

## PATTERN OF BRONCHIAL ASTHMA IN SINGAPORE\*

By Chong Tong Mun

### SYNOPSIS

This paper gives information on prevalence, sex difference, age of onset, familial incidence, racial difference, prognosis, association of childhood eczema and vasomotor rhinitis, associated events of the first attacks, precipitating factors of recurrent attacks of bronchial asthma in Singapore.

Information on bronchial asthma in Singapore is lacking. The present study is the only one which gives detailed information on the pattern of bronchial asthma in Singapore. No such study has ever been done here before.

### MATERIALS AND METHODS

The study was carried out in the Mistri Wing of the Outram Road General Hospital of Singapore on the bronchial asthma cases admitted for treatment between 1963 and 1967, and through a survey of school children in Government Schools and young people in institutions of higher learning. During the 5-year period there were 517 new cases of bronchial asthma admitted to Mistri Wing for treatment. These cases were traced and called up by letters for interviews by the author. Only 254 cases turned up for interview. In 148 cases, the asthma had stopped for more than one year at the time of inquiry (58%). In the survey, the questionnaires were distributed to children of Kindergarten, Government Primary and Secondary Schools, Singapore Vocational Institute, Singapore Teachers' Training College, Singapore Polytechnic, Nanyang University and the University of Singapore. The parents were requested to fill the forms for the younger children. The diagnoses of bronchial asthma were made by their own family doctors. A total of 36,127 persons were covered in the whole survey.

### RESULTS

#### Prevalence

##### *Hospital Admissions*

The following table (Table I) shows the number of all new admissions for all types of cases

compared with those of bronchial asthma to Mistri Wing during the 5-year period. There were 517 new cases of bronchial asthma.

TABLE I

Year	All Types of Cases	Bronchial Asthma	Per Cent
1963	13,307	141	1.1
1964	11,720	111	0.9
1965	12,255	146	1.2
1966	12,726	59	0.5
1967	12,110	60	0.5

##### *School Survey*

From the survey of 36,127 young people in Singapore, it was found that between 2.5 to 5.5 per cent of them gave a history of asthma and between 0.5 to 2.0 per cent had active asthma. The Table II shows this more clearly.

##### *Prevalence Figures from Other Countries*

Reports on the incidence of asthma from various sources are difficult to compare because most prevalence studies fail to state whether the figures are lifetime prevalence or prevalence of active asthma.

From the Table III it can be seen that about 0.37% to 0.9% of young men were rejected from the Armed Forces recruits in other countries. Among University students between 3.1% to 5.6% gave a history of asthma while 1.7% to 2.4% had active asthma. Among school children, the prevalence is between 0.3% to 3.2%. In the population at large, the prevalence of asthma is between 0.4% to 1.01%.

The figures in Singapore are quite close and comparable to those of other countries.

The Table III shows the prevalence of asthma in other countries.

\*Part of M.D. Thesis, Faculty of Medicine, University of Singapore, 1969.

TABLE II

	Total No. Surveyed	Age Group (Years)	History of Asthma (%)	Active Asthma (%)
Kindergartens	862	4-6	5.50	2.90
Primary Schools	10,549	8-12	4.90	1.92
Secondary Schools	10,857	13-17	3.07	1.13
Technical Secondary Schools	1,818	13-17	4.34	3.09
Vocational Schools	4,773	14-15	2.94	1.56
School Teachers	3,112	20-45	3.02	1.06
Teachers' Training College	1,367	18-30	3.00	1.09
Singapore Polytechnic	533	18-30	3.38	0.75
Vocational Institute	544	15-16	2.57	0.92
Nanyang University	770	22-29	2.60	0.52
University of Singapore	942	18-30	5.83	1.49
<b>GRAND TOTAL</b>	<b>36,127</b>	<b>4-45</b>	<b>3.76</b>	<b>1.49</b>

TABLE III

Source	Sample	Age	History Asthma	Active Asthma
<b>Britain:</b>				
Williams (1952)	Armed Forces	18-19	0.90% (Rejected)	
Rook (1949-1950)	University Students		5.60%	2.40%
Hitchens (1952)	University Students		3.10%	1.70%
Grant (1957)	University Students		3.30%	1.90%
Stocks (1949)	Population	16 and Over	0.90%	
Smith (1961)	School Children	5-15	1.76%	
<b>U.S.A.:</b>				
Collins (1935)	Population			0.42%
Rackemann (1931)	Hospital Admissions			0.50%
Rowntree <i>et al</i> (1943)	Armed Forces	18-19	0.37% (Rejected)	
Hyde and Kingsley (1943)	Armed Forces	18-38	0.75% (Rejected)	
Rowe (1937)	University Students		3.00%	
Dees (1957)	Pediatric Admission			9.30%
<b>Finland:</b>				
Ericksson-Lihr (1955)	Armed Forces	18	0.90% (Rejected)	
Ericksson-Lihr (1955)	School Children	7-14	0.40% (Boys) 0.30% (Girls)	
<b>Sweden:</b>				
Kraepelin (1954)	School Children	7-14	0.73%	
Kraepelin (1954)	School Children	?	1.37%	
<b>Norway:</b>				
Claussen (1948)	Population	All Ages	0.40%	
<b>Denmark:</b>				
Schwartz (1952)	Population	?	1.01%	
<b>Australia:</b>				
Solomon (1952)	School Children	5-17	3.20% (Boys) 2.10% (Girls)	

TABLE IV

	Age (Years)	Male	Female	Total
Kindergartens	4-6	(32) 68.1%	(15) 31.9%	(47) 100%
Primary Schools	8-12	(263) 50.7%	(256) 49.3%	(519)
Secondary Schools	13-17	(182) 54.6%	(151) 45.4%	(333)
School Teachers	20-45	(48) 51.1%	(46) 48.9%	(94)
Teachers' Training College	18-30	(13) 31.7%	(28) 68.3%	(41)
Nanyang University	22-29	(11) 55.0%	(9) 45.0%	(20)
University of Singapore	18-30	(41) 74.7%	(14) 25.3%	(55)

TABLE V

Age in Years	1	2	3	4	5	6	7	8	9	10
No. of Cases	36	73	66	33	21	14	4	4	3	0

TABLE VII

	Chinese	Indians	Malays
Pr. & Sec. Schools:			
History of Asthma	2.68%	6.74%	7.74%
Active Asthma	1.02%	3.15%	2.93%
Tech. Sec. Schools:			
History of Asthma	3.15%	10.30%	8.81%
Active Asthma	1.64%	4.13%	4.00%
Vocational Schools:			
History of Asthma	1.83%	5.28%	5.14%
Active Asthma	1.01%	3.42%	2.45%

TABLE VIII

	Years	%
Kindergartens	4-6	46.8
Primary Schools	8-12	60.9
Secondary Schools	13-17	62.4
School Teachers	20-45	64.9
Teachers' Training College	18-30	63.3
Nanyang University	22-29	80.0
University of Singapore	18-30	78.1
AVERAGE	—	60.3

*Sex Difference*

Williams (1959) found that in the 0-14 age-groups, males have asthma twice as frequently as females, whereas in the middle-aged and elderly, females have asthma more frequently than males. Asthma is commoner in both sexes over the age of 45 years than under this age.

Our survey series show the following sex difference among the asthmatics (Table IV).

Only the 4-6 year-group shows that males have asthma twice as frequently as females. The other age-groups do not show the pattern that Williams (1959) had reported.

From the hospital cases, among the 254 asthmatics (below the age of 10 years), there were 154 males (60.6%) and 100 females (39.4%), a distinct higher incidence of male asthmatics.

*Onset of Asthma*

From the hospital cases, among the 254 cases of asthmatic children, the following ages of onset were found (Table V).

This is diagrammatically shown in the Figure 1.

From the graph it can be seen that the age of onset of asthma is maximum during the first 3 years of life. This is almost the same as that reported by Peshkin (1959). Abramson (1963) believes that the period of toilet training is the time when the number of cases is at a peak. Flensburg (1945) also reported that the age of onset in children in most cases was the 2nd and 3rd year of life.

The onset of asthma among the School Teachers shows interesting peaks at 2 years, at school age 7 years, and after finishing education at 15-20 years. Figure 2 illustrates these more clearly.

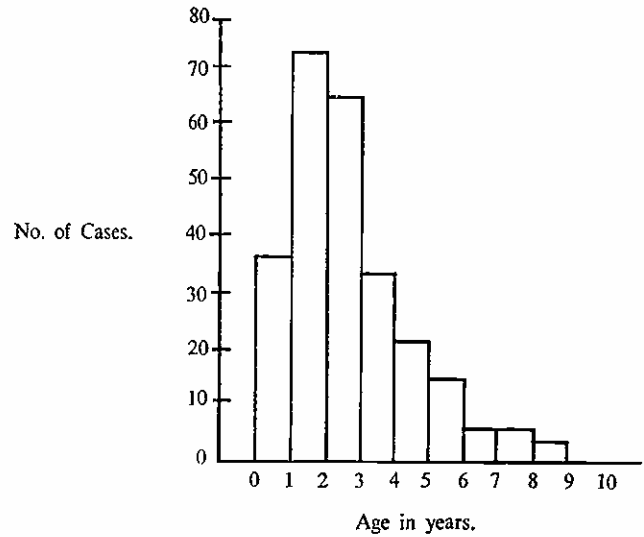


Fig. 1.

*Asthma in the Family*

The survey shows that the asthmatics in all cases have a higher percentage of asthmatic fathers, asthmatic mothers and asthmatic siblings. The following table (Table VI) shows this very significantly:

TABLE VI

	Asthmatic	Non-Asthmatic
Father	4.77%	0.61%
Mother	5.95%	0.74%
Siblings	18.80%	2.91%

Leigh and Marley (1967) found that the likelihood of developing asthma was greater in the relatives of asthma than of control probands. By the age of 65+ the likelihood of developing asthma in the first-degree relatives of asthma probands was

SCHOOL TEACHERS

ONSET OF ASTHMA

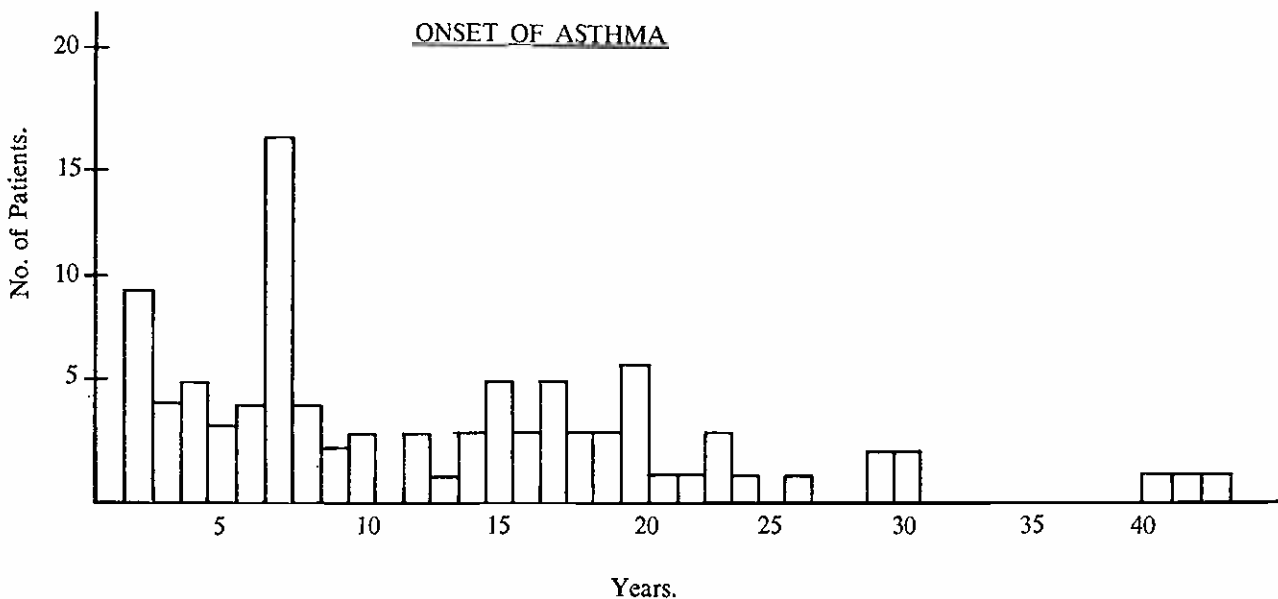


Fig. 2.

43%, and they thus postulated that bronchial asthma was a hereditary condition. However, Ratner and his co-workers (1941, 1952, 1953) were opposed to the hereditary concept, believing that all individuals are potentially capable of developing allergy and that the meaning of "hereditary" must be carefully defined. The fact that the asthmatic has more relatives who are asthmatic is no proof that asthma is a hereditary condition. Factors like imitation and identification are probably more important. Just like greeting people, the Japanese, the Chinese, the Red Indian, the Indian, through years and generations of cultural conditioning, the greet has deep symbolic meaning.

**Racial Difference**

In Singapore the Chinese have the lowest incidence of a history of asthma. The Indians and the Malays seem to have a much higher incidence. The Table VII shows this.

**Prognosis**

*Review of Other Studies*

There are several long-term follow-up observations on children affected with asthma. Flensburg (1945) in a follow-up study of 298 patients by letters found that in 40.3% the attacks had ceased. Rackemann and Edwards (1952) reported on 449 children seen with asthma and followed up 20 years later, and found 52.1% of these appeared to have been cured of asthma. Barr and Logan (1964) reported on 336 cases of asthma in children from a follow-up by letters 17 to 25 years after the first visit, and found only 48% were still wheezing. Buffum *et al* (1966) followed 518 patients and found after a duration of ten years 41% were asymptomatic.

*Singapore*

In Singapore, a follow-up of 254 patients previously admitted to Mistri Wing for treatment in 1963-1967, showed that 58% were found to have lost their asthma for a year or more at the time of inquiry in 1968. From the school survey we found the following percentages had lost the asthma for a year or more at the time of inquiry in the various groups (Table VIII).

Thus it seems that between 46% to 80% of the asthmatics in Singapore had lost their asthma at the time of inquiry.

**OTHER FACTORS WHICH ARE ASSOCIATED WITH OR INFLUENCE ASTHMA**

**Association of Childhood Eczema**

Among the 254 asthmatics investigated 14.2% of them gave a history of childhood eczema. The following table (Table IX) illustrates this:

TABLE IX

	Male	Female	Total
Childhood Eczema	22	14	36 14.2%
Total Asthmatics	154	100	254 100.0%

It is reported that 30-40% of cases of early eczema go on to develop asthma, and that 50-60% of early asthmatic cases were preceded by eczema (Mohr, 1961). Leigh and Marley (1967) found that childhood eczema was significantly more common in asthmatic than in control subjects.

**Association of Vasomotor Rhinitis**

24.8% of the 254 asthmatics investigated had vasomotor rhinitis as shown by the table below (Table X):

TABLE X

	Male	Female	Total
Vasomotor Rhinitis	38	25	63 24.8%
Total Asthmatics	154	100	254 100.0%

Leigh and Marley (1967) also found that one quarter of the total asthma population suffered from vasomotor rhinitis.

**Associated Events of the First Attack**

The following are some of the commonest associated events of the first attack from the 254 asthmatics interviewed. Their relative percentages of frequency against each event are shown below (Table XI):

TABLE XI

Birth sibling	15%
Severe chronic cough from measles and respiratory infections	75%
Frightening experiences—accidents, parental rows, drunkenness, etc.	10%
Starting school or kindergarten	20%
Hospitalisation of child	5%
Death or loss of mother	4%
Operation under G.A.	6%
None elicited	10%

McDermott and Cobb (1939) reported that the results of a psychiatric investigation carried out on 50 unselected patients with bronchial asthma, found that the first asthmatic attack of 20 patients was associated with some strongly emotional episode. Levy (1945) and Bakwin (1950) had pointed the psychic trauma of operations in children. Miller and Baruch (1950) made a study of acute emotional traumata which preceded the first onset of clinical allergy, and found that experiences such as overstrict toilet training, threats of punishment for masturbation, the mother going out to work, physical punishment, divorce of the parents, tonsillectomy and physical accidents often meant loss or threatened loss of the mother to the asthmatic child. Leigh (1953) found that in about one-third of the asthmatic patients sudden intense emotion had been the precipitating cause of their first attack.

### Precipitating Factors of Recurrent Attacks

The following are frequently claimed by the parents to be factors which precipitate recurrent attacks of asthma. However, some of the factors could be the result of suggestions from parents, relatives, friends or even physicians. Often the parents are so concerned, desperate and apprehensive that they will lend their ears to any advice and hearsay to protect the asthmatic child (Table XII).

TABLE XII

Weather—cold weather, rainy seasons, caught in rain	60%
Food—fruits, prawns, crabs, ice-water, etc.	80%
Emotional factors—anger, quarrels, parental scolding, examinations	75%
Exertion—running, laughing	10%
Infection	40%
No known causes	20%

In fact once the disease is established and the child labelled an asthmatic both to himself and his environment, the disease becomes self-perpetuating. Often the child may use his illness for secondary gain.

A number of authorities had suggested that asthma could be regarded as a conditioned response (Dekker and Groen, 1956) (Frank and Leigh, 1959) (Turnbull, 1962). Attacks similar to asthma with bronchospasm had been successfully conditioned in animals (Gantt, 1941; Liddell, 1951; Masserman and Pechtel, 1953; Ottenberg, 1958; Noelpp, 1951; Gantt, 1964). In man, psychogenic attacks of asthma had been produced in the laboratory

(Herxheimer, 1951, 1953). Dekker *et al* (1957) had shown that after a number of exposures of the subject, the experimental situation, or part of it alone was capable of provoking the attack.

### REFERENCES

1. Abramson, H.: "Some Aspects of the Psychodynamics of Intractable Asthma in Children; in the Asthmatic Child, Psychosomatic Approach to Problems and Treatment." Ed. Schneer, H.I. Harper and Row, N.Y., 1963.
2. Bakwin, H.: "Psychic Trauma of Operations." *J. of Ped.*, 36, 262-4, 1950.
3. Barr, L.W. and Logan, G.B.: "Prognosis of Children Having Asthma." *Pediatrics*, 34, 856-860, 1964.
4. Buffum, W.P. and Settupane, G.A.: "Prognosis of Asthma in Childhood." *Amer. J. Dis. Child.*, 112, 214-217, 1966.
5. Claussen, O.: "Asthma in Norway." *Nor. Med.*, 37, 525, 1948.
6. Collins, S.D.: "Age Incidence of Specific Causes of Illness." *Public Health Reports, U.S.A.*, 50, 1404, 1935.
7. Dees, S.C.: "The Asthmatic Child." *A.M.A. J. Dis. Child.*, 93, 228, 1957.
8. Dekker, E., Pelser, H.E. and Groen, J.J.: "Conditioning as a Cause of Asthmatic Attacks." *J. Psychosom. Research*, 2, 97, 1957.
9. Dekker, E. and Groen, J.J.: "Reproducible Psychogenic Attacks of Asthma." A Laboratory Study, *J. Psychosom. Research*, 1, 58, 1956.
10. Eriksson-Lihr, Z.: "Special Features in Allergy in Children." *Acta Allergol.* VIII, 289, 1955.
11. Flensburg, E.W.: "The Prognosis for Bronchial Asthma Arisen in Infancy, after non-specific Treatment Hitherto Applied (Investigation of Fate of 298 Asthmatic Children)." *Act. Ped.*, 33, 423, 1945.
12. Frank, C.M. and Leigh, D.: "The Theoretical and Experimental Application of a Conditioning Model to a Consideration of Bronchial Asthma in Man." *J. Psychosom. Research*, 4, 88, 1959.
13. Gantt, W.H.: "Experimental basis for neurotic behaviour." *Psychosom. Med. Monogr. Suppl.*, No. 3, 1941.
14. Gantt, W.H.: "Autonomic Conditioning. In the Conditioning Therapies." Ed. Wolpe and Salter), Holt, Rinehart and Winston, 1964.
15. Grant, G.: "Asthma Among Undergraduates at the University of Wales." *Acta Allergol.*, XI, 37, 1957.
16. Herxheimer, H.: "Induced Asthma in Man." *Lancet*, 1, 1337, 1951.
17. Herxheimer, H.: "Induced Asthma in Humans." *Int. Arch. Allergy*, 3, 192, 1953.
18. Hyde, R.W. and Kingsely, I.V.: "Distribution of Allergic States in Selectees." *J. Allergy*, 14, 386, 1943.
19. Kraepelin, S.: "The Frequency of Bronchial Asthma in Swedish School Children." *Acta Paediatrica*, 43 Suppl., 100, 149, 1954.
20. Leigh, D.: "Some Psychiatric Aspects of Asthma." *Practitioner*, 170, 382-385, 1953.
21. Leigh D. and Marley, E.: "Bronchial Asthma—A Genetic, Population and Psychiatric Study." Pergamon Press, 1967.
22. Levy, D.M.: "Psychic Trauma of Operations in Children." *Am. J. Dis. Child.*, 69, 7, 1945.
23. Liddell, H.: "The Influence of Experimental Neuroses on Respiratory Function, in Treatment of Asthma." Ed. Abrahamson, H.A., Williams and Wilkins Baltimore, 1951.
24. Masserman, J.H. and Pechtel, C.: "Neuroses in Monkeys." *Ann. N.Y. Acad. Sci.*, 56, 253, 1953.

25. McDermott, N.T. and Cobb, S.: "A Psychiatric Survey of 50 cases of Bronchial Asthma." *Psychosom. Med.*, 1, 203, 1939.
  26. Miller, H. and Baruch, D.W.: "Emotional Traumata Preceding the Onset of Allergic Symptoms in a Group of Children." *Ann. Allergy*, 8, 100, 1950.
  27. Mohr, G.J. *et al*: "Studies of Eczema and Asthma in the Pre-school Child." Read at the American Psychiatric Ass. May, 1961, Chicago, Accepted for Publication—*J. Amer. Acad. Child. Psychiat.*, 1961.
  28. Noelpp, B. *et al*: "Das experimentelle asthma bronchiale des meerschweinschens." *Internat. Arch. Allergy*, 2, 321, 1951.
  29. Ottenberg, P. *et al*: "Learned Asthma in the Guinea Pig." *Psychosom. Med.*, 20, 395, 1958.
  30. Peshkin, M.M.: "Intractable Asthma of Childhood, Rehabilitation at the Institutional Level with a Follow-up of 150 cases." *Internat. Arch. Allergy*, 15, 91, 1959.
  31. Rackemann, F.M.: "Clinical Allergy and Hay Fever." MacMillan, 1931.
  32. Rackemann, F.M. and Edwards, M.C.: "Medical Progress: Asthma in Children, Follow-up Study of 688 patients after 20 years." *New England J. Med.*, 246, 815-823, May 22, 1952; 858-863 May 29, 1952, 1952.
  33. Ratner, B. and Silberman, D.E.: "Allergy in Childhood, Does Heredity Determine the Age of Onset?" *J. Allergy*, 12, 272, 1941.
  34. Ratner, B. and Silberman, D.E.: "Allergy—Its Distribution and the Hereditary Concept." *Ann. Allergy*, 10, 1, 1952.
  35. Ratner, B. and Silberman, D.E.: "Critical Analysis of the Hereditary Concept of Allergy," 24, 371, 1953.
  36. Rowe, A.H.: "Clinical Allergy: Manifestation, Diagnosis, and Treatment." Philadelphia, Lea and Febiger, 1937.
  37. Rowntree, L.G. *et al*: "Causes of Rejection and the Incidence of Defects among 18 and 19 year old Selective Service Registrants." *J. Amer. Med. Ass.*, 123, 181, 1943.
  38. Scadding, J.G.: *Brit. Med. J.*, 2, 1425, 1963.
  39. Schwartz, M.: "Heredity in Bronchial Asthma." *Acta Allergol. V. Suppl. II*, 1952.
  40. Smith, J.M.: "Prevalence and Natural History of Asthma in School Children." *Brit. Med. J.*, 1, 711, 1961.
  41. Solomon, N.S.: "A Study of Results obtained at the Asthma Clinic." School Medical Service, N.S.W., Dept. of Public Health, *Med. J. Australia*, 45, 592, 1958.
  42. Stocks, P.: "Studies on Medical and Population Subjects." No. 2, London, H.M.S.O., 1949.
  43. Turnbull, J.W.: "Asthma Conceived as a Learned Response." *J. Psychosom. Res.*, 6, 59, 1962.
  44. Williams, D.A.: "Social Importance of Allergic Diseases." *Proc. 1st International Congress for Allergy*, Karger, Basel, 1952.
-