



# Effects of Helminths and Anthelmintic Treatment on Cardiometabolic Diseases and Risk Factors: A Systematic Review

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### Background

- Cardiometabolic diseases are the leading cause of death worldwide.
- Helminth infections affect 2 billion people globally and often overlap with cardiometabolic diseases in individuals and populations.
- Neither the causal relationship between helminths nor the effect of anthelmintic treatment on cardiometabolic disease risk have been reviewed systematically.

## **Objectives**

We conducted a systematic review to assess the reported effects of helminth infections on the severity or development of cardiometabolic diseases and risk factors in humans and animal models.





#### Methods Registered prospectively in PROSPERO (CRD42021228610). Two people screened and a third person resolved discrepancies. Meta-analysis was not possible due to heterogeneity. Figure. PRISMA flow diagram of systematic review Records identified Records identified Records identified Records identified through Medline through Embase through WoS through Cochrane and GIM (n=1199) (n=2649)(n=4622)(n=3506)Duplicate records Total records resulting from initial + updated search (n=11976) removed (n=3330)Titles and abstracts Records excluded **Predefined** based on eligibility screened search terms (n=8646)criteria generated for (n=8371)cardiovascular Records excluded Full-text articles disease and based on eligibility screened criteria risk factors, (n=275)(n=158)metabolic syndrome, Full-text articles Poor quality and helminths extracted + assessed records excluded with Downs and (n=34)Black criteria **Included studies:** (n=117)**RCT Total Studies (n=83)** Cohort Studies included in Cross-sectional 46 human final analysis (fair Case-control 36 animal quality or higher; 1 mixed human/animal study n=83) Animal

Results				
Cardiometabolic disease or risk factor	Number of studies	Median sample size	Overall effect of helminths on outcome	Overall effect of anthelmintic therapy on outcome
Serum lipids	44	167.5	Mostly ↓ (35 of 44 studies)	Mostly ↑ (5 of 6 studies)
Metabolic syndrome	38	213.5	Mostly ↓ (22 of 38 studies)	Mostly ↑ (7 of 10 studies)
Diabetes	30	279.5	Mostly ↓ (17 of 29 studies)	Mostly ↑ (3 of 5 studies)
Atherosclerotic cardiovascular disease	11	319	Mostly ↓ (7 of 10 studies)	Not studied
Blood pressure	18	555	Mixed (no effect in 10 of 18 studies)	No effect (3 of 3 studies)
High-sensitivity CRP	5	646	No effect (5 of 5 studies)	No effect (1 of 1 study)
Non- atherosclerotic cardiovascular disease	4	45	Mixed (2 showed ↑, 1 showed ↓, and 1 reported no effect)	Not studied

#### Conclusions

- Helminth infection may protect against dyslipidemia, metabolic syndrome, diabetes, and atherosclerotic cardiovascular disease.
- This protection may lessen after anthelmintic treatment.
- · Ability of helminths to lower cardiometabolic risk may be explained by a reduction in metabolic risk factors.
- Certain helminths are known to affect the liver, an organ crucial to lipid and carbohydrate metabolism.
- Prospective research is needed to clarify the effects of parasite eradication on cardiometabolic diseases and determine the mechanistic pathways linking helminth infections with these noncommunicable diseases and risk factors.

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