ORIGINAL RESEARCH article

Anticardiolipin antibodies in Sudanese women with recurrent miscarriage: A hospital-based study from Kosty, White Nile

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ABSTRACT

Recurrent miscarriage is a significant reproductive health issue, with antiphospholipid antibodies emerging as a key factor in its pathophysiology. This study aims to explore the prevalence and impact of anticardiolipin antibodies as antiphospholipid antibodies among Sudanese women with recurrent miscarriages attending the Teaching Hospital of Kosty, White Nile, Sudan. A total of 100 women with a history of two or more miscarriages were enrolled, and serum samples were collected to test for the presence of anticardiolipin antibodies. Personal regarding age, parity and number of miscarriages was collected using a well-constructed questionnaire. Anticardiolipin antibodies IgG and IgM were assessed using the ELIZA technique. The findings reveal 48.0% positivity regarding anticardiolipin antibodies among the study group. Also, the study reflects a significant correlation between the presence of anticardiolipin and recurrent miscarriage suggesting a potentially underdiagnosed etiology of pregnancy loss. The results underscore the importance of early screening for antiphospholipid antibodies in women with a history of recurrent pregnancy loss.

INTRODUCTION

Recurrent miscarriage (RM) is defined as the loss of two or more consecutive pregnancies and it affects a significant proportion of women globally, with an estimated prevalence of 1.0-3.0% in the general population [1]. The underlying causes of recurrent pregnancy loss are multifactorial, with antiphospholipid (aPL) antibodies being one of the most significant and frequently overlooked etiologies [2]. Antiphospholipid syndrome (APS), characterized by the presence of aPL antibodies such as anticardiolipin antibodies, lupus anticoagulant, and anti-β2 glycoprotein I antibodies, is a well-established autoimmune disorder that can lead to pregnancy complications, including RM, preterm birth, and fetal death [3]. In Sudan, as in many parts of sub-Saharan Africa, RM is a pressing reproductive health issue, yet there is limited research on its specific causes and the role of aPL antibodies in these outcomes. In the context of Sudan, where healthcare resources are often limited, early identification and proper management of women with APS could be vital in improving pregnancy outcomes. The lack of comprehensive studies in Sudanese women on the prevalence and impact of aPL antibodies in RM underscores the need for this research. The rationale of this study is to fill the gap in knowledge by investigating the relationship between aPL antibodies and RM among Sudanese women, specifically those attending the Teaching Hospital of Kosty in the White Nile region. Understanding this association will provide crucial insights into one of the hidden etiological factors contributing to pregnancy loss in this population and inform clinical practices in Sudanese healthcare settings. The primary objectives

of this study are to determine the prevalence of aPL antibodies (anticardiolipin antibodies) among Sudanese women with RM and to explore the clinical characteristics and demographic factors associated with the presence of aPL antibodies in women experiencing RM. Besides, the study aimed to provide recommendations for improving early diagnosis and management of APS in Sudanese women with RM.

MATERIALS AND METHODS

This is a cross-sectional descriptive study conducted at the Teaching Hospital of Kosty, White Nile, Sudan, from February to July 2021. The hospital serves as a referral center for reproductive health issues in the region, with a wide demographic representation from various socioeconomic backgrounds. The study population consisted of Sudanese women aged 18 to 45 years who had experienced two or more consecutive miscarriages (defined as RM) and were attending the Obstetrics and Gynecology clinic at the Teaching Hospital of Kosty. Women with a history of known genetic disorders, uterine anomalies, or other chronic conditions affecting pregnancy (such as diabetes or thyroid disorders) were excluded from the study to reduce confounding factors. Women with a confirmed diagnosis of systemic lupus erythematosus or other autoimmune diseases were also excluded.

A sample size of 100 women was determined based on an estimated prevalence of anticardiolipin antibodies IgG and IgM in RM, as reported in similar studies [4]. Women with a known history of autoimmune diseases, history of chromosomal abnormalities or significant uterine structural issues and pregnant women or those who had undergone assisted reproductive technologies in the past year were excluded. Data was collected through structured interviews and medical record reviews. A standardized questionnaire was used to gather demographic and clinical data, including; age, parity, number of previous miscarriages, history of hypertension or thrombophilia, family history of autoimmune diseases and use of contraceptives or hormonal therapies. Nicardipine antibodies were assessed in blood samples collected from each participant using enzyme-linked immunosorbent assay (ELISA) [5]. The study was conducted by the ethical guidelines established by the Declaration of Helsinki and the ethical standards of the Kosty Teaching Hospital. Ethical approval was obtained from the Hospital's Ethics Committee, and all participants provided verbal consent before enrollment. They were assured confidentiality and the right to withdraw from the study at any time without any consequences.

STATISTICAL ANALYSIS

Data was entered and analyzed using SPSS version 16. Descriptive statistics were used to summarize demographic characteristics, clinical history, and laboratory results. The prevalence of anticardiolipin antibodies among women with RM was calculated. Bivariate analyses (Chi-square test or Fisher’s exact test) were used to identify associations between the presence of these antibodies and factors such as age, number of miscarriages, and family history of autoimmune diseases. Statistical significance was set at a $p<0.05$.

Results

In **Table 1**, demographical and clinical characteristics of the participants are shown (n=100). More than 50.0% of the participants were between 18 and 30 years old and about 15.0% were more than 43 years old. Regarding parity, about 70.0% were Nulliparous and about 5.0% were Multiparous. Concerning frequency of previous miscarriages, more than half of the participants have more than three miscarriages and about 15.0% have two miscarriages. **Table 2** shows the prevalence of anticardiolipin antibodies among Sudanese participants. Thus, almost IgG and IgM were found to be equal (47.3% of IgG and 52.7% of IgM) with difference. In the association between anticardiolipin antibodies and a number of miscarriages, 48 were found positive and 52 were negative. A clear difference about the two miscarriages. However, no statistical differences between positive aPL and negative aPL regarding three miscarriages and more than three miscarriages (**Table 3**).

Table 1: Demographic and clinical characteristics of study Sudanese participants

Variable	Category	Frequency (n = 100)	Percent (%)
Age group	18- 30	52	52%
	31-43	32	32%
	> 43	16	16%
Parity	Nulliparous	69	69%
	Primiparous	27	27%
	Multiparous	04	04 %
Frequency of previous miscarriages	2 miscarriages 3 miscarriages ≥4 miscarriages	14 32 54	14% 32% 54%

Table 2: Prevalence of anticardiolipin antibodies among Sudanese participants

Anticardiolipin Antibodies	Positive cases (n = 38)	Percent
IgG	18	47.3%
IgM	20	52.7%

Table 3: Association between anticardiolipin antibodies and number of miscarriages

Miscarriages	Positive aPL (n=48)	Negative aPL (n=52)
2 miscarriages	02	12
3 miscarriages	18	14
≥4 miscarriages	28	26

Discussion

Recurrent miscarriage is a complex condition with various potential etiologies, and aPL antibodies such as anticardiolipin antibodies are increasingly recognized as a significant factor contributing to pregnancy loss. Our study, conducted at the Teaching Hospital of Kosty in White Nile, Sudan, aimed to investigate the prevalence of anticardiolipin antibodies among Sudanese women with RM. The findings show that a notable proportion of women with RM tested positive for the antibodies, supporting the growing body of evidence linking APS with recurrent pregnancy loss. However, our results are in agreement with some studies while differing from others, reflecting the variability in the prevalence and impact of aPL antibodies in different populations. The present study found that 48.0% of women with RM had positive tests for at least one anticardiolipin antibody, which is in line with other studies reporting a prevalence of 30.0-40.0% among women with RM [6]. This prevalence is notably higher than that found in the general population, where the presence of aPL antibodies is typically <05.0% [3]. These findings reinforce the hypothesis that anticardiolipin as antibodies one of aPL antibodies is a significant risk factor for RM. Similar findings have been reported in various international studies. Thus, a study in France observed a high prevalence of aPL among women with recurrent pregnancy loss, with anticardiolipin antibodies and lupus anticoagulant being the most commonly identified markers [4]. Likewise, a study in Egypt showed that aPL antibodies were present in 35.0% of women with RM [7], further supporting the association between these and pregnancy loss in the region. However, our findings contrast with those of a few studies conducted in sub-Saharan Africa. For example, a study in Nigeria found that only 12.0% of women with RM had positive tests for aPL antibodies including anticardiolipin antibodies [8]. This discrepancy could be attributed to differences in the methodologies used, sample sizes, and demographic factors such as age, parity, and comorbid conditions, as well as the type of testing employed.

The clinical implications of our findings suggest that aPL antibodies may play a significant role in the pathophysiology of RM in Sudanese women. The presence of aPL antibodies in the blood can disrupt normal placental development and function, leading to pregnancy loss through mechanisms such as thrombosis in the uteroplacental circulation, inflammation, and impaired trophoblast invasion [3]. These findings are in agreement with other studies that have shown a clear association between the presence of aPL antibodies and adverse pregnancy outcomes, including RM, preterm birth, and stillbirth [9]. However, not all studies agree on the strength of the association. For instance, the United States found that while aPL antibodies were present in a significant portion of women with RM, they were not necessarily predictive of pregnancy loss in all cases [10]. They argued that other factors, such as maternal age, underlying thrombophilia, and uterine abnormalities, could contribute equally or more significantly to the risk of miscarriage. The current study did not specifically examine these other factors, but future studies should explore the combined effects of aPL antibodies and other potential risk factors in Sudanese women. In addition, this study highlights the significant role of aPL antibodies in recurrent miscarriage among Sudanese women attending the Teaching Hospital of Kosty, White Nile, Sudan. Our findings indicate that a substantial proportion of women with recurrent pregnancy loss tested positive for anticardiolipin antibodies aligning with studies conducted in other regions of the world. This suggests that APS could be a prevalent yet underdiagnosed cause of RM in Sudanese women. Thus, based on the findings of this study, we recommend the implementation of routine screening for aPL antibodies in women with RM in Sudan. Early diagnosis of APS could lead to timely interventions (such as low-dose aspirin and heparin therapy), potentially reducing the risk of recurrent pregnancy loss and improving maternal and fetal outcomes. There is a need to raise awareness among healthcare providers in Sudan about the role of aPL antibodies in RM.

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