7300	100%
Low	800	10.96
Medium	1500	20.55
High	5000	68.69

APM: Adopt Preventive Measures; SID: Serving of Individual Dishes; SCAS: Serving Chopsticks and Spoons; NGM: No-Group Meals; DAS: Dine at Staggered Times; DAES: Disinfection After Each Serving

The income situation

The income situation is given in Table 1. 1500 (13.7%) patients were estimated as having the low income, 4800 (65.75%) patients were estimated as having the medium income; 1000 (20.55%) belong to the high level of cognition (Table 1).

The cognitive information

The cognitive information of patients is given in Table 1. 800 (10.96%) patients were estimated as having the low cognition, 1500 (20.55%) patients were estimated as having the medium cognition; 5000 (68.69%) belong to the high level of cognition (Table 1).

The information of Adopt Preventive Measures (APM)

All of the 7300 (100%) populations of *H. pylori* infection were

Table 2: Logistic regression analysis to the correlation between AMP and either income, education, living, age and recognition.

Influential factors	Total number	APM (NO.)	AMP (%)	CI (95%)	P
Education	7300	6500	89.04		
Illiteracy	110 (1.50)	40	36.36	0.070 (0.069-0.071)	0.029
Elementary	2000 (27.40)	1510	75.5	0.043 (0.043-0.044)	0.009
Junior high school	2200 (30.14)	2000	90.91	0.162 (0.162-0.162)	0.013
>Senior high school	2990 (40.96)	2950	98.66	0.076 (0.0766-0.076)	0
Income	7300	6500	89.04		
Low	1500 (13.70)	1000	66.67	0.082 (0.082-0.083)	0.011
Middle	4800 (65.75)	4520	94.17	0.211 (0.210-0.213)	0.007
High	1000 (20.55)	980	98	0.460 (0.460-0.460)	0
Living	7300	6500	5.91		
Country	4300 (58.90)	3640	84.65	0.180 (0.180-0.181)	0.013
City	3000 (41.10)	2860	95.33	0.075 (0.075-0.075)	0
Age	7300	6500	89.04		
<15	60 (0.82)	20	33.33	0.365 (0.365-0.366)	0.003
15~	740 (10.13)	700	94.59	0.076 (0.076-0.076)	0.005
30~-	2500 (34.25)	2400	96	0.039 (0.038-0.039)	0.007
45~	2850 (39.04)	2800	98.25	0.122 (0.121-0.123)	0.02
60~	1000 (13.70)	550	55	0.060 (0.059-0.060)	0.011
75~	1500 (2.06)	30	20	0.175 (0.173-0.177)	0
Cognition	7300	650	89.04		
Low	800 (10.96)	400	50	0.087 (0.086-0.088)	0.002
Medium	1500 (20.55)	1200	80	0.108 (0.110-0.112)	0.007
High	5000 (68.69)	4900	98	0.116 (0.116-0.116)	0

APM: Adopt Preventive Measures

eligible for investigation, 6500 (89.04%) patients adopted preventive measures. There were 2000 (30.77) patients with Serving of Individual Dishes (SID), 3500 (53.85%) patients with Serving Chopsticks and Spoons (SCAS), 1000 (15.38) patients with No-Group Meals (NGM), only 500 (7.69%) patients with Dine at Staggered times (DAS) who were almost in high school and only 200 (3.08%) patients with Disinfection After Each Serving (DAES) (Table 1).

The correlation analysis between the level of education and Adopting Preventive Measures (APM)

All cases were divided four groups on the level of education and Adopting Preventive Measures (APM): Group 1, Adopting Preventive Measures (APM) with the illiteracy (36.36%); Group 2, Adopting Preventive Measures (APM) with the primary school (75.50%); Group 3, Adopting Preventive Measures (APM) with the junior school (90.91%); Group 4, Adopting Preventive Measures (APM) with above high school (98.66%) (Table 2). The comparison was performed among the four groups, and the results showed that the incidence of Adopting Preventive Measures (APM) in group 4 (98.66%) was much higher than in other three groups (P<0.05) (Figure 1). Moreover, the incidence in group 3 (90.91%) was higher than in group 2 (P<0.05) (Figure 1), the incidence in group 2 (75.50%) was higher than in group 1 (P<0.05) (Figure 1).

These data suggested that the correlation analysis between the level of education and using preventive measures submits positive correlation. At-risk populations of *H. pylori* would Adopt Preventive Measures (APM) with the level of developing education.

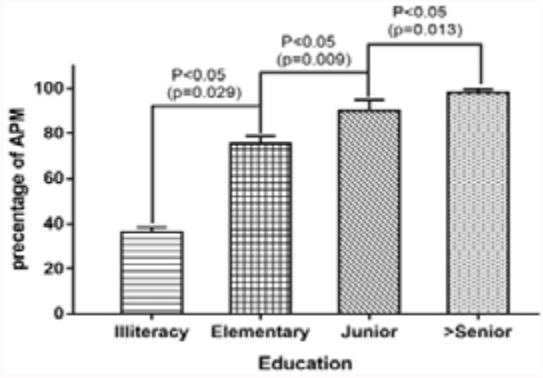

Figure 1: The correlation between AMP and education. (APM: Adopt Preventive Measures).

The correlation analysis between the level of income and Adopting Preventive Measures (APM)

All cases were divided three groups on the level of income and Adopting Preventive Measures (APM): Group 1, Adopting Preventive Measures (APM) with the low level of income (66.67%); Group 2, Adopting Preventive Measures (APM) with the medium level of income (94.17%); Group 3, Adopting Preventive Measures (APM) with the high level of income (98.00%). The comparison was performed among the three groups, and results showed that the incidence of Adopting Preventive Measures (APM) in group 3 (49.38%) was much higher than in other two groups (P<0.05) (Figure 2). Moreover, the incidence in group 2 (94.17%) was higher than in

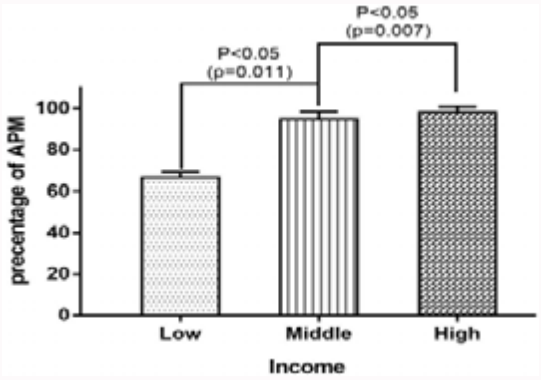

Figure 2: The correlation between AMP and income. (APM: Adopt Preventive Measures).

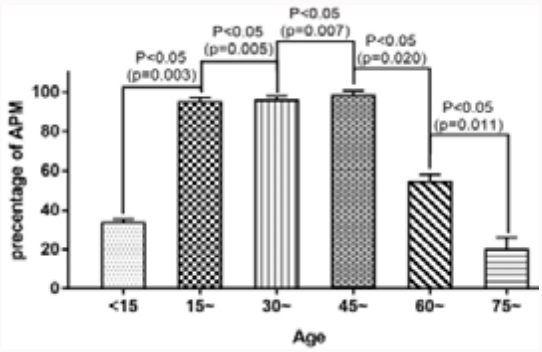

Figure 3: The correlation between AMP and ages. (APM: Adopt Preventive Measures).

group 1 (P<0.05) (Figure 2). the incidence in group 3 (98.00%) was higher than in group 2 (P<0.05) (Figure 2 and Table 2), these data suggested that at-risk populations of *H. pylori* would adopt preventive measures with the level of increasing income from the correlation analysis between the level of income and Adopting Preventive Measures (APM).

The correlation analysis between living region and Adopting Preventive Measures (APM)

All cases were divided two groups on living region and Adopting Preventive Measures (APM): Group 1, Adopting Preventive Measures (APM) living in city (95.33%); Group 2, Adopting Preventive Measures (APM) living in county (84.65%) (Table 2). The comparison was performed among the two groups, and the results showed that the incidence of Adopting Preventive Measures (APM) in group 1 (95.33%) was much higher than group 2 (P<0.05) (Figure 3). These data suggested that the correlation analysis between the living region and Adopting Preventive Measures (APM) submits positive correlation. At-risk populations of *H. pylori* would Adopt Preventive Measures (APM) with the better living region.

The correlation analysis between ages and Adopting Preventive Measures (APM)

All cases were divided six groups on ages and Adopting Preventive Measures (APM): Group 1, Adopting Preventive Measures (APM) in less than 15 year (33.33%); Group 2, Adopting Preventive Measures (APM) between 15 year and 30 year (94.59%); Group 3, Adopting Preventive Measures (APM) between 30 year and 45 year (96.00%); Group 4, Adopting Preventive Measures (APM) between 45 year and 60 year (98.25%); Group 5, Adopting Preventive Measures (APM) between 60 year and 75 year (55.00%); Group 6, Adopting Preventive Measures (APM) in elder than 75 year (20.00%) (Table 2 and Figure 3).

The comparison was performed among the six groups, and the results showed that the incidence of Adopting Preventive Measures (APM) in group 4 (98.66%) was much higher than in other five groups (P<0.05). Moreover, the incidence in group 3 (96.00%) was higher than in other four groups (P<0.05) (Figure 3), the incidence in group 6 (75.50%) was lower than in group 1 (P<0.05) (Table 2 and Figure 3).

These data suggested that the correlation analysis between the ages and using preventive measures submits positive correlation. These populations of *H. pylori* would Adopt Preventive Measures (APM) in the Youth and adults.

The correlation analysis between the cognition and the Adopting Preventive Measures (APM)

All cases were divided three groups on the cognition and the Adopting Preventive Measures (APM): Group 1, the Adopting Preventive Measures (APM) in the low cognition (50.00%); Group 2, the Adopting Preventive Measures (APM) in the medium cognition (80.00%); Group 3, the Adopting Preventive Measures (APM) in the high cognition (98.00%) (Table 2).

The comparison was performed among the three groups, and the results showed that the incidence of Adopting Preventive Measures (APM) in group 3 (98.66%) was much higher than in other two groups (P<0.05). Moreover, the incidence in group 2 (96.00%) was higher than in group1 (P<0.05) (Table 2).

These data suggested that the correlation analysis between the cognition and using preventive measures submits positive correlation. Many people would Adopt Preventive Measures (APM) with the better cognition.

Discussion

Oral transmission is an important transmission route of *H. pylori*, which is found in saliva. The infection rate of *H. pylori* can vary according to socioeconomic status, geographical region and age. It accounts for about 50.0% of the population in developing countries and 15.0% of the population in developed countries [9].

It is more serious and worth attention that meals sharing is one of the important ways to infect *H. pylori*, it is transmitted through shared meals, which is more common in China. Chinese eating habit, where many people eat food on a plate, unlike the western separate system, leads to the spread of *H. pylori*, most people implement the meal sharing system [10,11]. If one person in the family is infected by Hp, the bacteria will stick to the chopsticks, chopsticks turn over the dishes, so that each dish is like "bacteria washing water" and the family will dye the bacteria in this way. Similarly, parties or eating out provide an opportunity to infect Hp. If one person in a family has Hp infection, 60% to 80% of the family will be infected, in China, traditional meal sharing is not ignored in *Helicobacter pylori* (*H. pylori*) spreading [12-18]. Accordingly, to change traditional repast mode, execute separate meal system, or use public chopsticks and public spoon, clean and disinfect the tableware thoroughly are very important preventive measure.

The cognition and economic status were associated with the education, the economic income, the age and the residence which

determines whether the patients were willing to change their traditional dining patterns and Adopt Preventive Measures (APM).

In this study, by multivariate analysis, the data presented that *H. pylori* infection occurred more frequently in young adults and adults, more frequently in males (58.90%) than women (41.10%), *H. pylori* infection were more frequent in people living in city, where 58.90% patients of *H. pylori* infection were living in city and 41.10% in country. This study reflects that the patients in city were more careful for their heath in the current city situation according to the distribution of cases, because they would check *H. pylori* during health examination [19].

Fortunately, many populations would break the traditional way of eating together to control *H. pylori* infection. In this study, by the correlation analysis, the acceptance of the Adopting Preventive Measures (APM) varies significantly with age, region, culture, economy, cognition and other factors, the better the economic conditions, the better the living conditions, the higher the educational level, and the higher the young and middle-aged people accept preventive measures for *H. pylori*. for example, the populations with the high cognition degree (68.69) world adopt preventive measures (Table 1, 2); between 15 year and 60-year-old, 94.59% to 98.5% patients adopted APM, the populations of the high level of income (98.00%) adopted APM, and so on (Table 1, 2).

In a word, let people thoroughly change their traditional dining patterns and Adopt Preventive Measures (APM) for *H. pylori* control; we must improve people's cognitive level and economic ability. How to do? Firstly, the government authorities should make publicity for the harm of *H. pylori* with the media such as news, advertisement, posters, and so on. Secondly, the government authorities should reinforce the *H. pylori* Adaptive Preventive Measures (APM) such as Serving of Individual Dishes (SID), Serving Chopsticks and Spoons (SCAS), No-Group Meals (NGM), and so on.

Thirdly, the government authorities should reinforce the level of education; fourthly, the government authorities should raise the awareness of the general public about *H. pylori* prevention, providing information on what to do after *H. pylori* infection. Finally, the government authorities should increase the support of economics for *H. pylori* testing, therapy and prevention.

Conclusion

The cognition and economic status were associated with the education, the economic income, the age and the residence which determines whether the patients were willing to change their traditional dining patterns and Adopt Preventive Measures (APM).

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