

Research Article

Prevalence of Hepatitis C Marker in Patients with Rheumatic Valvular Heart Disease

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Egypt has the largest epidemic of hepatitis C virus (HCV) in the world. The recently released Egyptian Demographic Health Survey [EDHS] tested a representative sample of the entire country for HCV antibody. The overall prevalence (percentage of people) positive for antibody to HCV was 14.7%. Rheumatic heart diseases (RHD) constitute 25-40% of all cardiovascular disease in developing countries. It affects 5-30 million children and young adults, with Egyptian prevalence estimated 6.8 per 1000 normal people. This study aimed to determine the prevalence of hepatitis C marker in patients with rheumatic valvular heart disease to quantify the relation and percentage of HCV with different rheumatic valvular lesions. Up to our knowledge, the Prevalence of HCV among RHD patients has not reported before.

Key words: Hepatitis C Virus; Rheumatic Valvular Heart Disease; HCV; RHD

Aim

The aim of this study is to: determine the Prevalence of hepatitis C marker among patients with rheumatic valvular heart disease (RVHD).

Methods

Total number of 565 Rheumatic Valvular Heart Disease (RVHD) patients who underwent coronary angiography for preoperative assessment before rheumatic valve replacement or for balloon mitral valvuloplasty at Mansoura university hospital cath-Lab "Located at Mansoura city – Egypt", over the last 10 years. Patients were divided in to 2 groups: group I, included 118 Seropositive hepatitis C patients, and group II, included 447 Seronegative hepatitis C patients. Mansoura university hospitals laboratory investigates and detects HCV antibodies in serum.

Results

The results of the Study revealed: Among patients with RVHD, 353 (62.4%) had Mitral Valve Disease (MVD), 84 (14.9%) had Mitral Regurg (MR), 142 (25.9%) had Mitral Stenosis (MS), 70 (12.4%) had Aortic Valve Disease (AVD), 11(1.9%) had Aortic Stenosis (AS), 22 (3.9%) had Aortic Regurg (AR), 37(6.5%) had Double Aortic valve lesions (DA)(AS&AR) and 142 (25.1%) had combined mitral and aortic diseases before Double Valve Replacement (DVR) ($\chi^2 = 8.48$, $P = 0.024$). The overall Prevalence of positive HCV serology among patients with RVHD was 21.59%. (27.46% among patients with combined MV and AV diseases (20.96%) among patients with MVD (12.86%) among patients with AVD. Significant increase in prevalence of HCV among studied RVHD patients prepared for valve surgery in relation to increasing patient age from 0% among patient of less than 30 years up to 33.79% among patient of more than 50 years ($\chi^2 = 38.828$, $P < 0.001$). Non-Significant increase in prevalence of HCV among males (23.91%) than females (20%), ($\chi^2 = 3.133$, $P < 0.05$). Significant increase in prevalence of HCV among urban 28.47% than rural 18.34%, ($\chi^2 = 6.38$, $P = 0.045$). Significant decrease in prevalence of Positive Hepatitis C Virus Serology among hypertensive Cases 14.28% than normotensive Cases 24.36%, ($\chi^2 = 5.89$, $P = 0.042$). Valuable

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Sub Date: July 2nd, 2018, **Acc Date:** July 30th, 2018, **Pub Date:** July 31st, 2018

Citation: Nafee WE, Elsafty EE, Sakr SA (2018) Prevalence of Hepatitis C Marker in Patients with Rheumatic Valvular Heart Disease. BAOJ Cell Mol Cardio 4: 019

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findings in this study include significant decrease of positive HCV serology prevalence in certain valve lesions with parallel decrease of median age of this lesion group of patients; patients with MS who underwent Balloon Mitral Valvuloplasty (BMV) have the lowest median age (31.09 years) as well as the lowest positive HCV prevalence (7.9%). This could be explained by the younger age of patients suffering from tight MS and seeking treatment by BMV.

Conclusion

The Prevalence of HCV among Egyptian patients with severe rheumatic valvular heart disease (21.59%) is more than that reported among general population (10.0% and 14.4%). Prevalence of HCV among Egyptian patients with RVHD increase proportionally with the increase of age (from 0% among patients of less than 30 years to 33.79% among patients of more than 50 years).

Introduction

Hepatitis C virus (HCV) infection is a global health problem. It is the second most common chronic viral infection in the world with a global prevalence of about 3% (170 million people) [1]. About 3 to 4, million persons are newly infected with HCV each year and 80% newly infected patients, progress to develop chronic infection. A majority of patients is asymptomatic, anicteric, only 25-40% of the patients develop malaise, weakness, and anorexia and some become icteric. Anti HCV can be detected in 50-70% of the patients at the onset of disease symptoms and in approximately 90% of patients 3 months after the onset of infection. HCV is self-limited in only 15% of the patients [2]. Valvular heart disease (VHD) is a common condition in clinical practice that is strongly associated with heart dysfunction and death. The prevalence of VHD is 2.5% in developed countries [3]. In the last three decades, the etiology of VHD has changed in parallel with socio-economic development and an increasing aging population. In developing countries, rheumatic heart disease remains the primary cause of VHD [4]. According to the World Health Organization (WHO), CRHD affects 15.6–19.6 million people worldwide and causes 233,000 to 492,000 deaths per year [5]. Egypt has the largest epidemic of hepatitis C virus (HCV) in the world. The Egyptian Demographic Health Survey [EDHS] tested a representative sample of the entire country for HCV antibody. The overall prevalence (percentage of people) positive for antibody to HCV was 14.7 % [6]. Rheumatic heart diseases (RHD) constitute 25-40% of all cardiovascular disease in developing countries. It affects 5-30 million children and young adults, with Egyptian prevalence estimated 6.8 per 1000 normal people [7,8].

Studying the relation between HCV and RHD is due to the high prevalence of the two of them in Egypt and possible effect of HCV or its

treatment strategies on heart. Up to our knowledge, the Prevalence of HCV among RHD patients has not reported before.

Materials and Methods

Study Design

The current study is a single-center, retrospective study that reviewed catheterization reports of patients who had been subjected to coronary angiography at Mansoura university hospital "Mansoura-Egypt", cardiovascular medicine department for 10 years "since September 2006 until August 2016", where there is a well-organized system for keeping all reports that had been done since beginning of work at 14/1/2004.

Materials

The material of this study comprised (565) angiographic reports of Patients with rheumatic valvular heart disease (RVHD). They were selected from total (16,466) reports of patients who have been subjected to coronary angiography and Balloon mitral valvuloplasty at Cath. Lab Mansoura Specialized Hospital, Cardiovascular Medicine Department "from September 2006 to August 2016". The hard copy of each angiographic report include specific fixed items denoting "patient demographic data, indication for angiography, procedure, results of angiography and laboratory data." The hard copy of each balloon mitral valvuloplasty report include specific fixed items denoting "patient demographic data, pre-procedure and post-procedure parameters and laboratory data". The included reports comprised 63 reports of patients who underwent Balloon mitral valvuloplasty and 502 angiographic reports of patients with RVHD before valve surgery. Among the included angiographic reports, there were: 290 reports before mitral valve replacement (83 with MS, 84 with MR and 123 with double-mitral lesions), 70 reports before aortic valve replacement (11 with AS, 22 with AR and 37 with double-aortic lesions) as well as 142 reports with combined mitral and aortic valve lesions for double-valve replacement.

Methods for Report Selection and Analysis

Revision of hard copies all (16,466) of angiographic reports for patients who underwent Coronary Angiography and BMV reports at Catheterization Lab at Mansoura Specialize Hospital in the period from September 2006 to August 2016, to select reports of patients before valvular surgery. Revision of all selected reports before valve surgery (768) to select and include completed reports with RVHD in the study (565) and Revision of BMV reports (63) to select and include completed in the study (58). Analysis of included reports was Concentrated on Valvular Lesion, Age, Sex, Inhabitant, Serum Creatinine, Hepatitis C-virus Antibody result, Diabetes Mellitus and Hypertension. Tabulation of data, Analysis of data as follow, Prevalence

of Hepatitis C Positive markers among patients with RVHD, Factors affecting prevalence of Hepatitis C Positive markers among patients with RVHD as regard “Type of valvular Lesion, Age, Sex, Inhabitant, Associated DM and Associated HTN.

Statistical Methods

Data management and statistical analysis were performed using Statistical Package for Social Sciences (SPSS) vs. 21. Numerical data were summarized using means and standard deviations and ranges. Categorical data were summarized as numbers and percentages. Comparisons between the 2 groups with respect to normally distributed

numeric variables were done using the t-test. For categorical variables, differences were analyzed with χ^2 (chi square) test and Fisher’s exact test when appropriate. Pearson Correlation between variables was done, “r” (pearson correlation coefficient) ranges from +1 to -1. A value of 0 indicates that there is no association between the two variables; a value greater than 0 indicates a positive association; a value less than 0 indicates a negative association. All p-values are two-sided. P-values < 0.05 were considered significant.

Results

Patient Demographics

Table 1: Basic Demographic, Clinical and Laboratory Data of Completed 565 Angiographic and BMV Reports of Patients with RVHD

Parameters	Number	(%) or (MV ± SD)
Age		
Total number	565	100 %
Ages <30 years	25	4.43 %
Ages 30-<40 years	70	12.39%
Ages 40-50 years	240	42.48 %
Ages >50 years	230	40.70 %
Gender		
Female sex	333	58.93 %
Male sex	232	41.07 %
Residence		
Rural	401	70.97 %
Urban	164	29.03 %
Diabetes mellitus		
Not Diabetic	374	66.19 %
Diabetic	191	33.81 %
Hypertension		
Not Hypertensive	397	70.3 %
Hypertensive	168	29.7 %
Type of Revised Report		
Balloon Valvuloplasty	63	11.15 %
Angiographic Report (before valve Replacement Surgery)	502	88.85 %
Valvular Lesions		
Mitral Valve Diseases	353	62.5 %
Aortic Valve Diseases	70	12.4 %
Combined Mitral and Aortic Valve Diseases	142	25.1 %
Laboratory Parameter		
Serum Creatinine	565	1.21 ± 0.21
Hemoglobin (gm/dl)	565	11.70 ± 1.51
Platlets count	565	144.39 ± 68.68
INR	565	1.13 ± 0.12
Positive Hepatitis C-virus Serology	122	21.59 %
Negative Hepatitis C-virus Serology	443	78.41 %

Age

comparative analysis of prevalence of positive Hepatitis serology among studied rheumatic valve diseases in relation to different ages showed significant increase in prevalence of HCV among studied RHD patients in relation to increasing Age ($\chi^2=35.828$, $P<0.001$).Ta-

ble (2), Figure (1-a).Not present in ages > 30 years, 8.57% of ages 30 - 40 years, 16.67% of ages 40 – 50 years, 33.04% of ages > 50 years.RCO Curve Relation between Age and positive Hepatitis serology among RVHD Patients showed sensitivity76.7%, Specificity: 58.5%, P Value <0.001, Cut off point:48.5, Area under the curve: 0.708. Figure (1-b).

Table (2) : Effects of Age on prevalence of positive Hepatitis serology among All Complete Angiographic and BMV Reports of RVHD Patients.

Age Groups	Negative		Positive		χ^2	P
	HCV		HCV			
	No	%	No	%		
Ages: < 30 y (n = 25)	25	100%	0	0.0 %	35.828	<0.001*
Ages: 30 - < 40 y (n = 70)	64	91.43%	6	8.57 %		
Ages: 40 - 50 y (n = 240)	200	83.33%	40	16.67 %		
Age: > 50y (n = 230)	154	66.96%	76	33.04 %		

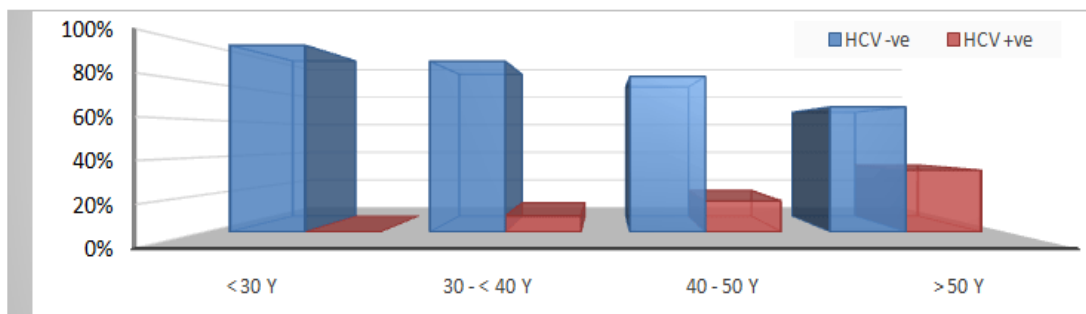


Figure (1-a): Prevalence of positive Hepatitis serology among RVHD patients with different age

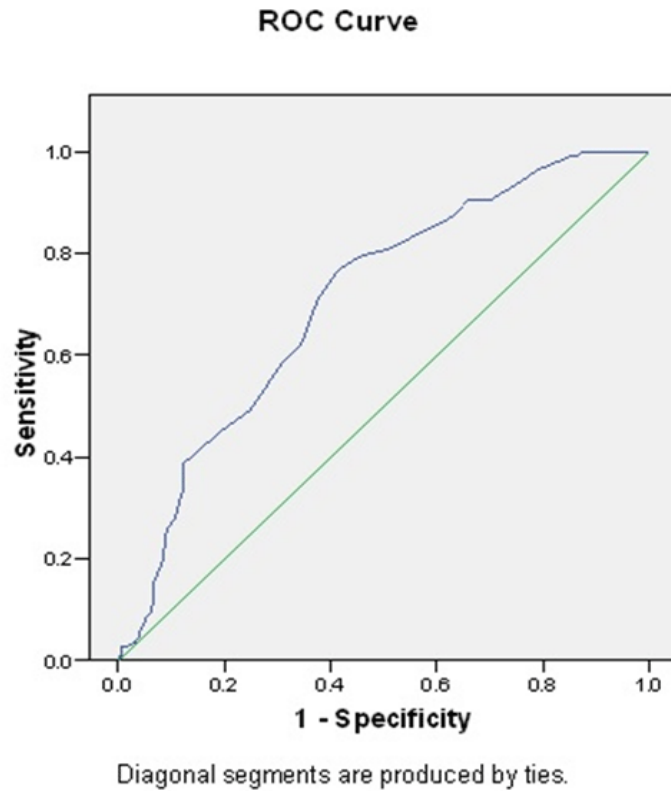


Figure (1-b): RCO Curve Relation between Age and positive Hepatitis serology RVHD Patients.

Sex non-Significant increase in prevalence of HCV among males (24.56%) than females (19.52%), ($\chi^2=3.233, P<0.05$). Table (3), Figure (2). comparative analysis of prevalence of positive Hepatitis serology among studied rheumatic valve diseases in relation to gender showed

Table (3) : Effects of Gender on prevalence of positive Hepatitis serology among All Complete Angiographic and BMV Reports of RVHD Patients.

	Negative		Positive		χ^2	P
	HCV		HCV			
	No	%	No	%		
Female (n = 333)	268	80.48%	65	19.52 %	3.233	0.072
Male (n = 232)	175	75.5%	57	24.56 %		

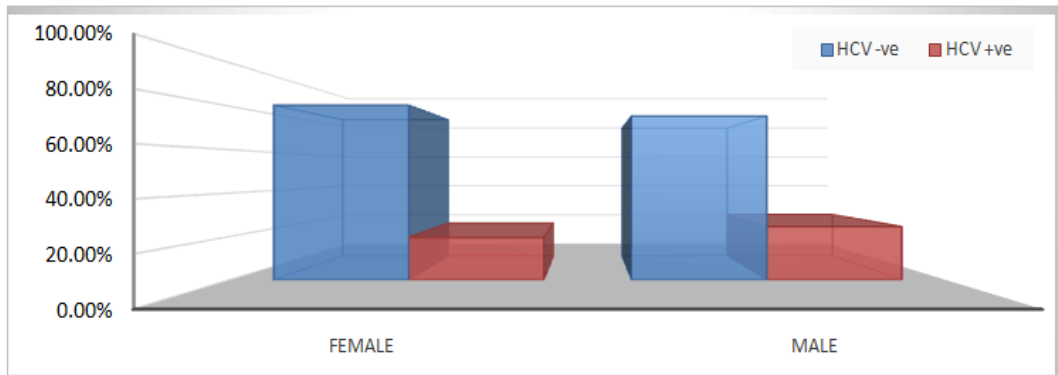


Figure (2): Prevalence of positive Hepatitis serology among RVHD patients in relation to gender

Residency

comparative analysis of prevalence of positive Hepatitis serology among studied rheumatic valve diseases in relation to residen-

cy showed Significant increase in prevalence of HCV among urban 28.04% than rural 18.95%, ($\chi^2=5.58, P=0.05$). Table (4), Figure (3).

Table (4) : Effects of Residence on prevalence of positive Hepatitis serology among All Complete Angiographic and BMV Reports of RVHD Patients. Patients.

Residence	Negative HCV		Positive HCV		χ^2	P
	No	%	No	%		
Rural (n = 401)	325	81.05%	76	18.95 %	5.58	0.004
Urban (n = 164)	118	71.96%	46	28.04 %		

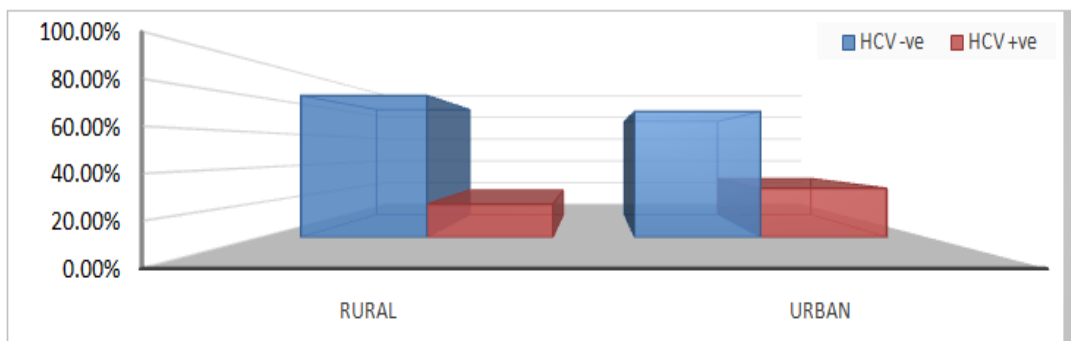


Figure (3): Prevalence of positive Hepatitis serology among RVHD patients in relation to residence

DM

comparative analysis of prevalence of positive Hepatitis serology among studied rheumatic valve diseases in relation to DM showed

non-significant increase of prevalence of HCV among Diabetics 23.56% than non-diabetics with percentage of 20.58%, ($\chi^2=0.23$, $P=0.56$). Table (5), Figure (4).

Table (5) : Effects of Diabetes on prevalence of positive Hepatitis serology among All completed Angiographic and BMV Reports of RVHD Patients.

	Negative		Positive		χ^2	P
	HCV		HCV			
	No	%	No	%		
Not Diabetic (n = 374)	237	79.42%	77	20.58 %	0.23	0.56
Diabetic (n = 191)	146	76.44%	45	23.56 %		

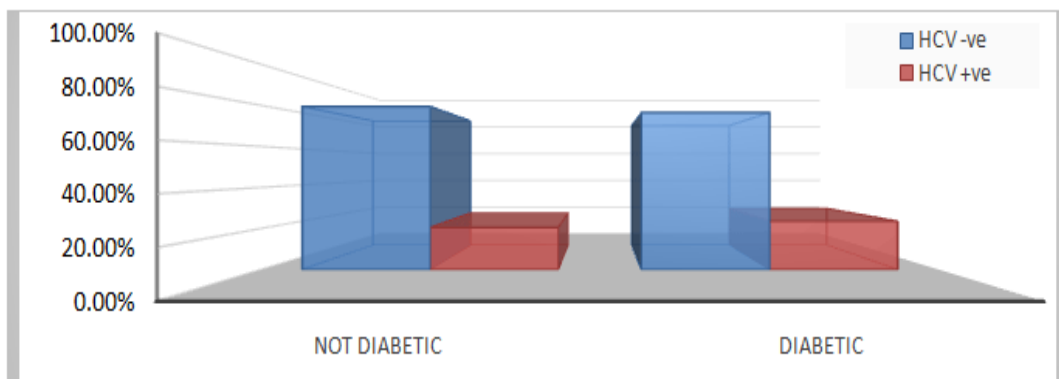


Figure (4): Prevalence of positive Hepatitis serology among RVHD patients in relation to DM

Hypertension

Comparative analysis of prevalence of positive Hepatitis serology among studied rheumatic valve diseases in relation to hypertension

showed Significant decrease in prevalence of HCV among hypertensive patients 13.69 % than normotensive patients 24.64%, ($\chi^2=8.80$, $P=0.003$). Table (6), Figure (5).

Table (6) : Effects of Hypertension on prevalence of positive Hepatitis serology among All completed Angiographic and BMV Reports of RVHD Patients.

	Negative		Positive		χ^2	P
	HCV		HCV			
	No	%	No	%		
Normotensive (n = 397)	298	75.06%	99	24.94 %	8.80	0.003
Hypertensive (n = 168)	145	86.31%	23	13.69%		

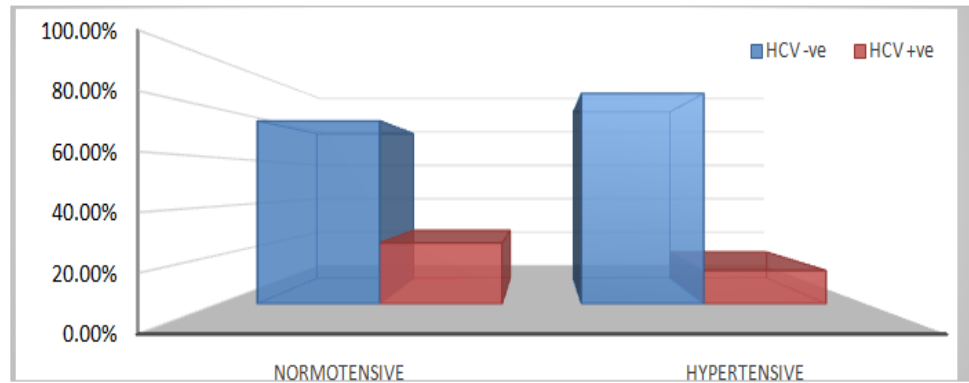


Figure (5): Prevalence of positive Hepatitis serology among RVHD patients in relation to HTN

Indication for Angiography

comparative analysis of prevalence of positive Hepatitis serology between RVHD patients subjected to BMV and patients assessed for Pre-valve replacement showed Significant increase in prevalence of

HCV among patients underwent Pre-Operative Valve replacement (22.3%) than patients underwent Balloon Valvuplasty (7.9%) than patients with non-available records 20.8%, ($\chi^2=7.077$, $P=0.004$). Table (7), Figure (6).

Table (7) : Differences in Prevalence of Positive Hepatitis C Virus Serology Between Complete Balloon Mitral Valvuplasty and Angiographic Reports of Patients with RVHD.

	Negative		Positive		χ^2	P
	HCV		HCV			
	No	%	No	%		
Reports of patient with BMV (n =63)	58	92.1%	5	7.9 %	7.077	0.004
Angiographic Reports (Pre Valve Replacement) (n =502)	389	87.7%	117	23.35 %		

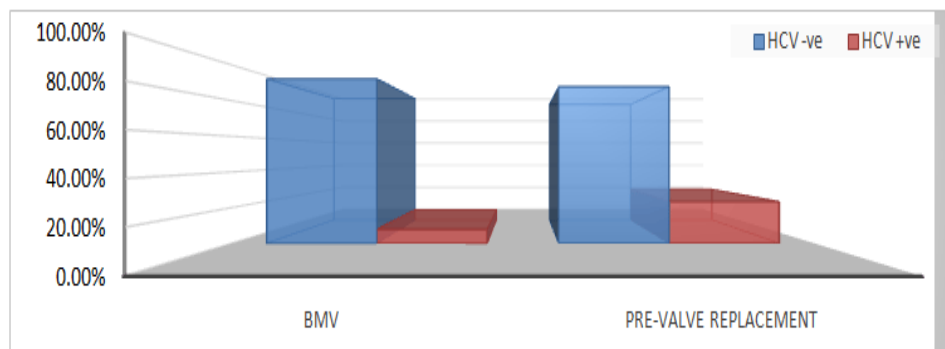


Figure (6): Prevalence of Positive Hepatitis C Virus Serology among patients subjected to Mitral Balloon Valvuplasty and patients prepared for valve replacement.

Type of Valve Lesion

comparative analysis of prevalence of positive Hepatitis serology between RVHD patients according to type of valve lesion showed Sig-

nificant increase in prevalence of HCV among patients with Multi-valve lesions (26.57 %) than patients with Mitral valve lesions (20.96 %) than patients with Aortic valve lesions (12.85%), ($\chi^2=6.583$, $P=0.001$). Table (8), Figure (7).

Table (8) : Prevalence of Positive Hepatitis C Virus Serology among complete Angiographic and BMV Reports of Patients with RVHD.

	Negative		Positive		χ^2	P
	HCV		HCV			
	No.	%	No.	%		
All RVHD Angio. and BMV Reports (n =565)	443	78.41%	122	21.59 %	6.583	0.001
MV- Diseases Angio. and BMV Reports (n =353)	276	78.7%	74	20.96 %		
AV-Diseases Angio. Reports (n =70)	61	82.5%	9	12.85%		
Combined MV & AV Diseases Angio. Reports (n =142)	110	75.9%	39	26.57 %		

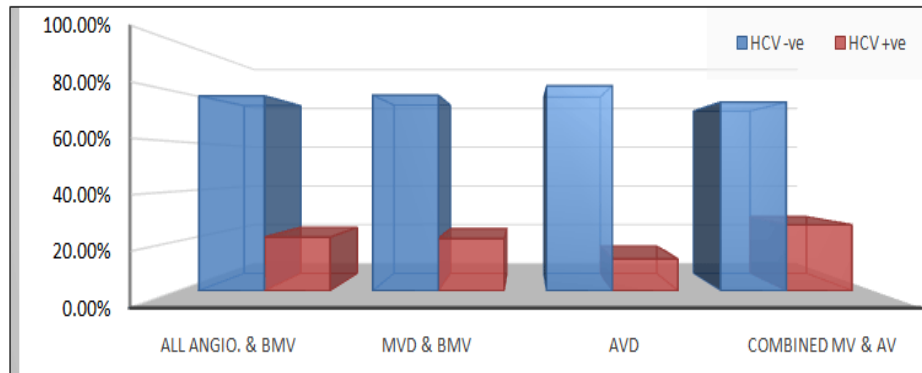


Figure (7): Prevalence of Positive Hepatitis C Virus Serology among Angiographic and BMV patients.

Mitral Valve Disease

comparative analysis of Prevalence of positive Hepatitis serology among Balloon Mitral Valvuloplasty and Angiographic Reports of Patients with Mitral Valve Diseases showed Significant increase in prevalence of HCV among patients with Mitral stenosis for pre-valve replacement (27.71%) than patients with Mitral stenosis for Mitral

Balloon valvuloplasty (7.93 %), ($\chi^2=7.82$, $P=0.00212$). Table (10), Figure (10).Significant increase in prevalence of HCV among patients with Mitral Regurgitation for pre-valve replacement (26.19%) than patients with combined MS & MR (19.51%), than all Mitral stenosis patients (19.17%), ($\chi^2=5.52$, $P=0.0045$). Table (9), Figure (8).

Table (9) : Prevalence of positive Hepatitis serology among Balloon Mitral Valvuplasty and Angiographic Reports of Patients with Mitral Valve Diseases

	Negative		Positive		χ^2	P
	HCV		HCV			
	No	%	No	%		
BMV Reports of MS patient (n = 63)	58	92.1%	5	7.93 %	7.82	0.00212
Angio Reports of MS patient Pre mitral-valve Replacement (n =83)	57	80.49%	23	27.71%		
All Angio and BMV Reports MS patient (n =146)	117	80.14%	28	19.17%	5.52	0.0045
Angio Reports MR patient (n =84)	64	76.20%	22	26.190%		
Angio Reports of Combined MS &MR Patients (n =123)	98	81.07%	24	19.51%		

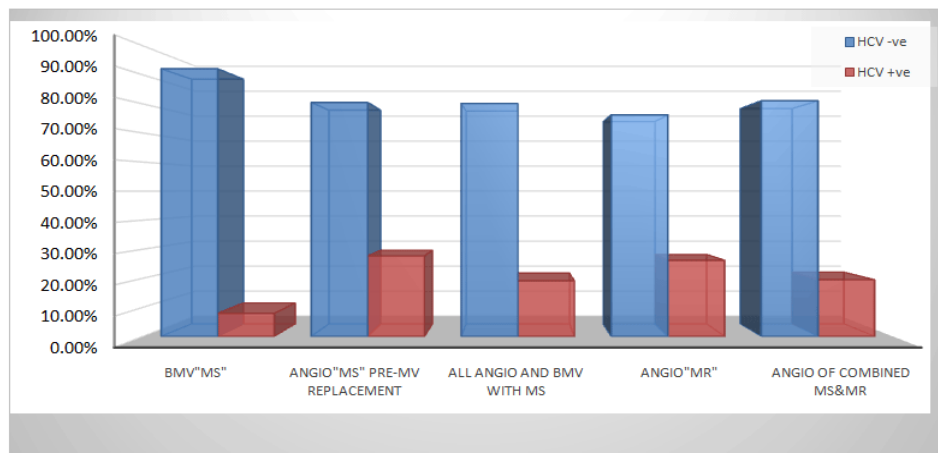


Figure (8): Prevalence of Positive Hepatitis C Virus Serology among patients with mitral valve disease

Aortic Valve Disease

comparative analysis of Prevalence of positive Hepatitis serology among angiographic reports of pre-operative assessment “pre-AV

replacement” according to aortic valve lesion showed Non-Significant increase in prevalence of HCV among patients with AR (13.6%) than patients with combined AR&AS (12.85%), than patients with AS (9.1%), ($\chi^2 = 9.15$, $P = 0.45$). Table (10), Figure (9).

Table (10) : Prevalence of positive Hepatitis serology among complete Angiographic Reports of Patients with Aortic Valve Diseases

	Negative		Positive		χ^2	P
	HCV		HCV			
	No	%	No	%		
Angio Reports of AS Patients (n =11)	10	90.9%	1	9.1%	9.15	0.45
Angio Reports of AR Patients (n =22)	3	86.4%	3	13.6%		
Angio Reports of Combined AS &AR Patients (n =37)	28	87.15%	9	12.85%		

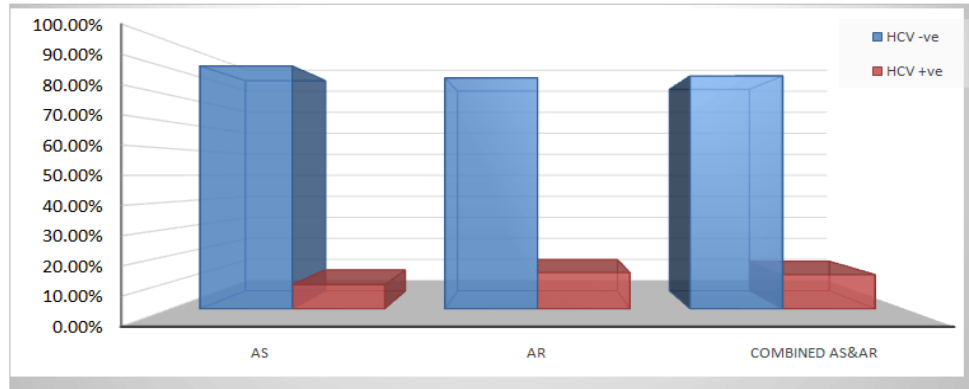


Figure (9): Prevalence of Positive Hepatitis C Virus Serology among patients with Aortic valve disease.

Overall Prevalence of positive HCV serology among patients with RVHD was (21.59%). table (11) figures (10-a &10-b).

Table (11) : Overall Prevalence of positive HCV serology among patients with RVHD

Total number = 565	Number	%
Positive Hepatitis C-virus Serology (n = 122)	122	21.59 %
Negative Hepatitis C-virus Serology (n = 443)	443	78.41 %

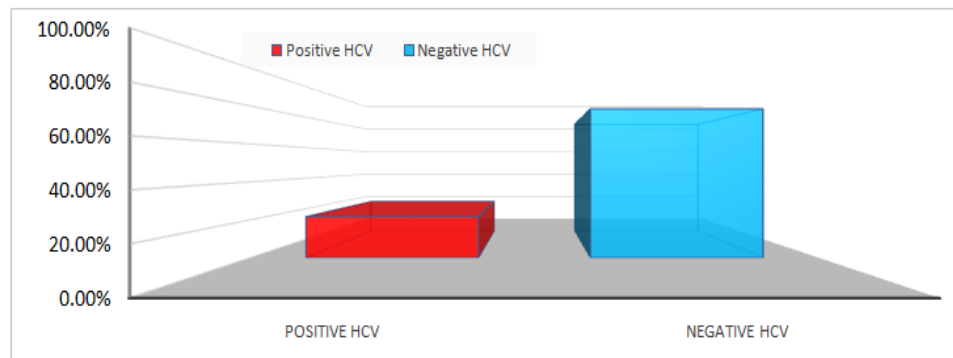


Figure (10a): Overall Prevalence of positive HCV serology among patients with RVHD

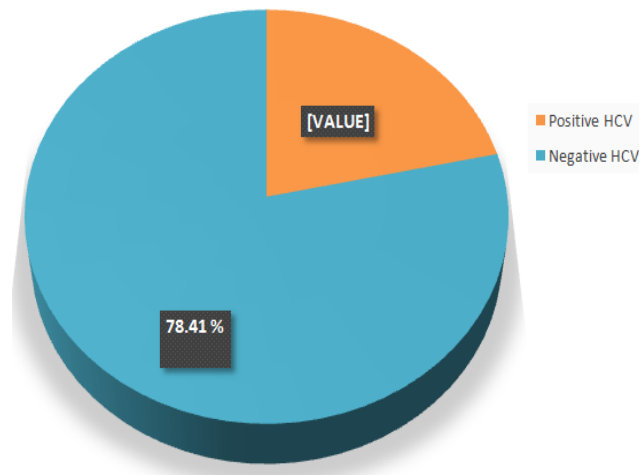


Figure (10 b): Overall Prevalence of positive HCV serology among patients with RVHD

Discussion

Hepatitis C virus (HCV) is the cause of many different forms of heart disease worldwide, and yet few cardiologists are aware of it as an etiology of heart disease, or its treatment [9]. The burden of HCV-derived heart diseases is global, with a higher prevalence in Asia, Africa, and low- and middle-income countries [9]. In 2009 Akira Matsumori showed that in more than 10% of Japanese patients, their cardiomyopathies are associated with HCV infection. More recently, they found in the USA that up to 15% of patients with heart failure with myocarditis have associated HCV infection. In contrast, in China 79% of patients with hepatocellular cancer and 37% of hepatitis C patients have heart disease, as detected by measuring a proven and sensitive biomarker of heart disease, NT-proBNP. In Pakistan, 17% of hepatitis C patients have heart diseases, as measured by this metric [9]. Based on these data, 3% of 6.6 billion (198 million) persons worldwide are infected with HCV, and 17–37% (34–73 million) persons are suffering from HCV-derived heart diseases. These figures may be comparable to the number of patients with hepatitis C. HCV infection causes only hepatitis in some patients, only heart diseases in some patients, and both hepatitis and heart diseases in other patients [9]. Rheumatic fever and rheumatic heart disease (RF/RHD) is a disease of low and middle income countries. Unfortunately, the disease affects young adults in their most productive years; adding to the economic burden of the involved families and the nation as a whole. In Egypt and other developing countries in the 1950's and 60's, RF/RHD was prevalent. A slow and steady decline in their prevalence has occurred since then; but not reaching the ideal goals [10] Rheumatic heart disease causes at least 200,000–250,000 premature deaths every 3 years and is the major cause of cardiovascular death in children and young adults in developing countries [11] With the expected improvement in the

socio-economic standards and primary and school health, a further decline is expected, reaching the prevalence seen in high income countries within the next 2 decades [10]. In the current study, there was Significant increase in prevalence of HCV among studied RHD patients in relation to increasing Age from 0% to 33.04% ($\chi^2=35.828$, $P<0.001$). Table (2), Figure (1-a). This was similar to Kandeel et al., 2016 [12] who studied The prevalence of hepatitis C virus infection in Egypt 2015. They found that there was statistical significant difference between age groups, prevalence increased from 1% to 33.9% with increase of age ($P<0.05$).

In relation to Miller FD et al., 2015 [13] who studied Epidemiology of hepatitis C virus exposure in Egypt. They found a proportional increase in prevalence of seropositive HCV with increasing age from 4% to 40% but at bigger rate than current study ($P<0.05$), this mild increase in the study of Miller FD et al., 2015 could be explained by different sample size in the present study and type of selected group of patients which in Miller FD et al., 2015 collected high risk exposure patients. In the current study there was Non-Significant increase in prevalence of HCV among males (24.56%) than females (19.52%), ($\chi^2=3.233$, $P<0.05$). Table (3), Figure (2). In contrast to Kandeel et al., 2015 [12] there was statistically significant increase in prevalence of positive HCV antibodies in males 12.4% than in females 8.1% ($P<0.05$). This could be explained by a large number of included patients in Kandeel et al., 2015 [12] in comparison with the current study. In the current study there was Significant increase in prevalence of HCV among urban 28.04% than rural 18.95%, ($\chi^2=5.58$, $P=0.004$). Table (4), Figure (3). In contrast to Darwish MA et al., 2001 [14] who studied Multiple studies were conducted among village residents in high HCV prevalence areas. The overall prevalence in rural areas averaged about 20%, higher than the national average. A study conducted in Kalama, a village in the Nile

Delta, reported HCV prevalence of 40% among village residents. This could be explained by a special nature of this village residents as regular blood donors. and have shown a higher prevalence among males compared to females as they are more compatible for blood donation. In contrast to Kandeel et al., 2016 [12]. A significant decrease of HCV seropositive antibody persons was noticed when generally observing the prevalence in Urban regions 6.9% and for rural regions in Upper-Egypt and Lower-Egypt average of 10.2%. With non-significant modification in prevalence of either HCV antibody or HCV RNA positivity was observed in the frontier governorates. This could be explained by large sample size of Kandeel et al., 2016 [12] and bigger area of distribution covering all Egypt while in the current study we only receive patients mainly from Delta region. In the current study there was Significant increase in prevalence of HCV among patients with Multi-valve lesions (26.57 %) than patients with Mitral valve lesions (20.96 %) than patients with Aortic valve lesions (12.85%), ($\chi^2=6.583$, $P= 0.001$) Table (8), Figure (7). In the current study there Significant increase in prevalence of HCV among patients with Mitral Regurgitation for pre-valve replacement (26.19%) than patients with combined MS & MR (19.51%), than all Mitral stenosis patients (19.17%), ($\chi^2= 5.52$, $P= 0.0045$). Table (9), Figure (8). And a Non-Significant increase in prevalence of HCV among patients with AR (13.6%) than patients with combined AR&AS (12.85%), than patients with AS (9.1%),($\chi^2= 9.15$, $P= 0.45$). Table (10), Figure (9).In agreement with Marijon et al., 2007 [15] who studied Prevalence of Rheumatic Heart Disease Detected by Echocardiographic Screening showed A significant increase in prevalence of rheumatic mitral valvular heart disease than other types of valve lesions as follow: Echocardiographic screening showed that 124 children (5.7%) had Doppler evidence of left-heart valve regurgitation. Sixty-six of these children were concordantly confirmed by the three independent experts to have valvular rheumatic damage, corresponding to a prevalence of 30.4 cases per 1000 (95% CI, 23.2 to 37.6). Of these 66 children, 63 (95.5%) had only mitral-valve disease MR, 2 had both aortic- and mitral-valve disease, and 1 had only aortic-valve disease, no cases of valvular stenosis were detected. In the current study there is an Overall Prevalence of positive HCV serology among patients with RVHD of 21.59%. table (11) figures (10-a & 10-b)In contrast to Kandeel et al., 2016 [12], the overall prevalence of positive HCV antibodies is 10%. This could be explained by the relative older age of patients undergoing interventional angiography with minimum age of 18 and a large number of patients around 40 years and over 50 years. However, in Kandeel et al., 2016 [12], the study groups contained a large number of children starting from age of 15 years, what's noticed is increasing incidence of HCV infection with increasing age. The Data and percentages listed in results about prevalence of positive HCV serology among different types of Rheumatic valve lesions and prevalence among patients in relation to the angiographic indication, DM and Hypertension is unique and unparalleled, the relation between prevalence of positive HCV and RVHD is not

listed before.

Study Limitations

Retrospective study that depend on presence of positive HCV antibodies for diagnosis of HCV infection which is not reliable as using recombinant DNA technology "PCR". Study evaluated only a group of RVHD-patients who need surgical intervention and BMV, and not patients with different disease states. This study was performed in a single center at Mansoura university hospitals "MUH" which serve mainly population of Delta governorates and Lower Egypt and don't represent all the country.

Conclusion

The Prevalence of HCV among Egyptian patients with severe rheumatic valvular heart disease is more than that reported among general population.

Prevalence of HCV among Egyptian patients with RVHD increase proportionally with increase of age.

Positive HCV serology is more prevalent among Egyptian patients with Multi-valve lesions than patients with Mitral valve lesions and patients with Aortic valve lesions.

In Egyptian patients with RVHD, the prevalence of Positive HCV serology is significantly Higher among urban than rural regions.

In Egyptian patients with RVHD, the prevalence of Positive HCV serology is significantly lower among hypertensive cases than normotensive cases.

Gender has no influence on prevalence of Positive HCV serology among Egyptian patients with RVHD.

Presence of diabetes mellitus has no influence on prevalence of Positive HCV serology among Egyptian patients with RVHD.

Conflict of Interest

The authors declare no conflict of interests.

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