

The cardiovascular effects of methamphetamine: a scoping review

Nazia Zia^{1,2}, David Newcombe^{1,2}, Natalie Walker^{1,2}

¹School of Population Health, Faculty of Medical and Health Sciences, University of Auckland. ² Centre for Addiction Research, University of Auckland.

Background: Methamphetamine (MA) is a stimulant drug with high addiction potential. The impact of MA use on the nervous, immune, and respiratory systems of the body is well documented, but little is known about the cardiovascular (CV) effects of MA.

Aim: To undertake a scoping review to identify and map literature on the CV effects of MA.

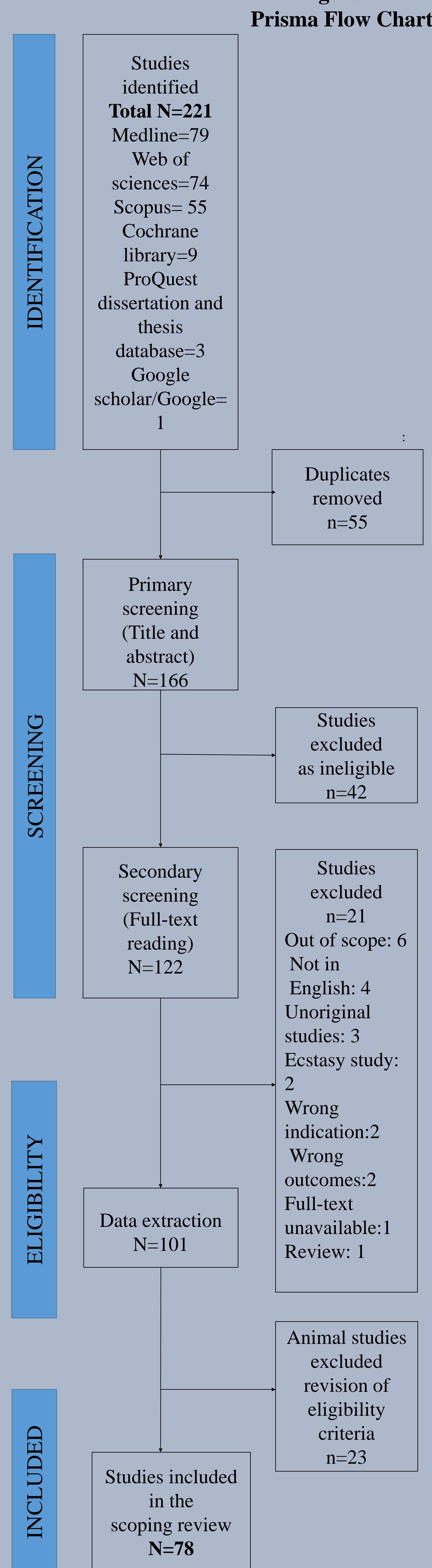
Objectives: To determine:

- 1) The relationship between MA use and CV functional abnormality and cardiovascular disease (CVD).
- 2) Whether the CV effects of MA are affected by the frequency and route of MA intake.
- 3) Whether demographic or comorbid conditions of MA users influence their CV outcomes.

Method: The review followed the PRISMA-ScR guidelines for scoping reviews, with six databases searched from 1960 till 5th March 2022. Identified studies were imported into Covidence for primary (title/abstract) and secondary (full-text) screening. Relevant data was extracted on data extraction forms. Extracted data were summarised using thematic analysis. Studies were grouped according to whether they were hypothesis-generating (descriptive) or hypothesis-testing (analytic).

Results: A total of 78 papers were included in the scoping review (Figure 1).

- The majority (n=58, 74%) of evidence consisted of hypothesis-generating studies.
- MA use, its pattern of use, and route of administration were inconsistently reported in the literature.
- Available research lacked an equity-based focus, with inadequate representation of people from communities with high MA use (i.e., women, gender-diverse, indigenous, and ethnic minorities).



- In normal/asymptomatic MA users, the MA-associated CV functional abnormalities were increased heart rate, high blood pressure and heart rhythm irregularities.
- In regular MA users, five CVD themes were identified in the literature:

MA-associated Heart Failure/ MA-associated cardiomyopathy (MACM)

- MACM patients are 10-15 years younger (on average) than non-MA-associated HF patients.
- MACM is more common in males than females.
- MA-associated HF = significantly reduced ejection fraction (<40%)
- MA use can use. cause a unique form of stress-related cardiomyopathy (Takotsubo cardiomyopathy).
- MACM can be reversed after cessation of MA.

Coronary Artery Disease (CAD)

- There is an increased risk of acute coronary events in MA users.
- CAD is a common pathology (25-55%) seen at autopsy of MA users.

Stroke

- High probability of haemorrhagic stroke in MA users.
- MA users can experience aneurysmal rupture, leading to subarachnoid haemorrhage, and arterial stenosis predisposing to stroke.

Hypertensive disorders

- Hypertensive heart disease.
- Pregnancy-related hypertensive disorders.

Arrhythmia

- Heart rhythm disorders in young (<40 years) patients.

Conclusion: Evidence suggests a causal association between MA use and adverse CV outcomes. However, a definitive link between CV abnormality and MA use could not be established. More analytic studies, with a greater equity focus, are required on this topic, plus better reporting on the pattern of MA use and route of administration.