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Review

A narrative review of bariatric surgery in Indigenous peoples

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ABSTRACT

Introduction: Indigenous peoples suffer high rates of obesity and obesity-related disease worldwide. Currently, bariatric surgery is the most effective intervention for severe obesity and obesity-related disease. The role bariatric surgery plays in alleviating the obesity burden amongst Indigenous peoples is unknown. We aimed to collate studies investigating bariatric surgery in Indigenous peoples and to provide a simple framework to use in future research surrounding this important issue.
Materials and methods: We conducted a systematic review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Studies that investigated outcomes for Indigenous peoples at any point along the bariatric surgery journey were included.
Results: Six articles were included in this review. Three studies investigated access to bariatric surgery and the remaining three studies investigated short to long-term outcomes following bariatric surgery. A narrative review was performed given study heterogeneity and quality of included studies. Indigenous peoples had lower access to bariatric surgery and in one study had greater weight loss in comparison to non-Indigenous peoples.
Conclusion: Despite a paucity of studies, it appears that there is emerging interest in investigating bariatric surgery among Indigenous peoples. We encourage those who seek to investigate this important issue at any point along the bariatric surgery journey, to do so using an equity-based approach.

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Introduction

Indigenous health is characterised by health inequities that are maintained through differential access to the determinants of health, to health care and the quality of care received [1,2]. Equitable access to surgical care is necessary for improving global health as well as the health of Indigenous peoples [3,4]. Indigenous health inequities should be considered in the context of the preferential benefit accrued by colonising nations from the systems they have introduced, erected and continue to refine and control [5]. Specifically, colonisation is centered on creating 'new histories' where Indigenous knowledge and beliefs are reconstructed as myths and superstition [5]. This has led to the silencing of Indigenous voices, particularly in response to Indigenous health inequities.

Obesity and its related diseases such as type II diabetes (T2DM) are global pandemics affecting the quality of life of all affected [6]. Prevalence figures show that Indigenous peoples suffer from remarkably high rates of obesity and its complications [7]. Thus, there is a real need for culturally safe, evidence-based interventions for the clinical management of obesity among Indigenous peoples. Bariatric surgery is currently the most effective treatment for severe obesity and T2DM [8–11]. The mainstays of obesity management are lifestyle and behavioural modification but long-term efficacy of these is poor [12]. Whilst not completely understood, mechanisms of weight loss after bariatric surgery arise as a result of an altered gastrointestinal milieu causing physiological changes such as altered gut hormone profiles, changes in bile acid secretion and in the intestinal microbiome [13].

There is growing interest in evaluating ethnic disparities following bariatric surgery however, there is little evidence investigating bariatric surgery in Indigenous peoples [14]. Excellent health research is required for good health outcomes, services and systems and should build towards equity whilst also ensuring that no one is left behind [15].

We aimed to perform a narrative review of the literature describing bariatric surgery in Indigenous peoples and to provide insights into how future research might be undertaken in this space.

Material and methods

This narrative review was performed, where possible, in keeping with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [16]. A series of electronic searches were performed in Medline, Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PubMed. With the assistance of a subject librarian and following a brainstorm session, two authors (JR and JT) collated a list of keywords and search terms to incorporate into strategies for each database. The search terms combined concepts of 'Indigeneity' and 'bariatric surgery' (Table 1). Study design or language limitations were not applied. Search results were downloaded and managed with EndNote X8 citation manager (Clarivate Analytics, Philadelphia, PA, USA).

Study selection

Abstracts were screened, and full-text papers obtained to identify primary research studies, whose primary purpose was to investigate bariatric surgery among Indigenous peoples. Two reviewers (JR and JT) independently performed the searches and examined titles and abstracts to exclude irrelevant reports and produce a list of studies for full-text review in an iterative process. Any disagreement over inclusion or exclusion was discussed with the senior author (M.H) to reach consensus. Exclusion criteria included studies where Indigenous peoples were not described in the context of bariatric surgery and reviews, case studies and articles without full texts (i.e. conference abstracts). Additional articles and abstracts were retrieved by manually searching reference lists of retrieved articles. The last search was performed on May 24, 2018.

Table 1
Search strategy used in Ovid MEDLINE® In-Process & Other Non-Indexed Citations.

Indigenous peoples	Bariatric surgery
1. Indigenous.*mp* aborigin[a].*mp* first nation.*mp*	1. Bariatric surgery/
2. Māori.*mp*	2. Bariatric[a].*mp*
3. Native.*mp*	3. Gastric band[a].*mp*
	4. Lap band.*mp*
	5. Gastric sleeve.*mp*
	6. Sleeve gastrectomy.*mp*
	7. Gastric bypass.*mp*

Strategy was modified in line with each database where all terms 'Ethnic', 'Surgery' and 'Disparities' were combined. exp exploded MeSH term, .mp key word.
[a] Truncation of keyword.

Data abstraction

Two reviewers (JR and JT) independently performed data extraction using pre-designed electronic tables. Articles were disaggregated into the following phase groups: pre-operative, perioperative and post-operative outcomes. The primary outcomes of interest in this review were descriptors of access to bariatric surgery, measurable weight loss and comorbidity remission outcomes and postoperative complications among Indigenous peoples following bariatric surgery.

Assessment of risk of bias

Two reviewers independently assessed methodological validity (JR, JT) using the Newcastle-Ottawa Quality Assessment Scale for cohort studies, which assesses the quality of cohort selection, comparability and assessment of outcomes [17]. This tool uses a scoring system with a maximum of nine stars and studies that achieve five or more stars are considered high quality. Any disagreements in scoring were discussed with the senior author (MH) to reach consensus.

Results

Of 294 records identified in our initial database search, six studies met our inclusion criteria (Fig. 1). Three studies covered the preoperative phase and described ethnic disparities in access to bariatric surgery, while the remaining three studies described short to medium term outcomes in Indigenous peoples from 12 months following bariatric surgery. Included study characteristics are summarised in Table 2.

Preoperative phase

Access

Three studies investigated access to bariatric surgery for Indigenous peoples and all reported that the Indigenous peoples had

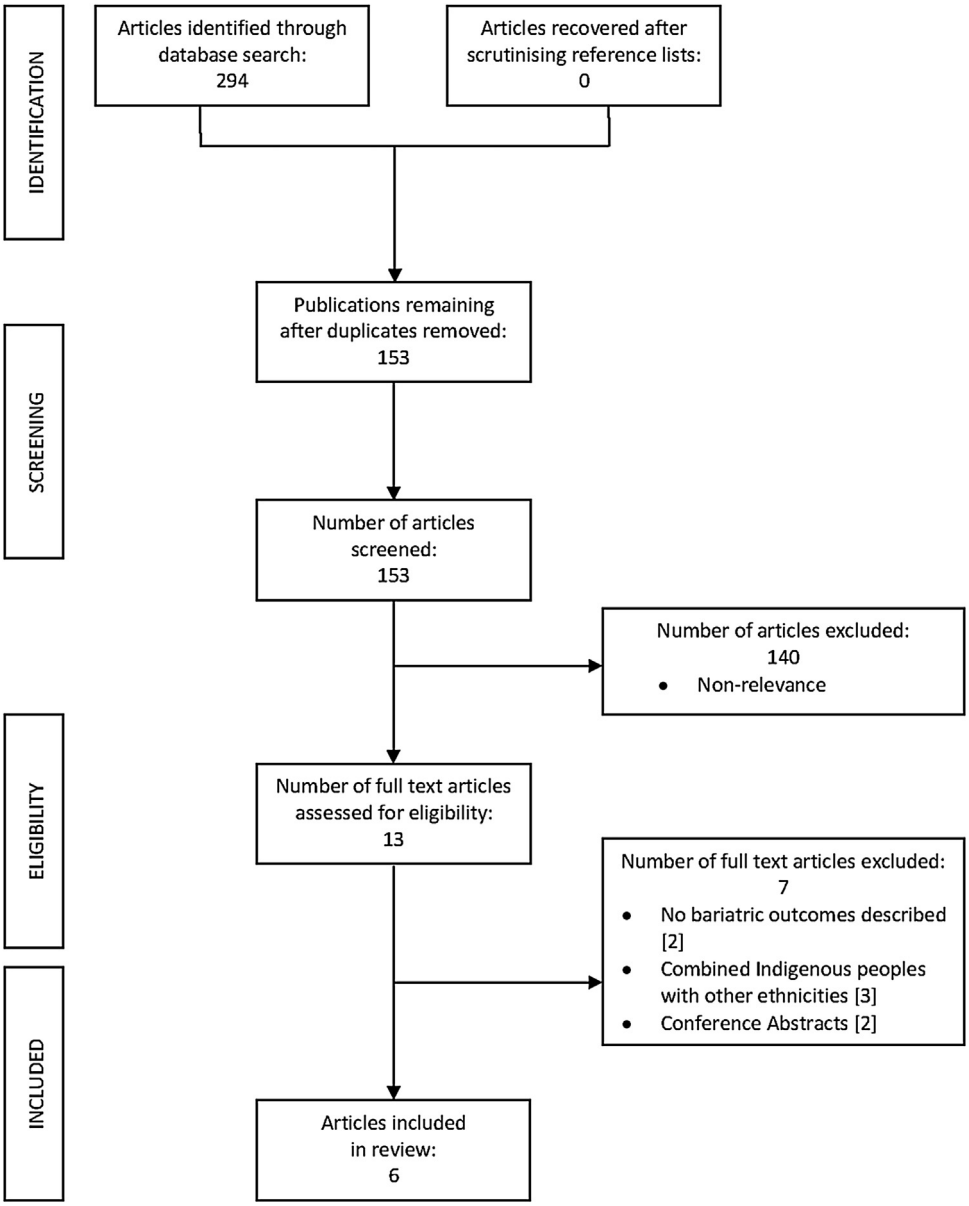

Fig. 1. PRISMA flow diagram showing study selection.

lower access to bariatric surgery. Wallace et al. observed that Native Americans (Indigenous peoples of the mainland of the United States of America) were half as likely to receive bariatric surgery than White Americans [18]. Similarly, rates of publicly funded bariatric surgery in New Zealand (NZ) over a 5-year period was three times lower in Māori (1.4 per 1000 morbidly obese population), the indigenous people in New Zealand (NZ), in comparison to people of NZ European/Other ethnicity (3.0 per 1000 morbidly obese population) [19]. Taylor et al. reported differences in rates of attrition after acceptance for bariatric surgery for Māori (50%), NZ Europeans (39%), and Pacific peoples (73%) [20].

Postoperative phase

Weight loss

Three studies monitored weight loss after bariatric surgery for a minimum of 12 months. O'Brien et al. employed several measures of weight loss observing a mean weight loss of 26.2 ± 14 kg, a mean BMI reduction from 44.3 to 34.4 kg/m^2 and significant reductions in waist and neck circumference in Indigenous Australian Aboriginal peoples 24 months after laparoscopic adjustable gastric banding (LAGB) [21]. Lam et al. measured successful weight loss after laparoscopic Roux-en-Y gastric bypass (LRYGB) as greater than 50% of excess body weight (EBW) lost and reported an EBW loss of 61% ($p < 0.001$) after 12 months in a cohort of Native Hawaiians [22]. Treacy et al. observed that metropolitan Australian Aboriginal peoples at five years following LAGB had a mean percentage of excess weight loss (%EWL) of 42 ± 27% and 67% achieved >50% EWL [23].

Remission of obesity-related comorbidities

O'Brien et al. measured T2DM remission as a fasting blood glucose of <7.0 mmol/L and a hemoglobin A1c (HbA1c) < 6.2% while off all diabetic medications aside from metformin [21]. Twenty-six patients completed 24 months of follow up, of which 20 (77%) achieved diabetes remission. Additionally, mean fasting plasma glucose reduced from 8.1 ± 2.6 to 5.9 ± 2.2 mmol/L and HbA1c reduced from 7.6 to 6.0%. Treacy et al. measured the cessation of diabetes medications and reported that 43/60 (76%) Torres Strait Islanders, Indigenous peoples of the islands off Australia, ceased

Table 2
Summary of included study characteristics.

	Study (Year)	Country	Indigenous peoples	Bariatric procedure	Study period	Study design	Total population (Indigenous population)	Follow-up period (months)	Outcomes measured
Preoperative Access	Rahiri (2017)	NZ	Māori	Not specified	2009–2014	Retrospective cohort	2109 (452)	60	Estimate rates of publicly funded bariatric surgery per 1000 morbidly obese population by ethnicity
	Taylor (2018)	NZ	Māori	Not specified	2007–2016	Retrospective cross-sectional	704 (227)	108	Ethnic differences in rates of attrition after acceptance onto a publicly funded bariatric surgery program
	Wallace (2010)	USA	Native Americans	Not specified	2006	Retrospective cohort	88605 (194)	12	Likelihood of bariatric surgery by ethnicity
Postoperative Outcomes	Lam (2016)	Hawai'i	Native Hawaiian	LRYGBP	2004–2009	Retrospective cohort	50	12	Weight loss and reduction of prescription medications
	O'Brien (2016)	Australia	Aboriginal	LAGB	2010–2012	Prospective cohort	30	24	Weight loss and remission of T2DM
	Treacy (2016)	Australia	Torres Strait Islander	LAGB	1998–2014	Prospective cohort	33	38.4	Weight loss and cessation of T2DM medications

LAGB, laparoscopic adjustable gastric banding; LRYGBP, laparoscopic roux-en-Y gastric bypass; T2DM, type 2 diabetes mellitus.

all diabetic medications [23]. After a mean period of 19 months post-surgery, 11 (92%) ceased insulin altogether.

Complications

Complication rates were reported in two studies. Treacy et al. reported a 5-year estimated rate of band revision/replacement in Aboriginal Australians of 7% and no reoperations for infection, leak or intolerance [18]. O'Brien et al. reported only one in-hospital adverse event where a 34-year-old man with severe diabetic nephropathy presented seven days after LAGB placement with sepsis in the region of the band. No deaths were observed in either study [21].

Comparison of outcomes between Indigenous and Non-Indigenous peoples

Two studies compared bariatric outcomes between Indigenous and non-Indigenous peoples. O'Brien et al. compared outcomes between Aboriginal and non-Aboriginal Australians. Aboriginal Australians were more obese than non-Indigenous Australians (BMI 44.8 vs 37.0) [21]. At 24 months follow up, Aboriginal Australians showed greater weight loss, reduction of waist circumference and reduction of diastolic blood pressure. However, non-Indigenous patients had a greater reduction in HbA1c and systolic blood pressure. Overall diabetes remission was similar between both groups at two years.

Treacy et al. reported no significant differences between Indigenous and non-Indigenous metropolitan-living Australians in mean %EWL (42 ± 27 vs 52 ± 30, $p = 0.65$) and %TWL (19 ± 13 vs 22 ± 12, $p = 0.45$) at final assessment [23]. Also, 67% Indigenous and 71% non-Indigenous metropolitan living peoples achieved the 5-year target of greater than 50% EWL after LAGB. Cessation of oral hypoglycemic medications postoperatively was comparable between both groups ($p = 0.58$).

Table 3
Newcastle-Ottawa scores for cohort studies.

	Selection	Comparability	Outcome	Overall Score
O'Brien et al. [21]	★★★★	–	★★★	7 stars
Lam et al. [22]	★★★	–	★★★	6 stars
Treacy et al. [23]	★★★★	–	★★★	7 stars
Rahiri et al. [19]	★★★★	–	★★	6 stars
Wallace et al. [18]	★★★★	★★	★★★	9 stars
Taylor et al. [20]	★★★★	★★	★★★	9 stars

Methodological quality of studies

Table 3 presents a breakdown of the Newcastle-Ottawa scores by category. The majority of studies were considered poor quality due to scoring 'zero' stars in the comparability section of the Newcastle-Ottawa Quality Assessment for Cohort Studies.

Discussion

This review collates relevant literature related to bariatric surgery and Indigenous peoples worldwide. Whilst there is a paucity of studies in this area, it appears there is emerging interest in this area. This review is an important first step in properly investigating and understanding the role that bariatric surgery may play in alleviating the obesity burden amongst Indigenous peoples.

Bariatric surgery is one of the most effective tools we have in modern medicine to treat obesity and obesity-related disease [24,25]. However, it has been previously postulated that bariatric surgery would only treat less than 1% of the total obese population [26]. In the studies included in this review, a development of research questioning equity in bariatric surgery for Indigenous peoples has been demonstrated. Two studies compared weight loss outcomes between Indigenous and non-Indigenous peoples following LAGB [21,23]. Surgeons appear to be shifting away from LAGB with its viability now being questioned in light of the LRYGB and LSG procedures producing better results [27,28]. Despite this, there

are a lack of studies investigating the efficacy of LRYGBP and SG in Indigenous peoples.

Bariatric surgery has attracted media attention worldwide that has given rise to contentious debates surrounding fairness and skepticism of its effectiveness and worth. A critique of the news print media and its portrayal of Indigenous Māori and bariatric surgery in NZ reported that justification for bariatric surgery took precedence over any issues surrounding Māori health and addressing health inequities [29]. This phenomenon of 'silencing' Indigenous narratives and legitimising Western narratives has become normalised [30]. In view of these important findings, we suggest that future research concerning Indigenous peoples and bariatric surgery should be performed using an equity-based approach that is responsive to Indigenous peoples.

Knowledge regarding the burden of ill-health afflicting Indigenous peoples in the realm of surgery is not new [31,32]. In Australia and NZ, the increasing number of Indigenous medical graduates has given rise to initiatives that aim to develop an Indigenous surgical workforce to improve the health status of Indigenous peoples [31,33]. Whilst significant progress is yet to be made, this movement will hopefully pave the way for Indigenous advocates within surgery to position themselves and conduct research that is equity-based, safe and responsive to Indigenous peoples. As adapted from Reid et al., we suggest that research concerning all Indigenous peoples and bariatric surgery requires good consultation, meaningful collaboration and safe analysis including the non-deficit interpretation of Indigenous data [15].

In summary, the lack of studies in this review signals that more and meaningful inquiry into the importance of equity in bariatric surgery for Indigenous peoples is required. We encourage those who seek to investigate this important issue, do so in partnership with Indigenous researchers and communities.

Disclosure and conflicts of interest

The authors have no conflicts of interest to declare.

CRediT authorship contribution statement

Jamie-Lee Rahiri: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft. **Jason Tuhoe:** Formal analysis, Writing - original draft. **Andrew MacCormick:** Writing - review & editing. **Andrew Hill:** Writing - review & editing, Supervision. **Matire Harwood:** Writing - review & editing, Supervision.

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Dr Rahiri, Dr Tuhoe and Dr Harwood are qualified Indigenous Māori medical practitioners and researchers based in New Zealand. Dr Harwood, the supervising author, has extensive expertise in Indigenous health research. However, the Authors acknowledge that they do not speak for all Indigenous peoples worldwide but instead recognise the common struggle that Indigenous people face in eradicating longstanding health inequities worldwide.

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