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Author Affiliation:Eye Hospital of Shandong University
of Traditional Chinese Medicine.**ADMINISTRATIVE INFORMATION****Support** - Unfunded.**Review Stage at time of this submission** - Data extraction.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2024100033**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 9 October 2024 and was last updated on 9 October 2024.**INTRODUCTION**

Review question / Objective Our aim was to relate body mass index (BMI) to different measures of abdominal obesity (waist circumference, ratio of waist to hip circumference, and ratio of waist to hip circumference) in order to assess the relationship between obesity and major ocular diseases (AMD, glaucoma, DR, and cataracts) and to compare the extent to which different indicators affect ocular diseases.

Rationale Obesity has been shown to be an independent risk factor for non-communicable diseases, and the rising prevalence of obesity globally poses a significant burden on global public health. Although a growing body of evidence supports a correlation between obesity and major eye diseases, the evidence remains inconsistent and the conclusions controversial. For example, different epidemiologic studies may demonstrate a negative, positive, or even insignificant association between obesity and age-related macular degeneration (AMD). In addition,

most systematic reviews or meta-analyses have examined the association between body mass index (BMI) and major ocular diseases only, but there are limitations because BMI does not reflect visceral fat or fat distribution.

Condition being studied Visual impairment and blindness is a global public health problem. By 2050, the number of blind people worldwide is estimated to reach 114.6 million, and another 587.6 million will be affected by moderate or severe visual impairment. According to the 2020 survey, cataracts, age-related macular degeneration (AMD), glaucoma and diabetic retinopathy (DR) are the leading causes of moderate to severe visual impairment and blindness worldwide.

METHODS**Search strategy** Search formula:

#1 "Eye Diseases"[MeSH Terms] OR "Glaucoma"[MeSH Terms] OR "Cataract"[MeSH Terms] OR "Diabetic Retinopathy"[MeSH Terms]

OR "Macular Degeneration"[MeSH Terms] OR "Xerophthalmia"[MeSH Terms]
 #2 "Obesity"[MeSH Terms] OR "Body Mass Index"[MeSH Terms] OR "Overweight"[MeSH Terms] OR "Waist-Hip Ratio"[MeSH Terms] OR "Weight Loss"[MeSH Terms]
 #3 #1 AND #2

Electronic databases: Pubmed, Cochrane Library, Web Of Science, Embase, Medline.

Participant or population Population with target eye diseases (AMD, glaucoma, cataracts, DR).

Intervention Evaluated as obese under BMI, WC, and WHR, respectively.

Comparator BMI is calculated as the ratio of body weight (in kilograms) to the square of height (in meters), and a person is considered obese when his or her BMI exceeds 30 kilograms per square meter or 28 kilograms per square meter.

Waist circumference was measured as the level of the waist at the approximate midpoint between the lower edge of the last palpable rib and the top of the iliac crest; or the top of the iliac crest; or at the narrowest waist; or at the level of the navel, and based on the results of the waist circumference, the cutoff values were 90 cm and 80 cm for men and women, respectively.

Waist-hip ratio (WHR) is defined as the quotient of waist circumference and hip circumference (HC) in the same unit (dimensionless). Waist circumference (in centimeters) was taken at the smallest horizontal girth between the costal margins and the iliac crests at the end of tidal expiration, while hip measurements (in centimeters) were made at the maximal protuberance of the buttocks. We followed the World Health Organization recommendation of a WHR threshold of 0.8 and 1 for women and men, respectively, to indicate central obesity.

Study designs to be included Cohort studies, case-control studies, cross-sectional studies.

Eligibility criteria The effect value of obesity on ocular disease is OR.

Information sources Electronic database: Pubmed, Cochrane Library, Web Of Science, Embase, Medline.

Main outcome(s) cataract, age-related macular degeneration(AMD), glaucoma, and diabetic retinopathy(DR).

Quality assessment / Risk of bias analysis The quality of the cross-sectional study was evaluated by the Agency for Healthcare Research and Quality (AHRQ) and consisted of 11 items with a yes/no/not clear response option: "yes" was rated as "1" and "no" or "not clear" was rated as "0". Yes" was rated as '1' and 'No' or 'Unclear' was rated as '0'. Each cross-sectional study was categorized as being at high risk of bias (score 0-3), moderate risk of bias (score 4-7), or low risk of bias (score ≥ 8) based on the overall score. Quality was assessed for each included case-control and cohort study using the Newcastle-Ottawa Scale (NOS), which consists of 3 main items: study selection, comparability, and exposure. NOS was assessed with an overall score ranging from 0 - 9, with an NOS score of 7-9 indicating high quality.

Strategy of data synthesis ORs and 95% CIs from each included study assessing the association between obesity and major ocular diseases under different metrics were coded and fully combined using a random effects model to obtain a combined OR and its corresponding 95% CI. When multiple models were used to adjust for ORs, the model with the largest number of covariates was used. For studies reporting only stratum-specific ORs (e.g., ORs for early- and mid-stage and late-stage AMD), we combined the ORs for each stratum and used the combined ORs in subsequent meta-analysis.

Subgroup analysis Subgroups were divided into Asian and non-Asian populations according to the variability of obesity indicators across ethnicity.

Sensitivity analysis lump-sum elimination.

Country(ies) involved China.

Keywords Obesity; BMI; WC; WHR; Major eye disorders.

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