

The impact of e-cigarette use on ovarian reserve and outcomes of assisted reproductive technology.

A systematic review.



The National Maternity Hospital
Vita Gloriosa Vita ~ Life Glorious Life

S Petch^{1,2,3}, C Nolan^{1,2,3}, L Glover^{1,2}, D Crosby^{1,2,3}

¹Merrion Fertility Clinic, Dublin; ²National Maternity Hospital, Dublin; ³University College Dublin

BACKGROUND

The negative impact of cigarette smoking on female ovarian reserve is well established.

Endocrine disruptor chemicals are linked to reduced female and male fertility (1). Smoking has been shown to reduce ovarian reserve and result in an earlier age of menopause (2).

Less is known about the impact of vaping (e-cigarette use) but emerging evidence is concerning.

The number of young people vaping is increasing and 1 in 5 women of childbearing age are estimated to vape (3).

METHODS

PRISMA guidelines were followed, study was registered on PROSPERO (CRD42024590117).

Time frame for studies: 2019-2025, searches in Sept 2024 and repeated
Databases searched: PubMed, the Cochrane database, EMBASE and CINAHL and conference abstracts from BFS, ASRM and ESHRE

Search terms: ‘vaping’ or ‘e-cigarette’, ‘Ovarian reserve’, ‘infertility’ or ‘subfertility’, ‘fecundability’ and ‘Pregnancy rate’ or ‘ART outcomes’.

Inclusion criteria: Experimental or observational studies including human female participants, vaping as exposure and objective measurements of ovarian reserve and results of ART as outcomes.

Exclusion criteria: animal studies, male only participants, review/opinion articles
The ROBINS-E tool for risk of bias assessment was used.

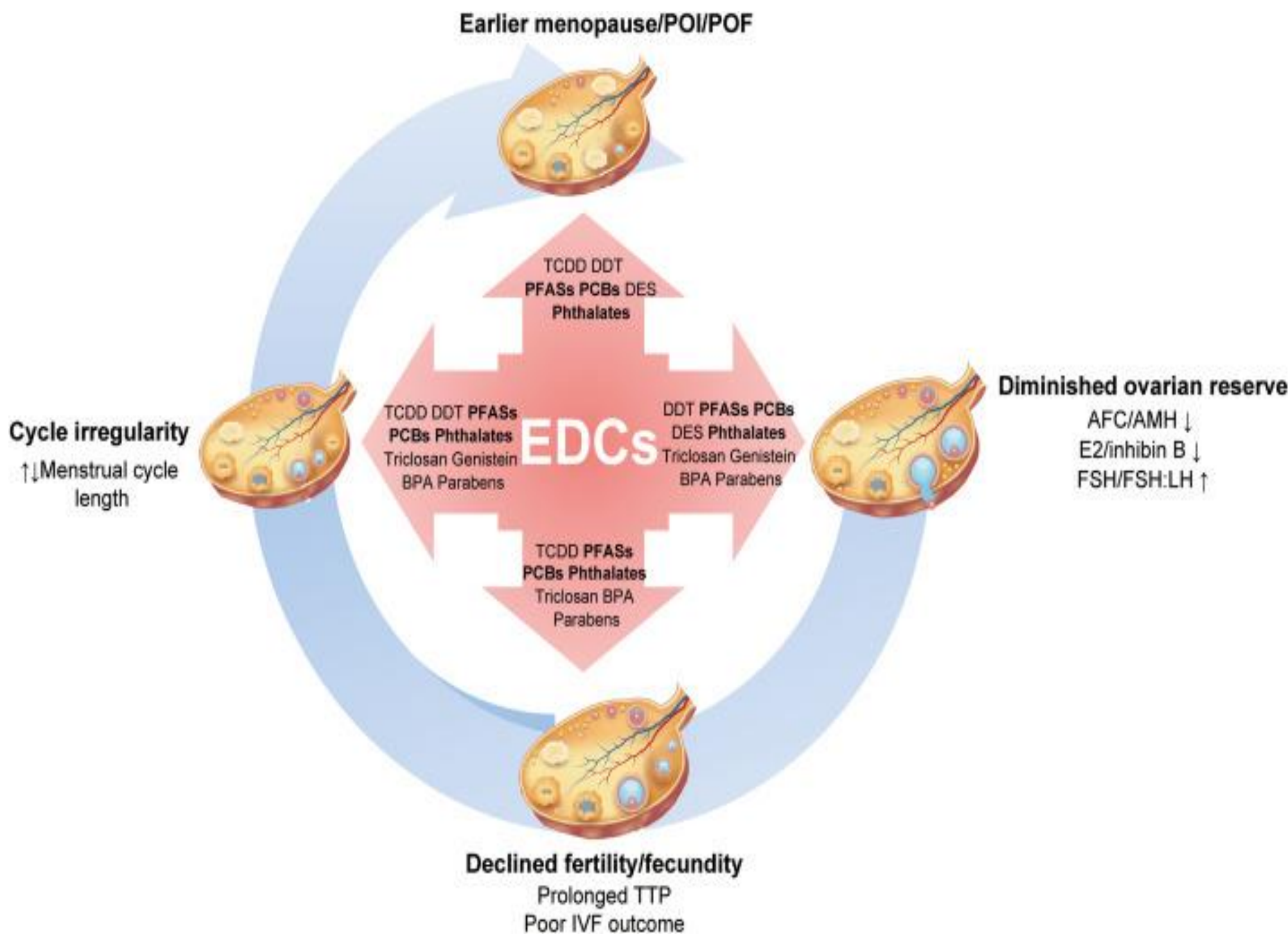


Figure 1: Impact of EDCs on ovarian function

Study	Risk of bias						
	D1	D2	D3	D4	D5	D6	D7
Galanti, 2023	✗	✗	✗	+	+	✗	-
Trapphoff, 2024	✗	✗	✗	+	+	+	-
Wainwright, 2025	✗	✗	✗	✗	+	✗	-

D1: Random sequence generation (Selection bias)
D2: Allocation concealment (Selection bias)
D3: Blinding of participants and personnel (Performance bias)
D4: Blinding of outcome assessment (Detection bias)
D5: Incomplete outcome data (Attrition bias)
D6: Selective reporting (Reporting bias)
D7: Other sources of bias

Judgement
✗ High
- Unclear
+ Low

Figure 2: Risk of bias tool (robvis)

AIMS

The aim of this systematic review was to review the literature on the impact of vaping (e-cigarette use) on ovarian reserve and outcomes of assisted reproductive technology (ART), including *in vitro* fertilisation (IVF) and intracytoplasmic sperm injection (ICSI).



RESULTS

The initial search included 213 studies. Three studies met the inclusion criteria. One study involved a retrospective review of Anti-Müllerian hormone (AMH) levels in > 20,000 healthy women of reproductive age and observed a **8% reduction in AMH levels in current vapers and 5% reduction in occasional vapers compared to non-vapers (4)**. Two of the studies were prospective observational studies on outcomes of intracytoplasmic sperm injection (ICSI) for infertile couples, comparing smokers/vapers to non-smokers(5,6). One study reported significantly lower AMH levels fertilisation rates but neither study reported a difference in clinical outcomes.

CONCLUSIONS

Vaping appears to reduce ovarian reserve.

A greater reduction in ovarian reserve was observed in ‘current’ vapers than ‘occasional’ vapers suggesting the reduction may be dose dependent but the threshold for harm and whether the effect is reversible is unclear.

Whether vaping impacts on the success of ART is yet to be empirically proven.

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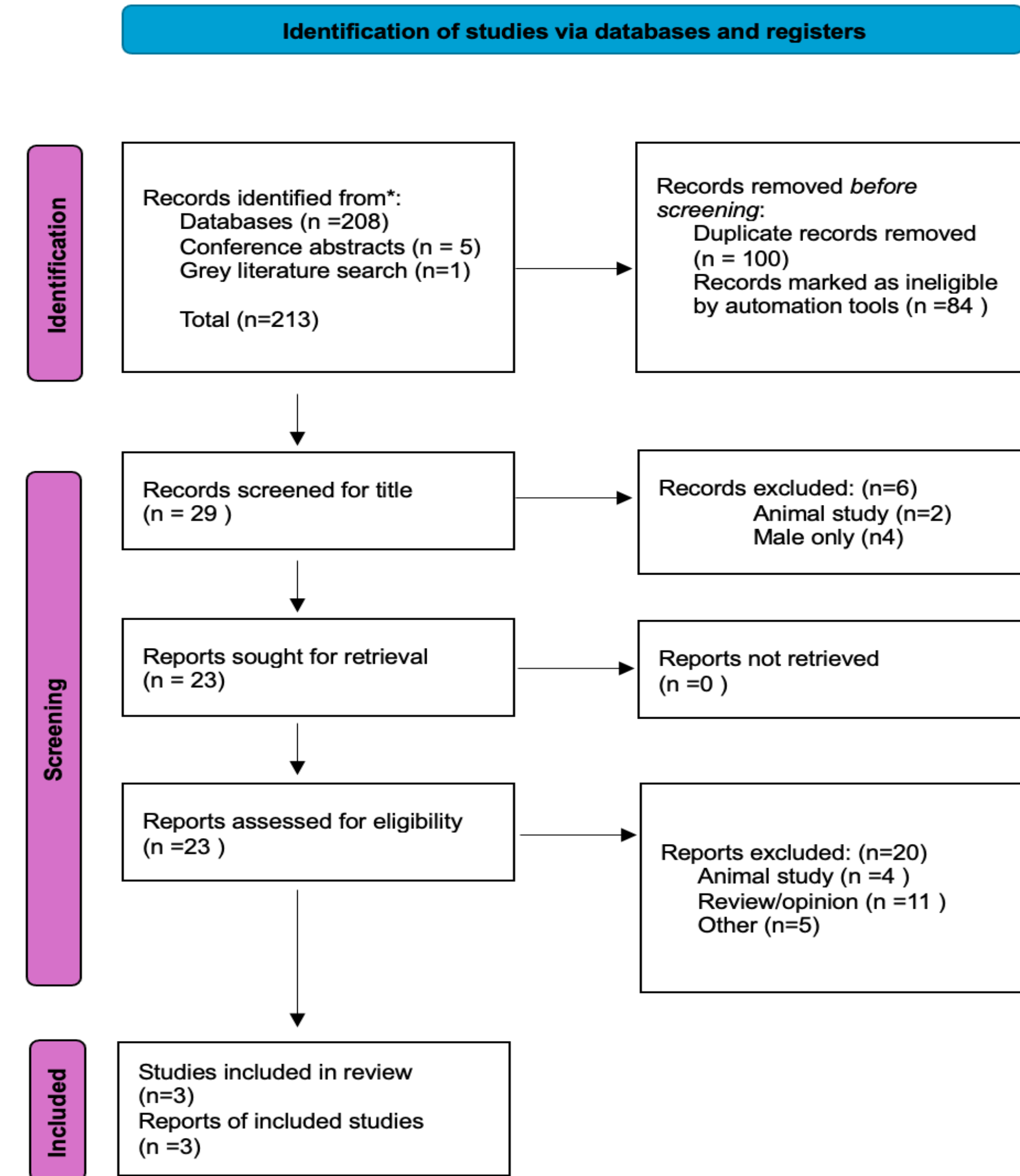


Figure 3: PRISMA flow diagram