

## Tetanus in adults in Bandung, Indonesia

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### Abstract

Data surveillance from the Indonesian Ministry of Health showed an annual incidence for tetanus of 0.2 per 100,000 population. The disease was seen evenly in all the provinces in the country. The disease mainly occurred in adults with 69% of the cases >15 years of age. There is a downward trend in the annual incidence of the disease for ages 5-14 years for the years 1990 to 1994. This is attributed to the success of primary immunization programme introduced since 1974. 85 adults patients with tetanus from the Hasan Sadikan Hospital, Bandung seen in 1991-1995 were reviewed. 69.4% developed the tetanus from leg wounds. The overall mortality was 25.6%. None of the patients had primary immunization. Greater attention should be given to the immunization of the adults to control the disease.

*Key words:* tetanus, epidemiology, Indonesia, clinical features, Bandung.

### INTRODUCTION

Whereas tetanus in adults is becoming a rarity in the developed world, it is still rampant in the third world.<sup>1,2</sup> Although tetanus immunization has been introduced in pregnant women in Indonesia since 1974, and in infants and children combined with diphtheria and pertussis vaccine since 1976, it remains an important public health problem in Indonesia today. The Ministry of Health, Indonesia has a data surveillance on tetanus. Since 1991, in the Hasan Sadikin Hospital in Bandung, the management of tetanus has been transferred from the surgery department to the neurology department. The following is a report of tetanus at national level as well as the recent cases seen from the Neurology Department of the Hasan Sadikan Hospital.

### MATERIALS AND METHODS

The Ministry of Health, Indonesia publishes a yearly surveillance on tetanus. Based on the data from the Ministry<sup>3</sup>, 3,843 new cases of tetanus was reported in 1994 making an annual incidence of 0.2 per 100,000 population. Table 1 is the age distribution of the new cases reported. Figure 1 shows the trend of the incidence of the disease from 1990 to 1994.<sup>3</sup> The annual incidence for the age 5-14 years showed a downward trend from 0.06 per 100,000 population in 1990 to 0.014 per 100,000 population in 1994. Table 2 is the breakdown of the case according to the geographical distribution (27 provinces) for the year 1994.<sup>3</sup> 84.6% of the cases were reported from the

provincial general hospitals whereas 15.4% were from the district health centres.

The Hasan Sadikin Hospital is the major referral hospital for West Java, which has 38 million population. The Hospital has a total of 1,000 beds, and the Neurology Department has 50 beds. 85 consecutive cases seen in the Neurology Department, Hasan Sadikan Hospital, over three half-year periods from 1991, 1994 and 1995 were retrospectively analysed. The diagnosis was clinical. The illness was characterized by muscle rigidity, hyperreflexia, normal conscious state and sensation, which could not be explained on other ground, such as strychnine poisoning or "hysteria". The patient was graded according to Patel and Joag.<sup>4</sup>

Patients are divided into five grades of severity depending on how many of the following criteria are present: lockjaw; fever within first 24 hours;

**TABLE 1: Age Breakdown of the Reported New Cases of Tetanus in Indonesia (1994)**

Age	No. of cases
< 1 year	190 (4.9%)
1-4 years	299 (7.8%)
4-14 years	702 (18.3%)
15-44 years	1,494 (38.9%)
>45 years	1,158 (30.1%)
Total	3,843

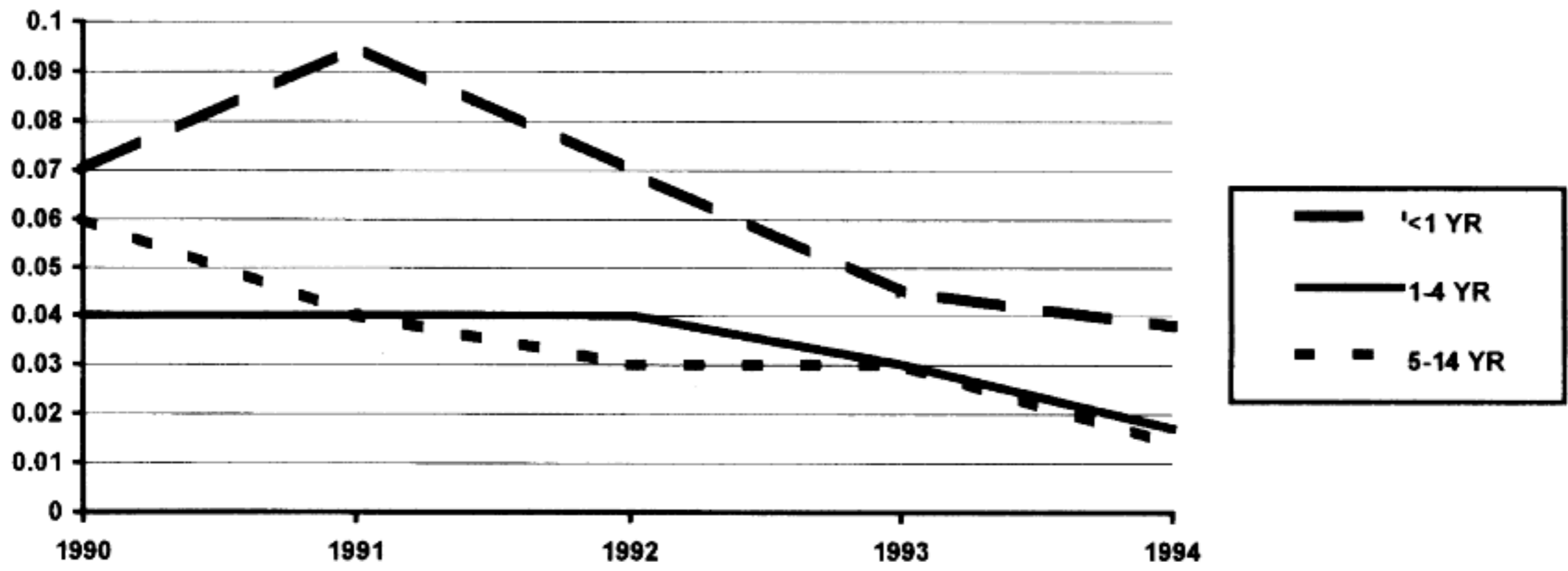


FIG. 1: Incidence rate of tetanus for various ages, 1990-1994 (per 100,000 population)

**TABLE 2: Reported New Cases of Tetanus in the Provinces of Indonesia (1994)**

D.I. Aceh	112
Sumatra Barat	70
Jambi	17
Bengkulu	22
DKI Jakarta	163
Jawa Tengah	429
Jawa Timur	1,229
Kalimantan Barat	64
Kalimantan Selatan	19
Sulawesi Utara	42
Sulawesi Selatan	113
Bali	216
Nusa Tenggara Barat	11
Irian Jaya	29
Sumatra Utara	143
Riau	46
Sumatra Selatan	113
Lampung	117
Jawa Barat	582
D.I. Yogyakarta	230
Kalimantan Tengah	6
Kalimantan Timur	28
Sulawesi Tengah	10
Sulawesi Tenggara	8
Maluku	17
Nusa Tenggara Timur	5
Timor Timur	2
<b>Total</b>	<b>3,843</b>

spasm; an incubation period less than 7 days; and a period of onset under 48 hours (time between jaw stiffness to generalized spasm). Fever is defined as axilla temperature >37.6 degree Celsius (99 degree Fahrenheit) or rectal temperature >37.8 degree Celsius (100 degree Fahrenheit). Grade I consists of patients with only one of these features (generally lockjaw). Each additional criterion alters the grade by one so that when all five are present the severity is regarded as grade V. Neonatal or puerperal tetanus is also included in grade V.

A total of 85 patients were seen over the three half year periods; 30 patients in 1991, 28 patients in 1994, 27 patients in 1995. The age ranged from 15-71 years, with the average being 43.4 years. It consisted of 67 males and 18 females with a female-male sex ratio of 3.7:1. Most of the cases were due to leg wounds, suffered during work for example, walking in the fields, and the unskilled laborer working at the construction site with unprotected feet. Two cases had infection from a biopsy and laparotomy wound respectively. There was no case of puerperal tetanus. None of the patients had primary immunization. The breakdown of the source of infection were as follows: leg - 59 patients (69.4%), dental - 9 patients (10.6%), arm - 5 patients (5.9%), head - 3 patients (3.5%), middle ear - 3 patients (3.5%), trunk - 2 patients (2.4%), unknown - 4 patients (4.7%).

On admission to the hospital, all cases had trismus. Neck and trunk stiffness was the next most common clinical feature followed by generalized spasm. The followings were the clinical grading during admission: Grade I - 16 patients (18.8%), Grade II - 21 patients (24.7%), Grade III - 22 patients (25.8%), Grade IV - 19

patients (22.3%) and Grade V - 7 patients (8.4%). The overall mortality rate was 25.9%. The mortality according to the clinical grading was: Grade I (12.5%), Grade II (0%), Grade III (13.6%), Grade IV (52.6%) and Grade V (100%). The two deaths in grade II were attributed to nasopharyngeal carcinoma and peritonitis and were not directly related to the tetanus.

In 1991, tetanus immunoglobulin at 20,000 U daily were given for 5 days. Since 1994, only only single dose at 10,000 U were given with no obvious difference in mortality. Penicillin and metronidazole were given to all patients. Wound debridement and tetracycline were added if the wound was obviously dirty. All patients were given intravenous diazepam to control the spasm. The dose varied according to the severity of the spasm. As expected, patients with a higher clinical grade were given higher daily doses of diazepam and for a longer duration. The following are the duration and average daily dose of diazepam given: Grade I - 6 days; 40mg. Grade II - 43 days, 53.5mg; Grade III - 64 days, 64.2mg; Grade IV - 96 days, 87.8mg. None of the patient was treated with mechanical ventilation.

## DISCUSSION

While the symptom of tetanus has been described since the time of Hippocrates, it was not until 1889 that the causative organism, *Clostridium tetani* was isolated and shown to cause the disease. *Clostridium tetani* is a Gram-positive, anaerobic organism which bears spores. It is widely distributed in the soil. The disease arises in man through contamination of wounds with the spores of the organism, especially as a result of accidents in which road dust or soil is introduced into the wound. The *Clostridium* does not spread beyond the wound, but produce an exotoxin, which reaches the nervous system and causes the illness predominated by muscle spasm.

It is estimated that there are one million deaths per year in the world attributed to tetanus. Over 90% of these are in neonates.<sup>5</sup> Warm climate, highly organic soil, rural occupation, bad health conditions, insufficient active immunization are the main factors determining the occurrence of the disease in a geographical location.<sup>6</sup> Cvjetanovic cites annual mortality rates of 28 per 100,000 population in Africa, 15 per 100,000 population in Asia, 0.5 per 100,000 population in Europe, and <0.1 per 100,000 in North America.<sup>7</sup> In one town in Sudan, 1% of

all newborns die of tetanus.<sup>8</sup> In the developed world, tetanus is mainly seen among the older adults who are either unimmunized or inadequately immunized.<sup>9</sup> In the United States, the incidence of tetanus has stabilized at between 0.03 and 0.04 cases per 100,000 since 1976;<sup>10</sup> with a population slightly more than Indonesia, an average of 50 cases per year continue to be reported.<sup>11</sup>

Based on data from the Ministry of Health, the annual incidence of tetanus in Indonesia for the year 1994 is 0.2 per 100,000 population. This is close to ten times that of the United States. However, it is much lower than the annual mortality rate of 15 per 100,000 population in Asia as estimated by Cvjetanovic.<sup>7</sup> Although Indonesia has a young population, 69% of the tetanus reported was above 15 years. There is also an encouraging four fold drop in the national annual incidence of tetanus for age 5-14 years for the year 1994 when compared to 1990. None of the adult patients with tetanus reviewed from the Hasan Sadikin Hospital in Bandung had primary immunization with tetanus toxoid. All these indicates that the primary immunization programme since 1974 for pregnant women and children is successful in helping to control the disease. The tetanus vaccine is widely available in government hospitals and health clinics. It is given free to pregnant women, infant and children. As tetanus is now mainly seen among non-immunized adults, greater effort should be devoted to the immunization of the adult population to further control the disease.

According to the data reviewed above from the Ministry of Health, tetanus is seen in all parts of Indonesia. The five provinces in Java accounted for 2,633 of the total 3,843 cases (68.5%) which correspond to the 70% of the total Indonesian population.

The source of infection which is mainly from the leg wounds is similar to elsewhere. Many of the farm and construction workers in Indonesia only wear shoes on formal occasions, and not during work. They also tend not to seek medical attention when they have apparently small wounds, such as that caused by nail or bamboo sliver. These injuries in fact can cause deep wounds which are ideal for anaerobic bacteria.

The clinical manifestation is also largely similar to those reported from elsewhere. As for the treatment of clinical cases, passive immunization with antitoxin is believed to be useful in neutralizing the circulating toxin. However, its therapeutic effect is limited as it is

largely unable to penetrate the central nervous system. As demonstrated in the review of our cases, there is no evidence that using a higher dose is advantageous. Blake et al have demonstrated the effectiveness of antitoxin at a low dose of 500 U, rather than the higher dose of 3,000 U and above.<sup>12</sup> Ahmadsyah & Salim<sup>13</sup> had demonstrated that metronidazole may be more efficacious than penicillin as the antimicrobial treatment of tetanus.

The case fatality rates in United States during 1985-86 was 5% for children and adults <50 years old but rose to 42% for patients >50 years of age.<sup>14</sup> Trujillo et al<sup>15</sup> reviewed the impact of intensive care treatment in reducing the mortality rate from 43.58% to 15%. The main cause of death for the non-ICU treated group, with the use of nonparalysing muscle relaxants and tracheostomy was respiratory failure. For the ICU treated group, the use of ventilatory support was able to substantially reduce the mortality from respiratory complications such as asphyxia or retained secretions leading to atelectasis and pneumonia. Autonomic instability with hypotension, cardiac arrhythmia and sudden cardiac arrest is also an important cause of death.<sup>15,16</sup> Continuous cardiac monitoring and the use of alpha and beta receptor blockade may help to control the autonomic instability. Other more recent mortality rate published were: 25% case fatality rates among 16 heroin addict patients in Hong Kong;<sup>17</sup> and no mortality among 15 patients seen in 1982-1992 from Auckland, New Zealand.<sup>18</sup> and 20% mortality from West Indies.<sup>19</sup>

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