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Protocol

Prevalence of ADHD and Related Factors in Some Asian Countries: A Systematic Review and Meta-Analysis Protocol

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Abstract

Background: Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental condition characterized by inattention, hyperactivity, and impulsivity. Despite extensive research, a gap remains in understanding ADHD prevalence and associated factors in select Asian countries.

Objectives: This systematic review and meta-analysis protocol aims to estimate ADHD prevalence, identify associated factors, assess study quality, and explore sources of heterogeneity in Asian countries.

Methods: Adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, electronic databases will be systematically searched for observational studies reporting ADHD prevalence and associated factors. Study selection, data extraction, and quality assessment will be conducted by two independent reviewers. Pooled prevalence will be estimated using a random-effects meta-analysis if homogeneity is present. Subgroup analyses and meta-regression will explore heterogeneity. Factors associated with ADHD will be synthesized narratively.

Results: The protocol outlines a comprehensive methodology for estimating ADHD prevalence and examining associated factors in Asian countries, including Iran, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, Jordan, Iraq, Syria, Lebanon, Yemen, and the United Arab Emirates (UAE). Findings will be instrumental in shaping interventions and strategies for ADHD management in the region.

Conclusion: This systematic review and meta-analysis protocol will bridge knowledge gaps regarding ADHD prevalence and associated factors in select Asian countries. By adhering to rigorous methodologies and the PRISMA guidelines, the study aims to contribute to in-

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1. Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) represents a multifaceted neurodevelopmental condition characterized by a consistent presence of inattention, hyperactivity, and impulsivity. These traits frequently contribute to compromised functioning across diverse life domains. Notably prevalent among children, ADHD is estimated to affect about 5% of school-aged individuals globally. Importantly, its ramifications are not confined to childhood, as it often endures through adolescence and into adulthood, exerting its influence over academic achievements, career trajectories, social connections, and overall well-being (1-6).

The comprehension of ADHD has undergone significant transformation from its early delineations, progressing beyond mere behavioral irregularities into a multidimensional condition encompassing cognitive deficits, neural circuit irregularities, and genetic inclinations. From a clinical standpoint, ADHD is presently classified into three subtypes: mainly inattentive, predominantly hyperactive-impulsive, and a combined presentation of both. These subtypes effectively encompass the diverse array of symptoms experienced by individuals with ADHD, encompassing challenges in maintaining attention, orchestrating tasks, as well as displaying impulsive actions and restlessness (7-10).

Despite substantial research efforts directed toward uncovering the origins, clinical presentations, and therapeutic approaches of ADHD, a significant void still exists regarding its occurrence and related influences across various global regions. A substantial proportion of studies investigating the epidemiology and causal factors of ADHD have predominantly emanated from Western nations, with a strong focus on North America and Europe. Consequently, this approach has yielded a limited scope in terms of representing worldwide diversity, particularly in the context of Asian countries. Within these regions, cultural norms, societal dynamics, and environmental variables possess the potential to significantly shape the manifestation of ADHD, further emphasizing the need for a more comprehensive understanding (5, 11-13).

This protocol outlines the methodology for a systematic review and meta-analysis that aims to address this gap by focusing on the prevalence of ADHD and its related factors in selected Asian countries. By comprehensively analyzing the available literature, we seek to provide a more inclusive understanding of ADHD's global prevalence and its unique attributes in Asian populations.

This investigation is not only essential for expanding the scientific knowledge base but also for informing clinical practices, healthcare policies, and cross-cultural approaches to ADHD assessment and management.

In the subsequent sections of this protocol, we detail our research objectives, methodology, and anticipated contributions to the field of ADHD research. Through this systematic review and meta-analysis, we aim to bridge the existing gap in knowledge and foster a more comprehensive understanding of ADHD's prevalence and associated factors, particularly within an Asian context.

By systematically reviewing the available literature and conducting a meta-analysis, this study seeks to provide a comprehensive understanding of ADHD prevalence and related factors in Asian countries. This understanding can help inform healthcare professionals, policymakers, and researchers about the unique challenges and opportunities associated with ADHD diagnosis, treatment, and management in this region.

1.1 Objectives

The objectives of this systematic review and meta-analysis are as follows:

- To estimate the prevalence of ADHD in populations in some Asian countries. (Iran, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, Jordan, Iraq, Syria, Lebanon, Yemen, and United Arab Emirates (UAE))
- To identify and analyze the factors associated with ADHD in the mentioned countries.
- To assess the methodological quality of the included studies.
- To explore potential sources of heterogeneity among the included studies.
- To provide recommendations for future research and implications for policy and practice.

2. Methods

This systematic review and meta-analysis will be conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The PRISMA guidelines provide a structured framework for transparent and comprehensive reporting of systematic reviews and meta-analyses, ensuring the methodolog-

ical rigor and clarity of the research process (14).

2.1 Eligibility Criteria.

Please refer to Table 1.

2.1.1 Types of Studies

- Observational studies (cross-sectional, cohort, case-control) reporting the prevalence of ADHD and related factors in Asian countries will be included.
- Intervention studies, case reports, editorials, and reviews will be excluded.

2.1.2 Types of Participants

- Populations residing in some Asian countries (Iran, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, Jordan, Iraq, Syria, Lebanon, Yemen, and United Arab Emirates (UAE)).
- Studies including participants with comorbid conditions (e.g., intellectual disabilities, autism spectrum disorder) will be included if separate data on ADHD prevalence are reported.

2.1.3 Types of Outcome Measures

- Primary Outcome: Prevalence of ADHD in some Asian countries.
- Secondary Outcome: Factors associated with ADHD (e.g., sociodemographic factors, genetic factors, environmental factors).

2.2 Information Sources

2.2.1 Electronic Databases

The search strategy will be developed with an experienced librarian or information specialist. The following search terms and their combinations will be used:

- ADHD
- Attention Deficit Hyperactivity Disorder
- Prevalence
- Incidence
- Risk factors
- Associated factors

A comprehensive search will be conducted in the following databases:

PubMed:

((((((((((((((ADHD[MeSH Terms]) OR (Attention Deficit Hyperactivity Disorder[MeSH Terms])) OR (Hyperkinetic Disorder[Title/Abstract])) OR (Attention Deficit Hyperactivity Disorder[Title/Abstract])) OR (ADHD[Title/Abstract])) OR (Attention Deficit Disorder[Title/Abstract])) OR (Attention Deficit Syndrome[Title/Abstract])) OR (Hyperactivity Disorder[Title/Abstract])) OR (Minimal Brain Dysfunction[Title/Abstract])) OR (Executive Dysfunction[Title/Abstract])) OR (Developmental Coordination Disorder[Title/Abstract])) OR (Hyperactive Impulse Control Disorder[Title/Abstract])) OR (Hyperactive Child Syndrome[Title/Abstract])) OR (Hyperkinetic Reaction of Childhood[Title/Abstract])) AND ((frequency [Title/Abstract]) OR (proportion [Title/Abstract]) OR ("prevalence"[Title/Abstract] OR "incidence"[Title/Abstract] OR "cumulative incidence"[Title/Abstract] OR "prevalence"[MeSH Terms]))) AND (((Iran[Title/Abstract] OR Bahrain[Title/Abstract] OR Kuwait[Title/Abstract] OR Oman[Title/Abstract] OR Qatar[Title/Abstract] OR Saudi Arabia[Title/Abstract] OR United Arab Emirates[Title/Abstract])) OR (Jordan[Title/Abstract] OR Iraq[Title/Abstract] OR Syria[Title/Abstract] OR Lebanon[Title/Abstract] OR Yemen[Title/Abstract]))

Scopus

#1: (TITLE-ABS-KEY (frequency) OR TITLE-ABS-KEY (proportion) OR TITLE-ABS-KEY (prevalence) OR TITLE-ABS-KEY (incidence) OR TITLE-ABS-KEY (cumulative AND incidence))

#2: (TITLE-ABS-KEY (adhd) OR TITLE-ABS-KEY (attention AND deficit AND hyperactivity AND disorder) OR TITLE-ABS-KEY (hyperkinetic AND disorder) OR TITLE-ABS-KEY (attention AND deficit AND disorder) OR TITLE-ABS-KEY (attention AND deficit AND syndrome) OR TITLE-ABS-KEY (hyperactivity AND disorder) OR TITLE-ABS-KEY (minimal AND brain AND dysfunction) OR TITLE-ABS-KEY (executive AND dysfunction) OR TITLE-ABS-KEY (developmental AND coordination AND disorder) OR TITLE-ABS-KEY (hyperactive AND impulse AND control AND disorder) OR TITLE-ABS-KEY (hyperactive AND child AND syndrome) OR TITLE-ABS-KEY (hyperkinetic AND reac-

No	Criteria	Inclusion	Exclusion
1	Study Types	Observational studies (cross-sectional, cohort, (case-control	Intervention studies, case reports, editorials, reviews, conference abstracts, non-peer-reviewed articles, animal studies, qualitative studies
3	Participants	Population	-
4	Geographic Region	Asian countries Iran, Bahrain, Kuwait, Oman, Qatar, Saudi) Arabia, Jordan, Iraq, Syria, Lebanon, Yemen, ((and United Arab Emirates (UAE	Studies conducted outside of Asian countries
5	Outcome Measures	:Primary Outcome Prevalence of ADHD in the mentioned Asian countries	Studies not reporting the prevalence of ADHD in the mentioned Asian countries
7	:Secondary Outcome	Studies not reporting factors associated with ADHD in Asian population Factors associated with ADHD in Asian countries	
9	Language	English	Studies published in languages other than English
10	Publication Date	No restrictions	-
11	Full-Text Availability	Full-text articles available	Studies with unavailable full-text articles
14	Comorbid Conditions e.g., intellectual) ,disabilities autism spectrum (disorder	Studies including participants with comorbid	Studies focused solely on comorbid conditions without reporting separate data on ADHD prevalence
17	Study Quality	No restrictions	Studies with critically low methodological quality

Table 1: Inlcusion Criteria

tion AND of AND childhood))

#3: (TITLE-ABS-KEY (Bahrain) OR TITLE-ABS-KEY (Kuwait) OR TITLE-ABS-KEY (Oman) OR TITLE-ABS-KEY (Qatar) OR TITLE-ABS-KEY (Saudi AND Arabia) OR TITLE-ABS-KEY (Iran) OR TITLE-ABS-KEY (united AND Arab AND emirates) OR TITLE-ABS-KEY (Jordan) OR TITLE-ABS-KEY (Iraq) OR TITLE-ABS-KEY (Syria) OR TITLE-ABS-KEY (Lebanon) OR TITLE-ABS-KEY (Yemen))

#1 AND #2 AND #3

(TITLE-ABS-KEY (ADHD) OR TITLE-ABS-KEY (attention AND deficit AND hyperactivity AND disorder) OR TITLE-ABS-KEY (hyperkinetic AND disorder) OR TITLE-ABS-KEY (attention AND deficit AND disorder) OR TITLE-ABS-KEY (attention AND deficit AND syndrome) OR TITLE-ABS-KEY (hyperactivity AND disorder) OR TITLE-ABS-KEY (minimal AND brain AND dysfunction) OR TITLE-ABS-KEY (executive AND dysfunction) OR TITLE-ABS-KEY (developmental AND coordination AND disorder) OR TITLE-ABS-KEY (hyperactive AND impulse AND control AND disorder) OR TITLE-ABS-KEY (hyperactive AND child AND syndrome) OR TITLE-ABS-KEY (hyperkinetic AND reaction AND of AND childhood)) AND (TITLE-ABS-KEY (frequency) OR TITLE-ABS-KEY (proportion) OR TITLE-ABS-KEY (prevalence) OR TITLE-ABS-KEY (incidence) OR TITLE-ABS-KEY (cumulative AND incidence)) AND (TITLE-ABS-KEY (Bahrain) OR TITLE-ABS-KEY (Kuwait) OR TITLE-ABS-KEY (Oman) OR TITLE-ABS-KEY (Qatar) OR TITLE-ABS-KEY (Saudi AND Arabia) OR TITLE-ABS-KEY (Iran) OR TITLE-ABS-KEY (united AND Arab AND emirates) OR TITLE-ABS-KEY (Jordan) OR TITLE-ABS-KEY (Iraq) OR TITLE-ABS-KEY (Syria) OR TITLE-ABS-KEY (Lebanon) OR TITLE-ABS-KEY (Yemen))

Web of Science

frequency OR proportion OR prevalence OR incidence OR cumulative incidence (Topic) AND Bahrain OR Kuwait OR Oman OR Qatar OR Saudi Arabia OR Iran OR United Arab Emirates OR Syria OR Iraq OR Jordan OR Yemen OR Lebanon (Topic) AND ADHD OR Attention Deficit Hyperactivity

Disorder OR Hyperkinetic Disorder OR Attention Deficit Disorder OR Attention Deficit Syndrome OR Hyperactivity Disorder OR Minimal Brain Dysfunction OR Executive Dysfunction OR Developmental Coordination Disorder OR Hyperactive Impulse Control Disorder OR Hyperactive Child Syndrome OR Hyperkinetic Reaction of Childhood (Topic)

2.3 Study Selection

2.3.1 Screening Process

- Two independent reviewers will screen titles and abstracts for potential eligibility based on the predefined inclusion and exclusion criteria.

- Full-text articles will be obtained for potentially eligible studies.

2.3.2 Study Selection

- Two independent reviewers will assess the full-text articles for final inclusion.

- Any disagreements will be resolved through discussion or by involving a third reviewer.

2.4 Data Extraction

A standardized data extraction form will be developed and pilot-tested. Two reviewers will independently extract the following information from each included study:

- Study characteristics (author, year of publication, country)
- Study design
- Participant characteristics (age, gender, sample size)
- Diagnostic criteria for ADHD
- Prevalence of ADHD
- Factors associated with ADHD
- Methodological quality indicators

2.5 Quality Assessment

The methodological quality and risk of bias of the included studies will be assessed using appropriate tools, such as the Newcastle-Ottawa Scale for observational studies. Two reviewers will independently assess the quality of each study, and any discrepancies will be resolved through discussion or by involving a third reviewer.

2.6 Data Synthesis and Analysis

2.6.1 Prevalence Meta-Analysis

- If sufficient homogeneous studies are available, a random-effects meta-analysis will be conducted to estimate the pooled prevalence of ADHD.
- Subgroup analyses and meta-regression will be performed to explore potential sources of heterogeneity.

2.6.2 Factors Associated with ADHD

- A narrative synthesis will be conducted to summarize and analyze the factors associated with ADHD in Asian countries.

- If feasible, a meta-analysis will be performed to estimate the pooled effect sizes of specific factors.

2.7 Assessment of Heterogeneity

Heterogeneity among the included studies will be assessed using statistical measures (e.g., I^2 statistic) and visual inspection of forest plots. Subgroup analyses and meta-regression will be performed to explore potential sources of heterogeneity.

2.8 Publication Bias

Publication bias will be assessed using funnel plots, Egger's regression, and Begg's rank correlation tests. If publication bias is detected, appropriate measures (e.g., trim-and-fill analysis) will be employed to adjust the effect estimates.

3. Discussion

3.1 Summary of Findings

The main findings regarding the prevalence of ADHD in some Asian countries and the factors associated with

ADHD will be summarized.

3.2 Interpretation of Findings

The implications of the findings will be discussed in the context of the existing literature, highlighting the unique characteristics and challenges related to ADHD in Asian countries.

3.3 Limitations

The limitations of the systematic review and meta-analysis, including potential sources of bias and heterogeneity, will be acknowledged and discussed.

3.4 Implications for Policy and Practice

The implications of the findings for policy development, prevention strategies, and clinical practice will be discussed, considering the cultural and contextual factors in Asian countries.

3.5 Conclusion

The systematic review and meta-analysis will provide a comprehensive overview of the prevalence of ADHD in Asian countries and identify factors associated with the disorder. The findings will inform future research directions and contribute to developing targeted interventions and policies to address the burden of ADHD in Asian countries.

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