



RISK FACTORS ASSOCIATED WITH BARRETT'S ESOPHAGUS IN HOSPITALIZED PATIENTS

FACTORES DE RIESGO ASOCIADOS A ESÓFAGO DE BARRETT EN PACIENTES HOSPITALIZADOS

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ABSTRACT

Objective: The objective of this article is to carry out a systematic review of scientific articles that reveal the risk factors associated with Barrett's esophagus in hospitalized patients. **Methods:** The review was performed by electronic search for articles related to risk factors associated with Barrett's esophagus in hospitalized patients. The PEO question was: What are the risk factors associated with Barrett's esophagus in hospitalized patients? The search sources were in PUBMED. The search terms were: Risk Factors; Barrett's esophagus; hospitalized patients. For this review, articles published from 2010 that had research experiences and theoretical-conceptual aspects were selected. **Results:** Of the 389 results found with indexing sources, a total of 25 articles were selected where 22 articles contained research results and 3 were considered for theoretical-conceptual aspects that are related to the purpose of the study. The search resulted in risk factors associated with Barrett's esophagus according to demographic characteristics and patient traits, presentation, and clinical data and lifestyles. **Conclusion:** An association of various risk factors with Barrett's esophagus is evidenced in hospitalized patients. The most concordant risk factors associated with Barrett's esophagus in the review were male sex, increased age, metabolic syndrome, hiatal hernia, use of proton pump inhibitors, gastroesophageal reflux (GER), obstructive sleep apnea, and erosive esophagitis.

Key words: Risk Factors; Barrett's esophagus; Patients (source: MeSH NLM).

RESUMEN

Objetivo: El objetivo de este artículo es realizar una revisión sistemática de artículos científicos que revelen los factores de riesgo asociados a Esófago de Barrett en pacientes hospitalizados. **Métodos:** La revisión fue efectuada mediante búsqueda electrónica de artículos relacionados a factores de riesgo asociadas a Esófago de Barrett en pacientes hospitalizados. La pregunta PEO fue ¿Cuáles son los factores de riesgo asociados a Esófago de Barrett en pacientes hospitalizados? Las fuentes de búsqueda fueron en PUBMED. Los términos de búsqueda fueron: Factores de Riesgo; Esófago de Barrett; pacientes hospitalizados. Para esta revisión se seleccionaron los artículos publicados a partir el año 2010 que tuvieron experiencias investigativas y aspectos teórico-conceptuales. **Resultados:** De los 389 resultados encontrados con fuentes de indexación, se seleccionaron un total de 25 artículos donde 22 artículos contenían resultados de investigación y 3 fueron considerados para aspectos teórico – conceptuales que se relacionan con el propósito del estudio. La búsqueda dio como resultado factores de riesgo asociados a Esófago de Barrett según las características demográficas y rasgos del paciente, presentación y datos clínicos y estilos de vida. **Conclusión:** Se evidencia una asociación de diversos factores de riesgo con Esófago de Barrett en pacientes hospitalizados. Los factores de riesgo asociados a Esófago de Barrett en la revisión que fueron más concordantes son sexo masculino, edad incrementada, síndrome metabólico, hernia hiatal, uso de inhibidores de bomba de protones, reflujo gastroesofágico(RGE), apnea obstructiva del sueño y esofagitis erosiva.

Palabras clave: Factores de Riesgo; Esófago de Barrett; Pacientes (fuente: DeCS BIREME).

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INTRODUCTION

At present, there are several risk factors for Barrett's esophagus which have not been fully reviewed in hospitalized patients. Barrett's esophagus is an acquired esophageal condition characterized by the presence of metaplastic columnar epithelium in the distal esophagus that replaces the normal stratified squamous mucosa. Factors associated with Barrett's esophagus are symptoms of gastroesophageal reflux disease (GERD), advanced age, and male gender. Studies have revealed an association with central obesity (waist / hip ratio or abdominal circumference, but less clearly with body mass index or overall body fat content), smoking, Caucasian race, and a positive family history. In contrast, alcohol consumption does not appear to be a significant risk factor. Research has also found possible risk factors, such as metabolic syndrome, type 2 diabetes mellitus, and sleep apnea⁽¹⁾.

A potential mechanism of BE pathogenesis involves transdifferentiation, in which fully differentiated esophageal squamous cells change to fully differentiated columnar cells, either directly (without undergoing cell division) or indirectly (through cell division). Although once differentiated cells are considered immutable, studies have shown that differentiated cells can be reprogrammed to acquire characteristics of immature progenitor cells. Many types of mature cells have the ability to de-differentiate into cells with progenitor cell characteristics. Therefore, trans difference in the esophagus can occur through a 2-stage GERD process in an induced reprogramming in which mature squamous cells reverse their differentiation to acquire progenitor cell plasticity before changing to a columnar phenotype⁽²⁾.

The diagnosis of Barrett's esophagus should appear to be straightforward, that means, a visible change in the lining of the distal esophagus and histologic

confirmation with columnar metaplasia. Diagnostic components of Barrett's esophagus include endoscopic recognition, appropriately targeted biopsies, and histologic confirmation⁽³⁾.

The objective of this article is to carry out a systematic review of scientific articles which reveal the risk factors associated with Barrett's esophagus in hospitalized patients.

METHODS

A systematic search of electronic databases was carried out to identify publications related to risk factors for Barret's esophagus, in the PUBMED indexing source. The PEO question was: What are the risk factors associated with Barret's esophagus in hospitalized patients?

The advanced search terms for PUBMED were: Risk factors, Barret's esophagus and patients. For this review, articles published with research results and those with theoretical-conceptual aspects since June 2010 and carried out in humans were selected with the help of the PUBMED advanced search. The systematic search used in PUBMED was: ((Patients[tiab] OR patient[tiab] OR Clients[tiab] OR Client[tiab]) AND (risk factors[tiab] OR Factor, Risk[tiab] OR Factors, Risk[tiab] OR Risk Factor[tiab] OR Population at Risk[tiab] OR Risk, Population at[tiab] OR Populations at Risk[tiab] OR Risk, Populations at[tiab] AND (Barrett Metaplasia[tiab] OR Barrett Metaplasias[tiab] OR Metaplasia, Barrett[tiab] OR Metaplasias, Barrett[tiab] OR Barrett's Syndrome[tiab] OR barrett Syndrome[tiab] OR Barrett Syndrome[tiab] OR Barrett's Esophagus[tiab] OR barrett Esophagus[tiab] OR Esophagus, Barrett's[tiab] OR Esophagus, Barrett[tiab] OR Barrett Epithelium[tiab] OR Epithelium, Barrett)). Figure 1 shows the process of selecting the terms for the systematic search.

Table 1. Term selection process for the PUBMED systematic search.

	DeCS	MeSH	MeSH + Entry terms
P Participants	Patients	"patient" [Mesh]	Patients[tiab] OR patient[tiab] OR Clients[tiab] OR Client[tiab]
E Exposition	Risk factor	"risk factors" [Mesh]	Risk factors[tiab] OR Factor, Risk[tiab] OR Factors, Risk[tiab] OR Risk Factor[tiab] OR Population at Risk[tiab] Pr Risk, Population at[tiab] Or Populations at Risk[tiab] OR Risk, Populations at[tiab]
O Outcome	Barret's esophagus	"Barrett Esophagus" [Mesh]	(Barret Metaplasia[tiab] OR Barret Metaplasias[tiab] OR Metaplasia, Barrett[tiab] OR Metaplasias, Barrett[tiab] OR Barrett's Syndrome[tiab] OR barrett Syndrome[tiab] OR Barrett Syndrome[tiab] OR Barrett's Esophagus[tiab] OR barrett Esophagus[tiab] OR Esophagus, Barrett's[tiab] OR Esophagus, Barrett[tiab] OR Esophagus, Barrett[tiab] OR Barrett Epithelium[tiab] OR Epithelium, Barrett))

REVIEW ARTICLE

RESULTS

A total of 389 results were obtained in the systematic search found in PUBMED and a total of 25 articles were selected where 22 articles contained research

results and 3 were considered for theoretical-conceptual aspects that are related to the purpose of the study. Figure 2 shows the article selection process in PUBMED.

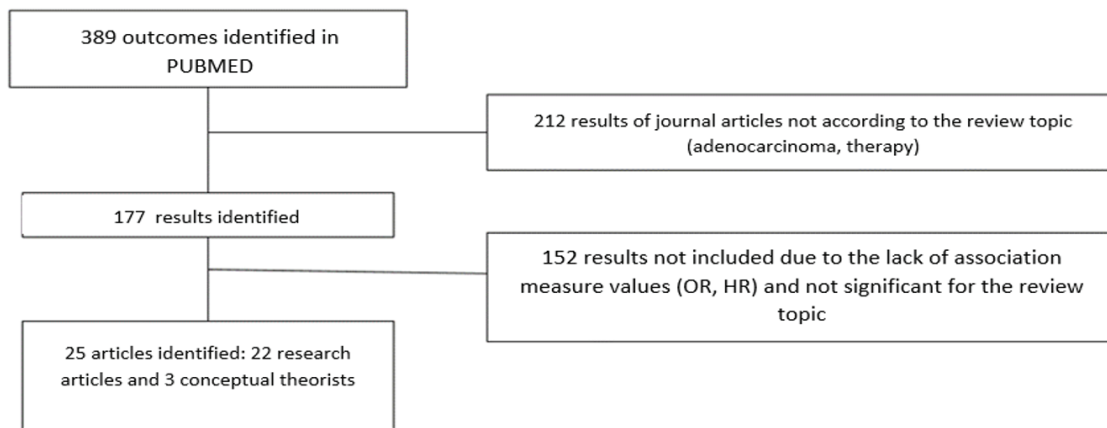


Figure 1. Selection process of research and theoretical-conceptual articles for the review article in PUBMED

The search resulted in risk factors associated with Barret's esophagus according to demographic characteristics and patient traits, presentation and clinical data, and lifestyles. Table 1 shows the

risk factors for Barret's esophagus in hospitalized patients from observational cohort studies and selected cases and controls for the review article.

Table 2. Risk factors for Barret's esophagus in hospitalized patients from observational cohort and case-control studies.

Measured risk factor	Author	Study type	Article	Population	Measurement value	CI 95%	P
Características demográficas y rasgos del paciente (edad, sexo, etnia, imc)							
Male patient	Yousaf Bashir Hadi ⁽⁴⁾	cases and controls	Independent association of obstructive sleep apnea with Barrett's esophagus	1091	OR:1.71	1.13–2.59	<0.01
Male patient	Emery C Lin ⁽⁵⁾	Cohort study	Low Prevalence of Suspected Barrett's Esophagus in Gastroesophageal Reflux Disease Without Alarm Symptoms	4122	OR:2.61	2.44 - 2.79	
Male patient	Yan-Hua Chen ⁽⁶⁾	Cohort study	Prevalence and risk factors for Barrett's esophagus in Taiwan	3385	OR:2.106	1.145- 3.872	0.017
Male patient	A. Sonnenberg ⁽⁷⁾	cases and control	The influence of Helicobacter pylori on the ethnic distribution of Barrett's metaplasia	596 479	OR: 3.34	3.28–3.40	<0.0001
Male patient	Theresa H. Nguyen ⁽⁸⁾	cases and control	Risk Factors for Barrett's Esophagus Compared Between African Americans and Non-Hispanic Whites	1952	OR:3.35	1.51–7.43	0.003
Male patient	K. Keyashian ⁽⁹⁾	cases and control	Barrett's esophagus in Latinos undergoing endoscopy for gastroesophageal reflux disease symptoms	663	OR:2.34	1.35–4.05	0.002
Male patient	Matheus Degiovani ⁽¹⁰⁾	cases and control	Is there a relation between hellybacter pylori and intestinal metaplasia in short column epitelization up to 10 mm in the distal esophagus?	373	OR:1.76	1.13 - 2.76	0.013
Edad incrementada	Yousaf Bashir Hadi ⁽⁴⁾	cases and control	Independent association of obstructive sleep apnea with Barrett's esophagus	1091	OR:1.04	1.02–1.06	<0.01
Edad incrementada	Atsuhiko Masuda ⁽¹¹⁾	Cohort study	Influence of hiatal hernia and male sex on the relationship between alcohol intake and occurrence of Barrett's esophagus	8031	OR:1.42	1.23– 1.64	<0.0001

Increased age	Matheus Degiovani ⁽¹⁰⁾	Cases and control	IS THERE A RELATION BETWEEN HELICOBACTER PYLORI AND INTESTINAL METAPLASIA IN SHORT COLUMN EPITELIZATION	373	OR:1.017	1.001 -1.033	0.031
Increased age	Yan-Hua Chen ⁽⁶⁾	Cohort study	UP TO 10 MM IN THE DISTAL ESOPHAGUS?	3385	OR:1.033	1.012-1.055	0.002
Increased age	Rena Yadlapati ⁽¹²⁾	Cohort study	Prevalence and risk factors for Barrett's esophagus in Taiwan	193	OR:1.08	1.01-1.16	0.03
Increased age	Wytske M. Westra ⁽¹³⁾	Cases and controls (Cigarette and smokeless tobacco users vs Non-users)	Reduced Esophageal Contractility Is Associated with Dysplasia Progression in Barrett's Esophagus: A Multicenter Cohort Study	1015	OR:1.06	1.05-1.08	<.001
Increased age	Wytske M. Westra ⁽¹³⁾	Cases and controls (Cigarette and cigar users vs Non-users)	Smokeless Tobacco and Cigar and/or Pipe Are Risk Factors for Barrett Esophagus in Male Patients With Gastroesophageal Reflux Disease	1015	OR:1.06	1.05-1.08	<.001
Increased age	A. Sonnenberg ⁽⁷⁾	Cases and control	The influence of Helicobacter pylori on the ethnic distribution of Barrett's metaplasia	596 479	OR: 18.29	17.39-19.24	<0.0001
Increased age	K. Keyashian ⁽⁹⁾	Cases and control	Barrett's esophagus in Latinos undergoing endoscopy for gastroesophageal reflux disease symptoms	663	OR:2.17	1.25-3.76	0.006
Increased age	Gloria Vargas Cárdenas ⁽¹⁴⁾	Cases and control	Esófago de Barrett: Prevalencia y Factores de Riesgo en el Hospital Nacional "Arzobispo Loayza" Lima-Perú	11,970	OR: 2.57	1.41-4.69	0.001
Age 40 to 49 years	Emery C Lin ⁽⁵⁾	Cohort study	Low Prevalence of Suspected Barrett's Esophagus in Gastroesophageal Reflux Disease Without Alarm Symptoms	4122	OR:1.32	1.18 - 1.47	
Age 50 to 59 years	Emery C Lin ⁽⁵⁾	Cohort study	Low Prevalence of Suspected Barrett's Esophagus in Gastroesophageal Reflux Disease Without Alarm Symptoms	4122	OR:1.54	1.39 - 1.71	

Age 60 to 69 years	Emery C Lin ⁽⁵⁾	Cohort study	Low Prevalence of Suspected Barrett's Esophagus in Gastroesophageal Reflux Disease Without Alarm Symptoms	4122	OR:1.68	1.51 - 1.87	
A equal to or greater than 70 years	Emery C Lin ⁽⁵⁾	Cohort study	Low Prevalence of Suspected Barrett's Esophagus in Gastroesophageal Reflux Disease Without Alarm Symptoms	4122	OR:1.42	1.25 - 1.61	
BMI greater than 25	Hirohiko Shinkai ⁽¹⁵⁾	Cases and controls	Association between the Body Mass Index and the Risk of Barrett's Esophagus in Japan	113	OR: 3.45	1.30–9.13	
North european	A. Sonnenberg ⁽⁷⁾	Cases and controls	The influence of Helicobacter pylori on the ethnic distribution of Barrett's metaplasia	596 479	OR: 1.14	1.03–1.26	
Presentation and clinical data (medical history)							
Metabolic syndrome	Shou-Wu Lee ⁽¹⁶⁾	Cases and controls	Association of metabolic syndrome with erosive esophagitis and Barrett's esophagus in a Chinese population	7712	OR:2.82	2.05-3.88	
Metabolic syndrome	Cadman L. Leggett ⁽¹⁷⁾	Cases and controls	Metabolic Syndrome as a Risk Factor for Barrett Esophagus: A Population-Based Case-Control Study	309	OR:2	1.1-3.6	
Metabolic syndrome	Cadman L. Leggett ⁽¹⁷⁾	Cases and controls	Metabolic Syndrome as a Risk Factor for Barrett Esophagus: A Population-Based Case-Control Study	309	OR:1.9	1.03-3.6	
Central obesity	Chih-Cheng Chen ⁽¹⁸⁾	Cases and controls	Central Obesity and H. pylori Infection Influence Risk of Barrett's Esophagus in an Asian Population	161	OR:2.79	1.89–4.12	
Diabetes	K. Keyashian ⁽⁹⁾	Cases and controls	Barrett's esophagus in Latinos undergoing endoscopy for gastroesophageal reflux disease symptoms	663	OR:2.23	1.10–4.53	
Hiatal hernia	Camille Bazin ⁽¹⁹⁾	Cases and controls	Esophageal Motor Disorders Are a Strong and Independent Associated Factor of Barrett's Esophagus	201	OR:5.60	2.45-12.76	
Hiatal hernia	Atsuhiko Masuda ⁽¹¹⁾	Cohort study	Influence of hiatal hernia and male sex on the relationship between alcohol intake and occurrence of Barrett's esophagus	8031	OR:3.37	2.50–4.59	

Hiatal hernia	Emery C Lin ⁽⁵⁾	Cohort study	Low Prevalence of Suspected Barrett's Esophagus in Gastroesophageal Reflux Disease Without Alarm Symptoms	4122	OR:1.60	1.50 - 1.70	
Hiatal hernia	Yan-Hua Chen ⁽⁶⁾	Cohort study	Prevalence and risk factors for Barrett's esophagus in Taiwan	3385	OR:3.037	1.765- 5.225	< 0.001
Hiatal hernia	Praveen Mathew ⁽²⁰⁾	Cases and controls	Risk factors for Barrett's esophagus in Indian patients with gastroesophageal reflux disease	278	OR:3.14	1.2-8.17	0.01
Hiatal hernia less than 3cm	Theresa H. Nguyen ⁽⁸⁾	Cases and controls	Risk Factors for Barrett's Esophagus Compared Between African Americans and Non-Hispanic Whites	1952	OR:2.79	1.85-4.19	<0.001
Hiatal hernia greater than or equal to 3cm	Theresa H. Nguyen ⁽⁸⁾	Cases and controls	Risk Factors for Barrett's Esophagus Compared Between African Americans and Non-Hispanic Whites	1952	OR:5.08	3.35-7.69	<0.001
Hiatal hernia	Hirohiko Shinkai ⁽¹⁵⁾	Cases and controls	Association between the Body Mass Index and the Risk of Barrett's Esophagus in Japan	113	OR:18.3	7.21-46.5	<0.01
Active gastritis (antrum)	Theresa H. Nguyen ⁽⁸⁾	Cases and controls	Risk Factors for Barrett's Esophagus Compared Between African Americans and Non-Hispanic Whites	1952	OR:1.73	1.10-2.73	0.02
Use of proton inhibitor pump	Theresa H. Nguyen ⁽⁸⁾	Cases and controls	Risk Factors for Barrett's Esophagus Compared Between African Americans and Non-Hispanic Whites	1952	OR:1.88	1.40-2.52	<0.001
Use of proton inhibitor pump	Hirohiko Shinkai ⁽¹⁵⁾	Cases and controls	Association between the Body Mass Index and the Risk of Barrett's Esophagus in Japan	113	OR:8.28	2.96- 123.1	0.01
Presence of belching	Praveen Mathew ⁽²⁰⁾	Cases and controls	Risk factors for Barrett's esophagus in Indian patients with gastroesophageal reflux disease	278	OR:2.28	1.11-4.66	0.02

Motor disorder of the esophagus	Camille Bazin ⁽¹⁹⁾	Cases and controls	Esophageal Motor Disorders Are a Strong and Independent Associated Factor of Barrett's Esophagus	201	OR:4.49	1.85-10.93	<0.001
Rge	Yousaf Bashir Hadji ⁽⁴⁾	Cases and controls	Independent association of obstructive sleep apnea with Barrett's esophagus	1091	OR:2.23	1.45-3.49	0.01
Rge	Cadman L. Leggett ⁽²¹⁾	Cases and controls	Obstructive Sleep Apnea Is a Risk Factor for Barrett's Esophagus	7482	OR:3.4	1.9-6.0	<.0001
Rge	Jiro Watari ⁽²²⁾	Cases and controls (Cases vs without PPI)	Association between obesity and Barrett's esophagus in a Japanese population: a hospital-based, cross-sectional study	1581	OR:3.48	1.89-6.41	<0.0001
Rge	Jiro Watari ⁽²²⁾	Cases and controls (Cases vs PPI)	Association between obesity and Barrett's esophagus in a Japanese population: a hospital-based, cross-sectional study	1581	OR:5.67	2.17-14.86	0.0004
Age of presentation of GER symptom under 30 years	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:2.93	1.67-5.15	
Age of presentation of GER symptom under 30 years	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Patients with GER)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	316	OR:1.93	1.15-3.22	
Nighttime symptoms of GER	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:5.40	3.81-7.72	
Feeling stuck	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:3.00	2.13-4.24	

Family history of GER	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:2.55	1.80-3.62
BE family history	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:10.08	2.83-35.84
BE family history	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Patients with GER)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	316	OR:3.64	1.50-8.83
1-2 appointments per year for GER	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:7.13	4.71-10.81
More than 3 appointments per year for GER	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:5.12	2.96-8.83
3-5 appointments per year for any reason	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:2.06	1.40-3.03
6-10 appointments per year for any reason	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:2.69	1.65-4.37

More than 10 visits per year for any reason	Omar Bakr ⁽²³⁾	Cases and controls (Cases vs Population)	Gastroesophageal Reflux Frequency, Severity, Age of Onset, Family History and Acid Suppressive Therapy Predict Barrett's Esophagus in a Large Population	317	OR:2.25	1.33-3.83	
Human papillomavirus DNA	M. YW Wong ⁽²⁴⁾	Cases and controls	Human papillomavirus exposure and sexual behavior are significant risk factors for Barrett's dysplasia/esophageal adenocarcinoma	133	OR:8.2	2.8-23.8	0.0001
Obstructive sleep apnea	Yousaf Bashir Hadji ⁽⁴⁾	Cases and controls	Independent association of obstructive sleep apnea with Barrett's esophagus	1091	OR:3.26	1.72-6.85	<0.01
Obstructive sleep apnea	Cadman L. Leggett ⁽²¹⁾	Cases and controls	Obstructive Sleep Apnea Is a Risk Factor for Barrett's Esophagus	7482	OR:1.8	1.1-3.2	0.03
Erosive esophagitis	Atsuhiko Masuda ⁽¹¹⁾	Cohort study	Influence of hiatal hernia and male sex on the relationship between alcohol intake and occurrence of Barrett's esophagus	8031	OR:2.82	2.04-3.85	<0.0001
Erosive esophagitis	Hirohiko Shinkai ⁽¹⁵⁾	Cases and controls	Association between the Body Mass Index and the Risk of Barrett's Esophagus in Japan	113	15.3	3.49-66.8	0.01
Esophagitis	Gloria Vargas Cárdenas ⁽¹⁴⁾	Cases and controls	Esófago de Barrett: Prevalencia y Factores de Riesgo en el Hospital Nacional "Arzobispo Loayza" Lima-Perú	11,970	14.81	3.96-55.41	0.001
Grade B esophagitis (LA)	Emery C Lin ⁽⁵⁾	Cohort study	Low Prevalence of Suspected Barrett's Esophagus in Gastroesophageal Reflux Disease Without Alarm Symptoms	4122	OR:2.19	1.72-2.78	
Grade C / D esophagitis (LA)	Emery C Lin ⁽⁵⁾	Cohort study	Low Prevalence of Suspected Barrett's Esophagus in Gastroesophageal Reflux Disease Without Alarm Symptoms	4122	OR:3.50	2.59-4.73	
Premature birth	Seiji Shiota ⁽²⁵⁾	Cohort study	Premature Birth and Large for Gestational Age Are Associated with Risk of Barrett's Esophagus in Adults	1679	OR:4.08	1.38-12.05	

Lifestyle (sexual intercourse, consumption of food and drink, tobacco, alcohol)

Person in a sexual relationship	M. YW Wong ⁽²⁴⁾	Cases and controls	Human papillomavirus exposure and sexual behavior are significant risk factors for Barrett's dysplasia/esophageal adenocarcinoma	133	OR:11.4	1.4–93.9	0.02
More than 6 oral sex partners	M. YW Wong ⁽²⁴⁾	Cases and controls	Human papillomavirus exposure and sexual behavior are significant risk factors for Barrett's dysplasia/esophageal adenocarcinoma	133	OR:4.0	1.2–13.7	0.046
Alcohol consumption	Atsuhiro Masuda ⁽¹¹⁾	Cohort study	Influence of hiatal hernia and male sex on the relationship between alcohol intake and occurrence of Barrett's esophagus	8031	OR:1.92	1.41–2.61	<0.0001
Hot tea consumption	Yan-Hua Chen ⁽⁶⁾	Cohort study	Prevalence and risk factors for Barrett's esophagus in Taiwan	3385	OR:1.695	1.043–2.754	0.033
Always use a cigarette	Wytske M. Westra ⁽¹³⁾	cases and controls (Cigarette and smokeless tobacco users vs Non-users)	Smokeless Tobacco and Cigar and/or Pipe Are Risk Factors for Barrett Esophagus in Male Patients With Gastroesophageal Reflux Disease	1015	OR:1.43	1.06–1.88	0.02
Always use cigarettes and smokeless tobacco	Wytske M. Westra ⁽¹³⁾	Cases and controls (Cigarette and smokeless tobacco users vs Non-users)	Smokeless Tobacco and Cigar and/or Pipe Are Risk Factors for Barrett Esophagus in Male Patients With Gastroesophageal Reflux Disease	1015	OR:2.53	1.22–5.22	0.01
Always use a cigarette	Wytske M. Westra ⁽¹³⁾	cases and controls (Cigarette and cigar users vs Non-users)	Smokeless Tobacco and Cigar and/or Pipe Are Risk Factors for Barrett Esophagus in Male Patients With Gastroesophageal Reflux Disease	1015	OR:1.43	1.07–1.91	0.02
Always consume cigarette and cigar	Wytske M. Westra ⁽¹³⁾	Cases and controls (Cigarette and cigar users vs Non-users)	Smokeless Tobacco and Cigar and/or Pipe Are Risk Factors for Barrett Esophagus in Male Patients With Gastroesophageal Reflux Disease	1015	OR:1.90	1.03–3.58	0.04
Consumption of fatty foods	Gloria Vargas Cárdenas ⁽¹⁴⁾	Cases and controls	Esófago de Barrett: Prevalencia y Factores de Riesgo en el Hospital Nacional "Arzobispo Loayza" Lima-Perú	11,970	OR:8.67	2.28–32.99	0.001

The most consistent risk factors in the articles reviewed are male, increased age, metabolic syndrome, hiatal hernia, use of proton pump inhibitors, gastroesophageal reflux (GER), obstructive sleep apnea and erosive esophagitis. Central obesity, diabetes, active gastritis, presence of belching, esophageal motor disorder, human papillomavirus DNA, alcohol consumption, tobacco use, consumption of hot tea and consumption of fatty foods are risk factors with only one study showing confirms the association with Barret's esophagus, which should be further studied.

DISCUSSION

According to the demographic characteristics, for several authors, being a male is a risk factor for Barret's esophagus^(4,5,6,7,8,9). Although Matheus Degiovani et al, say that being a female is a risk factor for Barret's esophagus⁽¹⁰⁾.

According to many authors, increased age is a risk factor^(4,6,7,9,10,11,12,13,14). Although Emery C Lin et al, found that the OR increases constantly from 40 years to 69 years where their OR is 1.68⁽⁵⁾.

With regard to presentation and clinical data, according to Shou-wu Lee et al and Cadman L. Leggett et al, metabolic syndrome is a risk factor for Barret's esophagus^(16,17).

Other authors have found other components of the metabolic syndrome triad as risk factors, such as Chih-Cheng Chen et al, who mentioned that central obesity is a risk factor for Barrett's esophagus⁽¹⁸⁾.

According to several authors, hiatal hernia is a risk factor for Barret's esophagus^(5,6,11,19,20). Although Theresa H. Nguyen distinguishes the size of the hiatal hernia considering that one greater than or equal to 3 cm is more likely to have Barret's esophagus.⁸

According to Yousaf Bashir Hadi et al, Cadman L. Leggett et al and Jiro Watari et al, GER is a risk factor for Barret's esophagus^(4,21,22). Although Omar Bakr et al, mentions that both the age of presentation, symptoms, family history and the number of consultations made for GER could also be risk factors⁽²³⁾. Furthermore, Theresa H. Nguyen et al

and Hirohiko Shinkai et al, tells us that the use of proton pump inhibitors is a risk factor for Barret's esophagus^(8,15).

Conforming to Yousaf Bashir Hadi et al, Cadman L. Leggett et al, obstructive sleep apnea is a risk factor for Barrett's esophagus^(4,21).

According to Atsuhiro Masuda et al and Hirohiko Shinkai et al, erosive esophagitis is a risk factor for Barret's esophagus^(11,15). Although for Gloria Vargas Cárdenas et al, only the fact of having esophagitis would already be a risk factor⁽¹⁴⁾, on the other hand for Emery C Lin et al, they mention that only grade B, C, D esophagitis are a risk factor for Barret's esophagus⁵. Lifestyles are not as well studied as a risk factor for which more studies should be carried out.

CONCLUSION

An association of multiple risk factors with Barret's esophagus is evidenced in hospitalized patients. The risk factors associated with Barret's esophagus in the review that were the most concordant are male sex, increased age, metabolic syndrome, hiatal hernia, use of proton pump inhibitors, gastroesophageal reflux (GER), obstructive sleep apnea and erosive esophagitis.

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