INPLASY PROTOCOL

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Global trend of Helicobacter pylori infection 1980-2022: A systematic review and meta-analysis

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Review question / Objective: To explore the temporal trend of global H.pylori infection prevalence over the past four decades. Also, to probe its association with countries' income and universal health coverage levels.

Condition being studied: Helicobacter pylori (H.pylori), a gram-negative bacterium discovered by Marshall and Warren in 1983 as the chief 'culprit' for peptic ulcer, has attracted more and more attention to its prevalence worldwide. The discovery of H.pylori was a significant milestone in gastroenterology development. However, due to the non-uniform testing method, screening procedure, or indications, the time trend of its prevalence change is still ambiguous and controversial. Reported infection prevalence varies in diverse countries/regions, from lower than 30% among American populations to over 40% in the WestPacific region. Great difficulties were posed in evaluating the time trend by fluctuation and change of the H.pylori infection in different regions.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 06 October 2022 and was last updated on 02 February 2023 (registration number INPLASY2022100026).

INTRODUCTION

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countries/regions, from lower than 30% among American populations to over 40% in the WestPacific region. Great difficulties were posed in evaluating the time trend by fluctuation and change of the H.pylori infection in different regions.

METHODS

Search strategy: PubMed: ((HP[Title/Abstract]) OR (((H$ Pylori[Title/Abstract]) OR (pylori[Title/Abstract])) OR ((((((Helicobacter nemestrinae[Title/Abstract]) OR (Campylobacter pylori[Title/Abstract])) OR (Campylobacter pylori subsp. pylori[Title/Abstract])) OR (Campylobacter pyloridis[Title/Abstract])) OR ("Helicobacter pylori"[Mesh])))) AND ((((prevalence[Title/Abstract]) OR (seroprevalence[Title/Abstract])) OR (survery[Title/Abstract])) OR (incidence[Title/Abstract])) AND (1980/1:2022/12[pdat])

Embase: Date of pub From 1980 to 2022
1 'helicobacter pylori'/exp
2 'Helicobacter pylori':ab,ti OR 'H.pylori':ab,ti OR 'Campylobacter pylori':ab,ti OR ' helicobacter nemestrinae':ab,ti
3 'prevalence':ab,ti OR 'incidence':ab,ti OR 'seroprevalence':ab,ti OR 'survey':ab,ti
4 #1 OR #2
5 #2 AND #3 AND #4

MEDLINE: Date of pub From 1980
1 exp Helicobacter pylori/
2 (helicobacter pylori or H pylori or Campylobacter pylori).ab,ti.
3 (prevalence or incidence or epidemiology or seroprevalence or survery).ab,ti.
4 1 or 2
5 3 and 4
6 5 and 1980:2022.(sa_year)

Scopus: Date of pub From 1980 to 2022
((TITLE-ABS-KEY (prevalence) OR TITLE-ABS-KEY (incidence) OR TITLE-ABS-KEY (seroprevalence) OR TITLE-ABS-KEY (survey)) AND PUBYEAR > 1979 AND PUBYEAR < 2023 AND PUBYEAR > 1979 AND PUBYEAR < 2023) AND ((TITLE-ABS-KEY (helicobacter AND pylori) OR TITLE-ABS-KEY (helicobacter AND pylori) OR TITLE-ABS-KEY (h. AND pylori) OR TITLE-ABS-KEY (campylobacter AND pylori) OR TITLE-ABS-KEY (helicobacter AND nemestrinae)) AND PUBYEAR > 1979 AND

PUBYEAR < 2023 AND PUBYEAR > 1979 AND PUBYEAR < 2023) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (EXACTKEYWORD , "Human") OR LIMIT-TO (EXACTKEYWORD , "Humans"))

Web of Science (Timespan: 1980-01-01 to 2022-12-31)
1: ((((TS=(Helicobacter pylori)) OR TS=(H. pylori)) OR TS=(Campylobacter pylori)) OR TS=(helicobacter nemestrinae)) OR TS=(helicobacter pylori)
2: ((((TS=(prevalence)) OR TS=(incidence)) OR TS=(epidemiology)) OR TS=(seroprevalence)) OR TS=(survery)
3: #2 AND #1
4: #2 AND #1 and Article (Document Types) and Proceeding Paper or Book Chapters or Early Access or Retracted Publication or Data Paper (Exclude – Document Types).

Participant or population: Studies reported the prevalence of H.pylori infection.

Intervention: Not availiable.(Report with prevalence).

Comparator: Not availiable.(Report with prevalence).

Study designs to be included: Population-based studies, clinic-based studies and retrospective studies.

Eligibility criteria: Studies that described the prevalence of H. pylori. Diagnosis of H. pylori infection could be done by urea breath test (UBT), serology (anti-IgG antibody), histological methods, rapid urease test (RUT), and stool antigen test. Meta-analysis, systematic review, conference paper, editorials and other inappropriate form of studies were excluded. Specific sub-group of population (such as immune-deficiency, pregnant or cancer patients) were not included. Studies that failed to demonstrate the prevalence of H. pylori infection and detection methods were also eliminated.

Information sources: Data acquisition can be done by contacting with author by mail(yunhaoli@connect.hku.hk).

Main outcome(s): The reported prevalence of H. pylori infection of a certain country or region.

Quality assessment / Risk of bias analysis: Two independent authors did quality assessments using the Critical Appraisal of the Health Research Literature: Prevalence or Incidence of a Health Problem by Patricia L Loney et al. Maximum score of the intact quality assessment procedure is eight points, including three aspects of valid study methods, results interpretation, and result applicability. Total score of eight questions was calculated.

Strategy of data synthesis: Heterogeneity was assessed by use of the I^2 index and Cochran Q test. Pooled prevalence and the corresponding 95% confidence interval were carried out by the random-effects model. P-value of less than 0.05 was deemed statistically significant in all analyses.

Subgroup analysis: Subgroup analyses were conducted on predetermined factors (WHO regions, world bank income level, UHC level, study periods, diagnostic methods, subject's age at diagnosis and sex, and study types). Heterogeneity was assessed by the I^2 index and Cochran Q test. A P-value of less than 0.05 between subgroups implies significant heterogeneity. Random effects meta-regression was used to evaluate the impact of differences on selected factors (sample collection year, income level, region, UHC level, diagnostic method, subject's sex, and study types) of each study on the H. pylori prevalence. The multivariable meta-regression model used the multi-model inference method for variable inclusion based on the minimum of Akaike's information criterion (AIC) value. The mixed-effects models were fitted using the rma() function of the R package metafor by providing the estimated pooled prevalence (argument yi) and the corresponding standard error (argument sei) based on the weighted least squares (WLS) method. Between-study heterogeneity was established on error-in-variables random effects (DerSimonian and Laird method).

Regression coefficients were tested by the Knapp-Hartung method. A Gaussian link function was used in the model.

Sensitivity analysis: Inspection of the funnel plot and Egger's test were adopted to evaluate for publication bias.

Country(ies) involved: Hong Kong SAR, China.

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