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A systematic review exploring dietary intake and levels of physical activity as predictors of gestational diabetes mellitus

Jovana Mijatovic, Louise Capling, Jimmy Louie, Victoria Flood, Sonia Cheng

Citation

Jovana Mijatovic, Louise Capling, Jimmy Louie, Victoria Flood, Sonia Cheng. A systematic review exploring dietary intake and levels of physical activity as predictors of gestational diabetes mellitus. PROSPERO 2016 CRD42016027795 Available from:

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Review question

To determine a number of predictors for the development of gestational diabetes mellitus (GDM), including selected diets and levels of physical activity

Searches

We used the PICO (Population, Intervention, Comparator and Outcome) model to frame our search. For Population, the search terms included "Pregnant" OR "Pregnancy/" OR "Pregnant women/" OR "Gestation\$" OR "Maternal". The intervention for this study is actually an observation and the search terms included "Food intake/" OR "Food consumption" OR "Food habits" OR "Food analysis" OR "Dietary intake" OR "Macronutrient\$.mp ("dietary fat/" OR "dietary protein/" OR "dietary carbohydrate/") OR "Calorie intake" OR "Energy intake" OR "Kilojoule intake" OR "Glycemic index" OR "Glycaemic index" OR "Glycemic load" OR "Glycaemic load" OR "Sugar\$" OR "Potato" OR "White bread" OR "Soft drink\$" OR "Sugar sweetened beverage\$" OR "Soda" OR "Soda pop" OR "Carbonated drink" OR "Carbonated beverages" OR "Meat" OR "Meat products" OR "Meat intake" OR "Red meat" OR "Processed meat" OR "Dairy" OR "Dairy products" OR "Saturated fat" OR "Processed food\$" OR "Pre-packaged food\$" OR "Fast food" OR "Energy dense food\$" OR "Convenience food" OR "Discretionary food\$" OR "Discretionary snack\$" OR "Snack\$" OR "Physical Activity" OR "Exercise" OR "Movement" OR "Body movement" OR "Pedometer" OR "Active minutes" OR "Leisure time" OR "Resistance training" OR "Energy expenditure" OR "Energy metabolism". Outcome: "Gestational diabetes mellitus" OR "Gestational diabetes". Search limitations: study type to produce a list of studies with a higher quality ("Cohort" OR "Longitudinal" OR "Prospective"). Other limitations included English language, female, human and year limit (1985 – present) to reflect the dietary trends of recent years. We will also hand search the references of selected studies to obtain more articles for the purpose of this systematic review.

Databases which will be used for this systematic review include MEDLINE, PubMed, ScienceDirect, EMBASE and CINAHL.

A date limit from 1985-present will be imposed to capture lifestyle patterns of current times. Studies will be excluded if they are in a language other than English.

Types of study to be included

Cohort, prospective and longitudinal studies.

Condition or domain being studied

Gestational diabetes mellitus (GDM) is a mild form of diabetes, with symptoms of glucose intolerance occurring for the first time in pregnancy. GDM increases the risk of short term negative pregnancy outcomes including maternal pre-eclampsia, neonatal macrosomia and hypoglycaemia, among others. The striking impact of GDM is that it can have long lasting affect on mothers and babies. For instance, there is a 50% chance of mothers developing Type 2 Diabetes Mellitus 5-10 years post birth. Offspring developing and growing under hyperglycemic conditions are known to undergo epigenetic changes, thereby resulting in a generation susceptible to metabolic diseases such as Type 2 Diabetes Mellitus and obesity later in life. One could appreciate the concern of this self-exacerbating vicious cycle, programming subsequent generations to the development of metabolic diseases and placing a greater strain on the health system. Rather than point out how to treat the present problem, we aim to collate all the relevant information on dietary intake and physical activity which could potentially highlight the modifiable risk factors for the development or prevention of GDM.

Participants/population

This systematic review will focus on women with a singleton pregnancy with no gestational diabetes at the commencement of either cohort, longitudinal or prospective studies. These studies are to report dietary intake and/or physical activity levels throughout pregnancy with gestational diabetes mellitus as the primary outcome. Reports of additional information such as pre-eclampsia, macrosomia, small/large for gestational age offspring are also desirable.

A date limit from 1985-present will be imposed to capture lifestyle patterns of current times. Studies will be excluded if they are in a language other than English, if the article is a review/randomized controlled trial/cross sectional study and if the subjects have underlying medical conditions or major interventions but not limited to Roux-En-Y.

Intervention(s), exposure(s)

The present systematic review will be extracting data from observational studies including longitudinal, cohort and prospective studies, whereby subjects would have received none or minimal degree of intervention. More specifically, we are interested in lifestyle behaviours (i.e. dietary intake and/or levels of physical activity) that either increase the risk or are protective against the onset of gestational diabetes. With regards to the diet, we aim to encounter studies that report particular diet components such as those stated in the search terms list (e.g. meat intake, processed foods, carbohydrates) whereas with physical activity, we aim to collect information on type, duration and intensity of body movements.

Comparator(s)/control

Given the observational nature of our selected studies, participants that develop gestational diabetes mellitus will be compared to other women in their respective study that did not develop the disease. Depending on the degree of information provided, this will include demographic information, body mass index and family history of disease, among others.

Context

The studies to be included will mainly be those which focused on capturing long term dietary intake and/or levels of physical activity in women who subsequently become pregnant.

Main outcome(s)

Primary outcome for this systematic review is gestational diabetes mellitus.

* Measures of effect

Gestational diabetes mellitus is diagnosed across the world using different diagnostic criteria, therefore it is expected that some studies will capture a greater number of GDM-positive subjects than others. It is anticipated that this diagnostic test will take place between 24-28 weeks gestation. We are also aware that studies are likely to use different methods to capture dietary intake and levels of physical activity.

Additional outcome(s)

They include (but are not limited to) pre-eclampsia, macrosomia, small/large for gestational age offspring.

* Measures of effect

Not applicable. These were observational studies.

Data extraction (selection and coding)

The following steps will be taken to narrow down the number of studies for this review.

1. Search hits from multiple databases will be exported to EndNote, and subsequently duplicates will be removed.
2. Studies will be screened by title and those that meet the simplest criteria will be exported to an excel spreadsheet.
3. Studies will be screened by abstract and reasons for their exclusion are to be noted in the preformed table.
4. Studies will be reviewed by full text relying strongly on the inclusion/exclusion criteria set out earlier. Similarly reasons for exclusion will be noted on a different spreadsheet in Excel.

Risk of bias (quality) assessment

Studies will be assessed for bias and quality using the Quality Criteria Checklist obtained from the American

Dietetic Association Evidence Analysis Manual. Only the studies with positive or neutral ratings will be included in the final systematic report.

Strategy for data synthesis

If the present systematic review produces sufficient number of diet and physical activity with homogenous data, we plan to conduct a meta-analysis.

Analysis of subgroups or subsets

The initial plan is to run all the physical activity studies together and then perform sensitivity analysis for potential confounding variables.g. pre-pregnancy vs early pregnancy, different physical activity types (e.g. total physical activity vs medium-high physical activity vs incidental/housework type physical activity).

Contact details for further information

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Type and method of review

Epidemiologic, Meta-analysis, Systematic review

Anticipated or actual start date

23 October 2015

Anticipated completion date

28 February 2018

Funding sources/sponsors

None

Conflicts of interest

None known

Language

English

Country

Australia

Stage of review

Review Completed published

Details of final report/publication(s)

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<https://www.mdpi.com/2072-6643/10/6/698>

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Subject indexing assigned by CRD

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Diabetes, Gestational; Female; Humans; Motor Activity; Pregnancy; Publications; Risk Factors

Date of registration in PROSPERO

15 February 2016

Date of publication of this version

25 July 2019

Details of any existing review of the same topic by the same authors

Stage of review at time of this submission

Stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	Yes
Data extraction	Yes	Yes
Risk of bias (quality) assessment	Yes	Yes
Data analysis	Yes	Yes

Revision note

We updated our entry including providing details of the publication.

Versions

15 February 2016

19 June 2017

25 July 2019

PROSPERO

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