

Project Proposal:

Barriers to reduce postpartum weight retention in women with Polycystic Ovary Syndrome (PCOS).

Background:

Overview of PCOS

Polycystic Ovary Syndrome (PCOS), the most common endocrine disorder in women¹, generates numerous health problems across the lifespan. PCOS affects up to 18% of women of reproductive age in Australia, and of women screened for PCOS, 70% were undiagnosed². PCOS places a great burden on the health care system, and costs in Australia have been extrapolated to ~\$800 million³. The aetiology of PCOS is unclear: and both genetic inheritance and lifestyle factors may be implicated. PCOS increases the risk of hyperandrogenism, menstrual disorders, hirsutism, infertility, miscarriage, obesity, insulin resistance, anxiety, depression, cardiovascular complications, endometrial cancer, and type 2 diabetes (T2DM)⁴. The recently established NHMRC Centre for Research Excellence in the origins, outcomes, and optimal management of PCOS (CRE) recognises the importance of PCOS research, particularly: defining the natural history, the psychological features, quality of life, and drivers for adverse psychological health including obesity and infertility; and the incidence and prevalence of gestational diabetes, prediabetes, and T2DM, cardiovascular disease (CVD), and stroke. This research will align with these CRE aims and examine the barriers to post-partum weight loss, such as incontinence, for women with PCOS.

During pregnancy, physiological adaptations occur which contribute to gestational weight gain. After pregnancy, postpartum retention of this weight gain contributes to overweight and obesity, which may continue throughout the reproductive years⁵. Postpartum weight gain is a risk factor for worsening reproductive, cardiometabolic and psychological obesity-related morbidity⁶. Optimising post-partum weight loss can reduce future obesity⁷ and decrease the risk of future T2DM or CVD⁸ and adverse psychological outcomes⁹. This is of great relevance in PCOS given the high associated risk of obesity and associated metabolic and psychological adverse consequences.

The postpartum period is one of great change for all women, and there are barriers that may make weight loss difficult, particularly in women with PCOS, such as urinary incontinence^{10,11}, appetite dysregulation¹² and poor mental health or quality of life¹³. Women with PCOS experience poor quality of life and depression¹³, but the association with weight management and specifically post-partum weight retention is not known. Additionally, incontinence has not been studied in PCOS, and not in the postpartum period. Women with incontinence also have higher levels of depression and lower quality of life, and we have previously found that there is an additive affect, which affects both physical and mental health¹⁴. Younger women with incontinence are also less resilient¹⁵, and this may have implications for weight retention in women with PCOS in the postnatal period. This research focuses on the interaction of PCOS with incontinence risk and psychosocial factors that may influence associated comorbidities such as postpartum obesity, and potentially, T2DM.

Aims:

The specific aims of this proposal are:

1. To assess physical, psychosocial and psychological barriers and enablers, for postpartum weight loss in women with and without PCOS, and
2. To assess the associations between postpartum weight retention, with incontinence and psychosocial and psychological factors in women with PCOS.

Hypotheses:

The hypotheses which I will address in this program of research include:

- Women with PCOS experience a number of physical and psychological barriers to weight loss and in the postpartum period when compared to women without PCOS.

Rationale

As part of a larger fellowship application, this project will include questions in the 2015 SAHOS. The 2015 SAHOS already includes questions regarding PCOS, pregnancy, obesity, health related quality of life (SF-12), mental health, physical activity, risk perception of exercise, diet control and overeating, chronic conditions including T2DM and CVD, health risk factors and a number of demographic factors.

Lifestyle factors in PCOS

Currently, recommended first-line treatment for PCOS is lifestyle change, including healthy eating and optimal physical activity and weight management¹⁶. We know that obesity exacerbates and weight loss ameliorates some features of PCOS, such as hyperandrogenism, menstrual dysfunction and risk factors for CVD and T2DM.

The postpartum period and PCOS

The efficacy of a healthier lifestyle, particularly concerning weight gain, is a problem in postpartum women at a critical life stage where they may be at high risk of weight retention and weight gain which can contribute to future obesity-related complications such as T2DM and CVD. Even minor gains are associated with increased morbidity and each pregnancy can be associated with further weight gain⁵. This is highly relevant for women with PCOS¹⁷.

The influence of risk and psychosocial factors on comorbidity in PCOS

Urinary incontinence affects between 18.6 to 60% of postpartum women¹⁸, and can limit daily tasks¹⁹, including the ability to exercise, reducing the potential for managing healthy weight after pregnancy. Urinary incontinence also adversely affects health related quality of life and mental health¹⁴. Women with PCOS are already at risk of adverse mental health and quality of life¹³, and the impact of incontinence on these factors has not been measured in this group, particularly in the context of barriers to weight loss.

Methods

The South Australia Health Omnibus Survey (HOS)²⁰ has investigated a range of health issues annually since 1990. It is a representative population survey using a clustered, self-weighting, systematic, multistage area sample of metropolitan and country areas with populations of more than 1000. Interviews are conducted face-to-face with those aged fifteen years or over. The nature of an omnibus survey means that a number of not necessarily related questions regarding different topics are included from different users. Over 3000 respondents are interviewed with a response rate of 60%; this means approximately 1500 women will be surveyed. The use of HOS as a data collection

vehicle will provide a wider age group than previous Australian studies, based on a random sample from a representative South Australian community sample. Based on previous population estimates, we would expect approximately $n = 300$ women with PCOS to be identified in this survey, using a prevalence of 5- 20%²¹. There have been few recent whole of population studies that identify a subset of women with PCOS, enabling an epidemiological comparison of PCOS attributes with the rest of the population. HOS is also an ideal tool to recruit a random sample of women across different age and sociodemographic groups in SA, to be invited to be involved in further research.

Research Plan:

Key research strategies include:

1. Analysis of cross sectional study data surveying healthy weight, overweight and obese women with and without PCOS, regarding the barriers and enablers for weight management including incontinence and other psychosocial and physiological risk factors.
 - a. *Data sources:* 2015 South Australian Health Omnibus Survey, representative, community, face to face survey²⁰
 - b. *Subject selection:* Randomly selected South Australian women, 15 years and over, with and without PCOS
 - c. *Outcome measures:* Assessment of epidemiological associations between weight and other factors in postpartum women with and without PCOS including anthropometric, physiological and psychosocial factors such as Body Mass Index (BMI), incontinence, quality of life, physical activity, and mental health.
 - d. *Statistical Methodology:*
 - i. *Univariate Analysis:* In order to test our null hypotheses, a chi-square (χ^2) test will be used. Analysis of Variance will be applied to appropriate data formats.
 - ii. *Multivariable Analysis:* Logistic regression models will be used to examine the influence of PCOS status on the major outcomes of BMI with consideration of appropriate and risk demographic factors.
2. *Ethical Implications:* The original project methods for the methodology of the SAHOS have been approved by the University of Adelaide Human Research Ethics Committees, and the questionnaire has been approved for 2015. Further quantitative and qualitative work will require appropriate ethics approval from The University of Adelaide before proceeding.
3. *Community Involvement:* PCOS support groups will be informed about the project through group internet sites. Results will be conveyed to the community through presentations, media releases, internet sites and newsletters.

Proposed Questions:

We propose to include five validated questions which have been used in previous SAHOS surveys (1998, 2001) to examine incontinence and reflect the International Continence Societies definitions²² in the 2015 SAHOS. These questions will complement other already included questions including the prevalence of PCOS, a measure of pre pregnancy weight, parity and years since pregnancy, present height and weight, the Short Form 12, a measure of physical activity, nutrition, mental health, and other chronic conditions and risk factors, providing great potential for further analysis.

Timelines:

Planning for this project has already been initiated:

2015:	May:	Initial Questions and EOI submitted to Harrison’s Health Research (HHR)
	August:	Ethics application submitted
	August:	Pilot testing of HOS Questionnaire
	September - December:	Fieldwork of HOS Survey
2016	January:	Data analysis – HHR
	February:	Reports and Data received from HHR
	March:	Analysis
	May:	Publication Drafted
	July:	Submission of paper to journal ie BMC Women’s Health

Significance:

Identification of barriers to weight loss in PCOS will allow the development of targeted strategies to help these high-risk women to achieve optimal postpartum weight loss and lower their risk of obesity and T2DM. The uniqueness of this proposal is the ability to examine a wide range of factors related to PCOS and postpartum health in a community-based sample unlikely the majority of research in PCOS which is conducted in clinic-recruited populations. The novelty of this project is that research concerning barriers and enablers of post-partum weight loss in PCOS women have not been examined. PCOS places a costly burden on the health care system³ and impacts on health and quality of life¹³, yet this has not been examined in relation to the postpartum period as a key life stage to focus weight management to prevent future obesity-related morbidities.

This study builds on the career expertise I have developed in the epidemiological study and qualitative investigation of women’s chronic health conditions and comorbidities. By developing a thorough understanding of this problem, the novel data analysed here will contribute to reducing the burden of PCOS, at both the individual and the population level. This research project aligns with the New Knowledge Program activities of the CRE for PCOS in the following topic areas: Defining the natural history of PCOS; where we are examining the psychological features of PCOS, quality of life, and drivers for adverse psychological health including obesity and infertility, Establishing effective lifestyle and pharmaceutical interventions; and Emotional wellbeing in women with PCOS.

Expected Outcomes

The initiative described here will contribute to composing a high quality dataset, and a local cohort of PCOS women, to enable the analysis of data, further investigations and peer reviewed publications in relevant journals, adding to the evidence base for PCOS, and contributing to the success of future grant applications. A number of manuscripts are already planned as a result of this data collection, including initially “The effect of incontinence on weight loss in postpartum women with PCOS”, and “The determinants of quality of life in women with PCOS”. A pool of women with PCOS will also be identified for recruitment purposes for future work (qualitative, cross-sectional or clinical trials). This will provide a basis for further analysis and publication, increasing chances of future funding.

The outcomes of this project will include evidence to support fellowship applications for both Dr Avery and also for Dr Lisa Moran, as well as future Project Grant applications. Additionally, this work will contribute to the aims of the Adelaide node of the CRE which proposes to: Access and establish internationally unique, high-quality data sets and

health-information systems for PCOS, and Establish an integrated cross-sector health-professional research and training program, to build multidisciplinary research and clinical capacity in PCOS.

The SAHOS has been used in Australia for over 20 years, and has allowed researchers from various disciplines to conduct population research. SAHOS has been used by a number of organisations in South Australia to determine the population prevalences of chronic conditions in over time. A number of translational successes have arisen from data collected through SAHOS, such as Tobacco Control Policy, and the evaluation of Sunsmart policy, and a number of organisations have used SAHOS for their own evaluative and research purposes, such as Prof Alastair McLennan in the area of women's health. Dr Avery has herself published from SAHOS four times already.

Feasibility:

In her role as Senior Research Associate / Epidemiologist with Population Research and Outcome Studies, who oversee the management and marketing of the SAHOS, Dr Avery has been able to coordinate the questions of other users of SAHOS, market the SAHOS and identify potential collaborative opportunities, by encouraging the inclusion of quality of life measurements and other variables that will be of benefit to this project. This represents a significant opportunity as the cost of a single undiscounted SAHOS question is \$3100.

The 2015 SAHOS²⁰, a cross sectional face to face population survey, allows a number of researchers to purchase questions regarding their topic of interest in an omnibus of questions administered to participants, with each organisation paying only for their questions. A number of collaborators have already come together in the 2015 SAHOS, with the aim to study the population prevalence of PCOS and its association with a number of health and psychosocial risk factors, such as quality of life, sleep, and obesity, hypertension and hypercholesterolemia, physical activity and other psychosocial factors, considering parity as well as the postpartum period. The funding requested here will allow up to date cross sectional South Australian data regarding the associations of incontinence with PCOS during the postpartum period to be obtained using the 2015 SAHOS. Funding has also been requested for publication costs in a peer reviewed journal, such as BMC Women's Health.

SAHOS also provides ten demographic questions free of charge to subscribers, and the value added opportunity to use data from other subscribers is also possible. Additionally a general recruitment question for participants to be involved in further research is included. This means that for the cost of 5 questions, at least 40 questions will be available for analysis, with the potential for more data to be extracted once the makeup of the whole survey is known. A particular advantage of SAHOS is that an extremely rigorous sampling procedure is adopted for this survey, generating statistical information of the highest quality. SAHOS is rigorous and cost efficient, providing a robust and reliable data set, which has resulted in over 200 peer reviewed publications in different areas.

Summary Budget

Item / Activity for expenditure in 2015	Amount
Five questions in the 2015 Spring HOS @ \$2750 (discounted as included in a set of 10 plus) each plus	\$13,750.00
• Prompt card	\$440.00
Publication costs for paper in a BMC journal	\$649.00
Administration costs (phone calls, stationary)	\$161.00
TOTAL REQUEST	\$15,000.00

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