Prevalence, Presentation Echo-Findings, And Age Distribution Of Ventricular Septal Defect In Saudi Arabia

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Abstract

BACKGROUND:

Ventricular septal defect (VSD) is the most common congenital heart defect (CHD). It can present in isolation or coexisting with other CHD.

OBJECTIVE:

The objective was to assess the prevalence, presentation echo-findings, clinical pattern, and age distribution of VSD in Saudi children.

METHODOLOGY:

A descriptive cross sectional study, conducted at King Fahad Cardiac Center - King Saud University-KSA. The target population included Children, who had clinical suspicion of cardiac problem. Data analysis was performed using SPSS version 21.

RESULTS:

VSD was found in 114 patients. 55 (48.2%) males and 58(50.9%) females. 39 (34.2%) asymptomatic, while 75 (65.8) had heart murmur. 22 (19.3%) had a dysmorphic body. Mildly dilated atria in 14 (12.3%) patients. Membranous VSD location in 67 (58.8%), outlet in 1(0.9%), muscular in 21 (18.4%) and inlet-AV septal in 16 (14%). 7 (6.1%) patients had a pressure gradient of < 20 mmHg, 4 (11.4%) 30 - 40 mmHg. 7 (6.1%) 40-50, while 49 (43%) >50. Associated other abnormalities were ASD in 40(60.9%), TR in 36(46.8%) patients. Rt ventricular cavity size was increased in 12(17.4%) patients. VSD size was small in 59 (51.8%), moderate in 12 (10.5%) and large in 31(27.2%).

CONCLUSIONS:

Regarding CHDs types, VSD was the commonest lesion. Membranous VSD more common. Availability of expertise care locally will lead to more patients getting surgical treatment at an earlier age thereby reducing morbidity and mortality and improving quality of life for these children.

Keywords: Congenital heart disease, Ventricular septal defect, Echocardiography

INTRODUCTION:

Ventricular septal defect (VSD) is the most common congenital heart defect (CHD)(Van der Linde D et al ,2011), affecting approximately 2–8/1000 live births(Hoffman JI et al ,2002).VSD results from a malfunction of cardiac development, possibly including a failure in the alignment or in the fusion of the atrio-ventricular cushions during the formation of the inter-ventricular septum(Kliegman RM et al, 2007). VSDs can present in isolation or coexisting with other Congenital heart diseases(Miyague NI et al, 2003).

Ventricular septal defect (VSD) is defined as a lack of continuity in the inter-ventricular septum which allows the direct circulation of blood between the two ventricles (Jacobs et al, 2000). The lesion can be congenital6 – isolated (Kannan BR et al, 2003) or in association with other congenital heart defects (Watanabe N et al, 2014) – or acquired, usually as a complication of a myocardial infarction or chest trauma (Kannan BR et al, 2003).

Heart diseases constitute an important group of pediatric illness and major cause of childhood mortality and morbidity (Knott Craig CJ et al, 1995). VSD is the commonest of all congenital lesions. And occurs in approximately 8 of every 1000 live births.

Late diagnosis of CHD carries a high risk of avoidable mortality, morbidity, and handicap (Christopher J et al, 1995).

Heart diseases in children have not been studied thoroughly in Saudi Arabia as in other western and neighboring countries.

The purpose of this study was to know the burden of VSD in children at King Khalid University Hospital, Riyadh KSA. A tertiary, Referral care Hospital in the region.

There were a few studies conducted in the past, but data regarding the association of clinical presentation with echo findings is lacking. The results of this study will be useful for health personnel and general practitioner in the community so that early diagnosis can be made and proper management initiated.

MATERIAL AND METHOD:

This was a descriptive cross sectional, retrospective and prospective study was conducted at King Fahad Cardiac Center- Pediatric Cardiology Unit- King Khalid University Hospital -KSU-Riyadh –KSA, from October 2010- June 2014.The target population for this study was included Children of either sex, who had clinical suspicion of cardiac problem. They were enrolled consecutively as they attended the clinic for echocardiography to confirm their diagnosis; the examination reveals VSD either isolated lesion or associated with another defects; echocardiograms and reports for these patients forms part of the routine medical management. Once the cardiac location, orientation and situs have been determined, the echocardiographer then examines each cardiovascular segments and the connection between the chamber, size, and exact location of the defect; estimate PA pressure and estimate the magnitude of the shunt; using the Sequential Segmental Approach which acts as a newer nomenclature approach. Presenting symptoms were : recurrent chest infections, failure, feeding difficulty and failure to thrive, or detection of murmur in asymptomatic patients.

Exclusion criteria: were arrhythmias, cardiac failure and respiratory distress due to non-cardiac causes like anemia and volume overload especially in malnourished children.

After enrollment their detailed demographics presenting symptoms history and examination were recorded followed by relevant investigations and echocardiography.

Echocardiography (to confirm the diagnosis), chest –X ray and ECG were performed in all cases;

Echocardiography plays an important role in the diagnosis of the defect, planning for the optimal therapeutic approach. Echo was performed for the Diagnosis of the defect,

Localization of the defect, Assessment of the hemodynamic relevance, of the defect, Assessment of the impact of the defect on the morphology and function of the cardiac chambers ,Diagnosis of possible associated cardiac anomalies Guidance of the interventional closure, and Evaluation of the outcomes of therapy.

In a parasternal long axis view a muscular septal defect, either trabecular or outlet or a membranous/perimembranous septal defect can be visualized. The parasternal short axis view at the base of the great vessels is an important view in which a membranous/perimembranous or a muscular – outlet type – defect could be visualized just above the right coronary cusp Further short axis views of the left ventricle demonstrate muscular – trabecular type – septal defects A apical four chamber view can further confirm the presence of a muscular VSD Further rotating the transducer and displaying a so called an apical five chamber view that contains the aortic valve can help in visualizing a sinus type (inlet) VSD. The subcostal view displaying the four cardiac chambers can further demonstrate the presence of a muscular septal defect.

Statistical Analysis:

Statistical analyses were performed with SPSS software version 20.vaaaalues are represented as mean +SD. or percentage .p value of less than 0.05 is considered significant

RESULTS:

Ventricular septal defect was the most common lesion found in 114 patients. 55 (48.2%) were males and 58(50.9%) females.

Table 1. Shows the base line characteristics of the study population with VSD. Total 114 patients had VSD. Out of which 55 (48.2%) were males and 58(50.9%) females. Total 22(19.3%) child body was dimorphic while 92(80.7%) had normal body. Mean weight of the patients was 8.05+8.3 kg. mean height was 67.7+25.4 cm. Total 39(34.2%)patients were asymptomatic while 75(65.8%)had heart murmur. right ventricular systolic pressure was elevated in 2(1.8%) patients, while it was normal in 112(98.2%) patients. left ventricular cavity size was increased in 14(12.3%%) patients while it was normal in 100(87.7% patients. shunt direction was right to left in one patient and bidirectional in 6 patients rest had left to right direction in 44(57.1%)patients while it was bidirectional in 2(2.6%)patients, Table1

Mildly dilated right atria were present in 56(15.7%) patients. while left atria was dilated in 30(8.4% patients.

Membranous defect was present in 67(18.8%) patients, outlet location in 1(0.3%) patients, and muscular type in 21 (5.9%) patients. **Fig 1.**

Pressure gradient <20 was seen in 7(2%), Pressure gradient 30-40 in 6(1.7%) while rest had pressure gradient >50**. fig 2.**

Rt ventricular cavity size was increased in 15(13.2%) patients **Fig 3.**

VSD size was small in 59(51.8%) patients it was moderate in 12 (10.5%) patients while it was large in 31(27.2%) patients. **Fig 4.**

DISCUSSION:

Congenital heart disease is a leading cause of morbidity and mortality in the children. The VSD is most common Congenital heart defect world-wide, Saudi Arabia is definitely not an exception.(Kapoor R et al ,2003; Alnajjar AA et al,2009).

The percentage of congenital heart disease (CHD) caused by VSD in Riyadh is 33.1%, 34.5% in Madinah, and 29.6% in Al-Baha (Khadim Jawad et al, 2009; Abbag F , 2006).

Unfortunately, Studies about VSD in Riyadh are limited.

The detection of congenital heart diseases early in childhood will lead to better treatment, and reduction in the mortality and morbidity(Kapoor R et al,2008).

Ventricular septal defect (VSD) is the most common CHD in infants and children, accounts for 25% of CHD, the prevalence of VSD was almost the same as found in studies done in India, Taiwan(Yu C.H et al, 2009; Abbag F ,1998).

When seen anatomically majority of patients had membranous type of VSD followed by muscular type of VSD. Membranous defect was present in 40(60.9%) of patients, muscular type of VSD was present in 14(20.3%)patients, these figures are in agreement with the findings of another European study.16 In our study VSD size was small in 33(56.9%) patients it was moderate in 7 (12.1%) patients while it was large in 18(31%)patients. Similar observation was found in study from Thailand.

At certain places, due to the lack of skilled personnel, equipment and facilities for diagnosis at primary and secondary health care levels. Patients presented for echocardiography for the first time at a late age.

Other cardiac abnormalities were mitral regurgitation, pulmonary valve defects, aortic valve abnormalities, coarctation of aorta, and PDA.

Regarding the clinical presentation, 80% patients with CHD presented with respiratory distress, cough and recurrent chest infection. This correlates with Nigeria's study(George I.O et al,2009).

The study gives an overview of the pattern of congenital heart disease in children admitted with suspected cardiac problem with reference to VSD.

The limitation in our study is lack of early referral which leads to under reporting the actual numbers of children with heart disease and VSD in the wider community. A population based prevalence study is required to determine the full extent of this problem.

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CONCLUSION:

Heart diseases not only contribute to a significant morbidity and mortality and reduced quality of life, but also cause a tremendous psychological stress and economic burden to the whole family. However, if the problems were recognized at earlier age, the chance of long term complications might be less with better outcome.

In order to avoid complications, reduce mortality and improve quality of life, earlier detection and correction of disease is of utmost importance.

Pediatric echocardiography as diagnostic tool should be made more widely available especially in tertiary institutions to enable early diagnosis and, screening for possible cardiac defects during pregnancy.

All newborn babies should be examined thoroughly for any evidence of CHD by pediatrician before hospital discharge and on follow up visits in the early neonatal period.

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Tables

Table 1. Baseline characteristics of study population =114

Variables N=77	Mean +SD or %
Female	58(50.9%)
Dysmorphic Child Body	22(19.3%)
Weight (kg)	8.05+8.3
Height (cm)	67.7+25.4
Asymptomatic	39(34.2%)
Murmur	75(65.8%)
Elevated Rt Ventr. systolic pressure	2(1.8%)
Increased Lt ventr. Cavity size	14(12.3%)
Shunt direction Rt to left	1(0.3%)
Shunt bidirectional	6(1.7%)

Figures:

Fig.1.

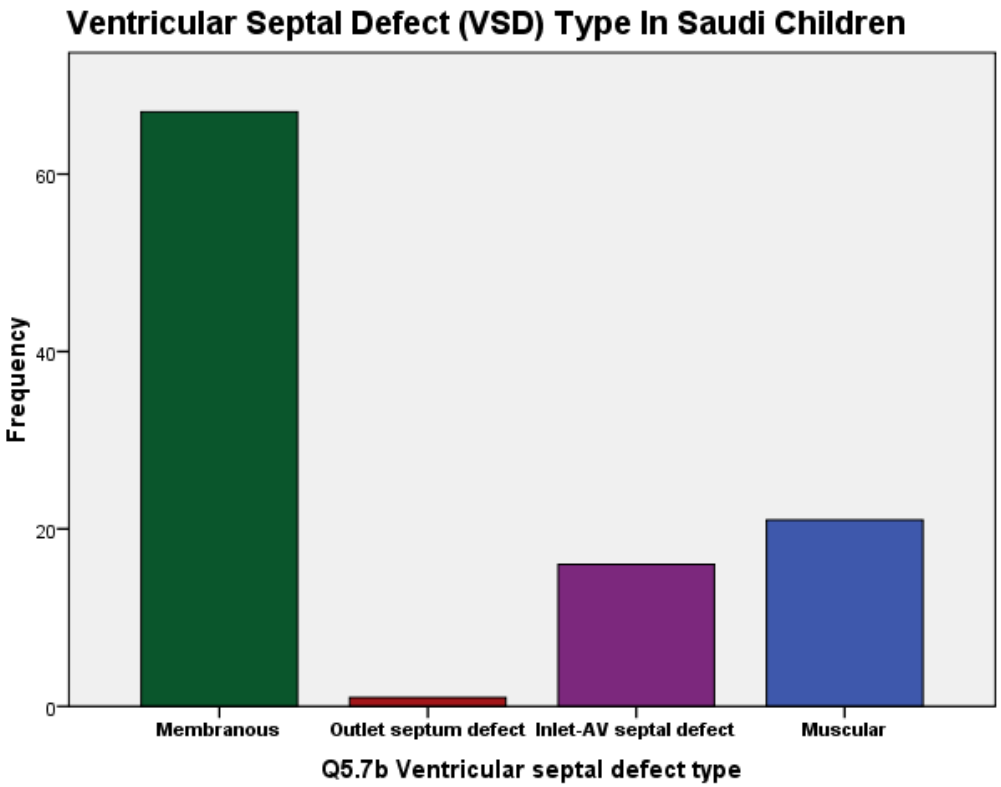


Fig.2

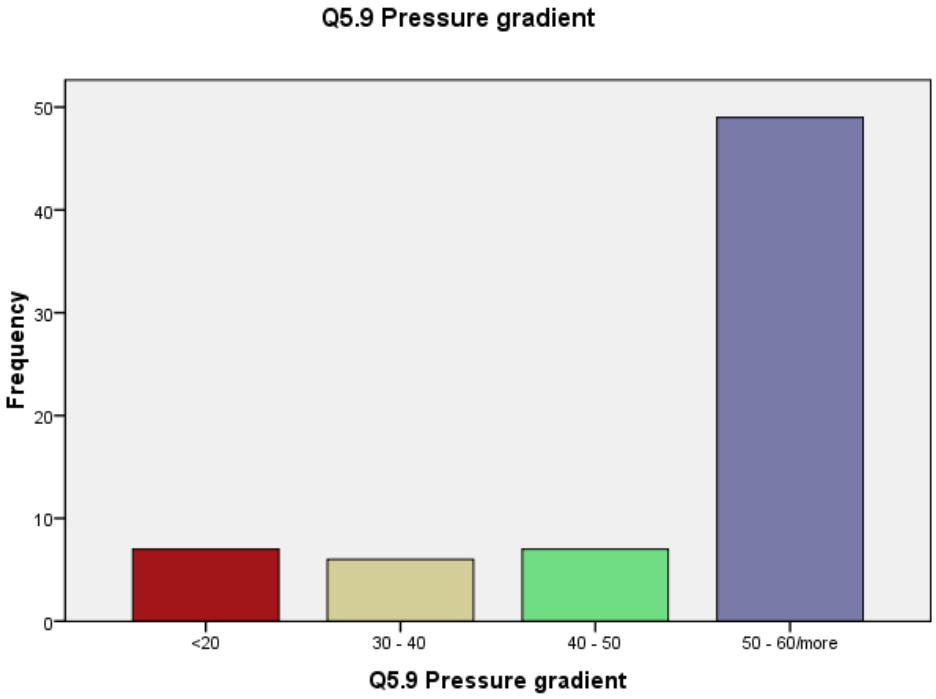

Q5.9 Pressure gradient
Frequency
50
40
30
20
10
0
<20
30 - 40
40 - 50
50 - 60/more
Q5.9 Pressure gradient

Fig. 3

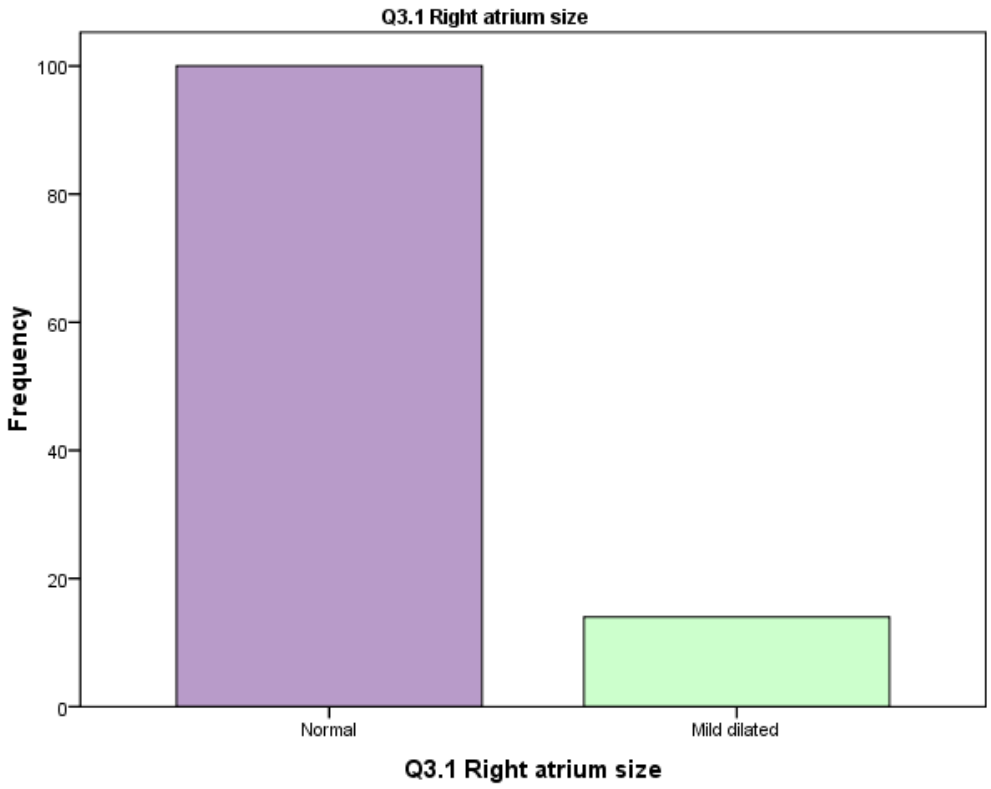
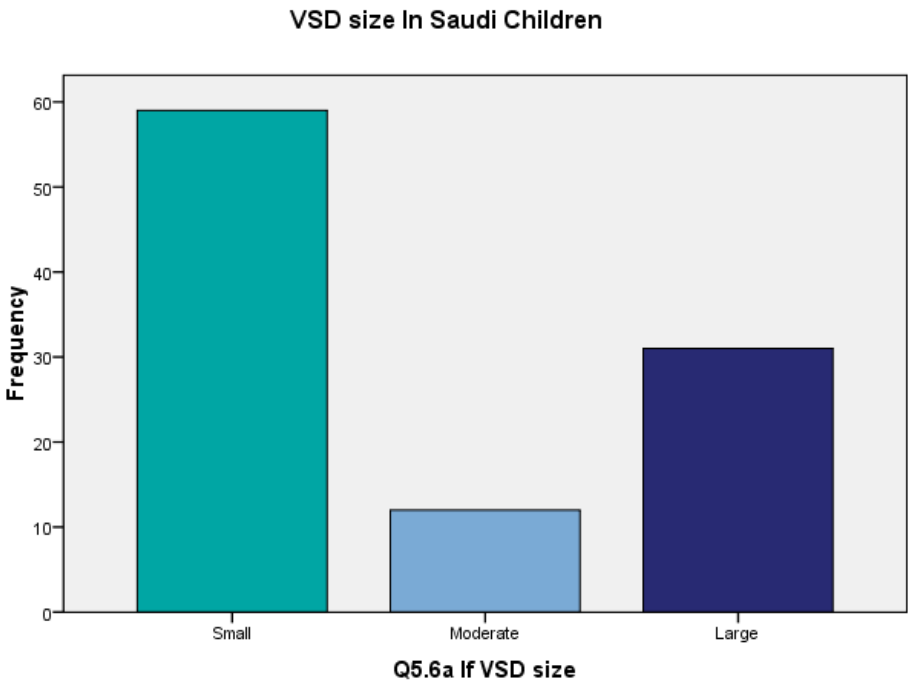

Q3.1 Right atrium size
Frequency
100
80
60
40
20
0
Normal
Mild dilated
Q3.1 Right atrium size

Fig.4


VSD size In Saudi Children
Frequency
60
50
40
30
20
10
0
Small
Moderate
Large
Q5.6a If VSD size