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Profile of adult patients presenting for rheumatic mitral valve surgery at a tertiary academic hospital

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Abstract

Background: Peri-operative morbidity and mortality are increased in patients with rheumatic heart disease. Pre-operative risk stratification is imperative for optimisation and a better outcome.

Methods: This was a descriptive, retrospective, contextual study. A consecutive convenience sampling method was used. Eighty-nine patients who underwent mitral valve surgery at Charlotte Maxeke Johannesburg Academic Hospital between January 2014 and December 2015 were enrolled. The objectives of the study were to describe the demographic profile of the patients presenting for rheumatic mitral valve surgery, describe their peri-operative cardiovascular and echocardiographic parameters, and risk stratify according to their clinical and echocardiographic parameters. Demographic, echocardiographic and laboratory data as well as the cardiovascular examination were analysed. Descriptive statistics using proportions (percentages), means (standard deviations) or medians (interquartile ranges) were used where appropriate.

Results: A total of 102 patients were reviewed. Thirteen were excluded due to significant missing data. Of the 89 analysed, all had demographic data, 81 had cardiovascular clinical examination data, 82 had echocardiographic data and 52 had laboratory data. Forty-seven patients presented with mitral regurgitation (MR) and 35 had mitral stenosis (MS). Data included two mixed mitral valve disease patients with predominant regurgitation who were classified under the MR group. In total, 45% (39 patients) had arrhythmias and 49% (42 patients) had congestive cardiac failure at presentation for surgery. The overall mean (SD) pulmonary artery systolic pressure was 57 (20) mmHg and mean (SD) left atrial size was 53 (11) mm. Those with MS presented with mean (SD) mitral valve area of 0.9 (0.2) cm². Of the analysed MR patients, 51% presented with left ventricular ejection fraction < 60% and 55% with left ventricular end-systolic diameter > 40 mm. Among the analysed MS patients, 59% had mitral valve area < 1 cm². A substantial number (49% MR and 54% MS) of collected records were not eligible for analysis and stratification using the American Heart Association/American College of Cardiology (ACC/AHA) guidelines for valvular heart disease due to missing vital information. Of the 24 MR patients analysed utilising the 2014/2017 AHA/ACC guidelines, 13 had asymptomatic severe MR (stage C) and 11 had symptomatic severe MR (stage D). One patient had progressive MS (stage B), eight had asymptomatic severe MS (stage C) and seven had symptomatic severe MS (stage D).

Conclusion: The majority of those who could be stratified presented in stages C and D of disease progression; however, they also presented with concomitant clinical and echocardiographic features that placed them at high risk of peri-operative morbidity.

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The estimated worldwide prevalence of rheumatic heart disease was 15.6 million in 2008, with 282 000 new cases arising each year, and 233 000 deaths per year in developing countries.[1] In 2010, the incidence of cardiac failure due to rheumatic heart disease in a South African township was reported to be between 30 per 100 000 per year in individuals aged 14 to 19 years and 53 per 100 000 per year in individuals 60 years and older.[2,3]

The commonest infectious cause of valvular heart disease in developing countries is Group A β haemolytic streptococcal infection. The mainstay treatment for valvular heart disease in these countries remains open-heart surgery due to late presentation of patients.[4]

The presence of complications such as arrhythmias, congestive cardiac failure, infective endocarditis and pulmonary hypertension increases mortality rates.[5-7] In 2004, Oli *et al*.[7] found that out of 457 patients with cardiovascular disease, 121 (26.5%) were from rheumatic heart disease and 70% of these died from congestive cardiac failure secondary to rheumatic heart disease.

Patients presenting for open-heart surgery pose anaesthetic challenges peri-operatively due in part to complications emanating from pre-operative low left ventricular ejection fraction (LVEF) and prolonged cross-clamp time.[8] An observational study assessing the value of pulmonary artery pressure (PAP) in predicting in-hospital and one-year mortality rates after valve-replacement surgery in patients with rheumatic mitral valve disease reported gradual but significant increases in in-hospital mortality rates as the PAP increased.[6] The timing of referral for surgery might therefore be important and may impact on the peri-operative course of patients.

Stratification of these patients pre-operatively is imperative to develop management plans tailored to each patient. Towards

this, the American Heart Association and American College of Cardiology (AHA/ACC) developed guidelines in 2014 that stage severity of rheumatic valvular heart disease (based on symptoms at presentation and pre-operative echocardiography findings).[9] These guidelines were updated in 2017 to recommend appropriate evidence-based management strategies.[10]

It is unclear whether the AHA/ACC guidelines for valvular heart disease were utilised for stratification of patients presenting for surgery at a major hospital as records had insufficient data to make conclusions. This study undertook to describe the profile of adult patients presenting for rheumatic mitral valve surgery at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH), a tertiary hospital of the University of the Witwatersrand in Johannesburg, South Africa.

Methods

The study was conducted in the Cardiothoracic Unit and the Department of Anaesthesiology at CMJAH, affiliated to the Faculty of Health Sciences of the University of the Witwatersrand. Approval was obtained from the Human Research Ethics Committee (Medical) of the University of the Witwatersrand and other relevant authorities.

A retrospective review was conducted of pre-operative anaesthetic, cardiology and cardiothoracic surgery records belonging to patients who presented for mitral valve surgery from January 2014 to December 2015. Reviewed variables were age, race, gender, pre-operative vital signs, cardiovascular examination data focusing on the presence or absence of arrhythmias, congestive cardiac failure and infective endocarditis, liver and renal function tests, and pre-operative echocardiographic parameters.

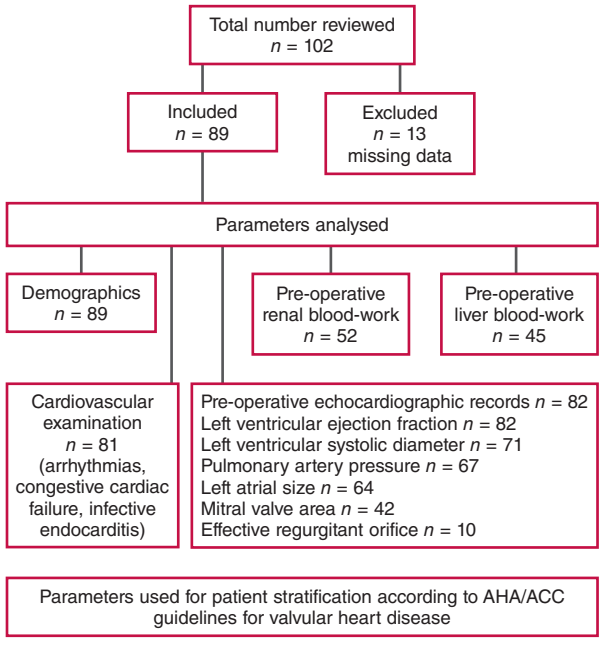


Fig. 1. Flow chart indicating variables collected for the study. AHA/ACC, American Heart Association/American College of Cardiology.

Relevant variables were then used to stratify patients according to the AHA/ACC guidelines for valvular heart disease. Demographic data, including ethnicity, were collected from hospital records as these were self-reported. These were utilised to classify patients into ethnic groups. All data were collected by one author (NM). A data-collection flow chart is shown in Fig. 1. Descriptive statistics were used, reported as numbers and percentages, means and standard deviations or medians and interquartile ranges, depending on the distribution of data.

Results

One hundred and two records were eligible for review and 89 patients were enrolled. Thirteen subjects were excluded due to missing vital data. The mean (SD) age of presentation was 42 (12) years, ranging from 18 to 72 years. Of the 89 patients, each had different data sets available for review. The patient demographics and cardiovascular examination findings are illustrated in Table 1.

Records of results of pre-operative liver and renal function parameters were available in 51 and 58% of patients, respectively. They were all normal (Table 2).

The predominant mitral valve lesion, as diagnosed on echocardiography, showed that 57% (47 patients) of study patients had mitral regurgitation (MR) and 42% (35 patients) had mitral stenosis (MS). Two study patients presented with mixed mitral valve disease with predominant regurgitation and were therefore classified under regurgitation as per the AHA/ACC guidelines for valvular heart disease. Combined echocardiographic results for MR and MS are shown in Table 3.

The MR patients had mean (SD) left atrial size of 55 (13) mm for females and 49 (6) mm for males. The mean (SD) for PAP was 55 (21) mmHg, mean (SD) LVEF was 59% (11) and

Table 1. Demographic and cardiovascular examination findings of study patients

Variables	*Frequency,* n *(%)*	
Gender, *n* = 89		
Female	52 (58)	
Male	37 (42)	
Ethnicity, *n* = 89		
Black	67 (75)	
White	16 (18)	
Other	6 (7)	
Pre-operative cardiovascular examination findings, *n* = 85	*Yes*	*No*
Arrhythmias	39 (46)	46 (54)
CCF	42 (49)	43 (51)
IE	10 (12)	75 (88)

CCF, congestive cardiac failure; IE, infective endocarditis.

Table 2. Pre-operative liver and renal parameters

Tests	*Interquartile range*	*Median*
Liver function test (mmol/l), *n* = 45		
Alkaline phosphatase	66	32–95
Gamma glutamine transferase	48	27–82
Alanine transaminase	52	28–111
Aspartate transaminase	45	29–83
Renal function test (mmol/l), *n* = 52		
Urea	5.8	5.1–8.4
Creatinine	83	68–105

Table 3. Echocardiographic data of interest for both MR and MS

	Mean (SD)	*Min–max range*
Left atrial size (mm), *n* = 64	53 (11)	30–91
Female, *n* = 40	54 (13)	30–91
Male, *n* = 24	51 (6)	41–60
PAP (mmHg), *n* = 67	57 (20)	21–101

PAP, pulmonary artery pressure.

Table 4 Echocardiographic data for MR

Variables		*Number (%)*
Left atrial size (mm), *n* = 35		
Female	< 43	3 (9)
Male	< 47	6 (17)
Female	43–47	4 (11)
Male	47–52	4 (11)
Female	> 47	13 (37)
Male	> 52	5 (15)
Pulmonary artery pressure (mmHg), *n* = 32		
Mild	< 30	5 (16)
Moderate	30–50	7 (22)
Severe	> 50	20 (62)
Left ventricular ejection fraction (%), *n* = 47		
> 60		23 (49)
< 60		24 (51)
Left ventricular end-systolic diameter (mm), *n* = 38		
< 40		21 (55)
> 40		17 (45)
Effective regurgitant orifice area (cm²), *n* =10		
< 0.4		4 (40)
≥ 0.4 (+ haemodynamic changes)		6 (60)

the mean (SD) left ventricular end-systolic diameter (LVESD) was 39 (14) mm.

Of the female patients, 28% had enlarged left atrial size while 43% had high PAP. Normal LVEF of more than 60% was found in 51% of MR patients and 55% had left ventricular end-systolic diameters of less than 40 mm. Echocardiographic data for MR are shown in Table 4. Seventy-nine per cent of the effective regurgitant orifice area data were incomplete from the charts. These data are necessary for patient stratification.

Echocardiographic parameters for MS patients showed a mean (SD) mitral valve area of 0.9 (0.2) cm², and a mean (SD) left atrial size of 54 (13) mm for female patients and 52 (7) mm for male patients. The mean (SD) PAP was 60 (19) mmHg.

Critically stenosed mitral valve disease with a mitral valve area of less than 1 cm² was found in 59% of patients, and 69% of MS patients had severely elevated PAP. Echocardiographic data for MS are shown in Table 5, however, similar to MR, some charts had missing parameters.

Patient stratification as per the AHA/ACC guidelines for valvular heart disease combines symptoms at presentation, haemodynamic consequences and valve anatomy for disease severity staging. In the current study, the pre-operative cardiovascular examination findings representing symptoms and signs were collected, together with the pre-operative echocardiography findings, which demonstrated valvular structure and haemodynamic consequences (Table 6).

Review of the data for MR patients (47) for the purposes of stratification revealed incomplete parameters in 23 (49%) patients. Of the remaining 24 (51%), 13 (54%) were stratified

Table 5. Echocardiographic data for MS

Variables		*Number (%)*
Mitral valve area (cm²), *n* = 32		
1.5–1.0		13 (41)
< 1.0		19 (59)
Left atrial size (mm), *n* = 27		
Female	< 43	2 (7)
Male	< 47	2 (7)
Female	43–47	5 (19)
Male	47–52	2 (7)
Female	> 47	12 (45)
Male	> 52	4 (15)
Pulmonary artery pressure (mmHg), *n* = 32		
Mild	< 30	1 (3)
Moderate	30–50	9 (28)
Severe	> 50	22 (69)

Table 6. Stratification (stage of presentation) as per AHA/ACC guidelines for valvular heart disease

Symptoms, haemodynamic consequences and valve haemodynamics	*MR*, n *(%)*	*MS*, n *(%)*
Stage B (progressive disease)	–	1 (3)
Stage C (severe asymptomatic disease)	13 (28)	8 (23)
Stage D (severe symptomatic disease)	11 (23)	7 (20)
Incomplete vital information	23 (49)	19 (54)

as asymptomatic severe MR or stage C and 11 (46%) as symptomatic severe MR or stage D. Stratification for MS patients (35) showed that 19 (54%) study patients had incomplete data. Only 16 (46%) could therefore be analysed, with one patient (6%) having progressive MS or stage B, eight (50%) with asymptomatic severe MS or stage C, and seven (43%) with symptomatic severe MS or stage D.

Discussion

Rheumatic heart disease is a preventable medical condition, which has been eradicated in high socio-economic countries. In South Africa, where the disease is still prevalent, there are limited reported data on peri-operative risk stratification of patients with rheumatic heart disease. Our study, therefore, drew references predominantly from non-peri-operative epidemiological studies.

Different studies report varied ages at presentation of rheumatic heart disease. The mean (SD) age at presentation to surgery in the current study was found to be 42 (12) years. An epidemiological study by Sliwa *et al.*,[3] which was conducted in Soweto, Johannesburg, looked at new onset of presentation of rheumatic heart disease and reported a median (IQR) age of 42 (31–55) years.

Similarity in age between this study and that by Sliwa *et al.*[3] may be attributed to the fact that both studies were in the same geographical area of Johannesburg. Kim *et al.*[11] reviewed patients post mitral valve surgery in South Korea and reported the mean age as 49 (12) years. Faheem *et al.*[12] reported the mean age of new onset of presentation in a Pakistani population at 22 (6) years, while Joseph *et al.*[13] found the mean age of new onset of presentation to be 33 (18) years. Their study was conducted in an urban area of south India. Data from the current study could be used to indicate only age at presentation to surgery in relation to clinical picture, as these patients may have been

followed up for periods of time before presentation to surgery. It is however, postulated that rheumatic valve disease progression in the developing world is characterised by considerably shorter latent phase periods, likely due to recurrent carditis.[9]

Several studies reported a predominance of rheumatic heart disease among females,[3,11,12,14,15] with 68% being female in the study by Sliwa *et al*.,[6] 66% in that of Kim *et al*.,[11] 58% in that of Faheem *et al*.[12] and 81% in the study by Yau *et al*.[14] Findings from the current study, although reporting only on mitral valvular disease, also showed female predominance, with 58% of the patients being female. The reason for female predominance has not been explored in previous studies,[4,6,15] and may have been coincidental.

Outcomes of the current study showed that 75% of study patients were in the black population. Although the finding of predominance in the black population in rheumatic heart disease has been shown before, a direct link between race and high incidence of rheumatic heart disease has not been established.[2,3,16-19] An argument for the influence of poor socio-economic conditions may however be made.

This link to low socio-economic status has been made previously.[19] The majority of black South Africans live in impoverished areas of South Africa, which may indicate a link with the high prevalence of rheumatic heart disease in this population.[2,3,16-19] The link between high rheumatic heart disease rates and poor socio-economic status is supported by Hofer *et al*.,[19] who noted that the highest rates of disease were in Aboriginal Australians from poor indigenous areas. In addition, Gosh *et al*.,[18] in their review article in 2011, also reported high rheumatic heart disease prevalence in a poor rural region of eastern India.

Arrhythmias, congestive cardiac failure, infective endocarditis and pulmonary hypertension are common complications of rheumatic heart disease.[14,19-25] In the current study, 45% of study patients presented with arrhythmias. This was, however, less than that seen in an epidemiological non-surgical Ugandan study in which 64% of patients had arrhythmias at initial presentation.[24] Okello *et al*.[24] also reported that 35% of their Ugandan study patients presented with decompensated cardiac failure. In the current study, a higher rate (49%) of patients presented for surgery in congestive heart failure. Only 12% of study patients within this study presented with infective endocarditis. This was much lower than those in the study by Koegelenberg *et al*.,[25] which found 51% of their patients presenting with infective endocarditis at Tygerberg Academic Hospital, Cape Town, South Africa in 2003.

The mean (SD) PAP in the current study was 57 (20) mmHg overall and the majority of the analysed and stratified study patients presented with moderate to severe pulmonary hypertension (PHT) (84% in MR and 97% in MS). This has critical clinical implications as peri-operative PHT is linked to increased complications and high rates of mortality peri-operatively.[6,21]

Jiang *et al*.[6] found a gradual but significant increase in in-hospital mortality rates as PAP levels increased in middle-aged and aged patients [mean (SD) age 57 (6) years] diagnosed with rheumatic mitral disease, undergoing valve-replacement surgery. They found that PAP > 52.5 mmHg had a sensitivity of 60.3% and specificity of 67.7% in predicting in-hospital death (area under the curve = 0.672, 95% confidence interval: 0.602–0.743, $p < 0.001$). They also showed that patients with PAP > 52.5 mmHg had higher one-year mortality rates after surgery than those without ($p < 0.001$).[6]

Pre-operative renal and liver function assessment is important as pre-operative creatinine levels > 2–4 mg/dl (176–352 mmol/l) in patients scheduled for valve procedures have been identified as risk factors for the development of acute renal failure post open-cardiac surgery.[26] Sabzi and Faraji[27] reported an overall hospital mortality rate of 54% in a prospective study carried out on patients who developed liver failure secondary to cardiac failure. The current study found that pre-operative urea and creatinine levels and liver function tests were normal for all study patients who had data.

The 2014 (updated in 2017) AHA/ACC guidelines for valvular heart disease include the description of the dominant lesion, left atrial size, pulmonary artery pressures, LVESD and LVEF as echocardiographic parameters for staging of severity in rheumatic valvular heart disease.[9,10]

Rheumatic MR appears to be predominant in African countries, as evidenced by studies conducted in the savannah in Nigeria, Soweto in South Africa, and a tertiary institution in Uganda, which reported MR predominance of 37% (the study reported mixed mitral valve as a separate group), 59 and 68%, respectively.[3,24,28] The current study also found MR to be predominant, as 53% of study patients were shown to have this lesion on echocardiography.

The decision for early or late surgical intervention in patients with asymptomatic MR remains controversial.[29-31] Tribouilloy *et al*.[30] noted that 'early surgical intervention is a reasonable consideration in asymptomatic patients booked for mitral regurgitation correction. However, clinicians are hesitant to recommend surgery in patients with no or minimal symptoms for fear of exposure to operative mortality and morbidity.' The AHA/ACC guidelines suggest that primary MR, being a mechanical leaflet problem, requires a mechanical surgical solution. 'The goal of therapy in MR is to correct it before the onset of left ventricular systolic dysfunction and the subsequent adverse effect on patient outcomes'.[9]

The overall mean (SD) left atrial size of patients in the current study was severely enlarged at 53 (11) mm, placing them at risk of developing complications. Enlarged left atrial size on echocardiography results in significant complications such as atrial fibrillation, stroke and heart failure.[32-34] Reed *et al*.,[35] in their study on pre-operative predictors of postoperative cardiac-related mortality concluded that (1) measures of both left ventricular systolic function and left atrial size are equally important in predicting postoperative cardiac-related mortality in patients with symptomatic chronic MR undergoing mitral valve replacement; (2) left atrial size may be important because it reflects the 'history' (severity and duration) of MR.[35]

LVEF and LVESD are good predictors of postoperative left ventricular function and can be used as objective markers to decide on timing of surgery in patients with MR.[29] In the current study, 49% of MR patients presented with LVEF > 60% and 45% presented with LVESD < 40 mm. Class 1 evidence for primary MR from the AHA/ACC guidelines suggests that the goal of therapy in MR is to correct it before the onset of left ventricular systolic dysfunction and the subsequent adverse effect on patient outcomes.[9] It is deemed ideal to operate prior to indications of systolic dysfunction (LVEF ≤ 60% or LVESD ≥ 40 mm). The

guidelines recommend a higher cut-off for normal LVEF in MR than in other types of heart disease.

Risk stratification of patients as per the AHA/ACC guidelines for the current study proved difficult, as 49% of study patients within the MR group and 54% of study patients from the MS group had missing important information necessary for stratification. Of the 51% of the study patients with available important information within the MR group, risk stratification as per the AHA/ACC guidelines showed that 13 (54%) patients had asymptomatic severe MR or stage C and 11 (46%) had symptomatic severe MR or stage D. Stratification for MS patients showed that one patient (6%) had progressive MS or stage B; eight (50%) had asymptomatic severe MS or stage C, and seven (43%) had symptomatic severe MS or stage D.

All patients in the current study underwent mitral valve replacement irrespective of the stage of disease at which they presented. As these data are retrospective, the reasons behind the decision regarding the choice of surgery/intervention and controversies thereof cannot be discussed. The decision, however, is often informed by other factors such as valve morphology, presence or absence of left atrial clot, mixed valve disease and availability of expertise.

The current study was undertaken to understand the profile of adult patients presenting for rheumatic mitral valve surgery and to open discussions and plan to further assess outcome in later studies. It is important to note that with the AHA/ACC guidelines 'the focus is on medical practice in the United States, but guidelines developed in collaboration with other organisations may have a global impact',[10] as patient populations may differ.

Presentation with signs and symptoms associated with adverse outcome in the current study was similar in pattern to findings by Sliwa *et al*.[3] in 'insights from the Heart of Soweto study', as it found that 66% of newly diagnosed rheumatic heart disease patients presented as stage D on the AHA/ACC guidelines. Perhaps the report of our study, similar to that in Sliwa *et al*.,[3] which reported on a feeder population into our institution, also indicates a delay in surgical intervention. Severe symptoms at initial diagnosis of rheumatic heart disease are a major predictor of mortality, therefore early presentation, before the development of complications, could lead to better outcomes as pulmonary hypertension, arrhythmias and heart failure are associated with high mortality and morbidity rates. A further investigation on outcome measures and waiting time from presentation to surgery is desirable.

Conclusion

Most study patients were black adult females. Approximately half of the patients in this study presented with heart failure. Although limited by inadequate echocardiographic data for stratification in about half of the study population, this data showed that predominantly female patients presented with moderate to severe disease, as evidenced by left atrial size, PAP and valve area parameters in both the stenotic and regurgitant groups. This conclusion is however not generalisable and may yield different results with a larger sample size. Poor records of echocardiographic data entry made it difficult to stratify a significant number of patients according to recommendations. Much improvement is needed in this regard. Although the study did not look at outcomes, the echocardiographic and clinical parameters assessed, such as LVEF, left atrial size, PAP, arrhythmias and heart failure, which are known to be associated with increased morbidity and mortality rates, indicate the possibility of a poor outcome. A follow-up outcome study would be ideal to elucidate this.

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References

1. Robertson KA, Mayosi BM. Rheumatic heart disease: social and economic dimensions. *S Afr Med J* 2008; **98**(10): 780–781
2. Mayosi BM, Gamra H, Dangou JM, Kasonde J, for the 2nd All-Africa Workshop on Rheumatic Fever and Rheumatic Heart Disease participants. Rheumatic heart disease in Africa: the Mosi-o-Tunya call to action. *Lancet Glob Health* 2014; **2**(8): e438–439.
3. Sliwa K, Carrington M, Mayosi BM, Zigiriadis E, Mvungi R, Stewart S. Incidence and characteristics of newly diagnosed rheumatic heart disease in urban African adults: insights from the heart of Soweto study. *Eur Heart J* 2010; **31**(6): 719–727.
4. Bloomfield GS, Barasa FA, Doll JA, Velazquez EJ. Heart failure in sub-Saharan Africa. *Curr Cardiol Rev* 2013; **9**(2): 157–173.
5. Prasad A, Kumar S, Singh B, Kumari N. Mortality due to rheumatic heart disease in developing world: a preventable problem. *J Clin Exp Cardiol* 2017; **8**(503): 2.
6. Jiang L, Wei XB, He PC, Feng D, Liu YH, Liu J, *et al*. Value of pulmonary artery pressure in predicting in-hospital and one-year mortality after valve replacement surgery in middle-aged and aged patients with rheumatic mitral disease: an observational study. *Br Med J Open* 2017; **7**(5): e014316.
7. Oli K, Asmera J. Rheumatic heart disease in Ethiopia: could it be more malignant? *Ethiop Med J* 2004; **42**(1): 1–8.
8. Ellenberger C, Sologashvili T, Cikirikcioglu M, Verdon G, Diaper J, Cassina T, *et al.* Risk factors of postcardiotomy ventricular dysfunction in moderate-to-high risk patients undergoing open-heart surgery. *Ann Card Anaesth* 2017; **20**(3): 287–296.
9. Nishimura R, Otto C, Bonow R, Carabello B, Erwin 3rd J, Guyton R, *et al*. 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; **129**: 157–185.
10. Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP, 3rd, Fleisher LA, *et al*. 2017 AHA/ACC focused update of the 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 Clinical Practice Guidelines. *Circulation* 2017; **135**(25): 1159–1195.
11. Kim JB, Kim HJ, Moon DH, Jung SH, Choo SJ, Chung CH, *et al*. Long-term outcomes after surgery for rheumatic mitral valve disease: valve repair versus mechanical valve replacement. *Eur J Cardiothorac Surg* 2010; **37**(5): 1039–1046.
12. Faheem M, Hafizullah M, Gul A, Jan HU, Khan MA. Pattern of valvular lesions in rheumatic heart disease. *J Postgrad Med Inst* 2007; **21**(2): 99–103.
13. Joseph N, Madi D, Kumar GS, Nelliyanil M, Saralaya V, Rai S. Clinical spectrum of rheumatic Fever and rheumatic heart disease: a 10 year experience in an urban area of South India. *N Am J Med Sci* 2013; **5**(11): 647–652.
14. Yau TM, El-Ghoneimi YA, Armstrong S, Ivanov J, David TE. Mitral

valve repair and replacement for rheumatic disease. *J Thorac Cardiovasc Surg* 2000; **119**(1): 53–60.
15. Tornos P. [Valvular heart disease in women]. *Rev Esp Cardiol* 2006; **59**(8): 832–836.
16. Cilliers AM. Rheumatic fever and rheumatic heart disease in Africa. *S Afr Med J* 2015; **105**(5): 361–362.
17. Stewart S, Wilkinson D, Becker A, Askew D, Ntyintyane L, McMurray JJ, *et al.* Mapping the emergence of heart disease in a black, urban population in Africa: the Heart of Soweto Study. *Int J Cardiol* 2006; **108**(1): 101–108.
18. Ghosh S, Dey S. Clinical profile of rheumatic heart disease in children and young people in Eastern India. *Int J Collab Res Internal Med Public Health* 2011; **2**(03): 100–107.
19. Hofer A, Woodland S, Reeve C. Mortality due to rheumatic heart disease in the Kimberley 2001–2010. *Aust N Z J Public Health* 2014; **38**(2): 139–141.
20. Nkomo VT. Epidemiology and prevention of valvular heart diseases and infective endocarditis in Africa. *Heart* 2007; **93**(12): 1510–1519.
21. Kaw R, Pasupuleti V, Deshpande A, Hamieh T, Walker E, Minai OA. Pulmonary hypertension: an important predictor of outcomes in patients undergoing non-cardiac surgery. *Respir Med* 2011; **105**(4): 619–624.
22. Fleming HA, Bailey SM. Mitral valve disease, systemic embolism and anticoagulants. *Postgrad Med J* 1971; **47**(551): 599–604.
23. Rankin JS, Hammill BG, Ferguson TB, Jr, Glower DD, O'Brien SM, DeLong ER, *et al*. Determinants of operative mortality in valvular heart surgery. *J Thorac Cardiovasc Surg* 2006; **131**(3): 547–557.
24. Okello E, Longenecker CT, Beaton A, Kamya MR, Lwabi P. Rheumatic heart disease in Uganda: predictors of morbidity and mortality one year after presentation. *BMC Cardiovasc Disord* 2017; **17**(1): 1–10.
25. Koegelenberg CF, Doubell AF, Orth H, Reuter H. Infective endocarditis in the Western Cape Province of South Africa: a three-year prospective study. *Q J Med* 2003; **96**(3): 217–225.
26. Rosner MH, Okusa MD. Acute kidney injury associated with cardiac surgery. *Clin J Am Soc Nephrol* 2006; **1**(1): 19–32.
27. Sabzi F, Faraji R. Liver function tests following open cardiac surgery. *J Cardiovasc Thorac Res* 2015; **7**(2): 49–54.
28. Sani MU, Karaye KM, Borodo MM. Prevalence and pattern of rheumatic heart disease in the Nigerian savannah: an echocardiographic study. *Cardiovasc J Afr* 2007; **18**(5): 295–299.
29. Matsumura T, Ohtaki E, Tanaka K, Misu K, Tobaru T, Asano R, *et al*. Echocardiographic prediction of left ventricular dysfunction after mitral valve repair for mitral regurgitation as an indicator to decide the optimal timing of repair. *J Am Coll Cardiol* 2003; **42**(3): 458–463.
30. Tribouilloy CM, Enriquez-Sarano M, Schaff HV, Orszulak TA, Bailey KR, Tajik AJ, *et al.* Impact of preoperative symptoms on survival after surgical correction of organic mitral regurgitation: rationale for optimizing surgical indications. *Circulation* 1999; **99**(3): 400–405.
31. De Bonis M, Bolling SF. Mitral valve surgery: wait and see vs. early operation. *Eur Heart J* 2013; **34**(1): 13–19.
32. Desanctis RW, Dean DC, Bland EF. Extreme left atrial enlargement: some characteristic features. *Circulation* 1964; **29**: 14–23.
33. El Maghraby A, Hajar R. Giant left atrium: a review. *Heart Views* 2012; **13**(2): 46–52.
34. Patel DA, Lavie CJ, Milani RV, Shah S, Gilliland Y. Clinical implications of left atrial enlargement: a review. *Ochsner J* 2009; **9**(4): 191–196.
35. Reed D, Abbott RD, Smucker ML, Kaul S. Prediction of outcome after mitral valve replacement in patients with symptomatic chronic mitral regurgitation. The importance of left atrial size. *Circulation* 1991; **84**(1): 23–34.

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'It is thought that those who have had a heart attack may be particularly vulnerable to plaque rupture as a result of these inflammatory mechanisms at play,' Garcia said. 'The association we found was independent of known cardiovascular risk factors and suggests mechanisms involving systemic inflammation in response to stress may be implicated in the likelihood of a subsequent cardiac event.'

The researchers also found that patients with high distress were more often black, female and from a disadvantaged socio-economic background and were more likely to smoke or have diabetes or high blood pressure. 'This finding highlights the importance of socio-economic status with regard to higher distress and raises important questions about the role of race, gender and other factors,' Garcia said.

The researchers plan to further investigate how socio-economic and demographic factors may influence mental health among people who suffer a heart attack at a young age. Recent studies have suggested younger adults, especially women, account for an increasing proportion of the heart attacks occurring each year in the USA, Garcia said, underscoring the importance of improving outcomes in this population.

'Outreach to the community has led to increased awareness of traditional heart disease risk factors and focuses on things such as diet and exercise, but many people, particularly younger people, may not be aware of the importance of mental health,' Garcia said. 'Our study offers a strong message to people recovering from a heart attack that ameliorating psychological distress is equally important.

Garcia cautioned that causation cannot be proven with an observational study and noted the possibility of recall bias among people with more severe disease, since psychological distress was self-reported in this study. While the study's sample size was relatively small, it did demonstrate a robust association using a prospective design.

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