

## The Frequency Distribution of Cardiovascular Diseases in 13 Hospital Admitted Patients in Korea\*

Jong Hoa Bae, M.D., Soon Jo Hong, M.D., Wee Hyun Park, M.D.,  
Young Moo Ro, M.D., Hak Choong Lee, M.D., Jong Sung Kim, M.D.,  
Jung Don Seo, M.D., Woong-Ku Lee, M.D., Jung Chae Kang, M.D.,  
Un Ho Ryoo, M.D., Chong Hoon Park, M.D., Young Lee, M.D.,  
Chung Kyun Lee, M.D. and Ock Kyu Park, M.D.

*The Korean Society of Circulation*

*The frequency distribution of cardiovascular diseases are changing recently due to the development of living environment. Unfortunately there are few epidemiological studies of cardiovascular diseases in general population, we tried to estimate the recent trend of cardiovascular diseases studying hospitalized patients in nationwide 13 large hospitals during a year of 1985.*

*The hypertensive disease (24.1%) was the most common cardiovascular disease and the next were cerebrovascular disease (15.8%), arrhythmias (12.2%), ischemic heart disease (9.7%), congenital heart disease (9.1%), and rheumatic heart disease (5.4%) in order.*

*This results showed that hypertensive disease and cerebrovascular disease are still the major cardiovascular disease and ischemic heart disease and arrhythmias are increased. But chronic rheumatic heart disease is declined compared with previous studies in hospitalized patients.*

---

Key Word: *Frequency distribution of cardiovascular disease*

### INTRODUCTION

**Recently** the cultural and nutritional environment and the life span of Korean were changed by the high growth of economy in Korea. Therefore the pattern of the frequency distribution of the cardiovascular diseases also could changed. The most common cause of death reported in 1985 by the

Economic Planning Board was the cardiovascular diseases (31.8%). There were few epidemiological studies for the prevalence of cardiovascular disease in Korean such as Korean Nationwide Blood Pressure Study (Kim et al., 1982). There were some reports of clinical studies for prevalence of cardiovascular diseases in hospitalized patients (Suh et al., 1968; Song, 1971; Song et al., 1972; Park, 1974; Kim et al., 1975; Kim et al., 1976; Koo et al., 1983; Kim et al., 1985).

In spite of many limitations and problems concerning data collection, we could estimate the trend for the frequency distribution of cardiovascular diseases from the data of hospitalized patients compared with previous studies and also we could get an idea of changing pattern of cardiovascular diseases

---

Address for Correspondence: Dr. Jong Hoa Bae, Division of Cardiology, Department of Internal Medicine, Kyung Hee University Hospital, Seoul 131, Korea. (Tel. 02) 966-5191 #2315)

\* This study was supported partly by the grant of Korean Academy of Medical Science, Korean Medical Association.

in Korea for the clinical practice of cardiovascular diseases. For this purpose, we studied the hospitalized patients in 13 nationwide large hospitals by the Korean Society of Circulation for the memory of 30th anniversary of annual scientific meeting.

## SUBJECTS AND METHOD

The age and sex distribution of patients are shown in Table 1. We studied the total of 25,939 cardiovascular diseases of in-patients aged above 15 years old except congenital heart diseases which consisted of 13,831 males (53.3%) and 12,108 females (46.7%). The distribution of age revealed the peak in 6th and 7th decades.

The participating hospitals were selected based on the location of hospital, size of hospital, facility and level of diagnostic skill. Therefore the diagnosis of cardiovascular disease was reliable in the participating hospitals.

The list of participating hospitals are as the follows:

Seoul: Catholic Medical College St. Mary's Hospital  
 Chung-ang University Hospital  
 Hallym Medical College Hospital  
 Hanyang University Hospital  
 Korea University Hospital  
 Kyung Hee University Hospital  
 National Medical Center  
 Seoul National University Hospital  
 Yonsei University Hospital

Taejeon : Chungnam University Hospital

Taegu : Kyungpook University Hospital

Pusan : Inje Medical College Hospital

Kwangju: Chonnam University Hospital

The data collected from each hospital were taken from discharge summary of the patients based on

classification of cardiovascular diseases by WHO (1977) from January to December 1985 and count every diseases on discharge summary.

The classification of cardiovascular diseases are as follows:

1. Acute rheumatic Fever (390-392)
2. Chronic rheumatic heart disease (393-398)
3. Hypertensive disease (401-405)
4. Ischemic heart disease (410-414)
5. Diseases of pulmonary circulation (414-417)
6. Other forms of heart disease (420-429)
7. Cerebrovascular disease (430-438)
8. Diseases of arteries, arterioles and capillaries (440-448)
9. Diseases of veins, lymphatics, and other (451-459)
10. Neoplasm of heart (164, 212)
11. Congenital heart disease (745-747)
12. Symptoms and signs of cardiovascular system (780-799)

## RESULTS AND DISCUSSION

### Frequency distribution of cardiovascular diseases:

The most common cardiovascular disease was hypertensive disease (24.1%) and the next were cerebrovascular disease (15.8%), arrhythmias (12.2%), ischemic heart disease (9.1%), and chronic rheumatic heart disease (4.9%) in order. Therefore thy hypertensive and cerebrovascular diseases were the main cardiovascular disease (39.9%) in Korea (Table 2).

To compare with several previous reports, still hypertensive and cerebrovascular diseases remained the major proportion, but ischemic heart disease and arrhythmias were increased than before.

**Table 1.** Age and sex distribution of cardiovascular disease patients admitted at 13 hospitals during one year of 1985

Age group	Male		Female		Total	
	No.	%	No.	%	No.	%
0 - 19	1,972	14.3	1,597	13.2	3,569	13.8
20 - 29	940	6.8	780	6.4	1,720	6.6
30 - 39	1,084	7.8	871	7.2	1,955	7.5
40 - 49	2,093	15.1	1,702	14.1	3,795	14.6
50 - 59	2,999	21.7	2,836	23.4	5,835	22.5
60 - 69	3,174	23.0	2,555	21.1	5,729	22.1
70 -	1,569	11.3	1,767	14.6	3,336	12.9
Total	13,831	100.0	12,108	100.0	25,939	100.0

**Table 2.** Distribution of cardiovascular diseases by sex

Diseases	Male		Female		Total	
	No.	%	No.	%	No.	%
1. Acute rheumatic fever	69	0.5	65	0.5	134	0.5
2. Chronic rheumatic heart disease	528	3.8	750	6.2	1,278	4.9
3. Hypertensive diseases	3,192	23.1	3,065	25.3	6,257	24.1
4. Ischemic heart disease	1,557	11.3	958	7.9	2,515	9.7
5. Pulmonary heart disease	236	1.7	206	1.7	442	1.7
6. Pericardial disease	172	1.2	167	1.4	339	1.3
7. Endocarditis	422	3.1	399	3.3	821	3.2
8. Cardiomyopathy	299	2.2	189	1.6	488	1.9
9. Arrhythmias	1,676	12.1	1,488	12.3	3,164	12.2
10. Heart failure etc	1,111	8.0	1,058	7.0	2,169	8.4
11. Cerebrovascular disease	2,198	15.9	1,890	15.6	4,088	15.8
12. Peripheral vascular disease	408	3.0	222	1.8	630	2.4
13. Congenital heart disease	1,250	9.0	1,120	9.3	2,370	9.1
14. Miscellaneous disease	713	5.1	531	4.4	1,244	4.8
Total	13,831	100.0	12,108	100.0	25,939	100.0

**Table 3.** Comparison of relative frequency of cardiovascular diseases by authors (%)

Author	Suh	Song	Song	Park	Kim	Koo	Ro	Shin	This study
Year	1968	1971	1972	1974	1976	1977	1977	1983	1985
No. of patients	693	2,116	2,548	2,639	1,949	5,000	3,091	7,271	19,052
Rheumatic	20.4	15.1	10.6	31.6	14.0	18.6	9.9	6.0	7.4
Hypertensive	48.0	67.7	68.3	43.2	67.5	62.3	69.9	52.9	32.9
Ischemic	15.7	5.5	13.0	5.1	9.7	12.2	15.5	13.2	13.2
Pulmonary	2.2	2.0	0.8	1.6	1.4	2.2	1.5	1.4	2.3
Pericardial	2.3	1.8	1.4	2.6	1.4	2.3	0.8	1.0	1.8
Endocarditis	0.4	0.4	—	1.0	0.9	—	0.3	0.5	4.3
Cardiomyopathy	7.5	3.4	3.4	9.7	3.7	3.1	2.2	2.5	2.6
Arrhythmia	—	2.5	1.7	1.3	2.1	—	5.1	16.8	16.6
Congenital	1.8	0.9	0.6	1.7	2.0	—	1.0	0.9	12.5
Others	1.7	0.7	0.1	2.2	1.7	1.9	0.2	2.5	6.4

\* Classification of cardiovascular disease was modified according to previous studies (see the text for details)

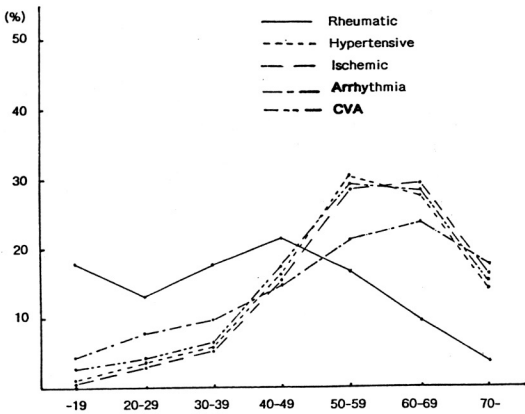
And chronic rheumatic heart disease was declined recently (Table 3). This results suggested that coronary artery disease and related diseases were gradually increased and become a major cardiovascular disease in the near future.

**Distribution of cardiovascular diseases by age and sex:** The distribution of cardiovascular diseases by sex was shown in Table 2 which revealed the male patients predominant in general, but in rheumatic heart disease female patient were still more than male patients, showing no difference as in previous

reports.

Figure 1 showed age distribution of cardiovascular disease which showed abrupt increment of some cardiovascular diseases with increasing age except rheumatic heart disease. Especially hypertensive, cerebrovascular and ischemic heart disease and revealed almost identical curve on the figure with peak frequency of 6th and 7th decades.

**Acute rheumatic fever:** The relative frequency of acute rheumatic fever in this study was 0.5% (Table 2). But this is not the actual frequency because acute



**Fig. 1.** Frequency distribution of major cardiovascular diseases according to age which showed same trend with increment of age in hypertensive, ischemic and cerebrovascular diseases.

rheumatic fever was usually occurred in children and were excluded in this study.

**Chronic rheumatic heart disease:** In chronic rheumatic heart disease, the mitral valve was involved in more than half of the cases (55.2%) and the next were combined mitral and aortic valves (25.4%), aortic valve (7.4%) and others (12.0%) in order. The mitral valve disease was found more commonly in female patients than in male patients (Table 4).

The relative frequency of chronic rheumatic heart disease was declined recently (Table 2) but the mitral valve was more commonly involved valve by the chronic rheumatic heart disease but showing decreasing frequency compared with the previous reports (Table 5). The combined valvular heart disease, especially mitral and aortic, was increased which was thought by the improvement of diagnostic methods for cardiac diseases.

**Ischemic heart disease:** The most common ischemic heart disease was the acute myocardial infarction (31.3%) and the next were unspecified ischemic heart disease (30.3%), angina pectoris

**Table 4.** Frequency distribution of involved sites by chronic rheumatic heart diseases

Involved sites	Male		Female		Total	
	No.	%	No.	%	No.	%
Pericardium	1	0.1	13	1.7	14	1.1
Mitral valve	240	45.5	466	62.1	706	55.2
Aortic valve	60	11.4	34	4.5	94	7.4
Mitral & aortic valves	151	28.6	174	23.2	325	25.4
Other structures	45	8.5	44	5.9	89	7.0
Miscellaneous	31	5.9	19	2.6	50	3.9
Total	528	100.0	750	100.0	1,278	100.0

**Table 5.** Comparison of relative frequency of cardiovascular diseases by authors (%)

Author	Song	Song .	Park	Kim	Koo	Ro	Shin	Shim*	This study
Year	1971	1972	1974	1976	1977	1977	1983	1980	1985
No. of Patients	321	271	834	272	929	540	435	805	1,412
Rheumatic fever	3.5	14.4	—	5.5	—	4.3	3.2	—	9.5
Mitral valve	74.5	69.7	84.4	76.1	84.0	65.9	86.4	56.9	50.0
Aortic valve	5.9	13.3	6.0	7.7	5.7	24.3	5.3	7.7	6.7
Mitral & aortic	16.2	2.6	9.6	10.7	10.3	5.5	5.1	33.0	23.0
Others	—	—	—	—	—	—	—	2.4	10.8

\* Diagnosed by cardiac catheterization

(28.4%), and old myocardial infarction (10.0%) in order (Table 6). Because the subjects were hospitalized patients, the myocardial infarction was predominant disease (41.3%), but the other chronic ischemic heart disease was assumed to be much more than this study.

The previous studies (Table 7) showed that the myocardial infarction and the angina pectoris hold relatively a small proportion in ischemic heart disease compared to this study. There are some problems and limitations to diagnose the ischemic heart

disease according to the hospital such as diagnostic method, criteria and equipments, especially for those patients with angina pectoris and other chronic ischemic heart disease. With recent advancement of diagnostic methods, much more patients with ischemic heart disease will be found and the ischemic heart disease will presume one of the major heart disease in the near future.

**Hypertensive disease:** Hypertensive disease was the most common cardiovascular disease (24.1%) in this study. In patients with hypertension, most of the

**Table 6.** Frequency distribution of ischemic heart diseases

Diseases	Male		Female		Total	
	No.	%	No.	%	No.	%
Acute myocardial infarction	555	57.3	233	24.3	788	31.3
Old myocardial infarction	179	11.5	72	7.5	251	10.0
Angina pectoris	447	28.7	268	28.0	715	28.4
Others	376	24.1	385	40.2	761	30.3
Total	1,557	100.0	958	100.0	2,515	100.0

**Table 7.** Comparison of frequency of ischemic heart diseases by authors (%)

Author	Song	Song	Park	Kim	Koo	Ro	Shin	This study
Year	1971	1972	1974	1976	1977	1977	1983	1985
No. of patients	116	330	135	103	487	387	1,129	2,515
Myocardial infarction	50.0	34.2	42.2	46.6	37.2	22.8	16.3	41.3
Angina pectoris	19.8	8.2	17.8	14.6	27.1	13.4	8.3	28.4
Others	30.2	57.6	40.0	38.8	35.7	63.8	75.4	30.3

**Table 8.** Frequency distribution of hypertensive diseases

Hypertensive disease	Male		Female		Total	
	No.	%	No.	%	No.	%
Essential hypertension	2,601	81.5	2,586	84.4	5,187	82.9
Hypertensive heart disease	150	4.7	156	5.1	306	4.9
Hypertensive renal disease	407	12.8	283	9.2	690	11.0
Hypertensive heart & renal dis.	20	0.6	23	0.8	43	0.7
Secondary hypertension	14	0.4	17	0.5	31	0.5
Total	3,192	100.0	3,065	100.0	6,257	100.0

subjects were essential hypertension (82.9%) and hypertensive heart disease was found in 4.9%, hypertensive renal disease in 11.0%. Secondary hypertension was found in 0.5%. This results suggested that almost all of the patients with hypertension had the essential hypertension (Table 8).

The distribution of hypertensive disease by age showed in Figure 1 which revealed that the peak incidence of hypertensive disease were 6th and 7th decades and there was no sex difference in patients with hypertensive disease.

**Cardiomyopathy:** The relative frequency of cardiomyopathy was 1.9% which was consisted of hypertrophic cardiomyopathy (90.4%), nutritional and metabolic cardiomyopathy (0.2%), and secondary cardiomyopathy (9.4%). In patients with hypertrophic cardiomyopathy, nonobstructive type was found in 94.5% and obstructive type in 5.5% (Table 9).

The diagnosis of cardiomyopathy is very difficult especially according to the etiology and clinically the classification of cardiomyopathies depends on morphologic features by echocardiography. Therefore the frequency distribution of cardiomyopathies hold some limitations and the prevalence of cardiomyopathies should be studied by same diagnostic criteria and methodology.

**Arrhythmias:** The relative frequency of arrhythmias was 12.2% of all cardiovascular diseases (Table 2). Compared with previous studies (Table 3), the relative frequency was increased markedly after 1980. The reason of increased frequency was thought due to increased occurrence of arrhythmias, increased record on discharge summary and improved diagnostic methods.

In patients with conduction disturbances (Table 10), right bundle branch block (37.2%) was the most

**Table 9.** Frequency distribution of cardiomyopathies

Cardiomyopathy	Male		Female		Total	
	No.	%	No.	%	No.	%
Hypertrophic cardiomyopathy						
Obstructive	15	5.2	9	4.8	24	5.0
Non-obstructive	248	85.2	161	5.6	409	85.4
Nutritional & metabolic CM	3	1.0	5	2.7	8	0.2
Secondary cardiomyopathy	25	8.8	13	6.9	38	9.4
Total	291	100.0	188	100.0	479	100.0

**Table 10.** Frequency distribution of conduction disturbances

Conduction disturbances	Male		Female		Total	
	No.	%	No.	%	No.	%
Atrioventricular block						
Complete	27	7.4	33	11.7	60	9.3
Incomplete	61	16.7	47	16.7	108	16.7
Bundle branch block						
Left	36	9.8	69	24.5	105	16.2
Right	164	44.8	77	27.3	241	37.2
Others	13	3.6	12	4.3	25	3.9
Sinoatrial block	3	0.8	7	2.5	10	1.5
Accelerated AV conduction	47	12.8	26	9.2	73	11.3
Others	15	4.1	11	3.9	26	3.9
Total	366	100.0	282	100.0	648	100.0

common disorder and the next were incomplete atrioventricular block (16.7%), left bundle branch block (16.2%), and accelerated atrioventricular conduction (11.3%) in order. These findings were same as previous reports (Huh et al., 1970; Kim, 1972; Rim et al., 1976; Jeon et al., 1979; Hwang et al., 1979; Park et al., 1982).

In patients with dysrhythmias (Table 11), atrial fibrillation and flutter (40.6%) was the most common dysrhythmias and the next was premature beats (16.3%). Compared with previous studies (Lee et al., 1968; Kim, 1972; Hwang et al., 1979), the relative frequency of premature beats was decreased that was thought as unlisted on discharge summary probably. In previous studies of arrhythmias, premature beats and atrial fibrillation and flutter hold more than 90% of cardiac dysrhythmias.

**Cerebrovascular disease:** The relative frequency

of cerebrovascular disease was occupied in 15.8% of cardiovascular disease which was the second most common cardiovascular disease.

In patients with cerebrovascular disease, intracranial hemorrhage was found in 41.3% and non-hemorrhagic strokes was found in 58.7% (Table 12). And also cerebral infarction (35.0%) was the most common cerebrovascular disease and the next were intracerebral hemorrhage (31.1%), subarachnoidal hemorrhage (10.3%), and transient ischemic attack (7.2%) in order.

Compared with previous studies (Suh 1968; Sohn et al., 1970; Kim et al., 1971; Suh et al., 1975; Bae et al., 1974; Chung et al., 1978; Lee et al., 1978; Chung et al., 1978; Kim et al., 1980; Kim et al., 1980; Song et al., 1982; Yang et al., 1982; Moon et al., 1985; Cho et al., 1985), the frequency of intracranial hemorrhage was more prominent, but recent trend using brain com-

**Table 11.** Frequency distribution of dysrhythmias

Dysrhythmias	Male		Female		Total	
	No.	%	No.	%	No.	%
Paroxysmal tachycardia						
Supraventricular	77	5.9	81	6.5	158	6.2
Ventricular	30	2.3	26	2.1	56	2.2
Atrial fibrillation & flutter	517	39.5	518	41.7	1,035	40.6
Ventricular fibrillation	20	1.5	4	0.3	24	0.9
Premature beats	198	15.2	217	17.5	415	16.3
Others	317	24.2	322	26.0	639	27.2
Unspecified	97	7.4	73	5.9	170	6.6
<b>Total</b>	<b>1,310</b>	<b>100.0</b>	<b>1,241</b>	<b>100.0</b>	<b>2,551</b>	<b>100.0</b>

**Table 12.** Frequency distribution of cerebrovascular diseases

Cerebrovascular diseases	Male		Female		Total	
	No.	%	No.	%	No.	%
Subarachnoidal hemorrhage	159	7.2	260	13.8	419	10.3
Intracerebral hemorrhage	655	29.8	618	32.7	1,273	31.1
Cerebral infarction	823	37.4	607	32.1	1,430	35.0
Transient ischemic attack	167	7.6	128	6.8	295	7.2
Acute but ill-defined CVD	140	6.5	125	6.6	265	6.5
Others	80	3.6	85	4.5	165	4.0
Late effect of CVD	174	7.9	67	3.5	241	5.9
<b>Total</b>	<b>2,198</b>	<b>100.0</b>	<b>1,890</b>	<b>100.0</b>	<b>4,088</b>	<b>100.0</b>

**Table 13.** Comparison of frequency of cerebrovascular diseases (%) diagnosed with and without brain CT by various authors

Authors	Year	No. of patients	SAH	ICH	CI	Others
without brain CT scan						
Suh	1963	500	15.0	32.2	52.8	—
Sohn	1970	177	4.5	61.6	28.9	5.0
Kim	1971	346	17.2	42.5	40.1	—
Suh	1975	772	19.3	44.5	36.3	—
Bae	1974	339	11.8	54.3	27.7	6.2
Chung	1978	504	12.7	31.0	50.2	.1
Lee	1978	279	16.5	40.1	35.9	7.5
Chung	1978	158	19.8	43.0	37.2	—
Kim	1980	210	17.6	41.4	35.3	5.7
with brain CT scan						
Kim	1980	63	9.5	34.9	39.7	15.9
Song	1982	186	24.2	41.9	33.9	—
Yang	1982	450	12.0	48.2	27.6	12.2
Moon	1985	180	18.3	45.0	36.7	—
Cho	1985	230	20.9	57.4	21.7	—
This study	1985	4,088	10.3	37.6	42.2	9.9

SAH: Subarachnoidal hemorrhage

ICH: Intracerebral hemorrhage

CI: Cerebral infarction

**Table 14.** Frequency distribution of congenital heart diseases

Congenital heart disease	Male		Female		Total	
	No.	%	No.	%	No.	%
Common truncus	10	0.8	4	0.4	14	0.6
Transposition of great vessel	39	3.1	18	1.6	57	2.4
Tetralogy of Fallot	117	9.4	79	7.1	196	8.3
Common ventricle	21	1.7	19	1.7	40	1.7
Ventricular septal defect	348	27.8	286	25.5	634	26.8
Atrial septal defect	226	18.1	226	20.2	452	19.1
Endocardial cushion defect	21	1.7	31	2.8	52	2.2
Anomalies of pulmonary valve	88	7.0	59	5.3	147	6.2
Tricuspid atresia & stenosis	5	0.4	6	0.5	11	0.5
Ebstein's anomalies	8	0.6	5	0.5	13	0.6
Congenital aortic stenosis	5	0.4	1	0.1	6	0.3
Congenital aortic insufficiency	13	1.0	5	0.5	18	0.8
Congenital mitral stenosis	2	0.2	3	0.3	5	0.2
Congenital mitral insufficiency	7	0.6	18	1.6	25	1.1
Hypoplastic left heart syndrome	—	—	1	0.1	1	0.1
Patent ductus arteriosus	90	7.2	163	14.6	253	10.7
Coarctation of aorta	12	1.0	12	1.1	24	1.0
Other anomalies of aorta	14	1.1	5	0.5	19	0.8
Anomalies of pulmonary artery	20	1.6	27	2.4	47	1.9
Anomalies of great veins	10	0.8	18	1.6	28	1.2
Others	194	15.5	134	11.6	328	13.5
Total	1,250	100.0	1,120	100.0	2,370	100.0



**Table 15.** Comparison of relative frequency of major congenital heart diseases by authors

Authors	Shim*		Pediatrics**		Kim***		This study	
Years	1963-1979		1983-1984		1959-1984		1985	
No. of patients	1,079		3,510		8,989		2,370	
	No.	%	No.	%	No.	%	No.	%
Transposition of great vessel	27	2.5	135	3.9	126	1.4	57	2.4
Tetralogy of Fallot	251	23.3	422	12.0	2,083	23.2	196	8.3
Ventricular septal defect	286	26.5	1,494	42.6	2,533	28.2	634	26.8
Atrial septal defect	161	14.9	293	8.4	1,110	12.4	452	19.1
Anomalies of pulmonary valve	77	7.1	114	3.2	234	2.6	147	6.2
Patent ductus arteriosus	171	15.9	396	11.3	2,384	26.5	253	10.7
Others	106	9.8	656	18.6	519	5.7	631	26.5

\* Diagnosed by cardiac catheterization

\*\* Statistical committee, Korean Association of Pediatrics

\*\*\* Based on cardiovascular surgery

puterized tomography cerebral infarction was increased gradually after 1985. There are some more patients with cerebral infarction who were not hospitalized because the course of disease is not critical. This results suggested that cerebral infarction is increasing more and more due to increased risk factors for atherosclerosis and also control of hypertension.

**Congenital heart disease:** The most common congenital heart disease was ventricular septal defect (26.8%), and the next were atrial septal defect (19.1%), patent ductus arteriosus (10.7%), and tetralogy of Fallot (8.3%) in order (Table 14). Compared with previous studies (Table 15) of the major congenital heart diseases, there was some differences in order of frequency, but above listed four disorders were the main congenital heart diseases (Shim et al., 1980; Kim et al., 1985; Korean Association of Pediatrics, unpublished data).

## CONCLUSION

To estimate the frequency distribution of cardiovascular diseases in Korea, we studied 25,939 cardiovascular diseases during a year of 1985 according to the WHO classification in admitted patients of nationwide 13 large hospitals.

The results revealed that the major cardiovascular diseases were hypertensive disease (24.1%), cerebrovascular disease (15.8%), arrhythmias (12.2%),

and ischemic heart disease (9.1%). The frequency distribution of cardiovascular disease in hospitalized patients were changed compared to previous reports. Therefore nationwide epidemiological study of cardiovascular diseases should be carried out as soon as possible providing the recent trend of prevalence of cardiovascular disease which is very useful in the clinical practice.

## REFERENCES

- Bae JH, Sohn ES, Kang SH, YR Ahn: *An epidemiological study on cerebrovascular accidents in Koreans. III. Clinical observation and recent trend in 177 cases of cerebrovascular accidents. Kor J Int Med* 13:17-30, 1970.
- Cho HK, Park YK, Choi BH, Sul SY: *A clinical study of cerebrovascular disease. Kor J Int Med* 29:80-88, 1985.
- Chung JW, Lew YS, Kwak BT, Lee BS, Park JR, Suk CY: *Clinical observation on cerebrovascular accidents. Kor J Int Med* 21:431-448, 1978.
- Chung YH, Kim MJ, Park LG, Kyung NH: *Clinical studies on cerebrovascular accidents. Kor J Int Med* 21:1045-1055, 1978.
- Huh KK, Song JS, Song HS, Seo JD, Lee YW, Kim DJ: *Clinical study on atrioventricular and intraventricular blocks. Kor J Int Med* 13:651-657, 1970.
- Hwang CD, Kim BH, Choi SB, Seo JD, Ahn YR, Kim KW, Lee YW: *A statistical study on arrhythmias. Kor J Int Med* 22:538-548, 1979.

- Jeon YM, Cho Ch, Park IS, Kim DH, Yoo SW, Lee HC: *Clinical study of arrhythmias, II. Disturbances in impulse conduction.* *Kor J Int Med* 22:466-478, 1979.
- Kim DH: *Clinical observations of cerebrovascular accidents.* *Kor J Int Med* 14:607-620, 1971.
- Kim HM, Kim HJ, Kim KT, Sun K: *Cardiovascular surgery in Korea.* *Kor J Thorac Cardiovasc Surg* 18:371-382, 1985.
- Kim IS, Lee YH, Suh I, Oh HC, Oh DK, Kim SJ, Park CD: *Korean nationwide blood pressure study.* *Yonsei Med J* 23:15-25, 1982.
- Kim JS, Lee SW, Hyun CO, Cho BW, Kim Y, Suh SJ: *Clinical observation of cerebrovascular accidents in Korea.* *Kor J Int Med* 23: 1097-1106, 1980.
- Kim JS, Lee YW: *Prevalence of diseases of circulatory system among rural Korean adults.* *Kor Circul J* 5:87-94, 1975.
- Kim KW, Chung NS: *Differential diagnosis of cerebrovascular disease by computerized tomographic brain scan.* *Kor J Int Med* 23:620-626, 1980.
- Kim MS: *A statistical study on arrhythmia.* *Kor J Int Med* 15:767-791, 1972.
- Kim SY: *Cardiovascular diseases in Korea.* *Kor Circul J* 6:95-109, 1976.
- Koo JY, Jun JE, Kim SY, Jung MH, Choi KH, Chang SG, Han KH, Kim NS, Park WH, Lee JB, Lee SR, Yun YG, Park HM: *Epidemiology of adult heart disease in Korea—including statistics on estimated cardiacs by sex-ratio correction.* *Kor J Int Med* 20:653-669, 1977.
- Lee SK, Han YS, Lee JW, Kwon JY, Oh SJ, Park HM: *Statistical review of electrocardiograms on 10,000 patients with various conditions. I. Arrhythmias.* *Kor J Int Med* 11:765-775, 1968.
- Moon JS, Park DH, Kim W, Kim BT, Koh YB, Shun DJ: *Computerized tomographic findings and clinical observations of cerebrovascular accidents.* *Kor J Int Med* 28:499-507, 1985.
- Park JH, Rim KS, Park BC, Song JS, Lee CH, Min YI, Bae JH, Song CS: *Clinical studies on cerebrovascular accidents. I. Clinical observation on 339 cases of cerebrovascular accidents.* *Kor J Int Med* 18:1006-1016, 1975.
- Park SK, Suh SK: *Study on the conduction disturbances of heart in Korea by electrocardiogram.* *Kor Circul J* 12:283-292, 1982.
- Park YJ: *Heart diseases in Korea.* *Kor Circul J* 4: 127-138, 1974.
- Rhee KJ, Choi DH, Yang JD, Kim SB, Lee BH: *A clinical study on cerebrovascular accidents.* *Kor J Int Med* 21:700-708, 1978.
- Rim KS, Park JH, Song JS, Bae JH, Lee CS: *A clinical statistic study of the atriventricular block and intraventricular conduction disturbances.* *Kor Circul J* 6:35-46, 1976.
- Ro YM, Yoo HS, Choi CH, Kang JK, Kang CS, Song HS, Suh SK, Park HC, Son KS, Lee JK, Lee KW, Lee CI, Lee SG, Song CS: *Epidemiological study of heart disease in Korea—5 year interval change.* *Kor Circul J* 7:179-193, 1977.
- Shim WH, Lee WK, Cho SY, Kim SS, Cha HD, Suh CS: *Analysis of cardiovascular disease by cardiac catheterization in Korea.* *Kor J Int Med* 23:185-193, 1980.
- Shin BJ, Lim SB, Choi TR, Lee BH, Lee CK, Sohn ES: *Cardiovascular diseases in Korea.* *Kor Circul J* 13:213-223, 1983.
- Sohn ES, Kang SH, Bae JH, Yoon JD, Park SC, Lee JS, Ahn SW, Choi IY: *An epidemiological study on cerebrovascular accidents in Koreans. I. Diagnostic criteria and clinical observation of cerebrovascular accidents.* *Kor J Int Med* 11:147-160, 1968.
- Song HS, Kwon KY, Kim KB, Park KH, Park YC: *A clinical study on cerebrovascular accidents by brain scan.* *Kor J Int Med* 25:1348-1358, 1982.
- Song JS: *Cardiovascular diseases in Korea.* *Kor J Int Med* 14:19-26, 1971.
- Statistical Committee: *The Korean Association of Pediatrics: Unpublished data (personal communication)*
- Suh CY, Kim IS, Lee KW, Kim JH: *Cardiovascular diseases in Korea.* *Kor J Int Med* 11:509-516, 1968.
- Suh SJ: *Cerebrovascular Accidents.* *Kor J Int Med* 6:657-674, 1963
- Suh YH, Lee JB, Lee SR: *Clinical observation on cerebrovascular accidents.* *Kor J Int Med* 18:553-556, 1975.
- Yang IM, Kim MS, Bae JH, Song JS: *Classification of cerebrovascular accidents by brain computerized tomography.* *Kor Circul J* 12:359-365, 1982.
- Yoon SH, Choi IG, Shin BJ, Lee BH, Lee CK, Sohn ES: *Clinical observation of the cerebrovascular accidents by computerized tomography.* *J Kor Med Assoc* 25:823-830, 1982.