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Prevalence of Non-Severe Tricuspid Regurgitation in Asymptomatic Individuals with Otherwise Normal Echocardiography Findings in Karbala City/Iraq

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Abstract

Objectives: Tricuspid regurgitation (TR) is a less commonly used echocardiographic finding. Hence, its clinical significance is not well-studied. This study evaluated the prevalence of nonsevere (mild and moderate) TR in asymptomatic patients with normal heart functions on trans-thoracic echocardiography (TTE).

Methods: The TTE data of 1220 patients visiting the Imam Al-Hujjah Hospital, Karbala, Iraq, between May 2018 to June 2019 were retrospectively analyzed. All patients were asymptomatic with a healthy functioning heart on TTE.

Results: The prevalence of mild and moderate TR in asymptomatic individuals with otherwise normal TEE findings was 5.6% (n = 69). The study included 41 females (59.9 %) and 28 males (40.1 %). Majority of the study participants had Mild TR (n = 57, 82%) followed by Moderate TR (n = 12, 18 %). The prevalence of TR was seen to significantly increase with increasing age.

Conclusion: Not all individuals having TR on TTE show the signs of having cardiac disease, as they can belong to the asymptomatic individuals with a normally functioning heart. However, the prevalence of TR increases significantly with age because of the degenerative process of aging.

Keywords: echocardiography; prevalence; tricuspid Regurgitation; tricuspid valve

Introduction

Tricuspid regurgitation (TR) is the backflow of blood from the right ventricle (RV) into the right atrium (RA) during ventricular systole, mostly due to incomplete coaptation of the valve leaflets.[1] TR is predominant in 70–90 % of the general population and is classified in to primary or secondary based on its functionality. [2] Primary TR is due to valve lesions like congenital lesions (e.g. Ebstein's anomaly and tricuspid valve dysplasia) or acquired lesions (e.g. Rheumatic heart disease). While the secondary TR is due to other causes like annular dilatation, left-sided heart disease, pulmonary hypertension, and cardiomyopathy.[3] TR can be mild, moderate, and severe. Severe TR is associated with a poor prognosis due to reduced survival, worse functional capacity, and increased surgical risk.[3–5] However, the management of TR remains vague due to minimal research on this topic and their contradictory results.[6]

In Iraq, there are no studies on TR to date. It is not clear whether all cases of TR on TTE are pathological. Therefore, there is a need for further cardiac

assessment. The study by Fender et al.[7] showed an increasing recognition of a subgroup of patients with isolated TR in the absence of other associated cardiac abnormalities. Hence not all TR cases need intervention. Besides, surgery for isolated TR is performed rarely because of 8–10% operative mortality and significant risk for recurrence of regurgitation after surgery. [7] So, further studies are needed to clarify the management of isolated TR in an otherwise normal heart. In this study, the prevalence of nonsevere TR in asymptomatic individuals with normal echocardiographic findings was assessed to avoid unnecessary further cardiac investigations.

Methods

The study was a retrospective analysis of transthoracic echocardiography (TTE) studies conducted between May 2018 to June 2019 in the cardiology department of Imam Al-Hujjah Hospital, Iraq. All patients were asymptomatic and the TTE studies were performed as a part of the preoperative check-up or to exclude cardiac-related causes of chest pain.

Participants with significant TTE findings, for example, inter-chamber connections, valvular heart disease, cardiomyopathy, chamber enlargement, ischemic heart disease, and reduced systolic function were all excluded.

A total of 1220 cases (682 were females and 538 were male) of all ages were chosen for the study.

TTE findings

Standard two-dimensional and Doppler echocardiography were conducted on the patients using Siemens Acuson -51000 system (Siemens, Munich, Germany).

Grading of TR into mild, moderate, and severe was based on the tricuspid valve anatomy, central jet area, vena contracta, and hepatic vein flow (see Table 1); according to the recent guidelines of the American society of echocardiography.[8] RA and RV volumes and functions were recorded according to the American and British guidelines for echocardiographic assessment of the right heart in adults.[9,10]

Statistical analysis was performed using SPSS Statistics 27 (SPSS, Chicago, IL), where a $P < 0.05$ was regarded as significant.

Results

Overall, only 1220 patients passed the inclusion criteria and were included in the study. The study population included 682 (55.9%) females and 538 (44.1%) males. Table 2 shows the basic demographic characteristics of the study group.

Sixty-nine (5.6%) patients exhibited the nonsevere TR (mild and moderate), out of which 41 were females (59.9%) and28 were males (40.1%; see Figure 1). However, no significant difference between male and females were recorded ($P = 0.545$) in TR distribution.

Figure 2 shows the mild and moderate TR distribution according to sex.

The majority of the patients with nonsevere TR had Mild TR (57, 82%) followed by moderate TR (12, 18 %; see Figure 3).

Figure 4 shows the distribution of mild and moderate TR according to the age group.

There is a significant increase in the prevalence of TR with increasing age group and show a strongly positive $P = 0.003$ (see Figure 5). However, no relationship between the distribution of severity of TR (mild and moderate) with age group or gender was observed.

Discussion

Little or no data on tricuspid valve disease is available in the Iraqi population. There is not much research done on the tricuspid valve and its

Table 1 Grading of TR by echocardiography.

TR grade	Jet area	Vena contracta	Hepatic vein flow	RA size	RV volume (ml)
Mild	< 5 cm^2	< 3 mm	Systolic dominance	Normal	< 30
Moderate	5–10 cm^2	3–6.9 mm	Systolic blunting	Normal or dilated	30–44
Severe	> 10 cm^2	≥ 7 mm	Systolic reversal	Usually dilated	≥ 45

TR, tricuspid regurgitation; RA: right atrium; RV: right ventricle.

Table 2 Basic demographic characteristics of the study group (N = 1220).

Variables	Age group	N (%)
Age (years)	<18	73 (6)
	18–30	155 (12.7)
	31–45	326 (26.7)
	46–60	385 (31.6)
	>60	281 (23)
Gender	Male	538 (44.1)
	Female	682 (55.9)

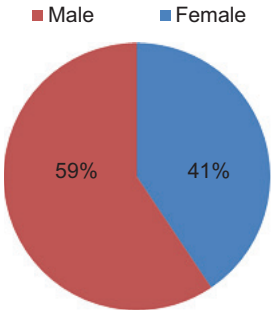

Figure 1 Prevalence of TR according to sex.

management compared with the mitral valve. There is a shortage of information on the significance of TR findings on TTE. And when to proceed with the further cardiac evaluation.

Severe, symptomatic TR requires further cardiac assessment and probably medical or surgical intervention. However, nonsevere TR (mild and moderate TR) significance and management remain vague because of the shortage of studies on the tricuspid valve.[11] There is still a confusion between ignoring this finding and taking it as a nonsignificant to proceeding with a full cardiac assessment. The line of distinction between harmless and nonharmless TR might be thin and opaque in clinical practice.

This study assessed the prevalence of nonsevere TR in individuals with no cardiac symptoms. The symptomatic patients were excluded from the baseline. Only those patients who came to the cardiology department of Imam Al-Hujjah Hospital in Karbala for a general routine check, preoperative check, or patients with non-specific chest pain of noncardiac in origin were included.

The TTE findings in this study, we excluded pathological TRs (that severe TR, congenital or

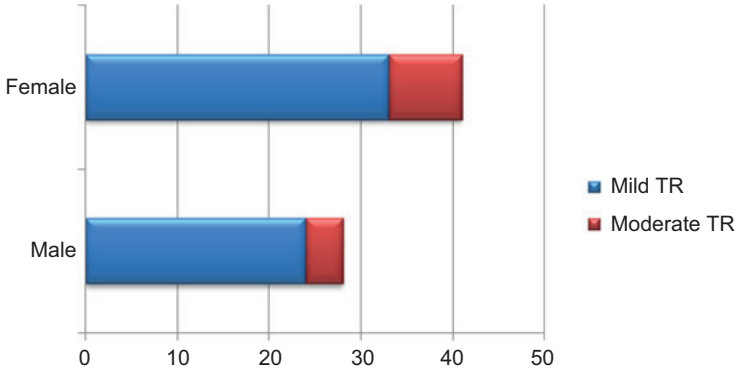

Figure 2 Detection of different TR severity according to sex.

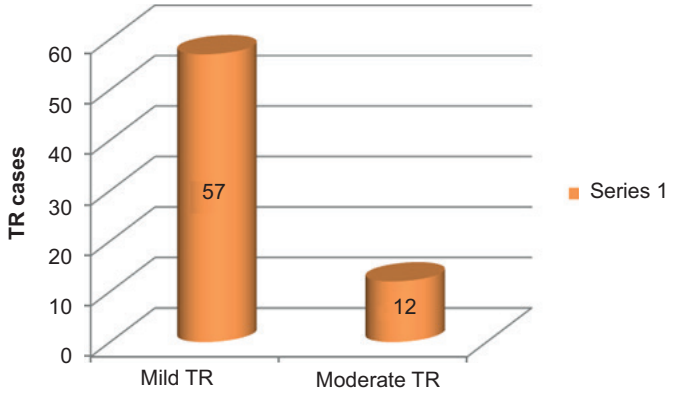

Figure 3 Distribution of TR severity in the study sample.

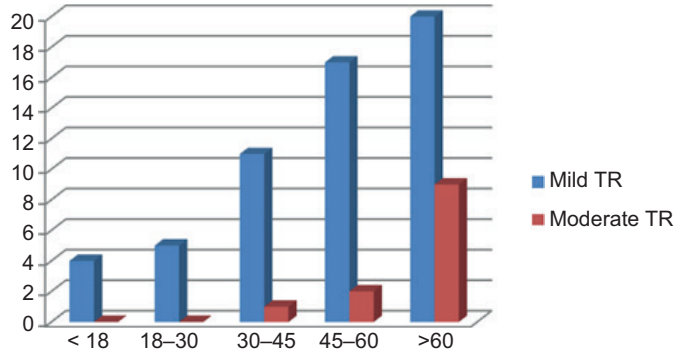

Figure 4 Detection of the different severity of TR in different age groups.

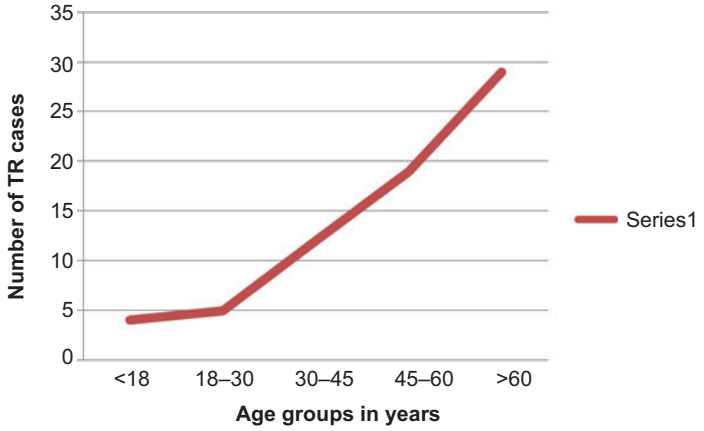

Figure 5 Distribution of TR cases according to age group.

acquired TV lesion, TV annular dilatation, cases of RV and RA dilatation, cases of ischemic heart disease, left-sided pathology, and cardiomyopathy). Our objective was to find the prevalence of nonsevere TR to compare with previous research studies of other countries. And to help clinicians plan further management steps in Iraq.

In this study, the prevalence of nonsevere TR in Karbala city was observed to be around 5.6%, which is much lesser than the figure given by the Framingham Heart Study, which detected rates up to 80% among the general population in 1999.[2] The discrepancy rates might be because of the inclusion of trace and severe TR in the Framingham study. Besides, they included symptomatic patients with other TTE findings also. However, our prevalence was in agreement with a Chinese study involving >1,34,000 patients, which detected mild and moderate TR in 5.18 % of the population and the Korean study with the prevalence rates of 4.6%.[1,12]

The majority of TR cases were mild (82%). However, this outcome might change in future studies because of implementing better classification criteria of TR severity with of new and more precise imaging techniques.

There is a strong relation between nonsevere TR and age group, as the prevalence of TR is seen to increase significantly with increasing age, probably as a result of the degenerative changes occurring on the valves during the aging process (leaflet thickening, annular dilatation, or papillary muscle dislocation),[13] this coincides with previous studies.[14–16]

There was no significant difference in the prevalence of mild and moderate TR between the sexes, although the study by Rostagno showed more prevalence in females.[14] However, more future studies need to clarify this with a larger sample and multicenter data.

TR is often posing diagnostic and therapeutic dilemma.[14] Although it is safer to leave the disorder untreated due to high surgical risk and recurrence rate after surgery,[7] ignoring its presence might grave left-sided lesions and hasten cardiac decompensation. Hence, we need a better understanding of when and where to intervene through further cardiac studies on this subject, which opens the way to more explicit and practical guidelines to manage TR.

Conclusion and Recommendations

Iraq has limited health system capabilities, mainly due to wars and an unstable political situation that affects all health aspects including, research in cardiology. The cases of valvular heart disease is high in Iraq because of high incidence of rheumatic fever.[17] We strongly recommend more studies in valvular heart disease to improve our understanding of this complex issue for improved management of this disease. Thus, we recommend more collaboration and information exchange between the health centers on the one hand and health centers and academic institutes on the other hand. Better TR management guidelines are needed to know when to escalate or stop cardiac evaluation.

Limitations

- Single-center analysis.
- Absence of similar studies in Iraq for comparison.
- Small sample size and highly selected patients.

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Conflict of interests

The author declares no conflict of interests.

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Data availability

The data analyzed during this study are available from the author upon request.

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