



UNIVERSITAS INDONESIA

FACULTY OF

MEDICINE

# Evaluating the Diagnostic Accuracy of GerdQ for Diagnosis of Gastroesophageal Reflux Disease: A Meta-Analysis

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## INTRODUCTION

GERD questionnaire [GerdQ] (2010) combines 3 questionnaires:

- Reflux Disease Questionnaire [RDQ],
- Gastrointestinal Symptom Rating Scale [GSRS], and
- Gastro-oesophageal reflux disease Impact Scale [GIS]

GerdQ is used as a **diagnostic tool** for GERD in primary care of many countries.

The **Asian guidelines** for GERD diagnosis and treatment **recommended** using symptom-based diagnostic questionnaires such as **GerdQ** for diagnosing symptomatic GERD, despite the **low level of evidence**.

The **2022 American College of Gastroenterology (ACG) guideline** for GERD diagnosis recommended using the **PPI test for establishing GERD diagnosis**, which already has a **moderate level of evidence**.

Aim: To summarize available evidence of the **diagnostic accuracy of GerdQ** compared to **upper endoscopy and/or pH-metry** for **diagnosing GERD**.

## METHODS

**Inclusion criteria:**

- Diagnostic Test Accuracy (DTA) studies** comparing **GerdQ to ambulatory pH-metry or upper endoscopy**
- Adult patients presenting with **symptoms suggestive of GERD** who filled in the GerdQ and underwent gold standard test,
- Any GERD phenotypes (erosive or non-erosive reflux disease)

**Exclusion criteria:**

- Studies with patients presenting with GERD alarm symptoms, pregnant patients, patients who are breastfeeding or with malignancy, and patients with extraesophageal manifestations

The **Quality Assessment of Diagnostic Accuracy Studies-2 tool** was used to assess the **study quality**

Meta-analysis using the **random-effects model (DerSimonian-Laird)** was done to summarize the **overall sensitivity, specificity, likelihood ratios (LRs), and diagnostic odds ratio (DOR)**.

The **hierarchical summary receiver operating characteristics (HSROC) curve** was calculated using the **bivariate model alongside the area under the HSROC (AUC)**.

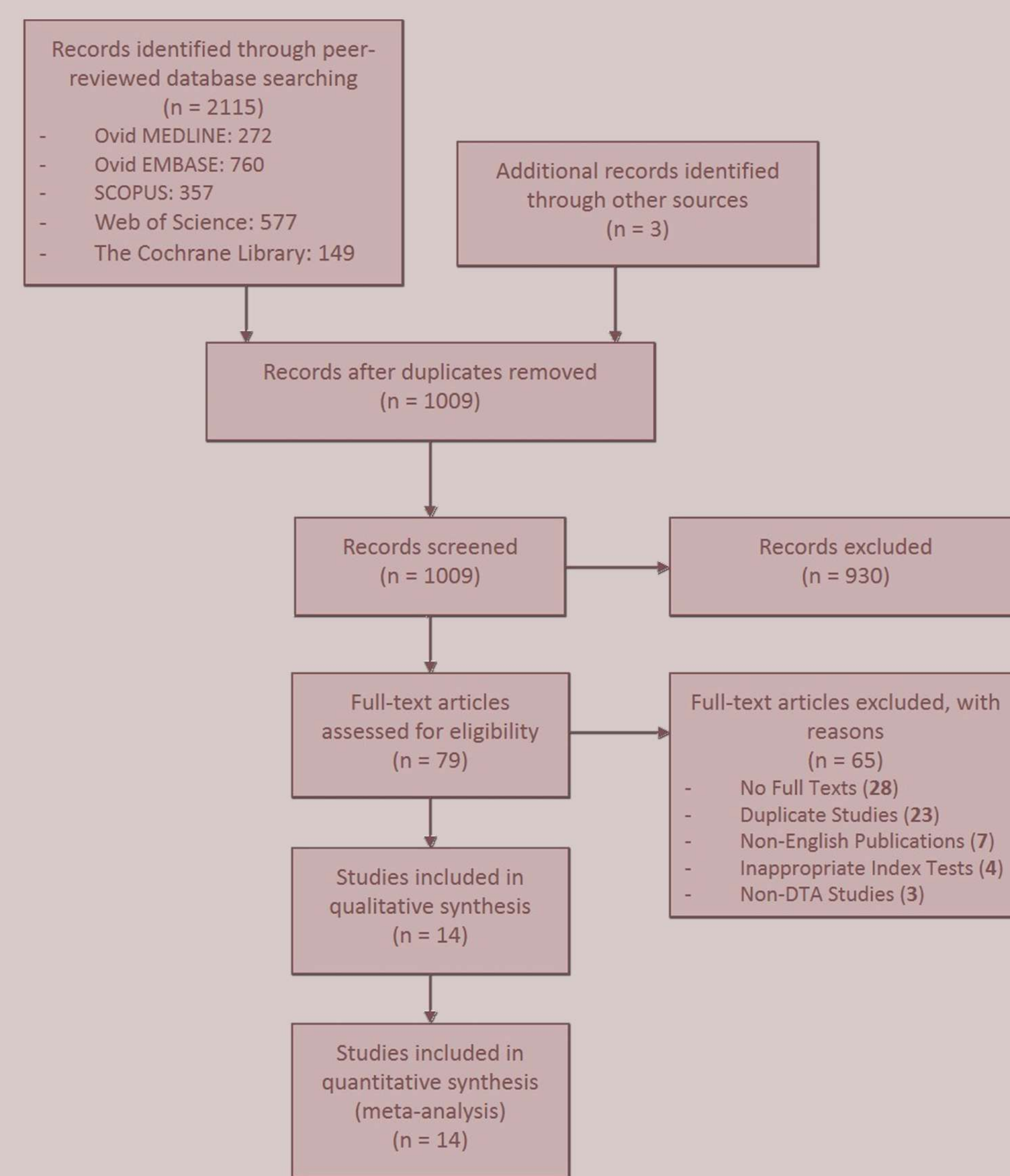


Figure 1. PRISMA Flow Chart for Study Selection. DTA: Diagnostic Test Accuracy.

Table 1. Characteristics of the Included Studies

First Author	Country	Study Design	Period of Study	Reference Test	Sample Size	Patients excluded from analysis	Age (years)	Male (%)
Jones R (2009)	Germany, Sweden, Canada, Denmark, Norway, UK	Non-randomized trial	Sep 2005 - Nov 2006	Upper endoscopy, 48-h wireless esophageal pH monitoring	308	5	47±14	143 (46)
Lacy BE (2011)	USA	Cross-Sectional	Oct 2008 - Oct 2009	Wireless 48-h pH-metry	358*	6*	51±14	101 (28)
Bai Y (2013)	China	Cross-Sectional	Jan 2010 - Dec 2010	Upper endoscopy	8065	0	40±8 (50)	4048 (50)
Jonasson C (2013)	Norway	Cross-Sectional	Mar 2009 - Dec 2009	Upper endoscopy, 24-h pH-metry	169	0	47±15	90 (53)
Wang W (2014)	China	Cross-Sectional	Feb 2011 - Dec 2011	24-h pH-metry	95	13	49±12	44 (54)
Zavala-Gonzales MA (2014)	Mexico	Cross-Sectional	Jan 2011 - Oct 2012	Upper endoscopy, pH-metry	252	0	49.49	93 (37)
Zhou LY (2014)	China	Non-randomized trial	Sep 2011 - Dec 2012	Upper endoscopy, 24-h impedance pH monitoring	636	0	49±14	265 (42)
Siregar GA (2015)	Indonesia	Cross-Sectional	Oct 2015 - Dec 2015	Upper endoscopy	85	0	45±13	50 (59)
Wang M (2017)	China	Cross-sectional	Aug 2014 - Dec 2015	Upper endoscopy	1233	0	54±12	532 (43)
Norder Grusell E (2018)	Sweden	Cross-Sectional	Oct 2009 - Apr 2014	24-h pH-metry	646	0	52 (15-84)	296 (46)
Vadivelu S (2019)	Malaysia	Cross-Sectional	NR	Upper endoscopy, pH-metry	104	0	47±1	50 (48)
Zalka S (2020)	Ukraine	Cross-Sectional	NR	24-h impedance pH monitoring	28	0	47±2	11 (39)
Chen G (2021)	China	Cross-Sectional	Jul 2018 - Aug 2018	Upper endoscopy	565	54	NR	290 (51)
Wang B (2021)	China	Cross-sectional	Jun 2016 - Jun 2019	Upper endoscopy	100	0	GERD: 45.4 Non-GERD: 45.4	GERD: 32 (52) Non-GERD: 19 (50)

Notes  
 GERD: Gastroesophageal Reflux Disease; NR: Not reported  
 Age presented in mean±SD / median (range)  
 \*178 participants were off acid suppression, and 180 participants were on acid suppression  
 †1 participant were off acid suppression, and 5 participants were on acid suppression

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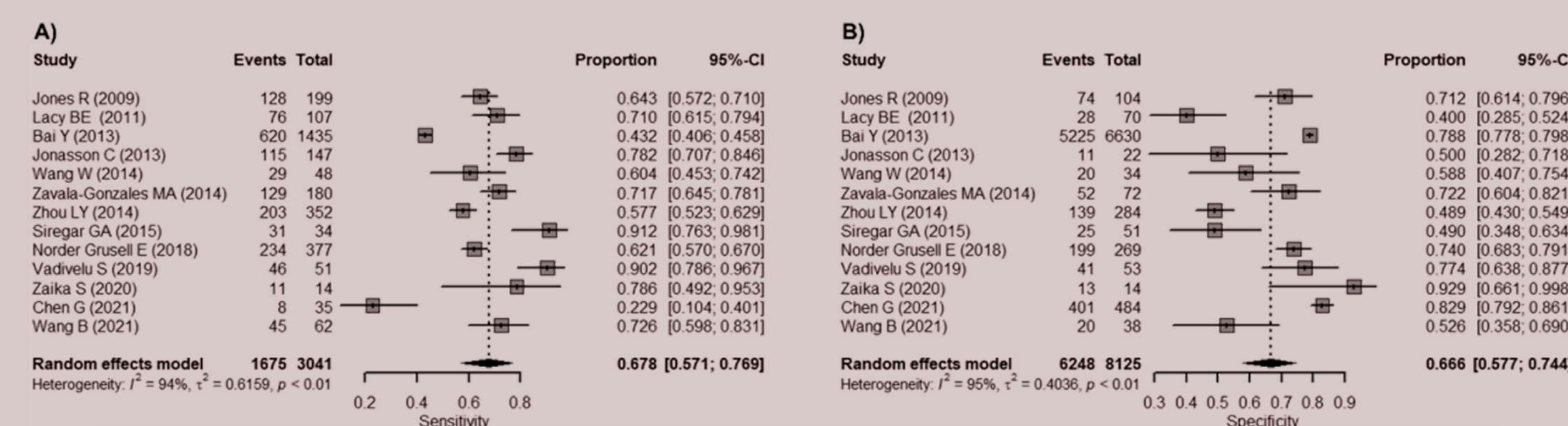


Figure 2. Forest plot demonstrating the pooled (A) sensitivity and (B) specificity of GerdQ for diagnosis of GERD. Pooled estimates and the 95%CI were calculated using the random-effects model.

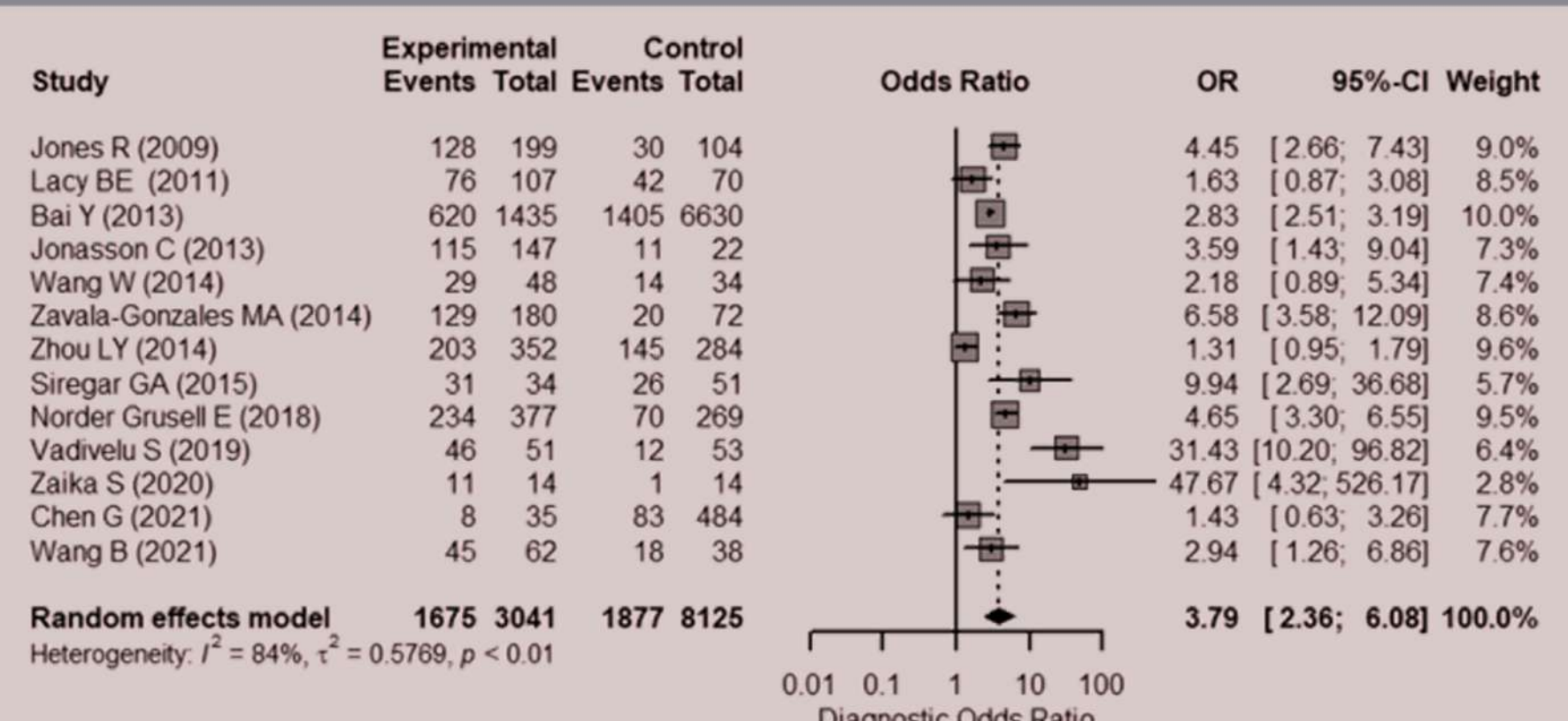


Figure 3. Forest plot demonstrating the pooled DOR and the 95%CI of GerdQ for diagnosing GERD.

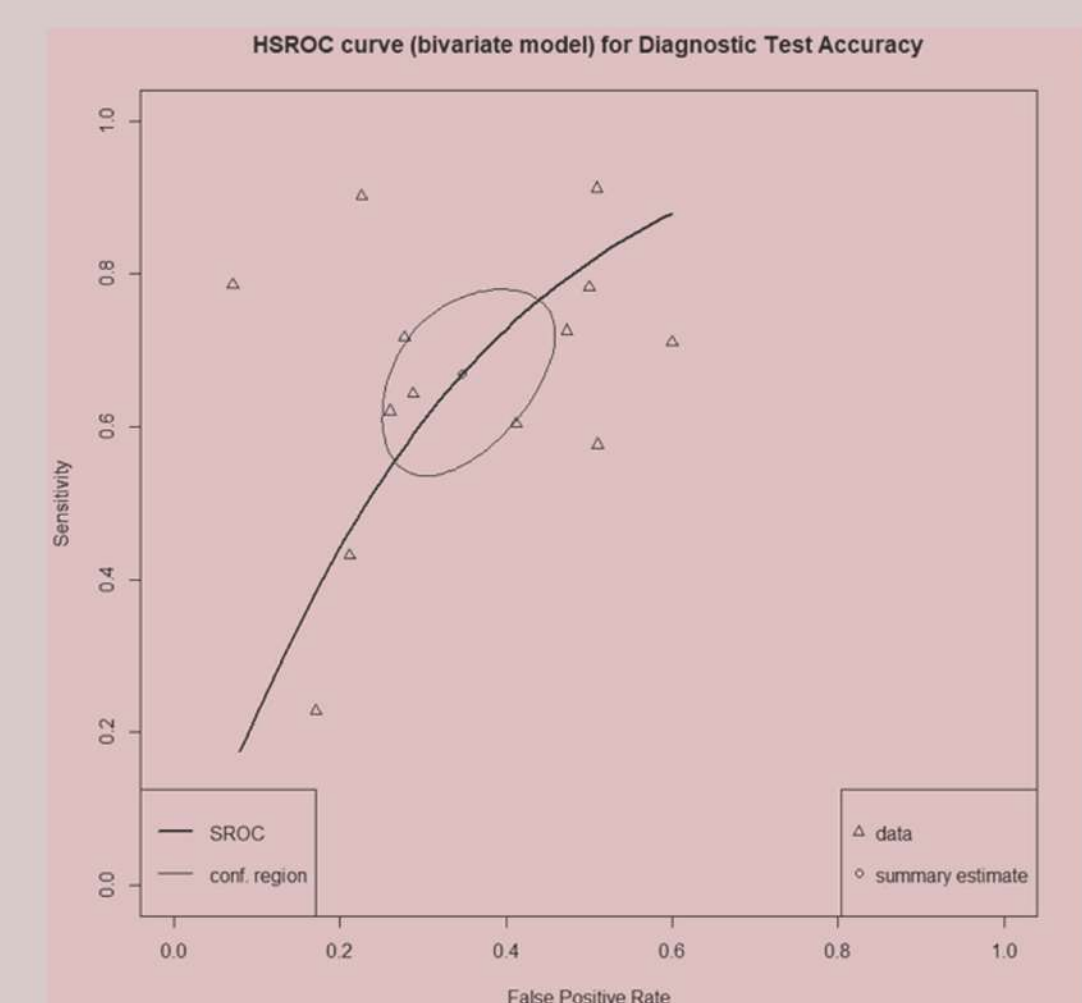


Figure 4. The HSROC curve of sensitivity vs. specificity of GerdQ in diagnosing GERD.

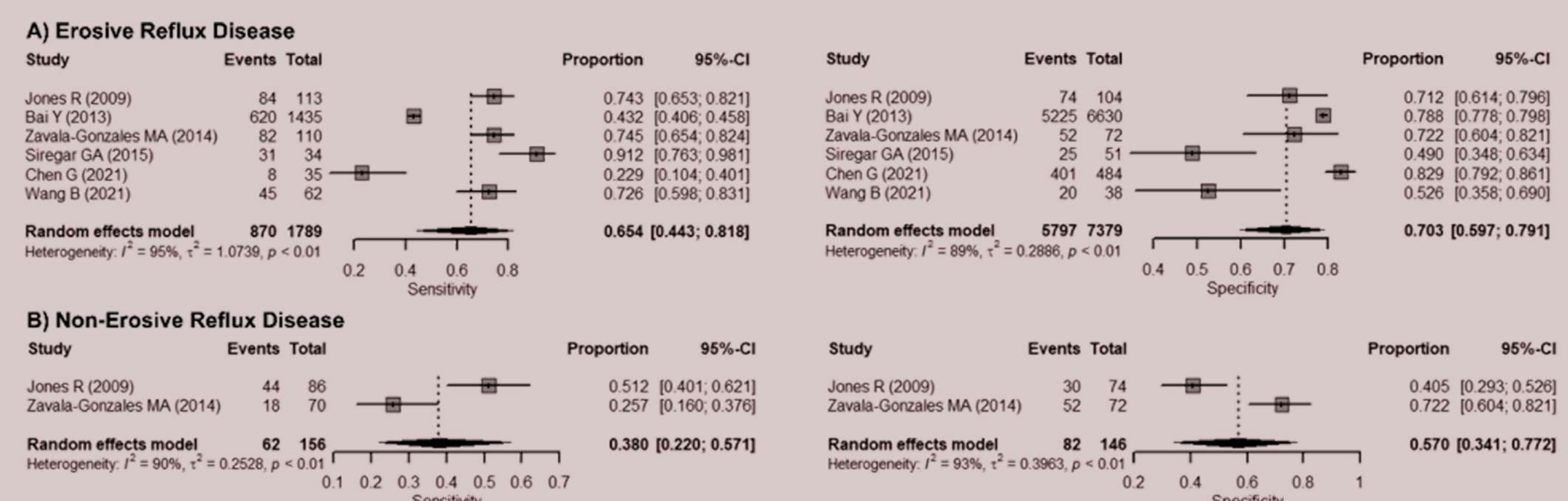


Figure 5. Forest plot demonstrating the pooled sensitivity and specificity of GerdQ for (A) erosive reflux disease and (B) non-erosive reflux disease.

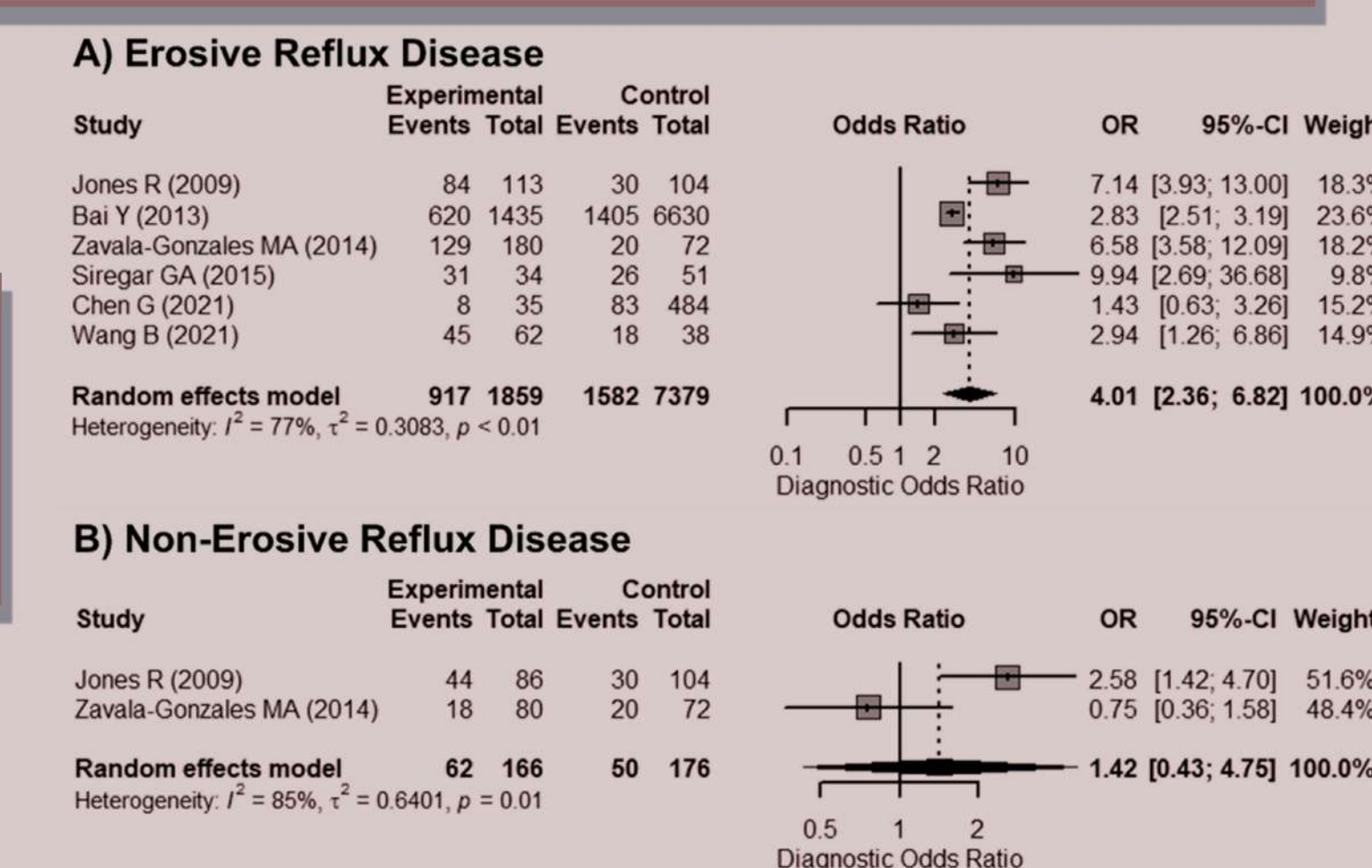


Figure 6. Forest plot demonstrating the pooled DOR and the 95%CI of GerdQ for (A) erosive reflux disease and (B) non-erosive reflux disease.

## DISCUSSION

**14 studies** with a total of **12566 subjects** were included, of which **3564 subjects** had confirmed GERD diagnosis.

The **overall pooled sensitivity, specificity, and AUC of GerdQ** was **67.8%, 66.6%, and 0.705**, respectively

- GerdQ with a **cut-off value of ≥8** = slightly modest diagnostic value for GERD
- GerdQ had **better specificity (70.3%)** in ERD diagnosis
- GerdQ was **suboptimal in establishing NERD diagnosis** (sensitivity of 38% and specificity of 57%)

Despite better sensitivity, specificity, and AUC of GerdQ in GERD compared to previous meta-analysis, GerdQ was **still insufficient** to be used as the only screening or diagnostic tool for GERD

While **PPI test** was shown to have moderate-to-high sensitivity (79%) for GERD, a **lower specificity (45%)** was expected due to the **high placebo effect**

**Upper endoscopy and esophageal pH/pH-impedance monitoring** are known to be more sensitive and specific  
 However, such reference tests are limited by the level of **invasiveness** and **need for referral** for primary care patients

Some studies **recommended increasing the GerdQ threshold** to improve its diagnostic credibility in predicting GERD  
 Only 1 study by Wang et al. used a GerdQ cut-off value >9 with a resulting in sensitivity and specificity of 87.7% and 65.8%

**Strengths** of this meta-analysis:

- Extensive and up-to-date search of studies** that identified an additional 8 articles not included in a previous meta-analysis

**Sensitivity analysis confirmed the robustness** of our study findings

**Limitations** of this meta-analysis:

- Only studies published in English were included

**Residual confounders (i.e PPI use)** cannot be entirely excluded due to different exclusion criteria definitions used in the included studies

## CONCLUSION

This meta-analysis demonstrated that:

- GerdQ had slightly **moderate sensitivity and specificity** for confirming GERD diagnosis, especially for the ERD phenotype

GerdQ may still be considered a GERD diagnostic tool in **resource-limited settings** which lacks accepted reference tests and when PPI test is unavailable or contraindicated