Obstetric outcome in patients with rheumatic heart disease: experience in a tertiary hospital

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ABSTRACT

Aims: To determine the clinical outcome of rheumatic heart disease in pregnancy.

Methods: Retrospective cross-sectional descriptive study from April 2019 to April 2021 in Nobel Medical College, Biratnagar, Nepal. Feto-maternal variables were taken for their health status. Data presented in table with frequency.

Results: Out of 13013 deliveries in a year, 49 had cardiac disease (0.37%) and 38 had rheumatic heart disease (0.29%) over 28 weeks of gestation; 95% (n=36) had mitral valve involvement; 12 were primigravida and 7 preterm at the time of delivery. Half of them underwent caesarean section for various indications. Most common maternal complications were cardiac failure, cardiac arrhythmia, admission to ICU, obstetric complications, including maternal mortality in 5.2% (n=2) cases. Low birth was in 29% (n=11) of cases, and 34% (n=13) of them needed NICU care at the time of delivery. There was history of rheumatic fever in 9 cases (24%).

Conclusions: Rheumatic heart disease is the commonest diagnosis among heart disease in pregnancy and adverse event can be minimized by multidisciplinary intervention.

Key words: cardiac disease, maternal mortality, pregnancy, RHD

INTRODUCTION

Rheumatic Heart disease (RHD) is an acquired heart disease, sequelae of rheumatic fever which affects heart valves and can result in heart failure and if left untreated. It is common in children and teenage group. Pregnancy is not an uncommon phenomenon in those age group. RHD has lots of complications in pregnancy...
like heart failure, arrhythmia, requirement for Intensive Care Unit (ICU) and even maternal mortality. RHD remains a major health problem in the developing countries. According to World Health Organization (WHO) Rheumatic heart disease claims approximately over 288348 lives each year - the large majority in low- or middle-income countries (LMICs).\textsuperscript{1} Heart disease is the highest indirect (non-obstetric) cause of mortality for pregnant women in both high-income countries (HICs) and LMICs. Rheumatic heart disease (RHD) is the most common acquired heart disease in many countries, more so in developing countries.\textsuperscript{2}

Damage to the cardiac valves, which is the hallmark of RHD, often leads to significant valvular heart disease and left ventricular dysfunction. These changes, coupled with the marked physiological adaptations associated with pregnancy, impose an increased hemodynamic stress on the cardiovascular system, increasing the risk of cardiovascular complications and poorer outcomes for both the mother and the fetus. Nevertheless, pregnancy complicated by non-severe valvular heart disease is generally associated with a favorable prognosis, providing that the risks are managed appropriately. This study aims to determine burden of rheumatic heart disease in pregnancy and feto-maternal outcome.

**METHODS**

This is a retrospective observational descriptive study carried out at Nobel Medical College and Teaching Hospital (NMCTH), Biratnagar, Nepal, from April 2019 to April 2021 to evaluate pregnancy outcome in patients with rheumatic valvular heart disease. After getting approval from the institutional ethical committee from this institute (IRC no 443/2021), all the records of the admitted and delivered in this college were searched for the rheumatic heart disease and pregnancy. Patient information and obstetrics profiles were recorded in pre-formed Performa. Baseline data at the time of admission included maternal age, parity, nature of the underlying cardiac lesion, New York Heart Association (NYHA) functional class, and cardiac assessment including ejection fraction.\textsuperscript{3} Recorded data were analysed using statistical tool SPSS version 20.

**RESULTS**

From 13013 deliveries over 28 weeks of gestation conducted at NMCTH, 49 pregnancies were detected to have cardiac disease during pregnancy and delivery. In this retrospective cross-sectional study, 49 case records of pregnancies with cardiac disease (0.37% for heart disease) were analysed; and among them 38 (77.6%) were RHD (0.29% of delivery). Age ranges from 18 to 40 years (26±5.5) years 27 of them were in 20-30 years age group. [Table-1]

Table-1: Age group of distribution of heart disease in pregnancy (N=38)

| Age group (in year) | Frequency (%) |
|--------------------|---------------|
| <20                | 5 (13.2%)     |
| 20-25              | 16 (42.1%)    |
| 25-30              | 11 (28.9%)    |
| 30-35              | 3 (7.9%)      |
| >35                | 3 (7.9%)      |
Twelve (32%) were primigravida and 7 (18%) were preterm at delivery; 13 (34%) were diagnosed RHD in the early first visit and 15 (39.5%) at the time of admission. Most of them (63.2%) were in NYHA grade 2. [Table-2]

Table-2: NYHA grade of patients at the time of admission

| NYHA | Frequency (%) |
|------|---------------|
| I    | 7 (18.4%)     |
| II   | 24 (63.2%)    |
| III  | 6 (15.8%)     |
| IV   | 1 (2.6%)      |

Nine cases had history of rheumatic fever and 3 cases had prior cardiac surgeries (2 PTMC and 1 ASD closure). Thirty-six (95%) cases had mitral valve involvement with various types of pathology. Three-fourth cases had mitral stenosis of various degree with or without other valvular lesions. More than half of them (n=15) were severe mitral stenosis. Eight cases (21%) had abnormally low ejection fraction. Mitral valve was involved in 36 (95%) of the cases (36/38). There was history of rheumatic fever in 9 cases only (24%). [Table-3]

Table-3: Cardiac valve involved (N=38)

| Valvular lesion | Frequency |
|-----------------|-----------|
| MS ±            | 19        |
| MR/TR/AR/AS     | 5         |
| (n=28;74%)      |           |
| MS + TR         | 5         |
| MS + MR         | 2         |
| MS + AR         | 1         |
| MS + AR + TR    | 1         |
| MR              | 4         |
| MR + AR         | 2         |
| (n=8;21%)       |           |
| MR + AS         | 1         |
| MR + TR         | 1         |
| Others          | 1         |
| (n=2;5%)        |           |
| AS              | 1         |
| TR              | 1         |

Note: AS-Aortic stenosis, MR-Mitral Regurgitation, AR-Aortic Regurgitation, MS-Mitral Stenosis, TR-Tricuspid Regurgitation.

Vaginal and caesarean deliveries were equally distributed in RHD. [Table-4]

Table-4: Mode of delivery (N=38)

| Mode of delivery | Frequency (%) |
|------------------|---------------|
| Spontaneous Vaginal delivery | 17 (45%) |
| Vacuum delivery    | 2 (5%)        |
| Caesarean Section | 19 (50%)      |

Vaginal birth after Cesarean section (VBAC) was the most common cause of the CS (42%) and other causes include fetal distress, impending maternal cardiac failure, cephalopelvic disproportion (CPD), failed induction and others. [Table-5]

Table-5: Indication of CS (N=19)

| Indication of CS | Frequency |
|------------------|-----------|
| VBAC refusal      | 8         |
| Foetal distress   | 4         |
| Impending heart failure | 4 |
| CPD               | 1         |
| Failed induction  | 1         |
| Others            | 1         |

Almost half (47%) of the total needed ICU care, and other maternal complications includes cardiac arrhythmia, pre-eclampsia, post-partum haemorrhage, pulmonary edema and even maternal mortality. Maternal mortality occurred in two cases due to pulmonary edema with severe MS. There were 39 maternal complication events altogether in 20 patients. [Table-6]

Table-6: Maternal Complications among RHD (N=38)
Bangladesh, India and Pakistan, whereas an increasing trend of RHD was observed in Nepal. The incidence of heart disease in our study was 0.3% and that of the RHD was 0.29% (2.92/1000). This result was comparable with other studies and it was lower than some study. RHD incidence was higher than previous studies done in Nepal in various places in Kathmandu but quite less than a study done by Shrestha NR et al in 2015 in Sunsari which was Echo based screening done in 5–15-year age group and incidence was 10.2/1000. Patients with the cardiac disease are often visit for the first time in the late trimester where they seek medical care for worsening symptoms. Mitral stenosis (MS) has been found to be the dominant lesion in RHD which is similar to other studies. Majority of the patients of RHD belonged to NYHA I and II as in other study.

Most of their babies were of average weight and 29% babies were of low birth weight. Thirty four percent of the babies needed NICU care for various reason like low birth weight, meconium stain liquor and respiratory distress syndrome. [Table-7]

**Table-7: Fetal outcome in RHD (N=38)**

| Fetal Outcome | Frequency (%) |
|---------------|---------------|
| Birth weight  |               |
| Very low (<1.5 kg) | 3 (8%) |
| LBW (<2.5 kg)    | 8 (21%)       |
| Average (2.5-4kg) | 26 (68%)     |
| High (>4kg)     | 1 (2.6%)      |
| Gender         |               |
| Male           | 18 (47%)      |
| Female         | 20 (53%)      |
| 1-min Apgar    |               |
| 0              | 2 (5%)        |
| <7             | 4 (11%)       |
| ≥7             | 32 (84%)      |
| Others         |               |
| NICU admission  | 13 (34%)      |
| Prematurity     | 3 (8%)        |

**DISCUSSION**

Heart disease is one of the most common risk factors for the maternal and neonatal morbidity and mortality and continues to be a major health problem. It has not so tremendous hazards in developed countries but for much of the developing world, RHD still kills. Estimates range that between 250-330 thousand people a year die from what has been called the “disease of poverty” across East, Central and South Asia, Africa and South pacific. Twenty-five population-based studies from South Asian countries (Bangladesh, India, Nepal and Pakistan) showed a decreasing trend of RHD in Bangladesh, India and Pakistan, whereas an increasing trend of RHD was observed in Nepal.

The incidence of heart disease in our study was 0.3% and that of the RHD was 0.29% (2.92/1000). This result was comparable with other studies and it was lower than some study. RHD incidence was higher than previous studies done in Nepal in various places in Kathmandu but quite less than a study done by Shrestha NR et al in 2015 in Sunsari which was Echo based screening done in 5–15-year age group and incidence was 10.2/1000. Patients with the cardiac disease are often visit for the first time in the late trimester where they seek medical care for worsening symptoms. Mitral stenosis (MS) has been found to be the dominant lesion in RHD which is similar to other studies. Majority of the patients of RHD belonged to NYHA I and II as in other study. Incidence of preterm labour (18.4% in present study) was also similar to other studies. Vaginal delivery was commonest mode of delivery similar to other study. LBW was more common (29%) than other study. It may be due to low socioeconomic condition, poor nutrition not proper antenatal check-up. But BLW was lower than some study (37.6%). IUFD was found in 5.3% which was similar to other studies like but less than some studies. There were 2 cases of maternal mortality which constitute 5.2%, which was similar to
other studies.9,17,22 Both were the cases of severe MS and died due to pulmonary edema.

Conclusion: Although RHD remains prevalent in eastern Nepal, with multidisciplinary care, the incidence of maternal and fetal mortality is low. Pregnancy increases the morbidity and mortality of both mother and baby in women with RHD and requires additional close monitoring by the obstetricians and the cardiologists.

REFERENCES

1. WHO. Rheumatic Heart Disease. 2020; Available from: https://www.who.int/news-room/fact-sheets/detail/rheumatic-heart-disease

2. Seckeler MD HT. The worldwide epidemiology of acute rheumatic fever and rheumatic heart disease. Clin Epidemiol. 2011;22(3):67–84. DOI: 10.2147/CLEP.S12977, PMID 21386976

3. Lang RM, Badano LP, Mor-Avi V, Afilalo J, Armstrong A, Ernande L, et al. Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. J Am Soc Echocardiogr. 2015;28(1):28. DOI: 10.1016/j.echo.2014.10.003, ISSN: 0894-7317

4. Bhatla N, Lal S, Behera G, Kriplani A, Mittal S, Agarwal N, et al. Cardiac disease in pregnancy. International Journal of Gynecology and Obstetrics 2003;82:153–9. DOI: 10.1016/S0020-7292, ISBN: 9111261773

5. Abdel-Hady ES, El-Shamy M, El-Rifai AA, Goda H, Abdel-Samad A, Moussa S. Maternal and perinatal outcome of pregnancies complicated by cardiac disease. Int J Gynaecol Obstet. 2015;90(1):21–15. DOI: 10.1016/j.ijgo.2005.03.008. PMID: 15913623.

6. Madazli R, Sal V, Cift T, Guralp OGA. Pregnancy outcomes in women with heart disease. Arch Gynecol Obstet. 2010;281(1):29–32. DOI: 10.1007/s00404-009-1050-z

7. Watkins DA, Johnson CO, Colquhoun SM, Karthikeyan G, Beaton A, Bukhman G, et al. Global, Regional, and National Burden of Rheumatic Heart Disease. N Engl J Med. 2017;377(8):713–22. DOI: 10.1056/NEJMoa1603693. PMID: 28834488

8. Roy S, Banik S. Current prevalence trend of rheumatic heart disease in South Asia: a systematic review. J Public Health. 2021. DOI: 10.1007/s10389-021-01578-y, ISSN: 16132238

9. Sethuraman D, Ramachandran N, Noorjahan SAP, Kanna V. Maternal and fetal outcomes in rheumatic heart disease in pregnancy. Int J Res Med Sci. 2014;2(4):1632–7. DOI: 10.5455/2320-6012.ijrims20141172

10. Subbaiah M, Sharma V, Kumar S, Rajeshwari S, Kothari SS, Roy KK, et al. Heart disease in pregnancy: cardiac and obstetric outcomes. Arch Gynecol Obstet. 2013;288(1):23–7. DOI:
11. Sullivan EA, Vaughan G, Li Z, Peek MJ, Carapetis JR, Walsh W, et al. The high prevalence and impact of rheumatic heart disease in pregnancy in First Nations populations in a high-income setting: a prospective cohort study. Br J Obstet Gynaecol. 2020;127(1):47–56. DOI: 10.1111/1471-0528.15938, ISSN: 14710528, PMID: 31512355

12. Prajapati D, Sharma D, Regmi PR, Khanal H, Baidya SG, Rajbhandari S, et al. Epidemiological survey of Rheumatic fever, Rheumatic heart disease and Congenital heart disease among school children in Kathmandu valley of Nepal. Nep Heart J. 2014;10(1):1–5. DOI: https://doi.org/10.3126/njh.v10i1.9738

13. Regmi PR, Pandey MR. Prevalence of rheumatic fever and rheumatic heart disease in school children of Kathmandu city. Indian Heart J. 1997;49(1):518–45. PMID: 9505020.

14. Kc MB. Rheumatic Heart Disease in Nepal: Current Scenario. 2016;13(2):1–2. DOI: 10.3126/njh.v13i2.15554

15. Bahadur KC, Sharma D, Shrestha MP, Gurung S, Rajbhandari S, Malla R, et al. Prevalence of rheumatic and congenital heart disease in schoolchildren of Kathmandu valley in Nepal. Indian Heart J. 2003;55(6):615–8. PMID: 14989511

16. Shrestha NR, Karki P, Mahto R, Gurung K, Pandey N, Agrawal K, et al. Prevalence of Subclinical Rheumatic Heart Disease in Eastern Nepal: A School-Based Cross-sectional Study. JAMA Cardiol. 2016;1(1):89–96. PMID: 27437661. DOI: 10.1001/jamacardio.2015.0292

17. Sawhney H, Aggarwal N, Suri V, Vasishta K, Sharma Y, Grover A. Maternal and perinatal outcome in rheumatic heart disease. Int J Gynecol Obstet [Internet]. 2003;80(1):9–14. Available from: https://doi.org/10.1016/S0020-7292(02)00029-2

18. Koirala PS. Obstetric outcome in patients with rheumatic heart disease: experience of a tertiary hospital. 2017;14(2):31–4. DOI: https://doi.org/10.3126/njh.v14i2.185

19. Ongzalima CO, Vaughan G, Ng A, Fitz-gerald JA, Sanfilippo FM, Dickinson JE, et al. Rheumatic heart disease in pregnancy: Profile of women admitted to a Western Australian tertiary obstetric hospital. Aust N Z J Obstet Gynaecol 2020;302–8. DOI: 10.1111/ajo.13102

20. Chhetri S, Shrestha NR, Pilgrim T. Pregnancy complicated by heart disease in Nepal. Heart Asia. 2014;26–9. DOI: 10.1136/heartasia-2013-010396

21. Paudyal P. Fate of Pregnancy in Women with Rheumatic Heart Disease Attending a Tertiary Referral Centre. J Nep Dent Assoc. 2020;17(2):24–9.

22. Silversides CK, Colman JM, Sermer M, Siu SC. Cardiac risk in pregnant women with rheumatic mitral stenosis. Am J Cardiol. 2003;91(11):1382–5. DOI: 10.1016/S0002-9149(03)00339-4, ISSN: 0029149, PMID: 12767443