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Original Article

Pregnancy Outcomes in Patients with Valvular Heart Disease

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ABSTRACT

Valvular heart disorders (VHD) may affect both mother and fetus during pregnancy. This research examined pregnancy outcomes in valvular heart disease patients. **Methods:** This was a descriptive comparative study conducted at Department of Cardiology, PIMS, Islamabad, from April 10th to August 31st, 2023. The study consisted 318 females, 166 of them were healthy (control group) and 152 of them had valvular heart disease (study group). SPSS version 25 was used to analyze the data. **Objectives:** To evaluate the pregnancy outcomes of females with valvular heart disease presenting to tertiary care hospital. **Results:** Group-I contained 152 females with valvular heart disease and group-II had 166 healthy females. Group-I mean age was 20.2±4.8 years, whereas group-II mean age was 22.3±2.8 years (p>0.05). Stillbirths were greater in group-I 10(6.57%) and 2(1.20%) (p 0.001) than group-II. Mitral stenosis was the most common valvular lesion at 53.97% (82 patients). 18.42% (28 patients) had mitral regurgitation. The study group had 0.65% maternal mortality compared to 0% in the control group. 11 (7.23%) patients developed cardiac arrythmias in study group compared to 2 (1.20%) patients in control group. **Conclusions:** There is a high risk of pregnancy in pregnant females who has valvular heart disease is a and have higher probability of having fetomaternal complications.

INTRODUCTION

In younger women with valvular heart disease, rheumatic heart disease, congenital conditions, and earlier endocarditis are more probable [1]. These disorders enhance pregnancy risk factors for both mother and baby [2]. Pregnancy frequently causes valvular heart disease. During pregnant, maternal physiological changes increase cardiac output and blood volume, possibly revealing a heart disease [3]. Rheumatic fever, particularly in immigrants from impoverished countries, induces most acquired valvular lesions [4]. The presence of valvular disease in pregnant women who are at risk for adverse outcomes is exacerbated due to its impact on functional capacity, left ventricular function, and pulmonary pressure [5]. Diagnosis of pregnant females with valvular heart disease is usually clinical [6]. Clinical guidance is lacking in data and most of the knowledge in respect comes from case studies, observational studies, or patient group data are all examples of research [7]. Normal pregnancy causes a 30-50% increase in blood volume and cardiac output after 24 weeks of gestation [8]. Stroke volume decreases systemic vasomotor resistance and raises heart rate by 10–20 beats per minute. Blood pressure lowers. The uterus contracts, increasing blood pressure and cardiovascular output [9]. Postpartum vena cava decompression and systemic uterine blood return may increase cardiac filling pressure. Pregnancy-induced cardiovascular adaptations reverse at

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six weeks [10, 11]. The proportion of persons with severe CHD who develop and procreate has grown in industrialized nations. CHD causes 30%–50% of all cardiac problems in pregnant women [12]. The incidence of clinically severe maternal cardiac disease during pregnancy is very low, accounting for fewer than 1% of cases but carries adverse fetomaternal outcomes [13]. Depending on disease severity, pregnant VHD patients require periodic risk assessment and customized therapy. This study aimed to evaluate the pregnancy outcomes of females with valvular heart disease presenting to tertiary care hospital.

METHODS

This was a descriptive comparative study was conducted at Department of Cardiology, PIMS, Islamabad, from April 10th to August 31st, 2023. The study consisted 318 females, 166 of them were healthy (control group) and 152 of them had valvular heart disease (study group). Interviews, physical tests, and medical records were used to gather data. Demographic information, medical history, type of valvular heart disease, NYHA class, pregnancy outcomes, and mode of delivery were all gathered. SPSS version 25 was used to analyze the data. The sample size was calculated as n = (Z/2)2 * p * (1-p) / d2, where n is the required sample size, Z/2 is the standard normal deviation at 95% confidence (1.96), p is the estimated proportion of patients with valvular heart disease (0.5), and d is the desired level of precision (0.05). As a consequence, the research group included 152 individuals, whereas 166 healthy controls were enrolled for comparison. The convenient sampling approach was utilized, and participants were chosen based on their availability and desire to participate in the research. Females with other cardiac disorders, such as congenital heart disease, coronary artery disease, and cardiomyopathy, were excluded from the study. Females who had already heart surgery or valve replacement were also excluded. Pregnant women with additional medical disorders that potentially impair pregnancy outcomes, such as diabetes, hypertension, or renal disease, were also barred from participating in the trial. Females with insufficient medical records or who did not provide permission were likewise barred from participating. The college of physicians and surgeons Pakistan, institutional review board accepted the study, which was carried out in compliance with all applicable ethical standards. Patient data were anonymzed to ensure confidentiality, and all study followed Helsinki Declaration standards.

RESULTS

This study examined 318 pregnant females divided into group-I and group-II. Group-I contained 152 females with valvular heart disease and group-II 166 healthy females. Group-I mean age was 20.2±4.8 years, whereas group-II mean age was 22.3±2.8 years (p>0.05). Group-I had a mean parity of 0.90±1.05, whereas group-II had 0.86±0.92 (p>0.05). Obstetric history differed across groups. 34(22.36%) group-I females and 9(5.42%) group-II females had abortions (p < 0.001). Stillbirths were greater in group-I 10(6.57%) and 2(1.20%) (p 0.001) than group-II. Both groups had similar preterm birth rates (p>0.05). Group preferences were similar. Most women in both groups scheduled, unbooked, or engaged in prenatal care (p>0.05). 13(8.55%) initially visited in the first trimester, 74 (48.68%) in the second, and 63(41.44%) in the third in group-I. Group-II had 14(8.43%) first-trimester visits, 80(48.19%) in the second, and 69(41.56%) in the third (*p*>0.05). This relevant information is presented in Table 1.

Table I: Demographic Description of Group1 and Group2

Description	Group I	Group II	P-value
Total Number of Females	152	166	>0.05
Marriage Age mean±S.D	20.2±4.8	22.3±2.8	>0.05
Parity mean±S.D	0.90±1.05	0.86±0.92	>0.05
Age Group			
Abortion	34 (22.36%)	9 (5.42%)	<0.001
Stillbirth	10 (6.57%)	2 (1.20%)	<0.001
Delivery Preterm	1 (0.65%)	0	>0.05
Present Preference			
Booked	56(36.84%)	61(36.74%)	>0.05
Un-booked	48(31.57%)	50(31.32%)	>0.05
Registered	53 (34.86%)	57 (34.33%)	>0.05
Visit Duration			
1st trimester	13(8.55%)	14(8.43%)	>0.05
2nd trimester	74(48.68%)	80(48.19%)	>0.05
3rd trimester	63(41.44%)	69(41.56%)	>0.05

Mitral stenosis was the most common valvular lesion at 53.97% (82 patients). 18.42% (28 patients) had mitral regurgitation. Aortic regurgitation was rare at 1.97% (3 patients), whereas pulmonary artery and tricuspid regurgitation were both under 2%. 51.97% (79 patients) of patients with these lesions were NYHA Class I, 29.60% (45 patients) Class II, 8.55% (13 patients) Class III, and 9.86% (15 patients) Class IV Table 2.

Table 2: Investigation of Valvular lesions

Lesion types	Number of Patients (%)
Mitral stenosis (MS)	82 (53.97%)
Mitral regurgitation (MR)	28 (18.42%)
aortic regurgitation (AR)	3 (1.97%)
pulmonary artery	2(1.31%)
NYHA	
class-I	79(51.97%)
class-II	45(29.60%)
class-III	13 (8.55%)
class-IV	15 (9.86%)

Prenatal history differed significantly between the study group (Group I) and control group (Group II). 21(13.81%) of the

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152 study patients underwent balloon mitral valvotomy, whereas none of the 166 control cases did. The study group had 18.42% more prenatal problems than the control group (1.20%). 8 patients (5.26%) in the study group had CHF compared to none in the control group. The study group had considerably more cardiac arrhythmias (7.23%) and ventricular ectopic beats (6.57%). However, ovarian cystectomy and tachycardia were similar in both groups. Finally, the study group had 0.65% maternal mortality compared to 0% in the control group Table 3.

Table 3: Patients parental history

Characteristics	Group I	Group II	P-value
Operational mediation			
Balloon Mitral Valvotomy	21(13.81%)	0	<0.001
Ovarian cystectomy	0	1(0.60%)	>0.05
Complications			
Patients without difficulties	126(82.89%)	158 (95.18%)	<0.001
Patients with difficulties	28(18.42%)	2(1.20%)	<0.001
Congestive Heart Failure (CHF)	8 (5.26%)	0	<0.001
Cardiac Arrhythmias	11(7.23%)	2 (1.20%)	<0.001
Ventricular ectopic beats	10(6.57%)	0	<0.001
Atrial Fibrillation	2 (1.31%)	1(0.60%)	>0.05
paroxysmal sinus ventricular	0	1(0.60%)	>0.05
sinus Tachycardia	0	1(0.60%)	> 0.05
Maternal Mortality	1(0.65%)	0	<0.001

Table 4 describes the fetal outcomes and obstetric issues that mother can during birth. *P*-values < 0.05 are describing that there is a significant difference between group-I and group-II of complications.

Table 4: Fetal Outcomes and Major Obstetric Issues

Complication	Group I	Group II	P-value
severe anemia	14(9.21%)	7(4.21%)	<0.05
Twin pregnancy	3(1.97%)	2(1.20%)	>0.05
Essential hypertension	1(0.65%)	1(0.60%)	>0.05
pregnancy-induced	14(9.21%)	14(8.43%)	>0.05
Eclampsia	2(1.31%)	2(1.20%)	>0.05
hematemesis	0	0	>0.05
gestational diabetes mellitus	1(0.65%)	1(0.60%)	>0.05
Intrauterine growth retardation	3(1.97%)	3(1.80%)	<0.001
preterm delivery	33(21.71%)	33(19.87%)	< 0.001
Gestational Age			
Mean ± S.D., weeks	34.7 ± 2.3	35.6 ± 2.6	< 0.001
congenital anomalies	0	0	> 0.05
Birth weight, mean±S.D., grams	1730±472	2553±562	< 0.001
Low birth weight	55 (36.18%)	55(33.13%)	< 0.01
Newborn with Apgar score	7(4.60%)	7(4.21%)	< 0.01
Stillbirth	5(3.28%)	5(3.01%)	> 0.05

76% of group-I and 79% of group-II gave birth vaginally. 11% of group-I and 13% of group-II delivered via caesarean section, the second most prevalent procedure. 13% of group-I and 8% of group-II needed instrumental delivery. Table-V With a p-value of 0.001,

Table 5: Patients delivery methods

Mode	Group-I	Group-II	P-value
Vaginal	115(75.65%)	131(78.91%)	> 0.05
Cesarean	17(11.18%)	21(12.65%)	> 0.05
Instrumental	20 (13.15%)	14 (8.43%)	<0.001

DISCUSSION

The study participants observed that pregnant females who has valvular heart disease had a greater risk of unfavorable pregnancy outcomes, such as abortions and stillbirths, than healthy pregnant females. This is in line with previous research by Elkayam et al and Vahanian et al., that found a higher risk of unfavorable pregnancy outcomes in people with valvular heart disease; [14, 15]. Mitral stenosis was the most prevalent valvular lesion in this investigation, which is consistent with previous results of Stone GW and collaborators [16]. This study also discovered that the majority of valvular heart disease patients were in NYHA Class I, suggesting that the disease was well-controlled and had no substantial influence on their pregnancy outcomes. This is consistent with previous study conducted Salem DN and colleagues, who demonstrated that well-controlled valvular heart disease had no effect on pregnancy outcomes [17. The analysis additionally identified a significant difference in method of delivery between the study group and the control group, with the study group having a greater rate of instrumental delivery. This is consistent with previous study by Rychik J *et al.*, who indicated that individuals with valvular heart disease may be at a greater risk of problems during delivery, suggesting the use of an artificial birth channel [18]. The research also highlights the issue of the long-term health of the mother and child as a result of valvular heart disease. Previous studies by Bonow and colleagues as well as Meissner et al., has shown that pregnant female with VHD are more likely to have heart failure or other cardiac issues later in life [19, 20]. To prevent long-term implications, healthcare practitioners must regularly monitor these individuals and offer proper follow-up treatment. Overall, the study emphasizes the need of adequate therapy and monitoring of pregnant females with valvular heart disease in order to achieve improved pregnancy outcomes. More study is required to investigate the influence of various forms of valvular heart disease on pregnancy outcomes and to determine the most effective treatments for these patients.

CONCLUSIONS

According to this research, pregnant females with Valvular heart disease had a greater risk of unfavorable pregnancy outcomes than healthy pregnant females. It is critical to handle and monitor these patients properly in order to achieve improved pregnancy outcomes.

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Authors Contribution

Conceptualization: H
Methodology: H
Formal analysis: MK
Writing, review and editing: H, MSA, AR, Z, NK

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

[1] Rousham E, Clark M, Latham M, Oo SP, Read S, Griffiths P, *et al.*, Resilience and vulnerabilities of urban food environments in the Asia-Pacific region. Maternal & Child Nutrition. 2023 Apr: 13513. doi: 10.1111/mcn.13513.

[2] Coffey S, Roberts-Thomson R, Brown A, Carapetis J, Chen M, Enriquez-Sarano M, *et al.*, Global epidemiology of valvular heart disease. Nature Reviews Cardiology. 2021 Dec; 18(12): 853-64. doi: 10.1038/s41569-021-00570-z.

[3] Iung B and Vahanian A. Epidemiology of valvular heart disease in the adult. Nature Reviews Cardiology. 2011 Mar; 8(3): 162-72. doi: 10.1038/nrcardio.2010.202.

[4] Altaf A, Faiz S, Badalyan SS, Khan R, Yahya S. The Effect of Valvular Heart Disease on Maternal and Fetal Outcome of Pregnancy in Young Pregnant Females. Pakistan Journal of Medical & Health Sciences. 2022 Nov; 16(09): 386-90. doi: 10.53350/pjmhs22169386.

[5] Klein LL and Galan HL. Cardiac disease in pregnancy. Obstetrics and Gynecology Clinics. 2014 Jun; 31(2): 429-59. doi: 10.1016/j.ogc.2004.03.001.

[6] 6. Stout KK and Otto CM. Pregnancy in women with valvular heart disease. Heart. 2017 May; 93(5): 552-8. doi: 10.1136/hrt.2005.067975.

[7] Canobbio MM, Warnes CA, Aboulhosn J, Connolly HM, Khanna A, Koos BJ, *et al.*, Management of pregnancy in patients with complex congenital heart disease: a scientific statement for healthcare professionals from the American Heart Association. Circulation. 2017 Feb; 135(8): 50-87. doi: 10.1161/CIR.0000000000000458.

[8] Jeejeebhoy FM, Zelop CM, Lipman S, Carvalho B, Joglar J, Mhyre JM, *et al.*, Cardiac arrest in pregnancy: a scientific statement from the American Heart Association. Circulation. 2015 Nov; 132(18): 1747-73. doi: 10.1161/CIR.0000000000000300.

[9] Lachtrupp CL, Valente AM, Gurvitz M, Landzberg MJ, Brainard SB, Wu FM, *et al.*, Associations between clinical outcomes and a recently proposed adult congenital heart disease anatomic and physiological classification system. Journal of the American Heart Association. 2021 Sep; 10(18): 021345. doi: 10.1161/JAHA.120.021345.

[10] Perloff JS and Koos B. Management of Pregnancy and Contraception in Congenital. Congenital Heart Disease in Adults. 2018 Aug:194.

[11] Hameed A, Karaalp IS, Tummala PP, Wani OR, Canetti M, Akhter MW, *et al.*, The effect of valvular heart disease on maternal and fetal outcome of pregnancy. Journal of The American College of Cardiology. 2011 Mar; 37(3): 893-9. doi: 10.1016/S0735-1097(00)01198-0.

[12] Van Hagen IM, Thorne SA, Taha N, Youssef G, Elnagar A, Gabriel H, *et al.*, Pregnancy outcomes in women with rheumatic mitral valve disease: results from the registry of pregnancy and cardiac disease. Circulation. 2018 Feb; 137(8): 806-16. doi: 10.1161/CIRCULATIONAHA.117.032561.

[13] Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin III JP, Guyton RA, *et al.*, 2014 AHA/ACC guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Circulation. 2014 Jun; 129(23): 521-643. doi: 10.1161/CIR.0000000000000031.

[14] Elkayam U and Bitar F. Valvular heart disease and pregnancy: part I: native valves. Journal of The American College of Cardiology. 2005 Jul; 46(2): 223-30. doi: 10.1016/j.jacc.2005.02.085.

[15] Vahanian A, Alfieri O, Andreotti F, Antunes MJ, Barón-Esquivias G, Baumgartner H, *et al.*, Guidelines on the management of valvular heart disease (version 2012) The Joint Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS). European Heart Journal. 2019; 33(19): 2451-2496.

[16] Stone GW, Adams DH, Abraham WT, Kappetein AP, Généreux P, Vranckx P, *et al.*, Clinical trial design principles and endpoint definitions for transcatheter mitral valve repair and replacement: part 2: endpoint definitions: a consensus document from the Mitral Valve Academic Research Consortium. European Heart Journal. 2015 Aug; 36(29):1878-91. doi.org/10.1093/eurheartj/ehv333.

[17] Salem DN, Stein PD, Al-Ahmad A, Bussey HI, Horstkotte D, Miller N, *et al.*, Antithrombotic therapy in valvular heart disease—native and prosthetic: the

DOI: https://doi.org/10.54393/pjhs.v4i10.1094

Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest. 2014 Sep; 126(3): 457-82. doi: 10.1378/chest.126.3_suppl.457S.

[18] Rychik J, Atz AM, Celermajer DS, Deal BJ, Gatzoulis MA, Gewillig MH, *et al.*, Evaluation and management of the child and adult with Fontan circulation: a scientific statement from the American Heart Association. Circulation. 2019 Aug; 140(6): 234-84. doi: 10.1161/CIR.0000000000000696.

[19] Bonow RO, Carabello BA, Chatterjee K, de Leon AC, Faxon DP, Freed MD. Practice guidelines for the management of patients with valvular heart disease: executive summary. Journal of The American College of Cardiology. 2016 Aug; 48(3): 598-675. doi: 10.1016/j.jacc.2006.05.030.

[20] Meissner MH, Wakefield TW, Ascher E, Caprini JA, Comerota AJ, Eklof B, *et al.*, Acute venous disease: venous thrombosis and venous trauma. Journal of Vascular Surgery. 2007 Dec; 46(6): 25-53. doi: 10.1016/j.jvs.2007.08.037.