The Prevalence of Metabolic Syndrome in Ethiopian Population: A Protocol for Systematic Review and Meta-analysis

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Protocol

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Abstract

Background: The metabolic syndrome is a clustering of hyperglycemia/insulin resistance, hypertension, dyslipidemia and obesity which are risk factors for cardiovascular disease, type 2 diabetes, stroke and all-cause mortality. The burden of metabolic syndrome is emerging alarmingly in low-and middle income countries like Ethiopia. This is the protocol to determine the pooled prevalence of metabolic syndrome in Ethiopian population.

Methods: This systematic review and meta-analysis will include original articles of observational studies published in the English language. Searches will be carried out in PubMed, Google Scholar, and Africa Journals up to April 2019. A Fixed/Random-effect model will be used to estimate the pooled prevalence of metabolic syndrome in Ethiopia. Heterogeneity will be assessed using I^2 statistic. Sub-group analysis will also be conducted based on sex, study subjects, and methodological differences. Funnel plots and egger's and Begg's test will be used to asses publication bias.

Ethics and dissemination: The review is based on published data; therefore, ethical approval is not required. The systematic review and meta-analysis will summarize the existing data on the prevalence of metabolic syndrome in Ethiopian population. This provides the empirical evidence necessary for researchers, policy-makers, and public health stakeholders to derive health-promoting policies, allocate resources, and set priorities for monitoring future trends. The final result will be presented at annual scientific meetings, conferences, and seminars. Moreover, it will also be published in the peer-reviewed reputable journal. We also plan to review every 5 years to provide updated information.

Protocol registration number: PROSPERO International Prospective Register of Systematic Reviews (CRD42018090944)

Background

Metabolic syndrome (MetS) is a cluster of interrelated risk factors that have been associated with cardiovascular disease (CVD), stroke, diabetes mellitus and other co-morbidities(1, 2). Insulin resistance, obesity, dyslipidemia, and hypertension are considered to be the primary components of MetS(3, 4). Worldwide prevalence of MetS and non-communicable chronic diseases in the adult population is on the rise(5). It has been estimated that the prevalence of MetS ranges 20–25% of the adult population globally(6). The epidemiologic nature of MetS is also emerging alarmingly and being common in Africa in contrast to the earlier trend of being considered rare(7). High prevalence of MetS have been reported in some sub-Saharan Africa countries like in Morocco (16.3%), and South Africa (33.5%)(8).

Individual with MetS have 2-3 times higher chance of developing stroke and CVD than without MetS (9, 10). It has also a six-fold greater risk of developing type 2 diabetes(11). Type 2 diabetes has become one of the major causes of premature illness and death, mainly through the increased risk of CVD (12). MetS is also associated with other co-morbidities like cancer, non-alcoholic fatty liver disease, and other

reproductive disorder. It is also suggested that mortality due to MetS is more than twice than without the syndrome(13)

The prevalence of MetS varies across different population. MetS appears to be more common in the presence of co-morbidities such as diabetes mellitus, hypertension and HIV infection than the counterparts. Around 85% of those with diabetes have MetS in the U.S in contrast to 25% of working adults in Europe and Latin America. Rates are rising in developing countries. The prevalence of MetS among diabetes, hypertensive and HIV patients estimated to be high, 63.7%(14), 67.1%(15), and 42.3% (16), respectively. Ethiopia, a developing country with fast economic growth, is facing a rapid escalation of non-communicable chronic diseases and associated mortality due to dramatic increase in urbanization, nutrition transition, and reduced physical activity for the past decades. In Ethiopia, several studies were conducted to assess the prevalence MetS having a great disparity and inconsistency findings. Hence, this protocol for systematic review and meta-analysis aims to determine the pooled prevalence of MetS in Ethiopia. This will provide the necessary information for policy makers, clinicians and concerned stakeholders in the country to provide an appropriate strategy and intervene in the control, prevention, and management of MetS.

Objective

This meta-analysis aims to estimate the pooled prevalence of metabolic syndrome in Ethiopian population.

Review question

This study will answer the following question by summarizing studies published up to April, 2019: What is the pooled prevalence of metabolic syndrome in Ethiopian population?

Study Design and protocol registration

This study entitled “The Prevalence of Metabolic syndrome in Ethiopian population: A Protocol for Systematic Review and Meta-Analysis” is registered online on PROSPERO International Prospective Register of Systematic Reviews (CRD42018090944). Moreover, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement guideline (17) will be followed.

Eligibility criteria for considering studies for the review

Observational studies describing the prevalence of MetS among the indigenous Ethiopian population will be included. Original research published in English and contained the minimum information (study participants and number of MetS cases) will be included. Moreover, studies in which MetS has been reported using (i), IDF criteria AND/OR (ii) NCEP ATP III will be included. The full text of studies meeting these criteria will be retrieved and screened to determine its eligibility. Whereas, MetS described other than the Ethiopian population, non-original research like (review, editorial, and a letter or commentary) and unknown/unclear methods of how MetS diagnosed will not be included

Expected Outcome

The expected outcome of this study will be the prevalence of MetS in Ethiopian population.

Searchstrategy

This systematic review and meta-analysis will be reported according to PRISMA statement guideline (18). A comprehensive literature search will be conducted to identify studies about the prevalence of metabolic syndrome in Ethiopian population. Both electronic and gray literature search will be carried out systematically. PubMed, African journal of Medline and Google Scholar will be used to retrieve data. The search terms will be used separately and in combination using Boolean operators like “OR” or “AND”. An example of keywords used in PubMed to select relevant studies will be the following: (Metabolic syndrome) OR MetS (MeSH Terms AND (Ethiopia) AND prevalence. The search will incorporate studies recorded up to 30th of April, 2019. The software EndNote version X7 (Thomson Reuters, New York, NY) will be used to manage references and remove duplicated references.

Quality assessment

Three reviewers (SA, BB, and MM) will independently screen the titles and abstracts to consider the articles in the full-text review. The quality of the studies will be assessed using Joanna Brigg’s Institute quality appraisal criteria (JBI)(19). The following items will be used to appraise cohort and cross-sectional studies: (1) appropriateness of inclusion criteria; (2) description of study subject and setting; (3) valid and reliable measurement of exposure; (4) objective and standard criteria used; (5) identification of confounder; (6) strategies to handle confounder; (7) outcome measurement; and (8) appropriate statistical analysis.

Data extraction and management

A standardized data extraction format Microsoft Office Excel 2016 will be used to extract all the necessary data in each article. The data extraction format will include information about primary author, year of publication, type of study, study design, study setting, number of participants, diagnostic criteria, sex/gender and the number of MetS cases. Data extraction will be performed by three reviewers (SA, BB, and MM) independently. AW will cross-check for its consistency.

Data analysis

A STATA version 14 (Stata Corp, 4905 Lake way Drive, College Station, Texas 77845 USA) statistical software will be used for meta-analysis. A fixed/random-effects meta-analysis model will be used to obtain an overall summary estimate of the prevalence across studies. Point estimation with a confidence interval of 95% will be used. Sensitivity analysis will be done by excluding each study step-by-step from the analysis process. Publication bias will be assessed by funnel plots and the Egger and Begg’s statistical tests. Moreover, the risk of study bias will also be assessed using Hoy D. eta al tool(20). Trim and fill methods (Duval and Tweedie’s) will be applied in the case of publication bias. I^2 statistics and the

Cochran Q test will be used to evaluate the magnitude of heterogeneity across the studies. The I^2 provides variability percentage due to heterogeneity rather than chance differences and/or sampling error, and the I^2 value of 25%, 50%, and 75% considered as representing low, medium and high heterogeneity, respectively. We will perform a subgroup analysis based on diagnostic criteria defining Mets, sex/gender and study subjects in the case of substantial heterogeneity.

Discussion

Recently, the burden of MetS and chronic non-communicable diseases are rising alarmingly not only in developed countries but also in developing countries. People with MetS carry a much higher risk of CVD, stroke, and diabetes. Moreover, MetS associated mortality have become a major concern in adult population. The changing patterns of life style and consumption, and an ageing global population, are associated with an increase in MetS. These diseases now have serious implications contributing to the “double burden of diseases” for many low and middle income countries like Ethiopia besides to the challenge burden of infectious diseases, poverty, and under-nutrition. This protocol of the systematic review and meta-analysis aims to estimate the pooled prevalence of MetS in Ethiopia population. The comprehensive estimate result will provide empirical evidence necessary for researchers and decision-makers to draft policy, research needs and programming priorities for the future trend of MetS and associated diseases.

Strength and limitation of the study

This systematic review will provide an inclusive overview of all the fragmented data on the prevalence of MetS in Ethiopian population. Being the first systematic review of the published studies reporting the prevalence of MetS among the Ethiopian population, it will provide baseline information for researchers and policymakers. The established clear inclusion and exclusion criteria will provide accurate data for this systematic review. The search will be conducted with no time restrictions. This study will adhere to the PRISMA Protocols. However, the diagnosis of MetS using different criteria may cause heterogeneity across studies.

Declarations

Ethical Approval and Consent to participate: Not applicable

Consent for publication: Not applicable

Abbreviations: Cardiovascular Disease =CVD, Metabolic Syndrome=MetS

Authors’ contributions: SA: Conception of the research protocol, designed the study, review literature, wrote the protocol. SA, MM, BB, AW, and AE: reviewed and rewrote the protocol.

Competing Interest: No competing interest

Funder: No funding agency. This systematic review and meta-analysis will be done without the help of government/research organization. Rather it is by the motivation of the authors.

Availability of supporting data: Available up on request on the correspond author

Stage of the systematic review

1. Preliminary searches have been completed
2. Piloting of the study selection process has been completed
3. Formal screening of search results against eligibility criteria started but not completed
4. Data extraction not started
5. Risk of bias (quality) assessment not started
6. Data analysis not started

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Supplementary Files

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- PRISMAPchecklist.doc