



Prevalence of reflux esophagitis among patients undergoing endoscopy in a secondary referral hospital in Giza, Egypt

Ahmed Gado, Basel Ebeid, Aida Abdelmohsen & Anthony Axon

To cite this article: Ahmed Gado, Basel Ebeid, Aida Abdelmohsen & Anthony Axon (2015) Prevalence of reflux esophagitis among patients undergoing endoscopy in a secondary referral hospital in Giza, Egypt, Alexandria Journal of Medicine, 51:2, 89-94, DOI: [10.1016/j.ajme.2013.09.002](https://doi.org/10.1016/j.ajme.2013.09.002)

To link to this article: <https://doi.org/10.1016/j.ajme.2013.09.002>



© Alexandria University Faculty of Medicine. Production and hosting by Elsevier B.V. All rights reserved.



Published online: 17 May 2019.



[Submit your article to this journal](#)



Article views: 95



[View related articles](#)



[View Crossmark data](#)



Citing articles: 1 [View citing articles](#)



Alexandria University Faculty of Medicine
Alexandria Journal of Medicine

<http://www.elsevier.com/locate/ajme>



ORIGINAL ARTICLE

Prevalence of reflux esophagitis among patients undergoing endoscopy in a secondary referral hospital in Giza, Egypt



Ahmed Gado ^{a,*}, Basel Ebeid ^b, Aida Abdelmohsen ^c, Anthony Axon ^d

^a Department of Medicine, Bolak Eldakror Hospital, Giza, Egypt

^b Department of Tropical Medicine and Infectious Diseases, Beny Suef University, Beny Suef, Egypt

^c Department of Community Medicine, National Research Center, Giza, Egypt

^d Department of Gastroenterology, The General Infirmary at Leeds, Leeds, United Kingdom

Received 17 June 2013; accepted 21 September 2013

Available online 25 October 2013

KEYWORDS

Reflux esophagitis;
Barrett's esophagus;
Prevalence;
Risk factors;
Egypt

Abstract *Background:* Gastro-esophageal reflux disease (GERD) is one of the most prevalent diseases seen in western countries. The prevalence of GERD is lower in the Asian population and the spectrum of the disease is mild. Data from Africa and the Middle East are sparse.

Aim: The aim of the study was to determine the prevalence, severity and risk factors of reflux esophagitis (RE) among patients undergoing endoscopy in a secondary referral hospital in Egypt. *Materials and methods:* This was a retrospective study. Data on patients presenting with gastro-esophageal reflux symptoms (RS) and scheduled for upper gastrointestinal endoscopy between January 2000 and January 2013 were collected.

Results: Four hundred and thirty-three patients were assessed. Two hundred and fifty-four (59%) were male. Ages ranged from 18 to 85 years, mean 45 ± 15 years. One hundred and forty-four patients (33%) had a history of smoking, 120 (28%) were taking aspirin or non-steroidal anti-inflammatory drugs and 8 (2%) were consuming alcohol. The duration of RS ranged from one

Abbreviations: GERD, gastro-esophageal reflux disease; NSAIDs, non-steroidal anti-inflammatory drugs; RS, reflux symptoms; RE, reflux esophagitis; NERD, non-erosive reflux disease; HH, hiatal hernia; BE, Barrett's esophagus; OR, odds ratio; CI, confidence interval; BMI, body mass index.

* Corresponding author. Address: Medical Department, Bolak Eldakror Hospital, Bolak Eldakror, Giza, Egypt. Tel.: +20 2 35837644 (residence), mobile: +20 1006809363; fax: +20 2 27383040.

E-mail addresses: agado1954@yahoo.com (A. Gado), bebeid@hotmail.com (B. Ebeid), aidanrc2002@yahoo.com (A. Abdelmohsen), anthony.axon@btinternet.com (A. Axon).

Peer review under responsibility of Alexandria University Faculty of Medicine.

<http://dx.doi.org/10.1016/j.ajme.2013.09.002>

2090-5068 © 2013 Alexandria University Faculty of Medicine. Production and hosting by Elsevier B.V. All rights reserved.

month to 20 years, mean 21 ± 30 months. One hundred and forty-six patients (34%) had the RS daily, 70 (16%) classified RS as severe intensity and 99 (23%) had acid regurgitation. One hundred and six patients (24%) were found to have RE. Ninety-eight of them (23%) showed grade 1. Barrett's esophagus (BE) was diagnosed in seven patients (2%) and esophageal stricture in one (0.2%). One hundred and four patients (24%) had hiatus hernia (HH), 16 (4%) gastric ulcers and 45 (10%) duodenal ulcers. In multivariate analysis, male sex and HH were two independent risk factors for the development of RE.

Conclusion: The prevalence of RE is low among patients undergoing endoscopy. Most of the patients had a mild degree of esophagitis. BE and stricture were rarely seen. Male sex and HH were risk factors of RE.

© 2013 Alexandria University Faculty of Medicine. Production and hosting by Elsevier B.V. All rights reserved.

1. Introduction

Gastro esophageal reflux disease (GERD) is a common chronic disorder prevalent in many countries.¹ It is one of the most prevalent diseases seen in Western countries.¹ Published studies indicate that the prevalence of GERD is lower in the Asian population and the spectrum of the disease is mild.² A systematic review identified a 10–20% prevalence of GERD (at least weekly heartburn and/or regurgitation) in the western countries; while in Asia, the prevalence was at < 5%.³ It has been suggested that there is an increasing trend in the prevalence of GERD over the last two decades and that reflux disease is more common in Asian countries than previously recognized.^{4,5}

Age, male sex, obesity, and hiatus hernia (HH) were the purported risk factors for GERD.¹ Changes in preference to a more Westernized diet and lifestyle were considered responsible for the increase in reflux disease in Asia.⁶ Epidemiologic data from the Indian subcontinent, Africa, South America, and the Middle East are sparse.¹ There are no population-based studies describing the prevalence of GERD in the African countries.¹

GERD is a condition which develops when the reflux of stomach contents causes troublesome symptoms and/or complications.⁷ Heartburn and regurgitation are the characteristic symptoms of GERD. Patients with GERD symptoms may have no obvious mucosal injury during endoscopic examination, whereas others with GERD symptoms demonstrate esophageal injury such as erosions and ulcers.⁸ Therefore, GERD can be subdivided into endoscopy-negative reflux disease or nonerosive reflux disease (NERD) and erosive esophagitis or reflux esophagitis (RE).^{8,9}

Esophageal complications of GERD are RE, hemorrhage, stricture, Barrett's esophagus (BE), and adenocarcinoma. BE is an important, potentially pre-malignant complication of GERD and is clearly associated with esophageal adenocarcinoma.¹⁰ BE, which develops as a complication of chronic GERD, is characterized by a change from the normal squamous esophageal epithelium to columnar epithelium. The major reason to evaluate patients with longstanding GERD is to recognize BE. The possible role of GERD induced RE leading to BE has not been clearly established, but possible cellular injury and subsequent healing with columnar epithelium has been hypothesized.¹⁰ Neither the frequency nor the severity of heartburn is useful for the prediction of the presence of RE or BE.^{7,11}

Studying racial and geographic differences in GERD and its complications are important as they highlight environmental or genetic influences in etiology and increase our understanding of the disease pathogenesis and management.¹

The aim of the study was to determine the prevalence, severity and risk factors of RE among patients undergoing endoscopy in a secondary referral hospital in Egypt.

2. Materials and methods

This was a retrospective, hospital-based study carried out at Bolak Eldakror Hospital over a 13-year period from January 2000 to January 2013. Bolak Eldakror Hospital is a secondary-care governmental hospital in Giza, Egypt. The hospital serves a population of nearly one million. The gastrointestinal endoscopy unit was set up in 1999. The endoscopy unit provides an open-access service and receives patients from outpatient clinics and other hospitals in the area. Patients are mainly with lower socioeconomic status. All patients presenting with gastro-esophageal reflux symptoms (RS) were included in the study. Ten gastroenterologists performed all endoscopies. Procedures were performed with well-trained competent endoscopists or supervised trainees. Endoscopic biopsy was done at the discretion of the endoscopist. Pathological examination was performed by two expert pathologists.

2.1. Definitions

Gastro-esophageal RS are defined as heartburn with or without acid regurgitation.¹¹ RE is defined as mucosal breaks in the lower esophagus, as seen by endoscopy.¹² Severity of esophagitis was defined based on endoscopic findings according to the Savary-Miller grading system.^{13,14} Grade 1: single or multiple erosions on a single fold. Erosions may be exudative or erythematous. Grade 2: multiple erosions affecting multiple folds. Erosions may be confluent. Grade 3: multiple circumferential erosions. Grade 4: ulcer, stenosis or esophageal shortening. Grade 5: BE. Columnar epithelium on the distal esophagus observed to rise proximally from the gastric plications and intestinal metaplasia and/or goblet cells found in biopsy samples from these sites was considered as diagnostic criterion for BE. NERD is defined as no mucosal breaks in the esophagus and the patients have typical RS.¹² HH is defined as a circular extension of the gastric mucosa of two cm or more above the diaphragmatic hiatus.¹⁵

2.2. Patients and exclusions

A total of 4477 patients underwent upper gastrointestinal endoscopy between January 2000 and January 2013. Four hundred and thirty-three patients were presenting with gastro-esophageal RS (10% all upper gastrointestinal endoscopies). Data on patients presenting with RS and scheduled for upper gastrointestinal endoscopy were collected. Patients with dysphagia, eosinophilic esophagitis, esophageal candidiasis and RE from gastric outlet obstruction were excluded.

2.3. Data recording and statistics

A standardized data collection form (sheet) was completed for each patient. Recorded information included Patients' characteristics: demographic data (age and gender), smoking history, drugs used (aspirin or non-steroidal anti-inflammatory drugs) and alcoholic consumption. Clinical data included description of gastro-esophageal RS (duration, frequency and intensity) and the presence of acid regurgitation symptoms. Due to the low education state of a big category of our patients, assessment of heartburn intensity was classified into 3 grades (mild, moderate and severe). Endoscopic findings and histopathology were also recorded. Microsoft Access and Excel were used for storage and analysis of the data. The endoscopic components of the database included identification of the presence of RE, grade of esophagitis, stricture and BE. Targeted biopsies and four-quadrant biopsies were obtained in patients with BE. Endoscopic findings, such as HH, gastric ulcer, duodenal ulcer were also assessed. Risk factors for the development of RE were assessed. Patients were divided into two groups according to the presence of esophagitis on upper gastrointestinal endoscopy (patients with RE or NERD). Patients' characteristics, clinical features and endoscopic findings were compared.

Data from the patients was registered tabulated and statistically analyzed using the Statistical Package for Social Sciences (SPSS) program version 15 to calculate frequencies and the χ^2 test or Fisher's exact test. The χ^2 test was performed to investigate the relationships between the rate of RE and patients' characteristics, clinical features and endoscopic findings. The following variables were included: age (<60 or ≥ 60 years); sex; current smoking; aspirin or non-steroidal anti-inflammatory drugs (NSAIDs) intake; alcohol consumption; Frequency of RS (daily, two to three times per week or infrequent); Intensity of RS (mild, moderate or severe); acid regurgitation symptoms; HH; gastric ulcer and duodenal ulcer.

A P value <0.05 was considered significant. Those variables found to be significant by univariate analysis were subsequently assessed by a stepwise logistic regression method (multi-variate analysis) to identify independent demographic, clinical and endoscopic factors predicting the presence of RE.

3. Results

A total of 433 patients presenting with gastro-esophageal RS were assessed. Two hundred and fifty-four patients (59%) were male and 179 (41%) female. Ages ranged from 18 to 85 years, mean 45 ± 15 years. One hundred and nine (25%) patients aged ≥ 60 years. One hundred and forty-four patients (33%) had a history of smoking, 120 (28%) were taking aspirin or NSAIDs and 8 (2%) were consuming alcohol. The duration of RS ranged from one month to 20 years, mean 21 ± 30 months. RS occurred daily in 146 patients (34%), two to three times per week 45 (10%), infrequent 48 (11%) and not recorded 194 (45%). RS were classified as mild in 42 patients (10%), moderate in 106 (24%), severe in 70 (16%) and not recorded in 215 (50%). Ninety-nine patients (23%) had acid regurgitation symptoms.

One hundred and six patients (24%) were found to have RE. Ninety-eight of them (23%) showed grade 1, five (1%) grade 2, two (0.5%) grade 3, and one (0.2%) grade 4. BE was suspected in seven patients (2%) and histologically confirmed in five (1%) of these. BE was long-segment in three patients (1%) and short segment in four (1%). One patient (0.2%) had esophageal stricture. One hundred and four patients (24%) had HH, 16 (4%) gastric ulcers and 45 (10%) duodenal ulcers. Three hundred and twenty-seven patients (76%) were found to have NERD.

A comparison of patients' characteristics, clinical features and endoscopic findings of patients with RE or NERD is shown in Tables 1 and 2. Both groups of patients were with similar mean age (46 and 45 years, $P = 0.5$). Male sex was predominant in patients with RE compared to those with NERD (79% and 52%, respectively, $P = 0.000$). Smoking consumption was significantly higher in patients with RE than those with NERD (45% and 29%, respectively, $P = 0.003$). Aspirin or NSAIDs intake and alcohol consumption were not significantly different ($P = 0.8$ and 0.4 , respectively). The duration of RS was similar (22 and 20 months, $P = 0.6$). The available data of frequency and intensity of RS revealed that both were not significantly different ($P = 0.5$ and 0.9 , respectively). The presence of acid regurgitation symptoms was not significantly

Table 1 Patients' characteristics of the studied group.

Parameters	Patients with RE ($n = 106$)	Patients with NERD ($n = 327$)	Total ($n = 433$)	P value
<i>Age</i>				
Mean \pm SD	46 ± 15 years	45 ± 15 years	–	0.5
≥ 60 years	33 (31%)	76 (23%)	109 (25%)	
< 60 years	73 (69%)	251 (77%)	324 (75%)	0.122
<i>Sex</i>				
Male	84 (79%)	170 (52%)	254 (59%)	
Female	22 (21%)	157 (48%)	179 (41%)	0.000
Current smoking	48 (45%)	96 (29%)	144 (33%)	0.003
Aspirin or NSAIDs intake	28 (26%)	92 (28%)	120 (28%)	0.8
Alcohol consumption	3 (3%)	5 (2%)	8 (2%)	0.4

Table 2 Clinical features* and endoscopic findings of the studied group.

Parameters	Patients with RE (<i>n</i> = 106)	Patients with NERD (<i>n</i> = 327)	Total (<i>n</i> = 433)	<i>P</i> value
Duration of RS (mean ± SD)	22 ± 30 months	20 ± 30 months	–	0.6
Acid regurgitation symptoms	28 (26%)	71 (22%)	99 (23%)	0.3
Hiatus hernia	57 (54%)	47 (14%)	104 (24%)	0.000
Gastric ulcer	1 (1%)	15 (5%)	16 (4%)	0.08
Duodenal ulcer	12 (11%)	33 (10%)	45 (10%)	0.7

* Frequency and intensity of RS are not included in the table because of some missing data.

Table 3 Univariate and multi-variate analysis of risk factors of reflux esophagitis.

Factors	Patients with RE (<i>n</i> = 106)	Patients with NERD (<i>n</i> = 327)	Univariate analysis			Multivariate analysis		
			OR	95% CI	<i>P</i> value	OR	95% CI	<i>P</i> value
Sex (male)	84 (79%)	170 (52%)	3.5	2.1–5.9	0.000	2.82	1.5–5.3	0.001
Current smoking	48 (45%)	96 (29%)	1.99	1.3–3.1	0.003	1.49	0.8–2.7	0.2
Hiatus hernia	57 (54%)	47 (14%)	6.9	4.2–11.3	0.000	7.4	4.3–12.7	0.0000

different ($P = 0.3$). HH was significantly higher in patients with RE than in those with NERD (54% and 14%, respectively, $P = 0.000$). Prevalence of gastric ulcer and duodenal ulcer was not significantly different ($P = 0.08$ and 0.7 , respectively). Univariate and multi-variate analysis of risk factors of RE are shown in Table 3.

4. Discussion

GERD is a common disease, especially in the Western countries. Endoscopy is a very valuable tool in the evaluation of GERD. Based on the endoscopic findings, the patients were divided into those with NERD or RE and BE. Endoscopic findings in patients with GERD have ranged as widely as from 10% to 70%.¹⁶

RE and BE are common complications of GERD in the Western countries. RE was reported in 62%, 49% and 34% of patients with symptoms of gastro-esophageal reflux in studies from Finland, Spain and United States, respectively.^{17–19} BE was detected in 15–20% of those undergoing upper gastrointestinal endoscopy for symptoms of gastro-esophageal reflux.^{19,20}

Studies from the Asian countries have showed a low prevalence of RE and BE among patients with symptoms of gastro-esophageal reflux. Also patients with RE had mild esophagitis and severe esophagitis was seen rarely.² RE was reported in 17%, 23% and 20% of patients with symptoms of gastro-esophageal reflux in studies from Turkey, Malaysia and Japan, respectively.^{16,21,22} BE was detected in 2% of those undergoing upper gastrointestinal endoscopy for symptoms of gastro-esophageal reflux.^{16,21}

A limited number of studies have reported on GERD and its complications in the African countries. RE and BE was reported in 45% and 10.6% of Sudanese patients with symptoms of gastro-esophageal reflux.²³ A South African study reported a prevalence rate of RE of only 0.7% although the definition of esophagitis was not provided.²⁴ The data indicate that BE is rare in Sub-Saharan African countries (South Africa, Ethiopia, Nigeria, Zimbabwe, Kenya, and Uganda).²⁵ Clearly there is recognizable potential for reporting bias based on differen-

tials as compared to other areas of the world. This would include: access to care, patient expectations and willingness for treatment, local resources, regional variations in diagnostic approaches, among other potential variables.¹ Two studies from Egypt reported that the prevalence of RE was 49.8% and 78% in patients with symptoms of gastro-esophageal reflux and the prevalence of BE was 7.3% and 9.9%.^{26,27}

In the current study 433 patients with gastro-esophageal RS undergoing endoscopy were assessed. RE was diagnosed in 24% of patients and most of the patients had a mild degree of esophagitis representing grade 1 (93%) and grade 2 (5%). Esophageal stricture was diagnosed in 0.2%. BE was suspected in seven patients (2%) and histologically confirmed in five (1%) of these. No case of esophageal cancer was reported in this study. Symptoms were unreliable indicators of the presence of RE. Risk factors of RE are analyzed and summarized in Table 3. Univariate analysis identified male sex, current smoking and HH as risk factors associated with RE. In multi-variable analysis, however, male sex (odds ratio [OR] = 2.82, 95% confidence interval [CI] = 1.5–5.3, $P = 0.001$) and HH (OR = 7.4, 95% CI = 4.3–12.7, $P = 0.0000$) were two independent risk factors for the development of RE.

Complications of GERD include RE, stricture and BE.¹⁰ The importance of RE rests in its potential for masking underlying BE.²⁸ BE, a condition clearly associated with adenocarcinoma, is asymptomatic.^{29,30} Age > 60 years old, male gender, smoking, alcohol drinking, overweight and HH were identified as risk factors associated with RE.^{22,31,32} RE and BE are common complications of GERD in the Western countries.¹⁶ However, Eastern countries represent different risk factors for GERD such as eating habits, lower prevalence of obesity, high rate of *Helicobacter Pylori*, and low parietal cell mass.¹⁶ For these reasons, the prevalence of these complications might be different in developing and under-developed countries and thus more data are needed.¹⁶

The current study revealed low prevalence of RE among patients with gastro-esophageal RS who underwent upper gastrointestinal endoscopy. Most of the patients had a mild degree of esophagitis. BE and stricture were rarely seen. Male

sex and HH were risk factors of RE. The low prevalence of RE (24%) and BE (1%) in the current study is consistent with the studies conducted in Asia and different from the studies conducted in Western countries. Attempts to explain these lower rates in Asia usually cited lower body mass index (BMI), differences in eating habits and genetic composition.¹⁶ The average BMI value for adults in Egypt is 26.7 and Egypt is one of the countries which have the highest averages of BMI (≥ 25) and the highest prevalence of obese among low- and middle-income countries (42.2%).^{33,34} Also the incidence of BE in the West has risen rapidly in recent years as has adenocarcinoma of the esophagus (the main complication of BE) and they are beginning to rise in the Far East where they have traditionally been less common than in America and Europe.^{35,36} These changes are too rapid for the underlying genetic profile to have evolved. It would be more appropriate to emphasize the differences in eating habits (environmental factors) for the lower rates found in the current study. The low prevalence of BE indicates that guidelines from developed countries should be adapted carefully in developing countries.

The prevalence of RE and BE in the current study (24% and 1%) is lower than that reported in two studies from Egypt (49.8%, 78%) and (7.3%, 9.9%).^{26,27} Both studies were conducted in tertiary hospitals (university hospitals) with patients' selection e.g. all patients had RS for at least three times weekly for the last year in one study.²⁶ Our study was conducted in a secondary referral hospital during routine practice over a 13-year period and most of the patients were managed in primary care practice before referral. Limitations of the current study include: This study was conducted in a secondary care governmental hospital serving a low socio-economic district; lack of assessment of extra esophageal symptoms; any treatment received by patients before endoscopy; BMI and some data were missing (frequency and intensity of RS). Further studies and multi-center studies are recommended to assess the prevalence of GERD and its complications in Egypt.

5. Conclusion

The prevalence of RE is low among patients undergoing endoscopy in a secondary referral hospital in Egypt. Most of the patients had a mild degree of esophagitis. BE and stricture were rarely seen. Male sex and HH were risk factors of RE.

Conflict of interest

None declared.

Acknowledgments

The authors wish to thank Prof. El-Hindawi A, Cairo University and Prof. AkIM, Theodor Bilharz Research institute for their contribution in the pathological examination.

References

- Sharma P, Wani S, Romero Y, Johnson D, Hamilton F. Racial and geographic issues in gastroesophageal reflux disease. *Am J Gastroenterol* 2008;**103**:2669–80.
- Wong WM, Lai KC, Hui WM, Hu WH, Huang JQ, Wong NY, et al. Pathophysiology of gastroesophageal reflux diseases in Chinese—role of transient lower esophageal sphincter relaxation and esophageal motor dysfunction. *Am J Gastroenterol* 2004;**99**:2088–93.
- Dent J, El-Serag HB, Wallander MA. Epidemiology of gastro-oesophageal reflux disease: a systematic review. *Gut* 2005;**54**:710–7.
- El-Serag HB. Time trends of gastroesophageal reflux disease: a systematic review. *Clin Gastroenterol Hepatol* 2007;**5**:17–26.
- Wong BC, Kinoshita Y. Systematic review on epidemiology of gastroesophageal reflux disease in Asia. *Clin Gastroenterol Hepatol* 2006;**4**:398–407.
- Kim BJ, Cheon WS, Oh HC, Kim JW, Park JD, Kim JG. Prevalence and risk factor of erosive esophagitis observed in Korean national cancer screening program. *J Korean Med Sci* 2011;**26**:642–6.
- Vakil N, Zanten S, Kahrilas P, Dent J, Jones R, The Global Consensus Group. The montreal definition and classification of gastroesophageal reflux disease: a global evidence-based consensus. *Am J Gastroenterol* 2006;**101**:1900–20.
- Kim N, Lee SW, Cho SI, Park CG, Yang CH, Kim HS, et al. The prevalence of and risk factors for erosive oesophagitis and non-erosive reflux disease: a nationwide multicentre prospective study in Korea. *Aliment Pharmacol Ther* 2008;**27**, 173–1.
- Rosaida MS, Goh KL. Gastro-oesophageal reflux disease, reflux oesophagitis and non-erosive reflux disease in a multiracial Asian population: a prospective, endoscopy based study. *Eur J Gastroenterol Hepatol* 2004;**16**:495–501.
- Gilani N, Gerkin R, Ramirez F, Hakim S, Randolph A. Prevalence of Barrett's esophagus in patients with moderate to severe erosive esophagitis. *World J Gastroenterol* 2008;**14**: 3518–22.
- Jung HK. Epidemiology of gastroesophageal reflux disease in Asia: a systematic review. *J Neurogastroenterol Motil* 2011;**1**: 14–27.
- Ou JL, Tu CC, Hsu PI, Pan MH, Lee CC, Tsay FW, et al. Prevalence and risk factors of erosive esophagitis in Taiwan. *J Chin Med Assoc* 2012;**75**:60–4.
- Genta RM, Spechler SJ, Kielhorn AF. The Los Angeles and Savary-Miller systems for grading esophagitis: utilization and correlation with histology. *Dis Esophagus* 2011;**24**:10–7.
- Ollyo JB, Fontollier C, Brossard E, Lang F. La nouvelle classification de Savary des oesophagites de reflux. *Acta Endosc* 1992;**22**:307–20.
- Yeom JS, Park HJ, Cho JS, Lee SI, Park IS. Reflux esophagitis and its relationship to hiatal hernia. *J Korean Med Sci* 1999;**14**:253–6.
- Bayrakci B, Kasap E, Ktapcioglu G, Bor S. Low prevalence of erosive esophagitis and Barrett esophagus in a tertiary referral center in Turkey. *Turk J Gastroenterol* 2008;**19**:145–51.
- Voutilainen M, Sipponen P, Mecklin JP, Juhola M, Färkkilä M. Gastroesophageal reflux disease: prevalence, clinical, endoscopy and histopathological findings in 1,128 consecutive patients referred for endoscopy due to dyspeptic and reflux symptoms. *Digestion* 2000;**61**:6–13.
- Garrido Serrano A, Guerrero Igea FJ, Lepe Jimenez JA, Perianes Hernandez C. Clinical features and endoscopic progression of gastroesophageal reflux disease. *Rev Esp Enferm Dig* 2003;**95**:712–6.
- Wo JM, Mendez C, Harrell S, Joubbran R, Bressoud PF, McKinney WP. Clinical impact of upper endoscopy in the management of patients with gastroesophageal reflux disease. *Am J Gastroenterol* 2004;**99**:2311–6.
- Winters C, Spurling TJ, Chobanian SJ, Curtis DJ, Esposito RL, Cotelingam JD, et al. Barrett's esophagus. A prevalent occult complication of gastroesophageal reflux disease. *Gastroenterology* 1987;**92**:118–24.

21. Rosaida MS, Goh KL. Gastro-oesophageal reflux disease, reflux oesophagitis and nonerosive reflux disease in multiracial Asian population: a prospective, endoscopy based study. *Eur J Gastroenterol Hepatol* 2004;**16**:495–501.
22. Okamoto K, Iwakiri R, Mori M, Hara M, Oda K, Danjo A, et al. Clinical symptoms in endoscopic reflux esophagitis: evaluation in 8031 adult subjects. *Dig Dis Sci* 2003;**48**:2237–41.
23. Ahmed HH, Mudawi HM, Fedail SS. Gastro-oesophageal reflux disease in Sudan: a clinical endoscopic and histopathological study. *Trop Gastroenterol* 2004;**25**:135–8.
24. Novis BH, Bank S, Marks IN. Upper gastro-intestinal fibre-optic endoscopy. A 3-year study at Groote Schuur Hospital. *S Afr Med J* 1974;**48**:857–61.
25. Segal I. The gastro-oesophageal reflux disease complex in sub-Saharan Africa. *Eur J Cancer Prev* 2001;**10**:209–12.
26. Fouad YM, Makhlof MM, Tawfik HM, El Amin H, Ghany WA, El-khayat HR. Barrett's esophagus: prevalence and risk factors in patients with chronic GERD in Upper Egypt. *World J Gastroenterol* 2009;**15**:3511–5.
27. Hak NG, Mostafa M, Salah T, El-Hemaly M, Haleem M, Abd El-Raouf A, et al. Acid and bile reflux in erosive reflux disease, non-erosive reflux disease and Barrett's esophagus. *Hepatogastroenterology* 2008;**55**:442–7.
28. Lassen A, Hallas J, Muckadell OB. Esophagitis: incidence and risk of esophageal adenocarcinoma—a population-based cohort study. *Am J Gastroenterol* 2006;**101**:1193–9.
29. Anderson LA, Watson RG, Murphy SJ, Johnston BT, Comber H, Mc Guigan J, et al. Risk factors for Barrett's oesophagus and oesophageal adenocarcinoma: results from the FINBAR study. *World J Gastroenterol* 2007;**13**:1585–94.
30. Bennett C, Green S, DeCaestecker J, Almond M, Barr H, Bhandari P, et al. Surgery versus radical endotherapies for early cancer and high-grade dysplasia in Barrett's oesophagus (Review). *Cochrane Database Syst Rev* 2012(11). <http://dx.doi.org/10.1002/14651858.CD007334.pub4> Art. No.: CD007334.
31. Chen TS, Chang FY. The prevalence and risk factors of reflux esophagitis among adult Chinese population in Taiwan. *J Clin Gastroenterol* 2007;**41**:819–22.
32. Cho J, Kim H, Ko G, Woo M, Moon C, Kim Y, et al. Old age and male sex are associated with increased risk of asymptomatic erosive esophagitis. *J Gastroenterol Hepatol* 2011;**26**:1034–8.
33. Body mass index. From wikipedia, the free encyclopedia. Available from http://en.wikipedia.org/wiki/Body_mass_index Internet.
34. Razak R, Corsi DJ, Subramanian SV. Change in the body mass index distribution for women: analysis of surveys from 37 low- and middle-income countries. *Plos Med*. Available from <http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001367> Internet.
35. Hongo M. Review article: Barrett's oesophagus and carcinoma in Japan. *Aliment Pharmacol Ther* 2004;**20**(Suppl. 8):50–4.
36. Ho KY. From GERD to Barrett's esophagus: is the pattern in Asia mirroring that in the West? *J Gastroenterol Hepatol* 2011;**26**:816–24.