

**IL-17A and IL-1 $\beta$  profiles in patients infected with  
*Giardia lamblia* and/or *Helicobacter pylori* :  
implications for pathogenesis and immune response**

**Thesis**

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# Introduction

*Giardia lamblia*, the etiological agent of Giardiasis, is one of the most common intestinal protozoan flagellates in humans (**Hooshyar *etal.*,2019**). Giardiasis affects both children and adults worldwide, it is more common in underdeveloped countries. Globally, more than 200 million cases of giardiasis are detected each year (**Rahman *etal.*,2020**).

This parasite spreads through direct or indirect ingestion of infectious cysts via the fecal-oral route (**Ryan and Cacciò ,2013**). excystation of cysts occurs inside the host and leads to the release of two flagellated trophozoites from each cyst. These trophozoites attach to the mucosa and the surface of the epithelium without invading the tissue (**Adam,2001**).

Symptomatic giardiasis is characterized by watery diarrhea, abdominal cramps, bloating, malabsorption, and weight loss. Infection is generally self-limiting, but can become persistent and severe in high-risk groups, especially young children and pregnant women, and re-infections occur frequently in endemic areas (**Adam,2020**).

*Helicobacter pylori* (*H. pylori*) is a type of bacteria that infects stomach. It can cause sores and inflammation in the lining of stomach or the upper part of small intestine (the duodenum)(**Venerito *etal.*,2018**).

Coinfections of *Giardia* and *H.pylori* are common in places with inadequate sanitation, as the oral route of *Giardia* infection is shared with *H.pylori* ( **Buret *etal.*,2015**). Predisposing factors are coincident in both groups of these pathogens, such as low age, immune suppression status, low socioeconomic and educational status, and consumption of contaminated water sources, and they are upper gastrointestinal complaints such as upper abdominal pain, abdominal bloating, nausea, vomiting, and epigastric bleeding (**Krzyżek and Gościniak,2017**).

In recent years, several studies have highlighted the importance of IL-17A in orchestrating the protective immune response against *Giardia*. The functional role of IL-17A in the intestine can be very broad and has been described as being dual with both protective and

pathological effects. IL-17A can influence many different cell types, such as T cells, B cells, macrophages, neutrophils and epithelial cells to produce various factors such as cytokines, chemokines, antimicrobial peptides, mucins and tight junction proteins (**Iwakura *etal.*,2008**). it is increasingly clear that IL-17A plays an important role in intestinal immune homeostasis and host defense mechanisms.

Interleukin-1 $\beta$  (IL-1 $\beta$ ) is a potent proinflammatory cytokine, and its deregulation is closely associated with the tumorigenesis of several cancers (**Hong *etal.*,2016**). Strong association was found between *H. pylori* and the host immune system during progress of gastrointestinal diseases, where *H.pylori* induces the production of many proinflammatory cytokines, such as interleukin 1 beta (IL- 1 $\beta$ ) ( **de Brito *etal.*,2018**).

## **Aim of the study**

The current study aims to detect the relation of IL-17A and IL- 1 $\beta$  in coinfection of both pathogens (*Giardia* and *H.pylori*) or single infection of each of them .