

A Comparison of Admission Patterns of Childhood Asthma in 1982 and 1992

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Asthma is a common disease in Thai children. The occurrence in school age children in 1990 was 4.29%¹ and seems to have increased recently. The incidence and morbidity of asthma all over the world has increased² although many studies have been carried out to improve knowledge about the causes, pathophysiology, treatment and prevention of asthma. Thailand is a developing nation which has changed from an agriculture to an industrialized country so the pattern of living and the level of pollution in the environment have changed. The incidence and pattern of asthma during recent years will be expected to be different from that in the last decade. The purpose of this study was to compare the patterns of childhood asthma hospital admission in 1982 and 1992.

MATERIALS AND METHODS

The study was a retrospective study of the records of children who were admitted because of asthmatic attack into the Department of Pediatrics, Faculty of Medicine Siriraj Hospital, Mahidol University in 1982 and 1992. Asthma was diagnosed by bronchial smooth muscle

SUMMARY The patterns of childhood asthma admission to the Department of Pediatrics, Faculty of Medicine Siriraj Hospital, Mahidol University in 1982 and 1992 were studied and compared. The number of childhood asthma admissions were 128 cases in 1982 and 132 cases in 1992. Male to female ratio changed from 1.3:1 in 1982 to 1.9:1 in 1992. The average age on admission was 57 months in 1982 vs 62 months in 1992 which was not significantly different ($p > 0.05$). The admission pattern of cases under 1 year of age went down from 16% in 1982 to 6% in 1992.

At emergency room, adrenaline injection was used for all asthma cases in 1982 but decreased to 30% of the patients in 1992 with the replacement of nebulized β_2 agonist. The percentage of cases that were treated with aminophylline, corticosteroid and oxygen therapy were comparable between both periods. The most common form of steroid used in admissions changed from hydrocortisone in 1982 to methyl prednisolone in 1992. The use of antibiotics went down from 92% in 1982 to 80% in 1992. All of the admission cases in both periods recovered and were later discharged. The average period of admission was 3.9 days in 1982 and was not significant different ($p > 0.05$) from 4.9 days in 1992.

contraction which responded to sympathomimetic drug and/or bronchial hyperresponsiveness. Respiratory failure was diagnosed by blood gas abnormalities ($\text{PaO}_2 < 50$ mmHg, $\text{PaCO}_2 > 50$ mmHg). Age, sex, seasonal distribution, precipitating factors, duration of attack, treatment and duration of admission were collected and compared for the year 1982 and 1992.

The results were analysed by Chi-square test and a p value < 0.05 was considered statistically significant.

RESULTS

The number of childhood asthma admission was 128 cases in 1982 and 132 cases in 1992. The comparison between characteristics of childhood asthma cases admitted

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Table 1. Comparison between characteristics of childhood asthma in cases admitted in 1982 and 1992.

Characteristics	1982	1992
No. of patients	128	132
Male : female	1.3 : 1	1.9 : 1
Age (months)	5-169	4-167
average	57	62
less than 5 years old (% of cases)	51	60
less than 1 year old (%)	16	6
Duration of asthma (% of cases)		
First attack	26	7
<1 year	20	18
1-3 years	37	48
>3-5 years	5	6
>5 years	13	21
No. of admission (% of cases)		
1	58	45
2	21	22
3	10	11
4	6	9
≥5	5	13

in 1982 and 1992 is shown in Table 1. Male to female ratio changed from 1.3:1 in 1982 to 1.9:1 in 1992. The average age between these two periods was comparable (57 vs 62 months, $p > 0.05$). The number of cases that were under 5 years of age in 1982 was 51% and under one year of age was 15% while in 1992 they were 60% and 6% respectively. The age of children admitted with asthma in 1982 and 1992 is shown in Fig. 1. In 1982, 26% of the cases experienced their first attack of asthma on admission while only 7% was found in 1992. Monthly distribution of cases admitted in 1982 and 1992 in Fig. 2 shows the peaks of admission in winter and rainy season.

Upper respiratory tract infection was the most common triggering factor in both periods of time as shown in Table 2. Duration of acute asthma attack before admission in Fig. 3 shows that most of the cases suffered from acute attack less than 24 hours before admission (52% in 1982 and 85% in 1992). Familial history of asthma was 48% in 1982 and 60% in 1992. Chest X-ray showed pneumonia in 30.5% of cases in 1982 and 19% in 1992. There was no report on sinus radiography in 1982. In 1992, 15% of cases had sinusitis shown by roentgenogram and 85% had maxillary sinusitis alone.

At emergency room, adrenaline injection was used in 100% of cases in 1982 while only 30% of the cases in 1992 were given adrenaline injection as described in Table 3. The adrenaline injection in 1992 was replaced by β_2 agonist nebulization. The percentage of cases that were treated with aminophylline, corticosteroid and oxygen therapy were comparable in both periods but nebulized salbutamol that was not used in 1982 increased to 92% usage in 1992. The most common form of steroid used in admission changed from hydrocortisone in 1982 to methyl prednisolone in

Percent of cases

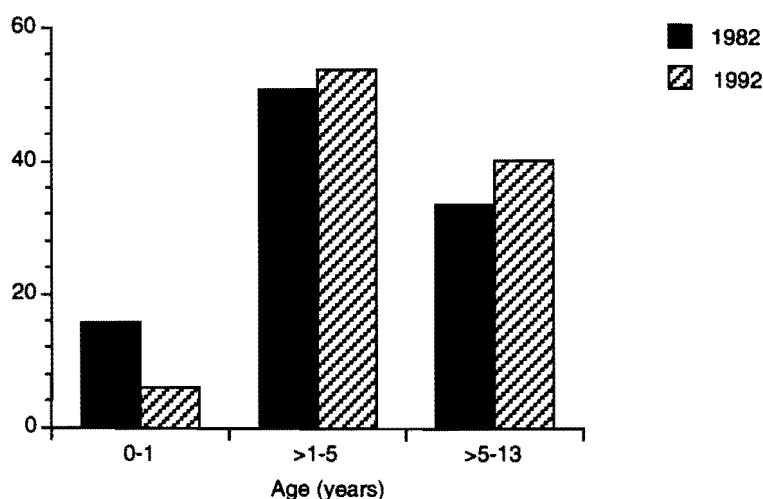


Fig. 1 Comparison of age of childhood asthma cases admitted in 1982 and 1992.

Table 2. Comparison of triggers of childhood acute asthmatic attacks admitted in 1982 and 1992.

Triggers	Percentage of cases*	
	1982	1992
Upper respiratory tract infection	62	60
Exercise	21	7
Change in weather	10	5
Irritants	2	2
Pneumonitis	0	19
Unknown	6	19

* Some patients had more than one trigger.

Percent of cases

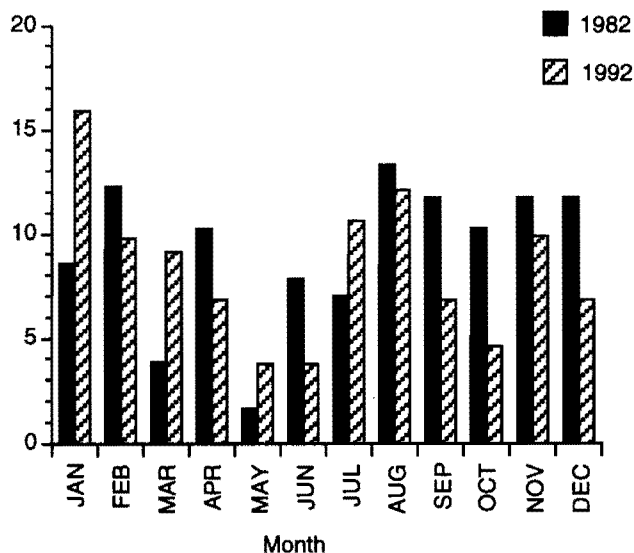


Fig. 2 Comparison of monthly distribution of childhood asthma cases admitted in 1982 and 1992.

1992. The use of antibiotics went down from 92% in 1982 to 80% in 1992 but the reduction was not significantly different ($p > 0.05$).

The duration of admission in 1982 and 1992 is shown in Fig. 4. The average duration of admission was 3.9 days in 1982 and 4.9 days in 1992. The percent of cases dis-

charged before 5 days was 84% in 1982 and was not significantly different ($p > 0.05$) from 69% in 1992. The percent of cases with respiratory failure was 0.8 and 1.5% in 1982 and 1992, respectively. All of the cases recovered both periods of time and were later discharged.

DISCUSSION

The occurrence of childhood asthma has increased in frequency, severity and rate of admission.³⁻⁹ The incidence of asthma in children is suspected to be higher than is reported because of underdiagnosis.¹⁰ The reasons for the increase in incidence may be an improvement of underdiagnosis, increase in environmental pollution and allergens. Most of the cases were under 5 years of age as observed in this study and studies in other western countries.^{11,12} The cases admitted under 1 year old decreased from 16% in 1982 to 6% in 1992 while the OPD cases increased because some cases who were admitted could not meet the criteria for diagnosis of asthma: the diagnosis was bronchitis or bronchiolitis which might be diagnosed as asthma in the future. The cases that had their first asthma attacks decreased for the same reason. In general, young children should have a higher rate of admission and more severe attack because of the small airway, incomplete elastic recoil of lung, partial function of muscles of chest and diaphragm and frequent attacks of viral infection of respiratory tract. The male to female ratio increased from 1.3:1 to 1.9:1 in 1992 as supported by previous studies.^{2,13} The rate of admission is greater in boys and the admission male to female ratio tends to increase.^{3,4,13} Most of the cases in both periods had attack within 24 hours before admission, which is similar to the previous report.¹⁴ The admission was mainly in rainy and cold season because of frequent viral respiratory tract infections, the weather, the peak of grass pollens and high incidence of some mold spores in the atmosphere. Respiratory tract infection was the most common trigger of asthmatic attack in both periods. Virus can increase bronchial hyperresponsiveness, permeability of respiratory tract mucosa, histamine release from mast cell and IgE pro-

Table 3. Comparison of management and result of childhood acute asthmatic attacks admitted in 1982 and 1992.

Management	Percentage of cases	
	1982	1992
Aminophylline	73	74
Corticosteroid	23	31
Nebulized salbutamol	0	92
Antibiotic	92	80
Oxygen therapy	72	87
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Result	1982	1992
Average days of admission	3.9	4.9
Discharge before day 5 (% of cases)	84	69
Respiratory failure (% of cases)	0.8	1.5

duction.¹⁵⁻¹⁸ A familial history of asthma was about 50–60% in our studies which was the same as in previous study.¹¹ Chest X-ray was done to identify complications such as pneumonia and it was found that 30.5% of the cases in 1982 and 19% of the cases in 1992 had pneumonia. Sinus radiography was done and it was found that 15% had sinusitis. Maxillary sinus was the most common affected sinus. There were no records of sinusitis in 1982. From the previous study, sinusitis diagnosed by roengenography was 48% of childhood asthma cases.¹⁹ Sinus roengenography should be done when the clinical signs and symptoms indicate sinusitis or the patients do not respond to ordinary asthma therapy.

Emergency management of asthmatic attack has been improved. The use of adrenaline injection was decreased and is replaced by a nebulized β_2 agonist.²⁰ Nebulized β_2 agonists can reach the site of action so the maximum bronchodilator response can be attained rapidly with far fewer side effects than adrenaline injection. Adrenaline injection is useful in the cases that cannot tolerate or do not respond to nebulization. Theophylline is still useful in the in-patient unit. The level should be kept between 10 to 20 $\mu\text{g}/\text{ml}$ to have bronchodilating without side effects. Systemic steroid is used to reduce inflammation of airway mucosa. It should be given when the patients have severe attacks that do not respond well to bronchodilators. Recently, methyl prednisolone has increased in use because it is the best corticosteroid and can penetrate the lung tissue. Hydrocortisone can penetrate lung tissue well but with lesser degree than methyl prednisolone. The disadvantage of methyl prednisolone is that it is much more expensive than hydrocortisone so socioeconomic status of the patients should be taken into account before choosing the kind of steroid. Side effects in short course

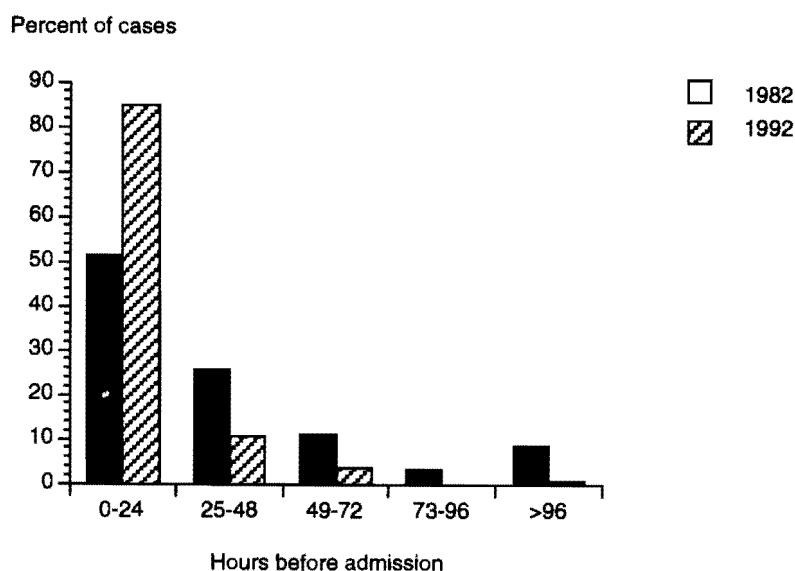
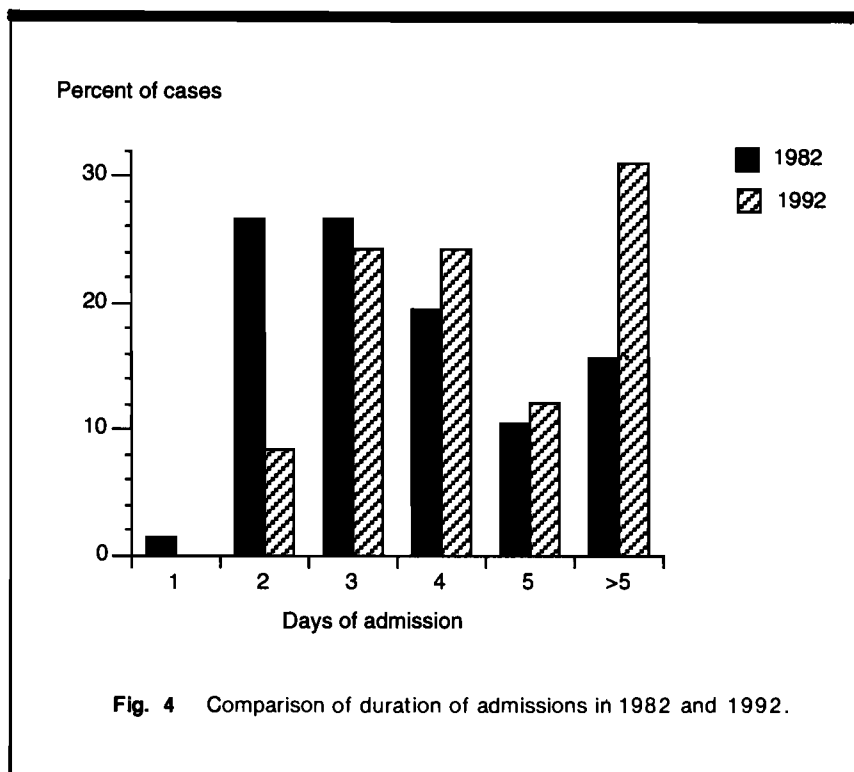


Fig. 3 Comparison of period that the patients suffered from acute asthmatic attack before admission in 1982 and 1992.



therapy of these two steroids are not significantly different from placebo, so steroids should be used for as short times as possible. In long term treatment, metered-dose or dried powder inhaler should be used to avoid corticosteroid side effect.

Although antibiotic use decreased from 92% in 1982 to 80% in 1992, it was still overused because the respiratory tract infections that precipitated asthmatic attack were mainly viral in origin. Antibiotics should be used only when there is evidence of bacterial infections such as bacterial pneumonia, otitis media and sinusitis to reduce the cost of treatment and the chance of drug allergy and resistance.

The case with respiratory failure in 1982 was treated with continued intravenous isoproterenol without the use of mechanical ventilator while the two cases in 1992 were treated with continuous drip aminophylline and nebulized salbutamol. One case in 1992 had to use mechanical ventilator. All of the

cases recovered and were discharged. The occurrence of respiratory failure in asthmatic patients was shown to be about 5% in 1977 and decreased to 0.8% in 1989.²¹ Intravenous isoproterenol which was used in the last decade showed no change in the use of mechanical ventilator and had high side effects such as arrhythmia and myocardial ischemia.²² Nebulized β_2 agonist replaced the use of isoproterenol. Continuous salbutamol intravenous drip shows good results with less side effects than isoproterenol but it is more expensive.^{23,24} Failure rate of both medications is 20–30% and those cases need a mechanical ventilator.

The duration of admissions increased from 3.9 in 1982 to 4.9 in 1992 which might be because the severity increased or because of bias in patient admission. Nowadays, there are many private hospitals nearby Siriraj Hospital where the less severe cases may be admitted, while the more severe cases are referred to Siriraj Hospital.

In conclusion, more boys were admitted because of asthma in 1992 than in 1982. Adrenaline injection was replaced by nebulized β_2 agonist in treatment of acute asthmatic attack in children. Average admission duration was longer in 1992 than 1982.

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