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Original Article

A Comprehensive Analysis on the Etiology of Recurrent Pregnancy Loss

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ABSTRACT

Introduction: *Recurrent pregnancy loss (RPL) is a significant reproductive health issue, affecting a considerable proportion of women globally. Understanding the demographic characteristics and etiological factors associated with RPL is crucial for developing effective management strategies. This study aimed to investigate the age distribution, Body Mass Index (BMI) classifications, and etiological factors contributing to RPL in a cohort of Bangladeshi women.* ***Methods & Materials:*** *This observational retrospective study was conducted at North Bengal Medical College, Sirajganj, Bangladesh, from March 2022 to March 2024. A total of 120 women who experienced two or more consecutive unexpected pregnancy losses were included. Data were collected through structured interviews, medical record reviews, and diagnostic tests. Statistical analysis focused on identifying patterns and correlations between various factors and the occurrence of RPL.* ***Result:*** *The age distribution showed a higher prevalence of RPL in older age groups, with 41.67% of participants aged 41-45 years. Regarding BMI, 48.33% of participants had a normal BMI, while 40% were either overweight or obese. The etiological analysis revealed uterine fibroids (29.17%) and polycystic ovary syndrome (25.83%) as the most common causes, followed by uncontrolled hypothyroidism (18.33%). Chromosomal abnormalities were identified in 1.67% of cases, and 3.33% of cases remained unexplained.* ***Conclusion:*** *The study highlights the increased prevalence of RPL in older women and across various BMI categories, emphasizing the multifactorial nature of RPL. The diverse etiological factors identified necessitate a comprehensive and individualized approach in the diagnosis and management of RPL.*

Keywords: *Recurrent Pregnancy Loss; Etiology; Maternal Age; Reproductive Health; Polycystic Ovary Syndrome*

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INTRODUCTION

Recurrent Pregnancy Loss (RPL), a condition characterized by two or more consecutive pregnancy losses, significantly impacts reproductive health, affecting about 1-2% of women globally[1,2]. This multifaceted condition, often leaving both patients and clinicians in a complex diagnostic and therapeutic dilemma, is clinically classified into early or late loss, typically demarcated at the 20-week gestation threshold[3]. Historically, the medical community's approach to RPL has evolved from considering it a random occurrence to recognizing its intricate etiology[4]. Key milestones in RPL research include the identification of genetic and anatomical factors, and more recently, the recognition of immunological and endocrine influences[5]. The current understanding of RPL's etiology is both broad and complex. It encompasses genetic abnormalities, such as chromosomal aneuploidies, and structural chromosomal aberrations[6]. Anatomical factors, including uterine anomalies, have been implicated, alongside immunological factors like antiphospholipid syndrome[7,8]. Endocrine dysfunctions, particularly thyroid disorders and polycystic ovary syndrome, have also been associated with RPL[9]. Environmental influences, such as lifestyle and exposure to certain toxins, and psychological stressors, further contribute to this complexity[10]. However, despite these advancements, a significant proportion of RPL cases remain unexplained, highlighting the ongoing challenges in diagnosis and treatment[11,12]. The multifactorial nature of RPL necessitates a comprehensive approach in its understanding and management. A multifaceted analysis, integrating genetic, anatomical, immunological, endocrine, environmental, and psychological assessments, is crucial for accurate diagnosis and effective treatment strategies[4]. This approach not only aids in identifying the underlying causes but also helps in tailoring personalized management plans for affected individuals[5]. The objective of the current study is to delve deeper into the etiology of RPL, particularly focusing on the less explored aspects such as environmental and psychological factors, and their interplay with the more established genetic and anatomical causes. By conducting a thorough and multifaceted analysis, this research aims to

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bridge gaps in the current understanding of RPL, addressing the controversies and challenges that persist in its diagnosis and management. The study seeks to contribute to the existing body of knowledge by providing a more holistic view of RPL, thereby facilitating the development of more comprehensive and effective treatment strategies.

OBJECTIVE

The objective of this study was to analyze the demographic characteristics and identify the underlying etiological factors associated with recurrent pregnancy loss in women attending a tertiary care hospital in Bangladesh.

METHODS & MATERIALS

This observational retrospective study was conducted from hospital records from March 2022 to March 2024 at the Maternity Ward of North Bengal Medical College, Sirajganj, Bangladesh. The study included a total of 120 women, encompassing both pregnant and non-pregnant individuals who visited the hospital for issues related to recurrent pregnancy loss (RPL). The inclusion criteria targeted women who had experienced two or more consecutive unexpected pregnancy losses, focusing on those directly affected by RPL. Women with fewer than two pregnancy losses or non-consecutive pregnancy losses were excluded to maintain the study's specificity and ensure a homogenous participant group for more reliable and applicable results. Data for the study were collected retrospectively from hospital records, encompassing both current and past visits related to RPL. Diagnostic tests, as recorded in the medical files and conducted according to the standard clinical protocols of North Bengal Medical College, were reviewed to identify any physiological or genetic factors that might contribute to RPL. Statistical analysis of the collected data focused on identifying patterns, potential risk factors, and correlations between various factors and the occurrence of RPL. The study adhered to strict ethical guidelines, ensuring confidentiality and the appropriate use of medical records. The research protocol was approved by the Institutional Review Board of North Bengal Medical College, ensuring compliance with ethical standards and best practices in medical research.

RESULTS

Table – I: Distribution of participants by age group (*n*=120)

Age	Frequency	Percentage
26-30	2	1.67%
31-35	26	21.67%
36-40	42	35.00%
41-45	50	41.67%

The age group with the fewest participants was 26-30 years, representing only 1.67% of the total (2 participants). This was followed by the 31-35 age group, which included 21.67% of the participants (26 individuals). A significant increase was observed in the 36-40 age group, comprising 35.00% of the total (42 participants). The most represented age group was 41-45 years, accounting for the highest percentage, 41.67%, which equates to 50 participants.

Table – II: Distribution of participants by BMI classification (*n*=120)

BMI	Frequency	Percentage
Underweight	14	11.67%
Normal	58	48.33%
Overweight	32	26.67%
Obese	16	13.33%

Of the total participants, 11.67% (14 individuals) were classified as underweight. The majority of the participants fell into the normal BMI category, accounting for 48.33% of the total, which translates to 58 individuals. The overweight category comprised a significant portion of the study population, with 26.67% (32 participants) falling into this group. Lastly, the obese category included 13.33% of the participants, amounting to 16 individuals.

Table – III: Distribution of determined etiology among participants (*n*=120)

Etiology	Frequency	Percentage
Chromosomal Abnormalities	2	1.67%
Uterine Fibroids	35	29.17%
Uterine Septum	5	4.17%
Cervical insufficiency	6	5.00%
Uncontrolled hypothyroidism	22	18.33%
Polycystic ovary syndrome	31	25.83%
Uncontrolled Diabetes	5	4.17%
Bacterial Infection	10	8.33%
Unexplained	4	3.33%

In this study of 120 participants investigating the etiology of recurrent pregnancy loss (RPL), various causes were identified, each contributing differently to the overall distribution. Chromosomal abnormalities were found in a small fraction, accounting for 1.67% (2 participants). Uterine fibroids were more prevalent, identified in 29.17% of the cases (35 participants), making it one of the more common etiologies. Uterine septum anomalies were present in 4.17% (5 participants), while cervical insufficiency was slightly higher at 5.00% (6 participants). A significant number of participants, 18.33% (22 individuals), had uncontrolled hypothyroidism. Polycystic ovary syndrome (PCOS) was another major contributing factor, found in 25.83% of the participants (31 individuals). Uncontrolled diabetes and bacterial infections were identified in 4.17% (5 participants) and 8.33% (10 participants), respectively. Notably, 3.33% of the cases (4 participants) remained unexplained, highlighting the complexity and multifactorial nature of RPL.

DISCUSSION

The findings from this study at North Bengal Medical College, Sirajganj, Bangladesh, offer significant insights into the demographic and etiological dimensions of recurrent

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pregnancy loss (RPL). The age distribution of participants reveals a pronounced trend towards older age groups, with the highest prevalence (41.67%) in the 41-45 age group. This observation aligns with the broader understanding in reproductive medicine that RPL risk escalates with advancing maternal age[13–15]. The increase in RPL incidence among older women can be attributed to factors such as age-related decline in oocyte quality and chromosomal anomalies[16]. These age-related reproductive changes underscore the need for tailored management strategies in older pregnant women. The study's BMI findings present a diverse picture, with the largest proportion of participants (48.33%) falling within the normal BMI range, yet a combined 40% in the overweight and obese categories. This distribution is particularly revealing, as it suggests that while higher BMI is a recognized risk factor for RPL, a significant number of cases occur in women with normal BMI, indicating the influence of other etiological factors[17,18]. Obesity's link to RPL is well-documented, with associations to hormonal imbalances and insulin resistance, which are known to adversely affect pregnancy outcomes[19]. However, the presence of RPL in women with normal BMI highlights the multifactorial nature of this condition, where factors beyond BMI, such as genetic, anatomical, or environmental influences, play a crucial role. In terms of etiology, uterine fibroids and polycystic ovary syndrome (PCOS) emerged as the most prominent factors, accounting for 29.17% and 25.83% of cases, respectively. These findings are consistent with existing literature that identifies uterine fibroids and PCOS, both individually and in combination, as significant contributors to RPL[20–26]. The impact of uncontrolled hypothyroidism, found in 18.33% of participants, aligns with research underscoring thyroid function's critical role in pregnancy[27]. The presence of chromosomal abnormalities in a smaller fraction of cases (1.67%) corroborates the genetic underpinnings of RPL[11]. Furthermore, the identification of cervical insufficiency, bacterial infection, and uncontrolled diabetes as contributing factors, though less prevalent, adds to the spectrum of causes leading to RPL, reflecting its complex and multifactorial nature. Notably, 3.33% of the cases in this study remained unexplained, a phenomenon not uncommon in RPL research. This highlights the idiopathic nature of RPL and the challenges in diagnosing and managing such cases[28,29]. The complexity of RPL, evidenced by the variety of identified etiological factors, necessitates a comprehensive and individualized approach to its management.

It is important to note that, although not specifically detailed in this report, appropriate and individualized treatment approaches were implemented for each case of RPL in this study. These treatment strategies were carefully tailored based on a comprehensive evaluation of each patient's unique medical history, pre-existing conditions, and personal preferences. This personalized approach underscores the importance of considering the multifaceted nature of RPL and the need for customized management plans to optimize outcomes. The success of these individualized treatments, while not quantified in this report, reflects the critical role of personalized medicine in addressing the complex challenges presented by recurrent pregnancy loss.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

In conclusion, this study conducted at North Bengal Medical College, Sirajganj, Bangladesh, provides valuable insights into the demographic characteristics and etiological factors associated with recurrent pregnancy loss (RPL). The findings highlight a higher prevalence of RPL in older age groups and across various BMI categories, underscoring the complex interplay of age, body weight, and other factors in the occurrence of RPL. The diverse etiological factors identified, ranging from uterine fibroids and PCOS to uncontrolled hypothyroidism and chromosomal abnormalities, emphasize the multifactorial nature of RPL. This study reinforces the necessity for a comprehensive, individualized approach in the diagnosis and management of RPL, taking into account the unique circumstances of each patient. The insights gained from this research contribute to a deeper understanding of RPL, paving the way for more effective and personalized treatment strategies in reproductive medicine.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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