



MEASUREMENTS OF INTERVENTRICULAR SEPTUM AND INTERATRIAL SEPTUM – A 2D ECHOCARDIOGRAPHIC STUDY

Anatomy

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ABSTRACT

INTRODUCTION: In view of occurrence of cardiovascular diseases which is increasing in the population causing major public health problem it is essential to know the risk factors which are causing coronary artery disease at an early stage for treatment and follow up.

MATERIALS AND METHODS: The present study was conducted in Osmania General Hospital and CARE Hospitals Hyderabad, Andhra Pradesh. The dimensions of cardiac chambers of the heart in normal asymptomatic individuals who are attending the Cardiology departments for routine health check ups were studied by using 2 Dimensional Echocardiography.

A total of 100 individuals who were apparently normal from both the genders were studied during the period from 2012 September to 2013 October. **RESULTS:** The mean and S.D. of the study population was calculated and distributed between 21 to above 71 years. The IVS dimension was between 21 – above 71 years and found 0.8 to 0.94. . 0.8 was found in above 71 years , 0.94 in 61-70 years. The IAS dimensions were ranged between 0.75 to 0.9. 0.75 in 21 -30 years and 0.9 in 31-50 and between 61-70 years.

The height wise distribution of Inter ventricular and Interatrial septum shows little or no difference. The height was ranged between 141 to above 171 cms. The highest IVS was 0.94 and least was 0.84. The highest IAS was 0.91 and least was 0.87 in 141 to 160 range.

The Interventricular septum and Interatrial septum was between 0.80 to 1.02. The highest IVS was 0.97 and least was 0.80. The highest Interatrial septum was 1.02 and least was 0.86. The IVS and IAS least shows 0.80 and 0.86 in 31 -50 kgs. The highest dimensions of IVS and IAS were 0.97 and 1.02 in above 91 kgs. 0.88 mean of IVS was found in 51 - 70 kgs.

CONCLUSION: The information obtained is applicable to research in aging and also provides standards with which Echocardiographic changes in aged individuals with pathologic conditions can be compared. Cardiovascular diseases mortality and morbidity can be reduced by early identification of pathology. The different sampling criteria are the best available explanation for the discrepancy between the values obtained in this study and those presented in international text books

KEYWORDS

INTRODUCTION

Tropical heart diseases like Rheumatic heart disease, nutritional deficiencies leading to heart diseases is a major public health problem in India and contributes 25% to 30% of newly diagnosed cases and deaths globally- WHO 2001-2004 year report. In 1990 cardiovascular diseases accounted for 63% of all deaths and India contributed 17% to world - wide mortality. Non-communicable diseases such as Diabetes mellitus, cancer, and heart diseases are rapidly replacing infectious diseases and malnutrition in India. Men and women are equally affected by coronary artery disease. More than 32 million patients are suffering with coronary heart disease in India (Shah and Mathur - 2010 *ICMR New Delhi*).

In view of occurrence of cardiovascular diseases which is increasing in the population causing major public health problem it is essential to know the risk factors which are causing coronary artery disease at an early stage for treatment and follow up.

MATERIALS AND METHODS

Measurements of normal anatomic dimensions of all the chambers of the heart are taken for the present study from the people who are attending **Osmania General Hospital**, Afzalgunj, **Hyderabad** and **CARE Hospitals** Banjara Hills, Hyderabad , **Andhra Pradesh** for normal check-ups during a period of one year from October 2012 to September 2013 as out-patient and in-patient. Normal people are screened by 2-Dimensional Echocardiographic study, to determine the dimensions of all the chambers of the heart. The heart and its performance are measured in terms of dimensions in specific planes.

Details are recorded as per the proforma. Informed consent was obtained from patients after explaining to them the purpose and method of the study in their mother tongue / language of fluency (Annexure-II).

Place of study :-

1. Osmania General Hospital, Afzalgunj , Hyderabad , Andhra Pradesh.
2. CARE Hospitals , Banjara Hills , Hyderabad , Andhra Pradesh .

Period of study : October 2012 to September 2013.

Duration :- One year.

Sample source :-

1. Department of Cardiology, Osmania General Hospital , Hyderabad.
2. Department of Cardiology, CARE Hospitals, Hyderabad.

Sample :-

2-Dimensional Echocardiographic study of people attending the out-patient and in- patient services for normal health check- ups and preoperative check- ups for non- cardiac reasons in the cardiology departments at Osmania General Hospital and CARE Hospitals , Hyderabad , Andhra Pradesh .

Sample size :- 100 cases.

Data Collection :-

Personal information including -name , age , gender , weight, height, address and case sheet no. are taken from the case sheet. Data regarding various parameters of the heart are taken from Echocardiographic scan (Annexure-I).

INCLUSION CRITERIA:

1. Apparently normal population attending Osmania General Hospital and CARE Hospitals as out-patients and in-patients for non cardiac illness from October 2012 to September 2013.
2. The study included males and females between 25 – 82 years of age without any evidence of chest wall deformity, coronary artery , valvular or hypertensive heart diseases , Diabetes mellitus and hyperlipidemia .
3. Pre operative and for certain procedures as a pre requisite .
4. People who require fitness certificate .
5. Normal people with family history of acquired heart diseases like Coronary artery disease and Patients with family history of genetically transmitted Cardiovascular diseases.
6. Re-evaluation of patients undergoing chemotherapy with cardiotoxic agents.
8. Routine screening for people participating in competitive sports , athletes with normal cardiac history , to evaluate cardiac status for fitness .
9. Individuals not taking medication known to influence cardiac function .

EXCLUSION CRITERIA:

1. Patients with systemic diseases like Diabetes mellitus and hypertension.
2. All patients with congenital heart diseases or acquired heart diseases.
3. All patients who underwent cardiac surgeries in the past.
4. Seriously ill patients with various causes.
5. Patients with other systemic diseases of severe nature.
6. Individuals below 18 years.
7. Pregnant women.

STATISTICAL METHOD:

Basic statistical analysis for various parameters using such as Percentage, Mean, Standard Deviation and p-value were calculated.

RESULTS

The mean and S.D. of the study population was calculated and distributed between 21 to above 71 years. The IVS dimension was between 21 – above 71 years and found 0.8 to 0.94. . 0.8 was found in above 71 years, 0.94 in 61-70 years. The IAS dimensions were ranged between 0.75 to 0.9. 0.75 in 21 -30 years and 0.9 in 31-50 and between 61-70 years.

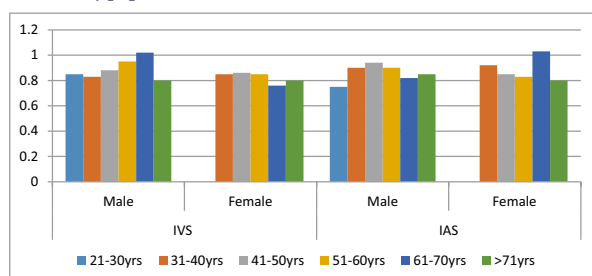
The height wise distribution of Inter ventricular and Interatrial septum shows little or no difference. The height was ranged between 141 to above 171 cms. The highest IVS was 0.94 and least was 0.84. The highest IAS was 0.91 and least was 0.87 in 141 to 160 range.

The Interventricular septum and Interatrial septum was between 0.80 to 1.02. The highest IVS was 0.97 and least was 0.80. The highest Interatrial septum was 1.02 and least was 0.86. The IVS and IAS least shows 0.80 and 0.86 in 31 -50 kgms. The highest dimensions of IVS and IAS were 0.97 and 1.02 in above 91 kgms. 0.88 mean of IVS was found in 51 - 70 kgms.

Table No.1 : Age wise distribution of measurements of IVS and IAS in the study population.

Age range in years	IVS Mean ± S. D.		IAS Mean ± S. D.	
	Male	Female	Male	Female
21 ---30 M=4 F=0	0.85 ± 0.10	----	0.75 ± 0.10	----
31 –40 M=8 F=4	0.83 ± 0.10	0.85 ± 0.10	0.9 ± 0.18	0.92 ± 0.09
41 –50 M=27 F=23	0.88 ± 0.10	0.86 ± 0.10	0.94 ± 0.16	0.85 ± 0.15
51 –60 M=14 F=9	0.95 ± 0.17	0.85 ± 0.07	0.90 ± 0.16	0.83 ± 0.11
61 –70 M=5 F=3	1.02 ± 0.20	0.76 ± 0.57	0.82 ± 0.14	1.03 ± 0.11
>71 M=2 F=1	0.8 ± 0.00	0.8 -	0.85 ± 0.16	0.8 -

Chart No. 1 : Age wise distribution of measurements of IVS and IAS in the study population.

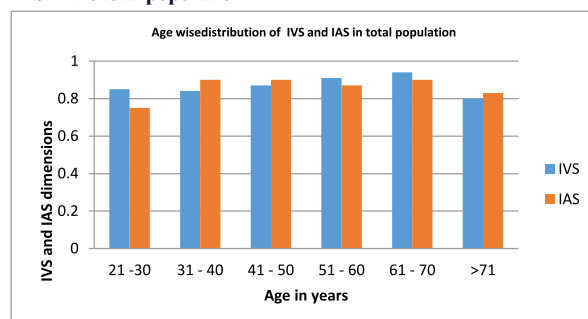


The highest Interventricular septum dimension in males was 1.02 between 61 -70 years and least in above 71 years and was found 0.8. In females the highest IVS dimension was 0.86 in 41 –50 years and the least was 0.76 between 61 – 70 years. The Interatrial septum dimension in females was highest in age range of 61 -70 years was 1.03 and least in above 71 years was 0.8. The least IAS dimensions in age range between 21 -30 years in males was 0.75 and highest was 0.94 in 41 -50 years range.

Table No. 2 : Age wise distribution of measurements of IVS and IAS in the total population (n -100)

Age in years	IVS Mean± S.D. in cms		IAS Mean± S. D. in cms	
	Mean	S.D.	Mean	S.D.
21 – 30 Total=4	0.85	± 0.1	0.75	± 0.1
31 – 40 Total=12	0.84	± 0.09	0.90	± 0.15
41 – 50 Total=50	0.87	± 0.10	0.9	± 0.16
51 – 60 Total=23	0.91	± 0.15	0.87	± 0.15
61 – 70 Total=8	0.94	± 0.21	0.9	± 0.16
>71 Total=3	0.8	± 0.00	0.83	± 0.05

Chart No. 2 : Age wise distribution of measurements of IVS and IAS in the total population

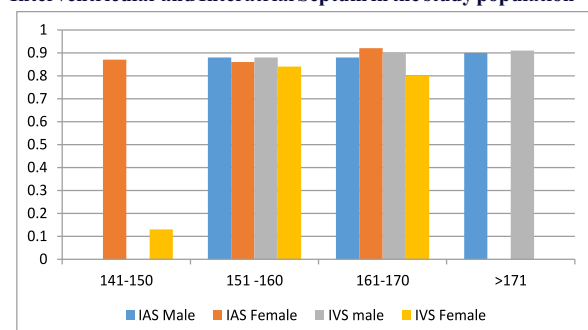


The mean and S.D. of the study population was calculated and distributed between 21 to above 71 years. The IVS dimension was between 21 – above 71 years and found 0.8 to 0.94. . 0.8 was found in above 71 years, 0.94 in 61-70 years. The IAS dimensions were ranged between 0.75 to 0.9. 0.75 in 21 -30 years and 0.9 in 31-50 and between 61-70 years.

Table No. 3 : Height wise distribution of measurements of the Interventricular and Interatrial Septum in the study population

Height (in cms)	IVS Mean ± S. D.		IAS Mean ± S. D.	
	M	F	M	F
141 -150 m=0 f= 12	---	0.87 ± 0.09	---	0.87 ± 0.13
151 -160 m=5 f= 24	0.88 ± 0.17	0.86 ± 0.07	0.88 ± 0.19	0.84 ± 0.16
161 -170 m= 35 f= 4	0.88 ± 0.12	0.92 ± 0.15	0.90 ± 0.13	0.80 ± 0.00
>171 m= 20	0.90 ± 0.15	---	0.91 ± 0.21	---

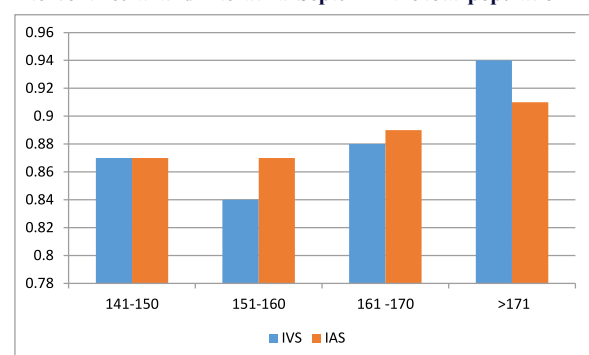
Chart No. 3 : Height wise distribution of measurements of the Interventricular and Interatrial Septum in the study population



The IVS and IAS dimensions observed were showing little increase with height in the study population. It shows that almost the equal dimensions in both the genders with height ranging from 141 – 171 cms and above. The mean of the IVS dimensions found was 0.88 – 0.90 cms in men; and 0.86 – 0.92 cms in women. The mean value of IAS in the same height range was 0.88 – 0.91 cms in men and 0.80 – 0.87 cms in women.

Table No. 4 : Height wise distribution of measurements of the Interventricular and Interatrial Septum in the total population (n= 100)

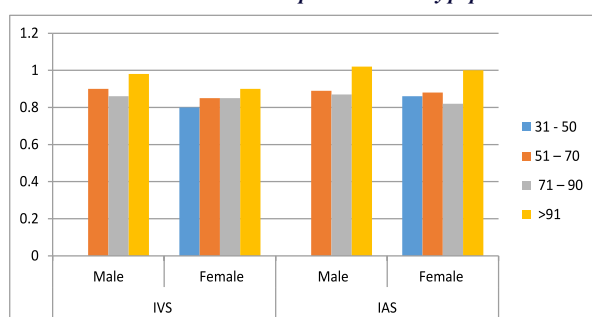
Height in cms.	IVS Mean± S. D.	IAS Mean ± S. D.
141– 150 Total=12	0.87 ± 0.09	0.87 ± 0.13
151 –160 Total=29	0.84 ± 0.09	0.87 ± 0.16
161 –170 Total=39	0.88 ± 0.12	0.89 ± 0.13
>171 Total=20	0.94 ± 0.15	0.91 ± 0.21

Chart No. 4 : Height wise distribution of measurements of the Interventricular and Interatrial Septum in the total population

The height wise distribution of Inter ventricular and Interatrial septum shows little or no difference. The height was ranged between 141 to above 171 cms. The highest IVS was 0.94 and least was 0.84 . The highest IAS was 0.91 and least was 0.87 in 141 to 160 range.

Table No. 5 : Weight wise distribution of measurements of the Interventricular and interatrial septum in the study population

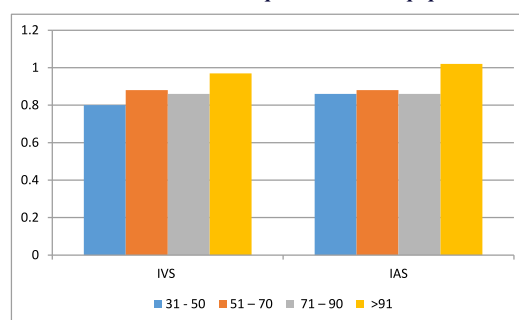
weigh (In Kgms)	IVS		IAS	
	M	F	M	F
31 – 50 M=0 F=3	----	0.8 ±0.00	----	0.86 ±0.20
51 – 70 M=30 F=24	0.9± 0.14	0.85 ±0.08	0.89 ±0.14	0.88 ±0.14
71 – 90 M=23 F=12	0.86± 0.10	0.85 ±0.11	0.87 ±0.17	0.825 ±0.12
>91 M=7 F=1	0.98 ±0.17	0.9	1.02 ±0.21	1

Chart No. 5 : Weight wise distribution of measurements of the Interventricular and interatrial septum in the study population

The observations found in IVS and IAS measurements with weight were distributed in 31 –above 91 kgms in both the genders . IVS in males was least 0.86 and 0.98 highest where as the IAS dimensions was 0.87 to 1.02. In case of females the IVS was from 0.8 to 0.9. The IAS dimension in females was between 0.82–0.1 . The least IVS in males was 0.86 in 71-90 kgms. and highest in above 91 kgms was 0.985 and the highest IAS also 1.02 in the same range. The least IAS in males 0.87 in 71-90 kgms in the same range least IAS was found in females with 0.825. The highest IAS in females was 1.0 in above 91kgms.

Table No. 6 : Weight wise distribution of measurements of the**Interventricular and interatrial septum in the total population (n - 100)**

weight (In Kgms)	IVS Mean ± SD	IAS Mean ± SD.
31 – 50 Total=3	0.80 ± 0.00	0.86 ±0.20
51 – 70 Total=54	0.88 ± 0.12	0.88 ±0.14
71 – 90 Total=35	0.86 ± 0.10	0.86 ± 0.15
>91 Total=8	0.97 ±0.16	1.02 ± 0.19

Chart No. 6 : Weight wise distribution of measurements of the Interventricular and interatrial septum in the total population

The Interventricular septum and Interatrial septum was between 0.80 to 1.02 . The highest IVS was 0.97 and least was 0.80. The highest Interatrial septum was 1.02 and least was 0.86. The IVS and IAS least shows 0.80 and 0.86 in 31 -50 kgms. The highest dimensions of IVS and IAS were 0.97 and 1.02 in above 91 kgms. 0.88 mean of of IVS was found in 51 - 70 kgms.

DISCUSSION

Echocardiography is a sensitive diagnostic test for identification of cardiac structures in normal or diseased states. Echocardiography is an inexpensive screening ,diagnostic tool and a powerful independent predictor of Cardiac Anatomy ,Physiology and also for major cardiac events.

- Echocardiography is a reliable and reproduced test and serves as a useful Non -invasive modality for assessing Cardiac Anatomy , Physiology and Pathologic condition.
- Body position of the Subjects can influence a small number of variables.
- Position of transducer , inclination and angulation over the body influences Echocardiographic measurements.
- In an adult population , age is not a significant factor in most of the Echocardiographic measurements .
- Height has an impact on Echocardiographic measurements with increase of height, the Cardiac dimensions also increased.
- Weight also influences Echocardiographic measurements , increase in dimensions observed proportionately.
- Gender has little effect or increased dimensions in males on Echocardiographic measurements.

The study describes the effect of aging on several Echocardiographic parameters obtained from normal individuals.

WL Henry et al (1978), found linear regression in IVS dimensions in a study on Echocardiographic dimensions in normal subjects with age.

Gardin JM (1979) , in a study in normal subjects found IVS dimensions were increased with age.

Santhosh Kansal MD et al (1979) , found the IVS and posterior wall thickness were in 1:1 ratio in a study of 19- 63 years of age group normal individuals and also found thick IVS in physically active people.

Voogd P J et al (1984) , showed linear regression in IVS dimensions as age advances.

K. M. Knutsen et al (1989) found that the IVS is more thicker in males.

L.I.H. Overbeek et al (2006) , showed that the IVS dimensions were smaller as age increases.

In the present study , there is little or no increase of IVS with increase in weight , age and BMI. No change in dimension with height. The present study is consistent with the studies of **W L Henry , Gardin JM , and Voogd P J .**

CONCLUSION

The study population is unique in that there is a high level of assurance that the individuals are free of overt coronary artery disease.

In the present study 100 individuals were taken from both the genders .60 males and 40 females from age range of 25 -82 years were studied.

- The dimensions of the heart chambers were studied in both the genders.
- In the present study subjects cardiac dimensions in general increases as age advances.
- The measurements of all the chambers are higher in males.
- Height shows impact on the cardiac dimensions . Cardiac dimensions increase with increase in height.
- Increase in body weight is associated with increase in cardiac dimensions.
- BMI shows influence on cardiac dimensions in the present study. Cardiac dimensions increases with increase in BMI.
- The dimensions of the cardiac chambers in Indian population shows lower values than western may be due to body built .
- The present study is a preliminary step to know the dimensions of the chambers of the heart in normal individuals. If we study the normal dimensions in detail in various groups like age, gender, height, weight and BMI wise , any deviation from normal dimensions of chambers can be detected . So the underlying pathology can be diagnosed. This helps in proper management and follow up.
- The information obtained is applicable to research in aging and also provides standards with which Echocardiographic changes in aged individuals with pathologic conditions can be compared. Cardiovascular diseases mortality and morbidity can be reduced by early identification of pathology. The different sampling criteria are the best available explanation for the discrepancy between the values obtained in this study and those presented in international text books .
- The present study gave us an idea regarding the dimensions of chambers of the heart in both the genders.

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