

# PYLORIC STENOSIS IN THE ETHNIC GROUPS OF SINGAPORE

By Alan Y. H. Chong and H. P. Lee

## SYNOPSIS

**The incidence of congenital hypertrophic pyloric stenosis among 141,215 Chinese, Malay and Indian live births in Singapore from 1972 to 1974 was determined. The incidence per 100,000 live births among these ethnic groups are: Chinese 21.2, Malay 9.7 and Indian 35.0. Pyloric stenosis is not absent although rare in oriental babies.**

## INTRODUCTION

It has been reported that congenital hypertrophic pyloric stenosis is much rarer among Oriental than Caucasian infants. In fact, the condition was thought to be absent among 11,274 Chinese live births in Hawaii over a period of 25 years (Shim and Wright, 1970).

Field (1951) commented in 1949 that with 22,782 live births registered in the Federation of Malaya, only 2 cases were recorded as having a provisional diagnosis of pyloric stenosis. The impression thus created is that congenital hypertrophic pyloric stenosis is extremely rare or even absent in the Malay or Chinese races. As far as we know, no data on the incidence of congenital hypertrophic pyloric stenosis in the Chinese are available from Taiwan, Hong Kong or the mainland of China. The incidence of congenital hypertrophic pyloric stenosis among the Malay race has also not been reported in Malaya or Indonesia.

The island republic of Singapore situated at the southern tip of Peninsular Malaysia, had a population in mid-1973 of about 2.2 millions, of which 76% were Chinese, 15% Malays, 7% Indians and the rest belonging to the other groups like Eurasians, Europeans and Arabs (Singapore Government, 1972/73). These people live in a compact area of about 586.4 square kilometres (226.4 square miles) in a fairly homogeneous socio-economic setting. Despite its multi-racial character, most of the marriages are endogamous especially for the Chinese, Malays and Indians. Of the 48,269 live births in 1973, 97% of them had both parents belonging to the same ethnic group.

The island republic thus offers excellent opportunities firstly for determining the incidence of congenital hypertrophic pyloric stenosis in the Chinese, Indian and Malay races and secondly, for comparing the effect of race on the incidence of this disease.

## MATERIALS AND METHODS

The period of study was three years, from 1st January 1972 to 31st December, 1974. All cases of congenital hypertrophic pyloric stenosis subjected to Ramstedt's pyloromyotomy in all the major government surgical units in Singapore were included. Patients believed to have congenital hypertrophic pyloric stenosis and treated medically were excluded. As it is the general policy of all the paediatric departments in Singapore to treat congenital hypertrophic pyloric stenosis surgically, medically treated cases were very few. It is possible that a few cases may have been treated in private hospitals, which were not surveyed.

Data on the racial distribution for all live births in Singapore are obtained from the annual reports of births, deaths and marriages of Singapore 1972 to 1974 (Annual reports of Singapore 1972/73). The race of a baby was determined by the paternal race as recorded on the birth certificate.

## RESULTS

There were 141,215 live births during the period of study. Among these, 108,251 were Chinese, 20,673 were Malays and 8,569 were Indians.

The incidence of congenital hypertrophic pyloric stenosis in the three main racial groups of Singapore are shown in Table I. The Chinese have an incidence of 21.2 per 100,000 live births, in contrast to the Malays whose incidence of 9.7 per 100,000 live births is lower, although the difference in ethnic distribution of cases was not statistically significant ( $p > 0.05$ ). An interesting observation is the incidence of 35.0 per 100,000 live births among the Indians which is higher than those of the other two races.

The overall incidence of congenital hypertrophic pyloric stenosis by sex is shown in Table II. This gives a male: female ratio of 8:1. This ratio is higher than those reported in other series (McKeown *et al*, 1951; Wallgren, 1960; MacMahon *et al*, 1951; McLean 1956; Gordon, 1959). The live birth male: female ratio of 1.07:1 in Singapore over the same period would make the male predominance in this disease highly significant ( $p < 0.001$ ).

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TABLE I  
INCIDENCE OF CONGENITAL PYLORIC STENOSIS IN SINGAPORE 1972 - 1974  
Proportions and Mean Annual Incidence Rates for all cases by ethnic groups

Ethnic Group	No. of Cases	Proportions of Cases (%)	Total No. Live Births	Proportions of Live Births (%)	Incidence Rate Per 100,000 Live Births
Chinese	23	79.3	108,251	76.7	21.2
Malay	2	6.9	20,673	14.6	9.7
Indian	3	10.3	8,569	6.1	35.0
Others	1	3.4	3,722	2.6	26.9
Total	29	99.9	141,215	100.0	20.5

TABLE II  
INCIDENCE OF CONGENITAL PYLORIC STENOSIS IN SINGAPORE 1972 - 1974  
Proportions and Mean Annual Incidence Rates for all cases by sex

Sex	No. of Cases	Proportions of Cases (%)	Total No. Live Births	Proportions of Live Births (%)	Incidence Rate Per 100,000 Live Births
Male	26	89.7	73,105	51.8	35.6
Female	3	10.3	68,110	48.2	4.4
Total	29	100.0	141,215	100.0	20.5

TABLE III  
INCIDENCE OF PYLORIC STENOSIS IN DIFFERENT COUNTRIES

Year	Country	Author	Cases per 1,000 Live Births
1940	Turkey	Eckstein	Very Rare
1951	England	MacMahon, <i>et al</i>	3.0
1951	Malaya	Field	Very Rare
1951	Scotland	Lawson	1.5
1960	Sweden	Wallgren	1.99
1963	Israel	Laron and Falk	0.5
1966	Malta	Cachia and Fenech	0.9 ± 0.5
	USA		
1957	Caucasian	Laron and Horne	1.2 ± 0.4
1957	Negro	Laron and Horne	0.5 ± 0.4
1966	Negro	Hara, <i>et al</i>	0.92
	HAWAII (USA)		
1970	Caucasian	Shim, <i>et al</i>	1.9 ± 0.2
1970	Chinese	Shim, <i>et al</i>	0
	SINGAPORE (present study)		
1975	Chinese	Chong and Lee	0.21
1975	Malay	Chong and Lee	0.1
1975	Indian	Chong and Lee	0.35

## DISCUSSION

Table III summarizes the incidence of congenital hypertrophic pyloric stenosis in different countries. The results reported here indicate that congenital hypertrophic pyloric stenosis is not "non-existent" among the Chinese, Malays or Indians although the incidence of 0.21, 0.1 and 0.35 per 1,000 live births is much lower than the reported incidence among the Caucasians e.g. 1.5 and 3.0 for Scotland and England respectively (Lawson, 1951; MacMahon *et al*, 1951).

This study points out the need to consider congenital hypertrophic pyloric stenosis in the differential diagnosis of upper gastrointestinal obstruction in the first few months of life, particularly if the baby is a male. The ethnic groups Chinese or Malay do not exclude the disease.

The higher incidence of congenital hypertrophic pyloric stenosis among Indians as compared to the Chinese may perhaps be explained by their ethnic origins, the former being Caucasian while the latter being Mongoloid.

The etiology of congenital hypertrophic pyloric stenosis has been attributed to a variety of causes (Cautley, 1898; Friesen *et al*, 1963) including genetic factors (Huguenard *et al*, 1972; Carter, 1967; De Bellefenille, 1962; Owens *et al*, 1973). The last theory arose from studies which showed an increased incidence of the disorder in familiar and racial groups and in monozygotic as opposed to dizygotic twins. The differences in incidence within the same racial group living in different parts of the world as reported here and Hawaii may suggest environmental factors influencing the genetic expression of the disease. It would be interesting to see if some of these environmental factors and their interaction with the genetic factors could be defined.

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