



Blood Group A Is Associated With Higher Incidence Of Nausea And Vomiting In Pregnancy

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Abstract

Background: To examine the association between the risk of nausea and vomiting of pregnancy (NVP) with the ABO blood groups.

Method: One hundred and eighteen women who were currently or previously pregnant volunteered for a study on NVP. All women completed a questionnaire assessing the severity of NVP and their general condition. Their obstetrical and physical characteristics as well as their blood type were also recorded. Participants were allocated to one of two groups: NVP- (no vomiting and nausea) and NVP+ (minimum of 1 vomiting episodes a day with nausea). Patients were also grouped according to their ABO blood type.

Results: Logistic regression analysis of the data indicates that those with Blood Group A have a higher risk of NVP compared to other Blood Groups (Odd Ratio of 3.43; p -value < 0.05).

Conclusions: Our preliminary data indicated that patients with Blood Group A are at a higher risk to have episodes of NVP compared to other Blood Groups. We hypothesize that the association between NVP and Blood Group A is due to the similarity between the A antigen and human chorionic gonadotrophin. A larger study as well as molecular-based approaches will be needed in order to unequivocally confirm this.

Introduction

Nausea and vomiting of pregnancy, colloquially known as morning sickness, is a multi-factorial condition that can contribute to adverse effects on the mother and foetus [1]. NVP affects around 50% to 70% of all pregnant women, and causes 28% to alter their usual lifestyle activities [2-4]. Furthermore, hyperemesis gravidarum, a severe form of NVP has been described as largely incapacitating to the point that little concern is left for the foetus [2]. As a result, morning sickness remains a significant public health issue that has an impact on the quality of life and health of the mother, foetus and their families.

Despite the significance of NVP and the plethora of studies examining this condition, the etiology of NVP is still unclear [5]. Past research has focused on several social and hormonal factors. Social variables include stress, body mass index, age and education [6-9]. Hormonal variables include estrogen, progesterone and especially human chorionic gonadotrophin (hCG) [5, 10, 11].

Notwithstanding the extensive studies in NVP, no team has examined the association between NVP and the ABO blood group. Research on the ABO blood groups have demonstrated associations with a variety of conditions such as deep vein thrombosis [12], cancer [13-15], organ transplantation [16], malaria [17] and even suicide [18]. Interestingly, both NVP and maternal blood conditions are typically associated with pregnancy complications [19, 20], thus it is likely that each of these influences the other. Therefore, it is possible that a link between NVP and the ABO blood group exists. Accordingly, this pilot study aims to examine this theory.

Methods

This pilot study began after obtaining approval from the Human Ethics Committee at the University of Western Australia. A cross-sectional research design with convenience sampling was used to recruit 118 women who were currently or previously pregnant and over 18 years of age. All women completed a questionnaire assessing their general condition, severity of NVP as well as their blood type and physical characteristics. Participants were categorised to one of two groups: NVP- (no vomiting and nausea) and NVP+ (minimum of 1 vomiting episodes a day with nausea). Patients were also grouped according to their ABO blood group: A, B, O and AB.

Statistical analysis was performed using Logistic Regression. The response was NVP (positive or negative) and the possible predictors used were ABO blood group, age, and number of previous pregnancies. Due to the nature of the data exact inference was carried out. All analysis was carried out using SAS software Version 9.1.3, Cary NC, USA.

Results

Out of the 118 women who enrolled in the study, 43 were in the NVP- group while 75 were in the NVP+ group. In addition, 45 participants were in Blood Group O, 55 were in A, 10 were in B and 8 were in AB. Logistic regression analysis indicated that women with Blood Group A have a higher risk of having NVP compared to blood group O (OR: 3.69 95% CI 1.45-9.83, p -value < 0.05; Illustration 1). The data for AB, B and O indicate no statistically significant differences; however the small sample sizes particularly in groups B and AB groups would contribute to this.

When comparing blood group A to a combination of the other blood groups we observe OR=3.43 (95% CI 1.45, 8.56), P <0.05. No statistically significant effects of age or previous pregnancies were observed.

Discussion

In this pilot study we have demonstrated that women with Blood Group A are at risk of NVP compared to other Blood Groups. This is a novel concept since no other study has specifically examined the link between ABO blood groups and NVP. This association can be explained by the biological similarities of the A antigen and hCG. Human chorionic gonadotrophin belongs to the cysteine knot growth factor family [21] and is a heterodimer consisting of an α and β subunit. Marz and colleagues (1973) observed that highly purified hCG significantly cross-reacted with blood group A [22]. More specifically, nearly all of the cross-reactivity resided within the α -subunit with β producing negligible activity [22]. In addition, the α -subunit contained enough structural similarities to the A-antigen to impart the conformation necessary for the reactivity with blood group A [22]. Interestingly, luteinizing hormone, which has a similar α -subunit to hCG, did not exhibit any cross-reactivity [22] indicating a specific association between hCG and the A blood group. It is not known how the structural and serological similarities between hCG and the A-antigen can cause NVP. However, it is interesting to note that hCG can increase the synthesis of estrogen and progesterone [23], two other hormones that are also implicated in NVP [24]. In addition, one can not deny the existence of studies showing different levels of hCG associated with NVP [24, 25]. In fact high levels of hCG are further linked with hyperemesis gravidarum, a severe form of NVP [24, 25]. Thus,

there is a possibility that this tentative link may exist. Moreover, it is also possible that NVP is an immune response as has been suggested by previous studies [26, 27].

It must be noted that the ABO blood groups have been implicated in a wide variety of conditions, disorders and diseases since its discovery in 1901 [28, 29]. This includes transplantation, malaria and even suicide [16-18]. A recent study observed that different blood groups are associated with different types and severity of cancers [28]. For instance, women with blood type A were more likely to develop an intestinal tumour [28]. Thus the ABO blood group remains an important factor when assessing different conditions and diseases.

The results shown in this study, that blood group A is associated with NVP, are pre-liminary. The connection between hCG, ABO blood and NVP is still at an infancy and a larger population size is required for each ABO blood group in order to unequivocally determine this association. In addition, molecular and cellular-based approaches will need to be completed in order to determine the exact mechanism of action. Taken altogether, the results in this study as well as the literature do warrant further investigation. Discovering what factors are associated with NVP will increase our understanding of its etiology as well as increasing our knowledge of pregnancy and related health care.

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Illustrations

Illustration 1

Blood Groups and the risk to nausea and vomiting of pregnancy (NVP)

Blood Group	NVP- (n=43)	NVP+ (n=75)	Exact Odds Ratio	P-Value
O (n=45)	23	22	.	.
A (n=55)	12	43	3.69	0.004
AB (n=8)	4	4	1.05	1.000
B (n=10)	4	6	1.56	0.777

One hundred and eighteen women were recruited and categorised into the ABO blood groups as well as severity of NVP. Logistic regression analysis using Blood Group O as the base-line

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