ISSN 0008-3194 (p)/ISSN 1715-6181 (e)/2021/50–58/$2.00/©JCCA 2021

Physical activity throughout pregnancy: guideline critical appraisal and implementation tool

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Objective: *The 2019 Canadian guideline for physical activity throughout pregnancy provides evidence-based recommendations to promote maternal, fetal, and neonatal health. We aimed to 1) critically appraise the 2019 Canadian guideline for physical activity throughout pregnancy; and 2) develop a guideline summary for clinicians to facilitate the uptake of recommendations into practice.*

Methods: *We used the Appraisal of Guidelines for Research and Evaluation II (AGREE II) instrument to critically appraise the quality and reporting of this guideline. Four reviewers independently scored between*

Activité physique durant la grossesse: examen critique des lignes directrices et outil de mise en œuvre

Objectif : *L'édition de 2019 des Directives canadiennes en matière d'exercice physique pendant la grossesse fournit des recommandations fondées sur des données probantes visant à favoriser la santé de la mère, du fœtus et du nouveau-né. Notre objectif était 1) d'examiner d'une façon critique l'édition de 2019 de ces lignes directrices; et 2) de faire un résumé à l'intention des cliniciens pour faciliter leur adoption dans l'exercice.*

Méthodologie : *On a utilisé la grille Appraisal of Guidelines for Research and Evaluation II (AGREE II) pour évaluer la qualité et le contenu des lignes directrices. Quatre examinateurs indépendants ont attribué une cote allant de 1 (fortement en désaccord) et*

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Conflicts of Interest: None
Funding: Funding from the Canadian Chiropractic Research Foundation

1 (strongly disagree) to 7 (strongly agree) for 23 items organized into six quality domains.

Results*: AGREE II quality domain scores ranged from 47%-64% and the overall quality of the guideline was rated as 83% (high quality).*

Conclusion: *Based on its methodological quality, we recommend the use of this guideline. Our guideline summary includes six recommendations and other safety precautions that are relevant for clinicians in Canada.*

(JCCA. 2021;65(1):50-58)

KEY WORDS: physical activity, exercise, pregnancy, practice guideline, implementation science

7 (fortement d'accord) à 23 éléments répartis dans six groupes d'aspects de la qualité.

Résultats *: Les cotes attribuées aux aspects de qualité de la grille AGREE II ont varié de 47 à 64 %. La cote attribuée à la qualité globale des lignes directrices s'est élevée à 83 % (grande qualité).*

Conclusion : *Compte tenu de la qualité de la méthode avec laquelle elles ont été élaborées, on recommande l'adoption de ces lignes directrices. Nous résumons six recommandations et des consignes de sécurité pertinentes pour les cliniciens canadiens.*

(JACC. 2021;65(1):50-58)

MOTS CLÉS : activité physique, grossesse, lignes directrices de pratique, science de la mise en œuvre

Introduction

Physical activity recommendations for pregnant women have evolved over the years. Concerns regarding the fetal response to exercise and strenuous exercise was once thought to compromise fetal well-being.[1-3] As a result of evolving research, concerns regarding the potential and theoretical harmful effects of exercising while pregnant have been unsubstantiated. In fact, the Society of Obstetricians and Gynecologists of Canada, encourage women who are experiencing healthy, uncomplicated pregnancies to exercise.[4,5] The benefits of exercising during pregnancy may include: decreasing pregnancy-related back pain, reducing nausea, reducing depression, fewer newborn complications, decreased risk of pre-eclampsia, and prevention of excessive maternal obesity.[5-11]

The 2019 Canadian guideline for physical activity throughout pregnancy provides six recommendations.[11] Recommendations were developed by a guideline consensus panel and informed by systematic reviews, prenatal expert opinion, methodological experts, exercise professionals and patient consultation. Recommendations are reported by strength indicating whether the recommendation best serves all pregnant women ("strong") or, if not all pregnant women benefit from the recommendation ("weak"). Additionally, recommendations are reported by the quality of evidence ranging from "very low" to "high" based on the guideline consensus panel's confidence in the estimated effect on the health outcome. All recommendations considered concepts regarding feasibility, acceptability, costs, and equity.

While the evidence for exercise throughout pregnancy is growing, not all healthcare professionals routinely counsel their pregnant patients regarding exercise.[12-14] Some healthcare professionals have reported that they lack knowledge of exercise during pregnancy, lack awareness regarding the existence of guidelines, or they feel that there is a disconnect translating this knowledge into practice.[12,13,15] Pregnant patients with musculoskeletal complaints may consult with clinicians, including rehabilitation professionals such as chiropractors or physiotherapists. They have opportunities to offer exercise prescription, manual therapies, education, and self-management strategies for pregnant patients experiencing musculoskeletal pain.[16-19] A proportion of clinicians report not having the appropriate knowledge or comfort level in treating this patient population.[20] A lack of formal training, institutional variability, and awareness of current research can be challenging and may explain the deficit in knowledge.[15,20] The 2019 Canadian guideline for physical activity throughout pregnancy provides a series of recommendations regarding physical activity throughout pregnancy in the promotion of maternal, fetal and neonatal health.[11]

Guideline implementation (GI) tools can be used to

Maximum possible score = 7 (strongly agree) x 3 (items) x 4 (appraisers)
Minimum possible score = 1 (strongly agree) x 3 (items) x 4 (appraisers)

$$\text{Scaled domain score} = \frac{\text{Obtained score} - \text{Minimum possible score}}{\text{Maximum possible score} - \text{Minimum possible score}} \times 100$$

Figure 1.
AGREE II scaled domain score formula

assist healthcare providers to understand and integrate clinical practice guidelines into practice by supporting GI implementation tools may include evidence summaries for clinicians, patient handouts, or indicators for performance measurement.[21-24] Disseminating GI tools may improve guideline uptake and adherence by healthcare providers.[21,25] GI tools present evidence in concise and user-friendly formats to meet the needs of the user and aim to go beyond just what recommendations to apply by guiding how to apply them. In a systematic review by Gagliardi and Brouwers in 2015, 137 guidelines published between 2008-2013 were evaluated using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) instrument and demonstrated low applicability scores.[26] Among included studies, the applicability domain scored lower compared to all other AGREE domains.[26] The pattern of low applicability scores among guidelines indicates a need for implementation tools. The purpose of this study was to critically appraise the methodological quality of this guideline and to develop a guideline summary for clinicians to improve the applicability recommendations in practice.

Methods

The AGREE II instrument was used to assess this clinical practice guideline.[27] The AGREE II instrument is a valid and reliable measure of quality of reporting and guideline development.[28,29] Four independent reviewers were trained in the use of the AGREE II instrument with an online module and previous practice appraisals, independently provided scoring between 1 (strongly disagree) to 7 (strongly agree) for 23 items organized into six quality domains (Scope and purpose, Stakeholder involvement, Rigour of development, Clarity of presentation, Applicability and Editorial independence). The reviewers met after independent appraisal to reach consensus through discussion. Reviewers considered each item independently for biases and determined the impact the bias might have on the overall quality of the guideline. Scaled domain scores were calculated according the AGREE II User Manual formula (Figure 1).[27] The combination of the scaled domain scores and consensus discussion informed the overall quality rating of the guideline. Data was extracted by three reviewers (CAW, HH, and KN) and double checked by another (LV). All authors were involved with the interpretation and reporting of key recommendations.

Results

Individual AGREE II item scores were used to evaluate the overall quality of the guideline. AGREE II domain scores ranged from 47%-64% (Table 1). The overall quality of this guideline was 83% and the reviewers recommended this guideline for use.

Table 1.
AGREE II scaled scores

Domain	Scaled domain score (%)*
▶ Scope and purpose	60
▶ Stakeholder involvement	62
▶ Rigour of development	57
▶ Clarity of presentation	64
▶ Applicability	47
▶ Editorial independence	48
▶ Overall guideline assessment	83
▶ Overall guideline recommendation	Yes

* A quality score was calculated for each domain according to the AGREE II formula and were reported as percentages.

Discussion

In our appraisal of the 2019 Canadian guideline for physical activity throughout pregnancy, the lowest domain score was regarding applicability and as such, we have designed a GI tool for clinicians. Low applicability scores arise when a guideline is not supported with tools or advice for implementation or when barriers to applying recommendations have not been adequately considered.[27] The overall rating could have been improved with a more clearly defined research question, robust details describing the recommendation development process and specific information on the monitoring or auditing criteria. The following recommendations are the result of the 12 systematic reviews conducted by the consensus guideline panel to describe the effects of physical activity throughout pregnancy.

Recommendations

[Strength of recommendation | Quality of evidence]

Recommendation 1:

All women without contraindications should be encouraged to be physically active throughout pregnancy. [Strong | Moderate]

- This recommendation includes women who were previously inactive, women diagnosed with gestational diabetes mellitus, and women who are categorized as overweight or obese (pre-pregnancy body mass index ≥25 kg/m2).
- No recommendation was provided for pregnant women over the age of 35 as there were no studies exclusively evaluating this subgroup.

Recommendation 2:

Pregnant women should accumulate at least 150 minutes of moderate-intensity physical activity each week to achieve meaningful health benefits and reductions in pregnancy complications. [Strong | Moderate]

- Moderate-intensity is described as tasks that result in light sweating and/or a slight to moderate increase in breathing or heart rate.[30,31] As the term "talk test" implies, the woman is at a comfortable intensity if she is able to maintain a conversation during physical activity and should reduce the intensity if this is not possible.[4,30] Examples include brisk walking, water aerobics, stationary cycling, and resistance training.
- Moderate-intensity heart rate ranges (beats/min) for pregnant women aged <29 years are 125-146 and for those aged 30-35 years are 121-141.[11]
- Although accumulating greater amounts of physical activity over the week is associated with greater benefit, physical activity below the recommendations also incurs some benefits. Therefore, pregnant women should be encouraged to be physically active, even if the recommendations are not able to be met.

Recommendation 3:

Physical activity should be accumulated over a minimum of 3 days per week; however daily activity should be encouraged. [Strong | Moderate]

- Ensuring that at least 150 minutes of moderate intensity physical activity accrues over a minimum of 3 days allows for a consistent accumulation of activity in manageable bouts and result in maternal and fetal benefit.
- There may be times when the recommendations cannot be met due to fatigue and/or discomforts of pregnancy; women are encouraged to do what they can and return to recommendations when possible.[11]

Recommendation 4:

Pregnant women should incorporate a variety of aerobic exercise and resistance training activities to achieve greater benefits. The addition of yoga and/or gentle stretching may also be beneficial. [Strong | High]

- Physical activities should meet the needs and abilities of pregnant women. Different types of exercise can be performed alone or in combination. However, combining aerobic and resistance training during pregnancy has been more effective at improving health outcomes than interventions that focused on aerobic exercise alone. In addition, exercise has been shown to reduce the severity of low back pain, pelvic girdle pain, and lumbopelvic pain during pregnancy.[32]

Recommendation 5:

Pelvic floor muscle training (PFMT) (e.g., Kegels) may be performed daily to reduce the risk of urinary incontinence. To achieve optimal benefit, instructions on the proper technique is recommended. [Weak | Low]

- Urinary incontinence (UI) is a common complaint of pregnancy and, as a result of the altered hormonal status that occurs during pregnancy, increased

weight of the uterus on the pelvic floor and the possible trauma to the pelvic floor muscles as a result of labour, UI may impact the postpartum period.[11,33]

Recommendation 6:
Pregnant women who experience light-headedness, nausea or feel unwell when they exercise flat on their back should modify their exercise position. [Weak | Very Low]

- Although the exercise interventions that included supine exercises were not associated with adverse pregnancy outcomes, there was insufficient, high-quality evidenced to determine whether or not this should be avoided during pregnancy.[11,34] Therefore, the panel suggested that pregnant women experiencing adverse events (nausea, light-headedness, etc.) while in this position should modify their position or avoid it altogether.[11]

How can clinicians help?

Clinicians can promote healthy lifestyle behaviours with their pregnant patients by providing education and prescribing physical activity programs. The uptake and adherence to physical activity can be facilitated by clinicians choosing to take a proactive role with their patients.[35] Clinicians can implement a personalized approach to exercise prescription by considering a patient's environmental context, available resources, personalized education, and providing reassurance of a patient's exercise capability.[35] All pregnant women without contraindications (Figure 2) should be encouraged to follow the recommended physical activity guidelines. If pregnant women were not physically active before pregnancy, they should be advised to commence a graduated program. Programs may include strength training exercises, aerobic conditioning, stretching, and relaxation techniques, and clinicians can help determine the appropriate frequency, intensity, and timing of physical activities. Clinicians can discuss physical activity and exercise options with patients in consideration of their abilities, preferences, other personal and environmental factors, and perceived barriers to participating in physical activity. Clinicians should assess and address barriers to exercise, whether personal (fear-avoidance) or environmental (social or physical). For example, for patients living in smaller spaces, clinicians can suggest activities that require minimal space or equipment such as walking or bodyweight exercises (e.g., push-ups, squats).

Given that moderate-intensity physical activity is recommended, clinicians should educate pregnant patients on the use of heart rate zones[36,37] or the "talk test" for monitoring intensity[4,30]. Pregnant patients who wish to maintain high-intensity physical activity, such as elite athletes, should be referred for co-managing and monitoring by an obstetrics care provider.[11,38] Clinicians can provide instruction on proper form and technique for all prescribed exercises. PFMT exercises alone or in combination with other forms of exercises may be prescribed to reduce the odds and severity of UI during pregnancy and the postpartum period.[33] If exercising in a supine position results in any light-headedness, nausea, or feeling unwell, alternative exercise positions should be recommended.[34] Clinicians should familiarize themselves with exercises performed in alternative positions, such as side-lying, seated, or standing.

As many as three quarters of pregnant women experience low back (LBP), pelvic girdle pain (PGP), or a combination of both during their pregnancy.[39] Due to their uncertain etiology, pregnancy-related LBP and PGP are complex in nature as well as unpredictable, involving variable levels of pain throughout the course of pregnancy and sometimes even throughout the course of a day.[40,41] This has historically made it difficult to research the effects of exercise on the prevention and treatment of pregnancy-related LBP and PGP.[42] A systematic review published in 2019 found that although exercise did not reduce the odds of pregnancy-related LBP or PGP, there was low to moderate evidence that prenatal exercise effectively decreased the severity of pregnancy-related LBP and PGP.[43] If clinicians choose to recommend exercise for women with pregnancy-related LBP and PGP, they should make sure to monitor for any possible exacerbations in symptoms and make modifications if necessary.

Pregnant patients should be regularly monitored for any development of diastasis recti.[44] If a midline separation between the two rectus abdominus muscles exists or seems to be developing, some exercises may need to be modified. For example, abdominal strengthening exercises such as abdominal curls should be avoided while aerobic exercise such as walking should be encouraged.[11]

Finally, there are a number of biomechanical and physiological changes that may impact the pregnant patient's body and normal range of motion including a skewed centre of gravity and an increase in ligament laxity. As such, it

is recommended that all physical activities should include appropriate warm-up and cool-down periods to potentially minimize the risk of injury.[30,44] Clinicians who feel unprepared to provide exercise instruction to their patients should make referrals to health or exercise professionals with experience in prenatal exercise programs.

Conclusions

The 2019 Canadian guideline for physical activity throughout pregnancy was deemed to have adequate methodological quality for use by clinicians. The guideline demonstrated a low applicability score amongst our reviewers, which led to the need to improve the implementation of guideline recommendations. We developed a GI tool for clinicians (Figure 2), which includes a safety checklist and recommendations to facilitate evidence-based patient care.

Author Contributions: GC drafted and revised the paper and approved the final draft. CAW, HH, KN, and LV drafted and revised the paper, critically appraised the guideline, and approved the final draft. CC conceived of the paper, assisted with the draft and revision of the paper and approved the final draft.

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Centre for Disability Prevention and Rehabilitation

Canadian Chiropractic Guideline Initiative

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Physical activity throughout pregnancy safety checklist and recommendations

For healthcare providers

Healthcare providers should:

✓ Know the contraindications

Absolute contraindications	Relative contraindications
▪ Ruptured membranes, premature labour ▪ Unexplained persistent vaginal bleeding ▪ Placenta previa after 28 weeks' gestation ▪ Pre-eclampsia ▪ Incompetent cervix ▪ Intrauterine growth restriction ▪ High-order multiple pregnancy (eg. triplets) ▪ Uncontrolled type I diabetes, uncontrolled hypertension or uncontrolled thyroid disease ▪ Other serious cardiovascular, respiratory or systemic disorder	▪ Recurrent pregnancy loss ▪ History of spontaneous preterm birth ▪ Gestational hypertension ▪ Symptomatic anaemia ▪ Malnutrition ▪ Eating disorder ▪ Twin pregnancy after the 28th week ▪ Mild/moderate cardiovascular or respiratory disease ▪ Other significant medical conditions

✓ Identify red flags

Patients should stop their activity and call their healthcare provider if they experience:
▪ Persistent excessive shortness of breath that does not resolve on rest ▪ Severe chest pain ▪ Regular and painful uterine contractions ▪ Vaginal bleeding ▪ Persistent loss of fluid from the vagina indicating rupture of the membranes ▪ Persistent dizziness or faintness that does not resolve on rest

✓ Remind patients of the safety precautions

- ✓ Avoid physical activity in excessive heat, especially with high humidity
- ✓ Avoid activities which involve physical contact or danger of falling
- ✓ Avoid scuba diving
- ✓ Training at altitude:
  - Avoid training at altitude if they have never done so
  - If patients need to train at altitude, they should be monitored closely by their healthcare provider
- ✓ Those considering athletic competition or exercising significantly above the recommended guidelines should seek supervision from an obstetric care provider with knowledge of the impact of high-intensity physical activity on maternal and fetal outcomes
- ✓ Maintain adequate nutrition and hydration – drink water before, during and after physical activity

Adapted with permission from: Mottola MF, Davenport MH, Ruchat S, et al. 2019 Canadian guideline for physical activity throughout pregnancy. Br J Sports Med. 2018;52(21),1339-46.

Figure 2a.
Guideline Implementation tool.

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Physical activity throughout pregnancy safety checklist and recommendations

For healthcare providers

Recommendations:

1. All women without contraindications should be encouraged to be physically active throughout pregnancy.
2. Pregnant women should accumulate at least 150 minutes of moderate-intensity physical activity each week to achieve meaningful health benefits and reductions in pregnancy complications.
3. Physical activity should be accumulated over a minimum of 3 days per week; however daily activity should be encouraged.
4. Pregnant women should incorporate a variety of aerobic exercise and resistance training activities to achieve greater benefits. The addition of yoga and/or gentle stretching may also be beneficial.
5. Pelvic floor muscle training (PFMT) (e.g., Kegels) may be performed daily to reduce the risk of urinary incontinence. To achieve optimal benefit, instructions on the proper technique is recommended.
6. Pregnant women who experience light-headedness, nausea or feel unwell when they exercise flat on their back should modify their exercise position.

How you can help:

- Develop a physical activity program in partnership with patient, instruct on proper technique and consider:
  - Frequency (minimum 3 days/week)
  - Intensity (know heart rate training zones)
  - Time (150 minutes/week of moderate-intensity physical activity)
  - Type (strength, cardiovascular, yoga/stretch)

Figure 2b.
Guideline Implementation tool.