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Relationship between Allergy and Helicobacter Pylori

Yousef Khalifa[1], Aiysha Alanazi[2], Meaad Alanazi[2], Yaser Alnaam[3], Dalal. S. Alshaya[4], Hayat Alafari[4], Talal A. Alharbi[5], Abdulrahman Alanazi[5], Wafa Alanazi[1], Omar M. Bagader[1], Nawaf M. Alotibi[1], Yousef M. Alanazi[1], Yousef S. Alshaiel[6], Fahad G. Alanzi[7], Badi Alanazi[1], Majed Alanazi[1], Abdulmajeed Alanazi[1], Arwa F. Alanazi[8], Amani F. Alanazi[9], Fahad Alhadhod[10], Mousa Alkhalefa[10], Abdulkarim S. BinShaya[10], Nahed S.Alharthi[10], Noura Aldayan[10], Deema Fllatah[10], Ghfren Aloraini[10], Awwad Alenezy[11], Saleh Almusabi[3], Mashael Altoub[12], Talat Bukhari[13], Rakan Alanazi[14], Essa E.Alanazi[15], Abdulrahman Talohi[16], Abeer Alsofyani[17], Rawiah Alsiary[17], Hiba S. AlAmodi[18], Hajir Alsaihati[19], Faris Q.B.Alenzi[10*]

Riyadh Health Affairts, MOH, Riyadh, Saudi Arabia[1]
KAMC, Riyadh, Saudi Arabia[2]
Dept of CLS, Prince Sultan Military College for Health Sciences, Dhahran, Saudi Arabia[3]
Dept of Biology, Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia[4]
Alnakheek Health Center, Riyadh, Saudi Arabia[5]
Military Hospital, Riyadh, Saudi Arabia[6]
Forensic Med Center Riyadh, Saudi Arabia[7]
Private Dental Clinic, Riyadh, Saudi Arabia[8]
RT Dept, Riyadh Care Hospital, Riyadh, Saudi Arabia[9]
1Dept of Med Lab Sci, College of Appl Med Sci, Prince Sattam University (PSAU)Alkharj, Saudi Arabia[10]
College of Medicine, UNB, Arar, Saudi Arabia[11]
Dept of Med Lab Sci, College of Appl Med Sci, KSU, Riyadh, Saudi Arabia[12]
College of Medicine, Um Qura University, Makka, Saudi Arabia[13]
Alfaisal University, Riyadh, Saudi Arabia[14]
Virology Lab, KSMC, Riyadh, Saudi Arabia[15]
Tabouk Health Affarirs, Tabouk, Saudi Arabia[16]
KAIMRC center, KSAU, Jeddah, Saudi Arabia[17]
Dept of Biochemistry, Faculty of Medicine, Umm Al-Qura University, Saudi Arabia[18]
Dept of Med Lab Sci, College of Appl Med Sci, Hafr Albatan University, Saudi Arabia[19]

Corresponding author: 10*

ABSTRACT— The present study aimed at the evaluation of the association between *H.pylori* and allergy by systematic review and meta-analysis study. We searched databases, including PubMed and Google Scholar using the following keywords in English: *H. pylori*& asthma; food allergy(FA); atopic dermatitis (AD) or eczema and allergic rhinitis (AR). Among 110 articles reviewed that included 40243 patients' samples, results showed that association between *H. pylori* and FA was significant, while no relationship with asthma, AD and AR. The results reveal that *H. pylori* may be one of the main causes of allergic diseases. Thus, a novel way should be employed for the complete management of *H. pylori* infections.

KEYWORDS: *H.pylori*, infections, allergy, association, systematic review

1. INTRODUCTION

Helicobacter pylori (*H. pylori*) is a widely distributed microbe and has been linked to a variety of disorders such as coronary heart disease, thyroid disease, anemia, diabetes, dyslipidemia, gastric lymphoma and hypothyroidism [28], [46], [3], [7]. *H.pylori* infection is diagnosed by many diagnostic techniques,

Including culture, histology, serology, stool antigen and urea breath test [29], [40].

In this systematic review related to *H. pylori* infection, we focus in 4 types of allergy, i.e.

Asthma is defined by the Global Initiative for Asthma (GINA) as:"a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. It is a complex inflammatory disorder with many potential cells involved there [48].

Allergic Rhinitis(AR)
It is defined as sneezing, itching, watery rhinorrhoea and nasal obstruction, falls into four main headings: allergic, infective, structural and a fourth poorly understood [13].

Atopic dermatitis (AD)
It is called atopic eczema isa chronic inflammatory disorder affecting the skin of thepatients leading to itching and damaging of the epidermal barrier, is mediated mainly by Th2 cells [36].

FOODALLERGY(FA) Ingestion of a small amount of food activates an abnormal immunological response [39].

2. MATERIALS AND METHODS

2.1 Protocol
This review was conducted based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [34].

2.2 Eligibility Criteria
To identify related studies, a systematic review of cross-sectional and case-control studies about allergy was performed. To avoid bias, all steps including search, selection of studies, quality assessment, and data extraction, were conducted by two investigators independently. Any disagreement was reviewed by a third investigator.

2.3 Study Characteristics
Exclusion criteria including sample size, lack of relevance to the topic, letters to the editor, and case report

2.4 Data Sources
Documents used in this systematic review were in English, obtained from scientific databases such as Scopus, PubMed, Science Direct, Web of Science, Springer, and Google Scholar. Keywords were used such as: helicobacter pylori& asthma, food allergy, eczema and allergic rhinitis). Some papers were excluded after reading the summary and/or the full text due to their nonrelevance to the topic, lack of criteria, and/or low quality.

2.5 Data Collection Process
In this study, a checklist of available studies was prepared. These included: the author's name, year of study, place of study, P-value, age. The 20-year period from 2000 to 2019 was used to retrieve the data analysed in this systematic review.

3. RESULTS

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3.1 Study Selection

In the initial search, 110 studies probably related to allergy were selected. Some studies were excluded due to non-relevance of the topic, and the lack of criteria and low quality. Finally, 95 studies were reviewed

3.2 Results of Studies

In a systematic review of studies, 95 case-control andcross-sectional studies fulfilled the inclusion criteria.

Among 95 articles reviewed, including 40243 patients' samples, THE results showed that:-

Association between H. pylori and AR was NOT significant with OR (odds ratio) = 1.5 (Table- 1)

Association between H. pylori and FA was significant with OR (odds ratio) = 21 (Table- 2) (p value =0.002)

Association between H. pylori and AD was NOT significant with OR (odds ratio) = 1.1(Table- 3)

Association between H. pylori and Asthma was NOT significant with OR (odds ratio) = 0.9 (Table-4)

TABLE-1 Relationship between Allergic Rhinitis and Helicobacter pylori

Authors' Name	Number of patients	Relationship between Disease and Hp	Type of patients	Location of the Study
[20]	211	Reverse	Adult	Japan
[32]	65	Reverse	Children	Russia
[21]	1249	Reverse	Adult	Sweden
[30]	3244	Reverse	Adult	UK
[45]	1368	Reverse	Adult	Germany
[1]	247	Positive	Adult	Turkey
[35]	10005	Positive	Adult	Norway
[9]	545	Positive	Adult	Italy
[19]	545	Positive	Children	Netherland

Relationship between Food Allergy and Helicobacter pylori(TABLE-2)

Authors' Name	Number of patients	Relationship between Disease and Hp	Type of patients	Location
[15]	38	Positive	Adult	Italy
[31]	97	Positive	Children	Poland
[14]	90	Positive	Adult	USA
[10]	388	Positive	Adult	Poland
[4]	102	Positive	Adult	Italy
[26]	404	Positive	Children	Finland
[37]	290	Positive	Children	Italy

[8]	90	Positive	Children	Italy

Relationship between Eczema and Helicobacter pylori(TABLE-3)

Authors' Name	Number of patients	Relationship	Type of patients	Location
[18]	3347	Positive	Children	Germany
[27]	270	Positive	Adult	Croatia
[2]	1006	Reverse	Children	UK
[6]	7412	Reverse	Children	US
[44]	863	Reverse	Children	Ethiopia
[42]	24	Reverse	Adult	Japan
[17]	287	Positive	Adult	France
[24]	326	Positive	Adult	Finland
[33]	3244	Reverse	Adult	UK

Relationship between Asthma and Helicobacter pylori (TABLE-4)

Authors' Name	Number of patients	Relationship	Type of patients	Location
[16]	90	Reverse	Children	Egypt
[23]	98	No Relationship	Children	Iran
[47]	770	No Relationship	Children	China
[11]	3797	No Relationship	Children	Netherlands
[43]	856	No Relationship	Children	USA
[5]	60	No Relationship	Adult	Italy

4. DISCUSSION

This is the first study at the PSAU to investigate the association between *H. pylori* and allergy. We searched many case control and cross-sectional studies that investigated the relationship between H. pylori infection and allergic diseases. We do not know as yet whether presence of *H.pylori* could be a combined infection with another microbe, or due to poor hygiene practices that could either protect or cause allergic diseases.

Based on the systematic review and meta-analysis, the most important findings may be summed up as follows:-

1- There is some evidence of strong relationship between FA and H. pylori. The prevalence of H.pylori infection, as expected

2- An inverse association between Ezcema/Allergic diseases and H. pylori infection.

3- This study demonstrates no evidence of any relationship or protective effect of H. pylori on asthma. Also, conflicting reports exist in the literature regarding the presence of H pylori in the AR.

Large conflicting studies demonstrate an inverse relationship between *H. pylori* infection and asthma or atopy in children. [6], [41] showed an inverse association between *H. pylori* sero-positivity and atopy, and that this association is more apparent in males. Several case-control and cross-sectional studies have

investigated the relationship between *H. pylori* infection and allergic diseases. Most of this research has been conducted in industrialized countries [38], Finland [25], and UK [22], where they found that allergy was more common, and with the decreasing trend of *H. pylori* infection. (i.e., H. *Pylori i*nfection has been found to be less in countries that have more allergy)

A significant negative association *H. pylori* infection and gender was demonstrated in men, underlining a difference in the negative association in relation togender, which has suggested a different immune response to *H. pylori* in women more than in men [6].

Since this microbe is an exogenous infection, it may elicit a Th1-mediated immune response, resulting in an overactive Th2, which in turn leads to allergy [12].

There is a discrepancy in asthma and its relation to H. pylori may be due to many factors:-
1- Heterogeneity between many international studies.
2- H. pylori infection was studied in serum samples from adult populations, not in GIT. Therefore, screening and diagnosis H. pylori infection might be a variable factor.

4- Use of antibiotics always affect H. pylori infection.

5. Conclusion

A precise recognition of the correlation between the *H. pylori* infection and asthma in young children could play an important role in the initiation of the physiopathology of not only asthma, but of other allergic diseases as well. This would offer potentially helpful new treatments for allergic diseases. Therefore we recommend a careful consideration of whether to eradicate *H. pylori* in young patients with asthma risk factors, as *H. pylori* may play a role in reducing the risk for asthma. Further prospective studies are warranted to clarify the underlying mechanisms.

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