

## Heart Diseases in School Children : A Preliminary Survey in the Khon Kaen municipal area

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### โรคหัวใจในเด็กนักเรียน : การสำรวจเบื้องต้นในเขตเทศบาลเมืองขอนแก่น

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การสำรวจโรคหัวใจในเด็กนักเรียนชั้นประถมศึกษาของโรงเรียนในเขตเทศบาลเมืองขอนแก่น ระหว่างเดือนกรกฎาคม ถึง ธันวาคม 2529 โดยแพทย์จากคณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น ได้สุ่มตัวอย่างโรงเรียนจำนวน 9 โรงเรียนจากทั้งหมด 26 โรงเรียน นักเรียนทั้งหมดมีจำนวน 7,106 คน เป็นชาย 4,026 คน และหญิง 3,080 คน มีอายุ 7-12 ปี

พบว่าความชุกของโรคหัวใจพิการแต่กำเนิด, โรคหัวใจรูห์มาติก และลิ้นไมตรัลโป่งแฉก (Mitral valve prolapse) ในอัตรา 2.81, 1.13 และ 1.13 ต่อพันตามลำดับ ภาวะอื่น ๆ ที่พบ ได้แก่ ภาวะจังหวะเต้นหัวใจผิดปกติชนิดเวเนตริกเกิลเต้นก่อนกำหนดจำนวน 1 ราย ภาวะโรคหัวใจจากโลหิตจางธาลัสซีเมียจำนวน 2 ราย และโรคข้ออักเสบรูห์มาติกจำนวน 1 ราย

A survey of heart disease in school children was carried out from July to December 1986 in the municipal area of Khon Kaen city.

From the total of 26 primary schools in this area, nine were randomly selected for this

study. There were 7,106 children, consisting of 4,026 boys and 3,080 girls. Their age distribution varied between 7 and 12 years. Every child was examined by staff of the Khon Kaen University Hospital. The results revealed that the prevalence

of congenital heart disease, rheumatic heart disease and mitral valve prolapse were 2.81, 1.13 and 1.13 per thousand respectively. Rheumatic arthritis was found in one child. Other forms of cardiac abnormalities less commonly observed were premature ventricular systoles and anemic heart disease. The former occurred in one child and the latter was encountered in two children who also suffered from thalassemia. —X—

### INTRODUCTION

Congenital heart disease and rheumatic heart disease are considered to be the major childhood health problems in many developing countries<sup>(1)</sup>. As of the chronic nature of the disability, it requires a considerable amount of money and man power for either treatment or prevention of the disease. The nationwide prevalence of heart disease in Thailand is not accurately known. A few studies have been done in the Bangkok Metropolitan area and in some provinces in the central region<sup>(2-6)</sup>. Heart disease in children, and in particular, rheumatic heart disease, is not generally reported to the public health departments. Therefore, estimating the prevalence in different geographic and climatic areas, in specific age groups, in varying socioeconomic levels, etc, should be made based on surveys.

The Northeast has long been known to be the poorest region of this country. The present study was undertaken to augment our knowledge of heart diseases in children who attended the primary schools in Khon Kaen municipal area.

### MATERIALS AND METHODS

From July to December 1986, all children from 9 primary schools in Khon Kaen municipal area were examined by staff of Khon Kaen University Hospital who had a special interest in cardiology. Based on the fact that studying at primary school is compulsory. The children sampled may be re-

garded as representative population aged between 7-12 years old of the child in this area. Nine out of 26 primary schools were randomly selected from this area. Histories relating to cardiovascular symptoms and rheumatic fever manifestations were carefully asked and recorded. The children, who were absent from school during examination days, were revisited in the following days such that every individual was examined. The examination included the observation of cyanosis and clubbing of fingers, palpation of femoral pulse, and special attention was paid to the auscultation of the precordial area<sup>(7)</sup>. All of the children were examined in the erect position. However children suspected of having positive findings were examined in both erect and supine positions. Murmurs were recorded in terms of location, transmission, timing and intensity. Degrees of murmur intensity were graded from 1 to 6, according to the criteria of Levine<sup>(8)</sup>.

Grade 1 to grade 3 ejection systolic murmurs, which tended to disappear in deep inspiration and included vibratory murmurs, pulmonic ejection murmurs, venous hums and carotid bruits, were considered to be innocent murmurs without further examination required<sup>(9,10)</sup>. Whenever the examiner reported the suspicion of organic heart disease, the child in question was subjected to a thorough cardiac work out at the Khon Kaen University Hospital which included chest X-ray and electrocardiogram. Echocardiogram and cardiac catheterization were also performed for a definitive diagnosis and management of the patients. Two dimensional echocardiograms were performed in children who were suspected of having rheumatic heart disease or had auscultatory findings of apical systolic murmur, non-ejection click, and late systolic murmur. The diagnosis of mitral valve prolapse followed the two dimensional echocardiographic criteria<sup>(11)</sup>. Rheumatic

fever was diagnosed according to modified Jones criteria<sup>(12)</sup>. Rheumatic heart disease included mitral insufficiency, mitral disease (combined mitral stenosis and insufficiency), aorto-mitral valve disease and mitral stenosis<sup>(13)</sup>

### RESULTS

A total of 7,106 children from 9 primary schools of Khon Kaen municipal area were examined during the 5 months study period in 1986. Age and sex distributions are shown in Table 1. There were

**Table 1 Distribution of children by age and sex**

Age (years)	Boys	Girls	Total
7	740	604	1,344
8	850	613	1,463
9	575	459	1,034
10	645	443	1,088
11	650	465	1,115
12	566	496	1,062
Total	4,026	3,080	7,106

4,026 boys and 3,080 girls. Their ages ranged from 7 to 12 years old. Twenty children with congenital heart disease were detected. This gave the overall prevalence rate of 2.81 per thousand. Various types of congenital cardiac defects are classified and tabulated in Table 2. Of those congenital heart diseases, 12 cases (60%) were not diagnosed prior to the survey. A total of twenty children included ventricular septal defect in 7 (35%), atrial septal defect in 6 (30%), patent ductus arteriosus in 3 (15%), tetralogy of Fallot in 2 (10%), pulmonic stenosis in 1 (5%) and transposition of great vessels in 1 (5%). There were three children who had already undergone surgery which included patent ductus arteriosus, atrial septal defect and tetralogy of Fallot. One child with tetralogy of Fallot had had surgical correction at Siriraj Hospital in Bangkok.

Isolated mitral regurgitation with no echocardiographic evidence of mitral valve prolapse occurred in 6 children. One child had aortic regurgitation and another was found to have both aortic and mitral regurgitation. Of 8 children diagnosed as having rheumatic heart disease, five children with

**Table 2 Congenital heart disease**

Types of heart disease	Age (years)		Total
	Boys	Girls	
Ventricular septal defect	7, 8, 10, 10, 12	9, 12	7
Atrial septal defect	8, 11, 12	9, 12, 12	6
Patent ductus arteriosus	10	7, 12	3
Tetralogy of Fallot	9, 11	-	2
Pulmonic stenosis	7	-	1
Transposition of great vessels	-	12	1
<b>Total</b>	<b>12</b>	<b>8</b>	<b>20</b>

mitral regurgitation and one child with aortic regurgitation had the history of rheumatic fever which fulfilled the modified Jones criteria<sup>(12)</sup> from hospital records and received prophylaxis against rheumatic fever recurrence prior to the survey. At the time of survey, we found a nine years old girl who suffered from active rheumatic fever with carditis. The prevalence of rheumatic heart disease was 1.13 per thousand. There was an eight year old boy who had been diagnosed as having rheumatic arthritis in the Khon Kaen University Hospital. The auscultatory features of a late systolic murmur, non-ejection click or apical systolic murmur with two dimensional echocardiographic evidence of mitral valve prolapse were found in 8 children, giving a total prevalence rate of 1.13 per thousand. Other cardiac abnormalities included premature ventricular systoles in one boy and anemic heart disease in two children who suffered from thalassemia. The innocent heart murmur was found in 36.9 percent of the children studied.

### DISCUSSION

A comparison of the results of previous surveys in Thailand, including this study, is presented in Table 3<sup>(2-6)</sup>. The prevalence of rheumatic and congenital heart disease of each survey is tabulated including the method of examination and the age of the population. In 1970, Vichitbandha et al<sup>(2)</sup> examined 920 subjects of all age at Si-Chang island. There were 12 patients who had rheumatic heart disease and 32 persons who had a history of arthritis or chorea. There was a 36 year old patient who had definite evidence of an initial attack of rheumatic fever with carditis at the time of survey. There was no case of rheumatic fever or rheumatic heart disease in children 5-15 years of age. The overall prevalence rate for rheumatic heart disease was 13.0 per thousand. During period 1971-1973, Pong-

panich et al<sup>(3)</sup> examined 2,764 school children in Bang Pa-In district of Ayutthaya province. Congenital heart disease was detected in nine and rheumatic valvular disease in three. The prevalence for congenital and rheumatic heart disease was 3.3 and 1.1 per thousand respectively. During period 1974 - 1977, Vichitbandha et al<sup>(4)</sup> examined 4,473 school children in a rural area of Songpinong district, Suphan Buri province, as compared to 5,070 from Bangkok Noi district of Bangkok. The prevalence rate for congenital and rheumatic valvular disease was 4.1 to 1.4 and 2.1 to 1.2 per thousand respectively. In a survey of Chaiyo District, Ang Thong province in 1976, Kachacheewa et al<sup>(5)</sup> found eight congenital heart disease in 1,900 children, which gave a prevalence of 4.2 per thousand. Rheumatic heart disease was found only in adults. The average prevalence was 1.8 per thousand. During 1977 to 1979, Lochaya et al<sup>(6)</sup> studied 31,040 students from 271 schools of Bangkok by double screening method utilizing PhonoCardioScan and cardiologist. The prevalence of congenital heart disease and valvular heart disease of rheumatic in origin altogether with rheumatic history were 2.26 and 0.42 per thousand respectively.

The prevalence of congenital heart disease in our study was comparable to those reports from central Thailand<sup>(2-6)</sup>. Ventricular septal defect was the most frequent congenital cardiac defects. Rheumatic heart disease prevalence in Khon Kaen municipal school children were also comparable to the figures from central Thailand in the past decade<sup>(2-4)</sup> but higher than those from Bangkok school children<sup>(6)</sup> (Table 3). The prevalence of mitral valve prolapse in this study and in Bangkok school children were quite low in comparison to the other reports from the western countries<sup>(14)</sup>. All children with mitral valve prolapse observed in this study were asymptomatic.

**Table 3 Summary of Surveys on Rheumatic Heart Disease (RHD) and congenital Heart Disease (CHD)**

Location	Reference	Year	Age ranges	Sample size	Methods	Prevalence (1/1,000)	
						CHD	RHD
Si-chang island	Vichitbandha <sup>(2)</sup>	1970	5 - 15	262	P.E.	No report	0
			All age	920	P.E.	No report	13
Bang Pà-In (Ayutthaya)	Pongpanich <sup>(3)</sup>	1971-73	4 - 16	2,764	P.E.	3.3	1.1
Songpinong (Suphan Buri)	Vichitbandha <sup>(4)</sup>	1974-77	5 - 14	4,473	P.E.	4.6	2.1
Bangkok-noi (Bangkok)	Vichitbandha <sup>(4)</sup>	1974-77	5 - 14	5,070	P.E.	1.4	1.2
Chaiyo (Ang-Thong)	Kachacheewa <sup>(5)</sup>	1976	1 - 14	1,900	P.E.	4.2	0
			All age	4,915	P.E.	4.5	1.8
Bangkok	Lochaya <sup>(6)</sup>	1977-79	4 - 18	31,040	P.C.S. + P.E.	2.3	0.42
Municipal area of Khon kaen city (Khon Kaen)	Present Study	1986	7 - 12	7,106	P.E.	2.81	1.13

P.E. = Physical examination

P.C.S. = Examined by "PhonoCardioScan"

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