Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health 6 (2016) 350–355

Contents lists available at ScienceDirect

Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health

journal homepage: www.elsevier.com/locate/preghy

# Aspirin adherence during high-risk pregnancies, a questionnaire study

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ARTICLE INFO

*Article history:*
Received 30 June 2016
Accepted 5 August 2016
Available online 6 August 2016

*Keywords:*
Acetylsalicylic-acid
Adherence
Aspirin
Compliance
High-risk pregnancy
Hypertensive disorders of pregnancy

ABSTRACT

*Objective:* Aspirin reduces the risk of recurrent hypertensive disorders of pregnancy (HD) and fetal growth restriction (FGR). This study examined the non-adherence rates of aspirin in women with high-risk pregnancies.
*Study design:* All consecutive women between 24 and 36 weeks gestation with an indication for aspirin use during pregnancy were invited for this study. A survey was used which included two validated questionnaires, the simplified medication adherence questionnaire (SMAQ) and the Beliefs and Behaviour Questionnaire (BBQ).
*Main outcome measures:* To determine the non-adherence rates of aspirin, and to identify the beliefs and behavior concerning aspirin.
*Results:* Indications for aspirin use during pregnancy were previous HD, FGR, intrauterine fetal death or current maternal disease. Non-adherence rates according to the SMAQ and BBQ were 46.3% and 21.4% respectively. No differences in demographic background or obstetrical characteristics between adherent and non-adherent women could be demonstrated.
*Conclusions:* Adherence for aspirin in this high-risk population cannot be taken for granted. The non-adherence rates in pregnant women are comparable with the non-adherence rates for aspirin in the non-pregnant population.


## 1. Introduction

Aspirin reduces the risk of (recurrent) hypertensive disorders of pregnancy (HD) and fetal growth restriction (FGR) [1,2]. Besides women with previous HD or FGR, women with maternal diseases like chronic hypertension, diabetes, chronic kidney disease and autoimmune diseases like systemic lupus erythematosus and antiphospholipid syndrome are at elevated risk to develop HD [3,4]. The number of indications is increasing, also due to recommendations of the World Health Organization and the NICE guidelines in which women at increased risk for pregnancy complications are recommended to take aspirin during pregnancy [5,6]. Commencing aspirin early in pregnancy (<16 weeks gestation) appears to be more effective than start at later gestation [1,7], although a recent meta-analysis does not support this finding [8]. The preferred moment of ingestion of aspirin is at bedtime [9,10]. The use of aspirin in pregnancy is considered safe since relatively little complications are associated with the use of aspirin, although long term follow-up of infants is limited [11]. Strategies to prevent (recurrent) HD and FGR are limited, and aspirin is described to reduce the risk to develop HD and FGR by at least 10% [1]. Adherence to aspirin seems important to receive the most optimal effect. One could speculate that missing a few tablets of aspirin already has an impact on its working mechanism, since some patient groups have persistent uninhibited platelet activity when using aspirin once a day [12].

We are not aware of any studies regarding adherence to aspirin in pregnancy. Adherence during pregnancy for other medicines has been studied, including iron supplements, anti-convulsants, anti-retrovirals, anti-diabetics and medicines for chronic conditions like cardiovascular diseases and ulcerative colitis [13–16]. A wide range of non-adherence rates was reported, varying from 20 to 80% [13–16]. Two studies described that adherence is equal or even higher during pregnancy compared to postpartum or non-pregnant patients [14,15]. On the other hand, another study reported lower adherence rates of medicines for chronic conditions during pregnancy compared to the general population [16]. A

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http://dx.doi.org/10.1016/j.preghy.2016.08.232
2210-7789/

review examining aspirin non-adherence in non-pregnant patients reported non-adherence rates from approximately 10% to over 50% [17]. It is questionable whether these results also apply to pregnant women, since pregnant women could either be more adherent because of the clear motivation to prevent pregnancy complications and the short period of time the medication needs to be taken. Yet, women could be less adherent due to fear of possible harm for the fetus or side effects. Therefore the aim of this study was to investigate aspirin adherence and beliefs and behavior of pregnant women concerning aspirin. It is of importance to investigate adherence to aspirin, because of its increased use in the obstetric field, as it is one of the few methods to decrease the incidence of HD in pregnancy.

## 2. Methods

### 2.1. Study population

This observational study was conducted between February 2015 and February 2016. All pregnant women of 18 years or older with an indication for aspirin use (acetylsalicylic acid 80 mg) during pregnancy were invited between 24 and 36 weeks gestation. Women who already had an indication for aspirin prior to their pregnancy were excluded (for example a history of cerebrovascular event), as well as participants who were not able to complete the survey in Dutch. Participants were recruited from the VU University Medical Center in Amsterdam, a tertiary university hospital in the Netherlands. The Institutional Review board of the VU University Medical Center in Amsterdam, the Netherlands, concluded that official approval from a medical ethical committee was not needed due to the character of this study. All women gave written informed consent.

### 2.2. Procedures

The main outcomes were non-adherence rates, beliefs and behavior regarding aspirin. A single survey was performed, which consisted of four parts, 59 questions in total.

1. Socio-demographic background and general history.
2. Pregnancy related questions including questions about prior and current pregnancies.
3. Validated simplified medication adherence questionnaire (SMAQ) [18]. The six-item SMAQ is a tool to measure the level of self-reported adherence. It has a satisfactory internal consistency with a Cronbach's alpha of 0.75 [18]. Questionnaires with a Cronbach's alfa >0.70 are considered acceptable [19]. A woman was considered to be non-adherent when either a positive response to any of the qualitative questions was given or more than two doses were missed over the past week or more than two days without medication occurred during the past three months.
4. Validated Beliefs and Behaviour Questionnaire (BBQ) [20]. The BBQ measures three categories of questions: beliefs, experience and behavior to assess adherence on a five-point Likert scale [20]. Each category consists of two sub-scales (confidence-concerns, satisfaction-disappointment and adherence- non-adherence). The internal consistency (Cronbach's alfa's) of all the sub-scales is >0.70, except the subscale 'confidence', with a Cronbach's alfa of 0.62. A woman was considered to be non-adherent when low scores on both the subscale 'adherence' (score below 19) and the subscale 'non-adherence' (score higher than 8) were reported. In both the SMAQ and the BBQ, some questions were modified to focus on aspirin use during pregnancy. For example 'medicine' was replaced by 'aspirin' or the term 'during pregnancy' was added.

**Table 1**
Baseline characteristics of participants.

| | n = 42 | % |
|---|---|---|
| *General characteristics* | | |
| Maternal age (years) | 33.5 ± 3.9 | |
| Non-Caucasian | 10/37 | 27.0 |
| Body mass index (kg/m$^2$) | 24.7 ± 12.5 | |
| Alcohol use | 2 | 4.8 |
| Highest educational level | | |
| Low | 0 | 0.0 |
| Middle | 10 | 23.8 |
| High | 32 | 76.2 |
| *Obstetric history* | | |
| Parity | 1.3 ± 0.8 | |
| Progeniture | 1.1 ± 0.7 | |
| HD | 22 | 52.4 |
| FGR | 16 | 38.1 |
| IUFD | 4 | 9.5 |
| Indicated preterm birth <37 weeks gestation | 28 | 66.7 |
| Indicated preterm birth <34 weeks gestation | 23 | 54.8 |
| *Gestational age at completing the survey* | | |
| Until 28 weeks | 19/40 | 47.5 |
| 29–32 weeks | 10/40 | 25.0 |
| After 32 weeks | 11/40 | 27.5 |

Data are depicted as mean ± SD or number and %. HD; hypertensive disorders of pregnancy, FGR; fetal growth restriction, IUFD; intrauterine fetal death.

### 2.3. Definitions

Participants were considered to be non-Caucasian when the participant or one of the parents was of non-European descent.

**Table 2**
Responses to and non-adherence rates of the simplified medication adherence questionnaire (SMAQ).

| Question | Response to the question (n = 42) | | | | |
|---|---|---|---|---|---|
| | % | | % | | |
| | Yes | | No | | |
| 1. Do you ever forget to take your aspirin? | 16 | 38.1 | 26 | 61.9 | |
| 2. Are you careless at times about taking your aspirin? | 3 | 7.1 | 39 | 92.9 | |
| 3. Sometimes if you feel worse, do you stop taking your aspirin? | 2 | 4.8 | 40 | 95.2 | |
| 4. Did you not take any of your aspirin over the past weekend? | 1/41 | 2.4 | 40/41 | 97.6 | |
| | Never | 1x | 2–3x | 4–5x | 6–7x |
| 5. Thinking about the last week. How often have you not taken your aspirin? | 33/41 | 5/41 | 1/41 | 1/41 | 1/41 |
| | 80.5 | 12.2 | 2.4 | 2.4 | 2.4 |
| | ⩽2 days | | >2 days | | |
| 6. Over the past 3 months, how many days have you not taken any aspirin at all? | 35/40 | 87.5 | 5/40 | 12.5 | |
| Non-adherence rate according to the SMAQ | 19/41 | 46.3 | | | |

Data are depicted as number and %.