

# A COMPARATIVE STUDY OF URBAN AND RURAL TETANUS IN ADULTS

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## ABSTRACT

An analysis of 382 patients, aged 12 and over, admitted to the infectious disease ward of Amin Hospital in Isfahan over a 20 year period with clinically diagnosed tetanus is reported. The study comprised 297 patients, 77.7% from rural areas and 85(22.3%) from the city of Isfahan. The male- female ratio for both groups was approximately 2:1. Rural patients were younger and showed a lower crude case fatality rate. Traditional practices such as application of cow manure to the wounds, and unhygienic circumcision and ear piercing were important contributing factors in developing tetanus, demonstrating a need for health education in rural communities.

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## INTRODUCTION

Tetanus is a major public health problem in most developing countries. It is costly both in human lives and expenditure for health care. There is not enough information about the variation of the epidemiological features of the disease in patients coming from rural and urban areas, so we conducted a comparative study of urban and rural tetanus.

who either refer on their own or are referred from parts of the city and its suburbs.

The study included 382 cases of clinically diagnosed tetanus admitted to the infectious disease ward during the period from April, 1969 to March, 1988. All cases were interviewed with the help of a questionnaire and followed until discharge or death. All patients received the same treatment in the form of muscle relaxants, anticonvulsants, symptomatic treatment and nursing care.

## MATERIALS AND METHODS

Amin Hospital is a large general hospital affiliated to the School of Medicine in Isfahan and its infectious disease ward is the only center for admission of patients

## RESULTS

The year distribution of the patients is shown in Table I. The group of patients seen between 1969 and

TABLE I. Distribution of urban and rural patients with tetanus in the years 1968-88

Years	Rural Number	%	Urban Number	%	Total Number	%
68-70	69	100	28	100	97	100
71-73	59	85.5	17	60.7	76	82.4
74-76	56	81.2	18	64.3	65	67
77-79	56	81.2	9	33.4	65	67
80-82	33	47.8	3	10.7	36	37.1
83-85	10	14.5	4	14.3	14	14.4
86-88	8	11.6	6	21.4	14	14.4
TOTAL	297		85		382	

TABLE II. Age distribution of urban and rural patients with tetanus in the years 1968- 88

Age Groups	Rural Number	%	Urban Number	%	Total Number	%
10-19	5	1.7	1	1.2	6	1.6
20-29	155	52.2	22	25.9	177	46.3
30-39	62	20.9	35	41.2	97	25.1
40-49	51	17.2	16	18.8	67	17.2
50-59	21	7	9	10.6	30	7
60-69	3	1	2	2.3	5	1.3
TOTAL	297	100	85	100	382	100

## Urban and Rural Tetanus

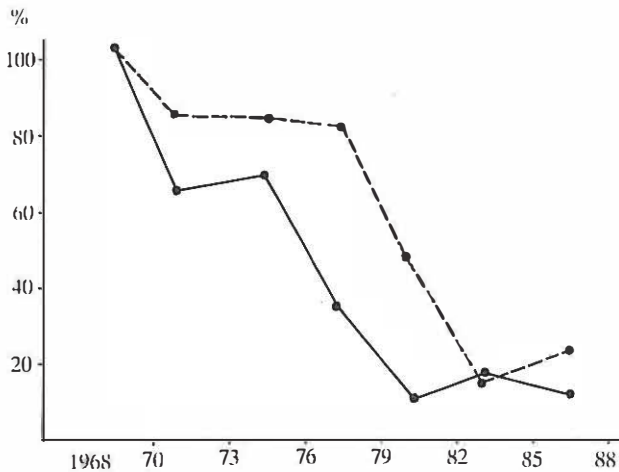


Fig. 1. Frequency distribution of patients with tetanus in the years 1968-88.

1971 was the largest for both urban and rural patients, and the least number specially for rural patients, was seen during the last three years (1986-88). The deduction in the number of patients for the urban areas was most in 1977 and for rural areas was most in 1980 (Fig. 1).

### Age

The age distribution of patients is shown in Table II. The age group 20-49 was the largest for urban and rural patients (89.2%). This shows that most patients were of middle age. The rural patients were on average younger, with 52.2% in the 20-29 age group, compared with 41.2% of urban patients in the 30-39 age group. The mean age was 36 years for rural and 29 years for urban patients (Fig. 2). These differences correlate with that of Rey and Raninder-Mantani, et al.<sup>1,2</sup> They showed a higher incidence of the disease with increasing age in developed countries, in contrast to a higher incidence among younger people in developing countries.

### Sex

The sex distribution of rural and urban patients with tetanus is shown in Table III. From the statistical point of view, there is no relation between sex and geographic zone. But in both urban and rural areas, the ratio between males and females was approximately 2:1

TABLE III. Sex distribution of rural and urban patients with tetanus in the years 1968-88

	Rural		Urban		Total	
	Number	%	Number	%	Number	%
Male	204	77.6	59	22.4	263	100
Female	93	78.2	26	21.8	119	100
TOTAL	297		85		382	

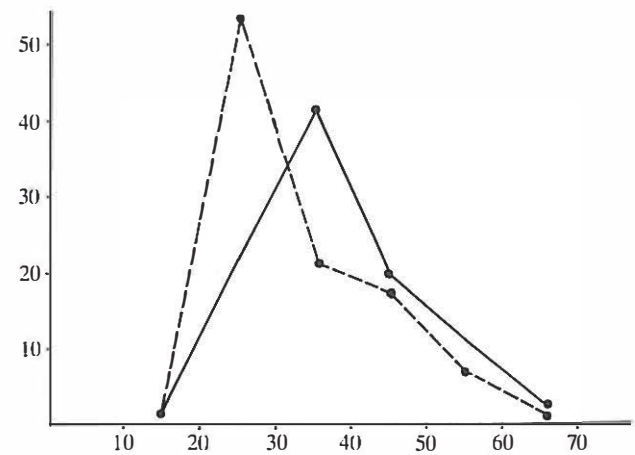


Figure 2. Frequency distribution of patients with tetanus in the years 1968-88.

(Fig. 3). Males are generally more often affected than females, because they are more often exposed to traumatic inoculation, but the same ratio is seen among neonatal tetanus.<sup>3</sup>

### Incubation period

Distribution of incubation periods for tetanus in rural and urban patients is shown in Table IV and Fig. 4.

The incubation period is commonly 7-10 days, however great variations occur and may range from 2-30 days. In this study the variation of incubation period of the patients with tetanus was 2-29 days.

Disregarding the patients with undefined incubation periods, the mean incubation period with 95% confidence for urban patients was 9-11 days, and 13-14 days for rural patients. This difference is statistically significant ( $P < 0.001$ ). So our urban patients had a shorter incubation period than rural patients.

### Types of inoculation

These are classified into six categories:<sup>2</sup>

TABLE IV. Distribution of incubation periods of tetanus in rural and urban patients

Incubation period (days)	RURAL		URBAN		TOTAL	
	Number	%	Number	%	Number	%
0-4	-	-	2	2.4	2	0.5
5-9	27	9.1	43	50.6	70	18.3
10-14	106	35.7	27	31.8	133	34.8
15-19	91	30.6	7	8.2	98	25.7
20-24	4	1.3	2	2.4	6	1.5
25-29	4	1.3	-	-	4	1.1
Not Known	65	21.9	4	4.7	69	18.1
TOTAL	297	100	85	100	382	100

\* These cases belonged to the non-traumatic and idiopathic group for whom an inoculation period could not be ascertained.

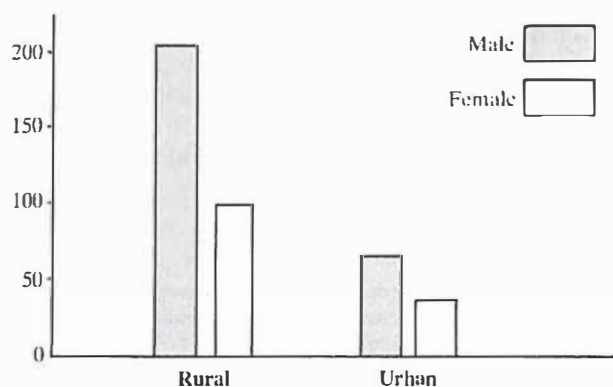


Figure 3. Frequency distribution of patients with tetanus by sex and geographical origin in the years 1968-88.

- 1- Accidental traumatic wounds,
- 2- Traditional practices including circumcision in boys and ear-piercing,
- 3- Non- traumatic inoculation including infection following shin ulcers, chronic suppurative otitis media, and other non- traumatic inoculation,
- 4- Obstetric inoculation including puerperal and post-abortum tetanus,
- 5- Iatrogenic including intramuscular injections and infection following surgical procedures,
- 6- Unknown entrance sites including idiopathic cases.

The frequencies of the various types of inoculation are shown in Table V. Non- traumatic inoculation is an important cause in the rural group. Out of the total 74 cases (24.9%) in this group, 67 cases had infected ulcers of the foot or hand, five gave a history of eczema, and two patients had chronic otitis media. In the category of traditional practices we had only eight patients (2.7%) from the rural areas. Five patients gave a history of applying cow manure to shin abrasions, two had used a kind of ointment after circumcision, and one case gave a history of ear- piercing.

In the obstetric cases, 28 patients (9.4%) came from rural areas. These cases are attributed to delivery (11

TABLE V

Distribution of types of inoculation in rural and urban patients

Type of inoculation	RURAL		URBAN	
	No. of cases	%	No. of cases	%
Accidental Traumatic wounds	139	46.8	47	55.4
Traditional practices	8	2.7	--	--
Non-Traumatic inoculation	74	24.9	11	12.9
Obstetric inoculation	28	9.4	4	2.7
Iatrogenic	--	--	2	2.3
Idiopathic	48	16.2	21	24.7
	297	100	85	100

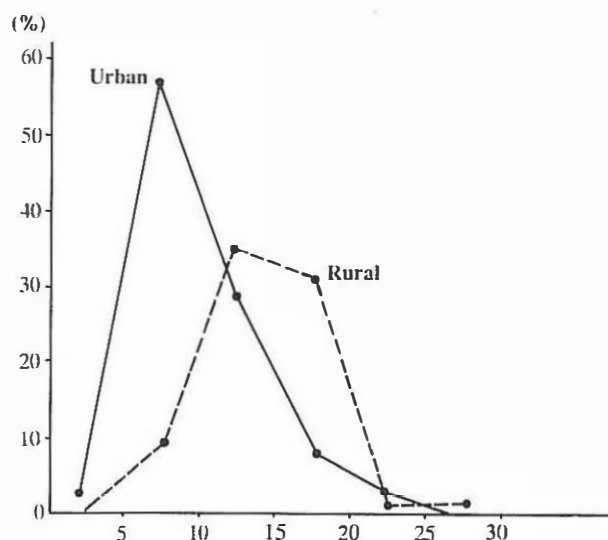


Figure 4. Frequency distribution of patients with tetanus by incubation periods and geographical origin in the years 1968- 88.

cases at home) and abortion (17 cases by intake of a kind of herbal material) conducted by traditional mid-wives.

In the urban group three patients gave a history of wanted abortion and for one patient delivery was conducted at home.

We also had three cases who developed tetanus following intramuscular injections.

The idiopathic category comprised 69 patients, 28 from the rural group and 21 patients from the urban group.

### Case Fatality Rate

The case fatality rate is influenced by a number of factors such as age, sex, incubation period and type of inoculation. The crude case fatality rate in the urban group was 54.1% compared with 39.1% in the rural group.

The acceptability range of this rate with 95% confi-

TABLE VI

Case fatality rate (%) of rural and urban patients with tetanus

Type of Inoculation	RURAL			URBAN		
	No. of cases	No. of death	CFR %	No. of cases	No. of death	CFR %
Accidental traumatic Wounds	139	66	47.5	47	36	76.5
Traditional practices	8	2	0.25	--	--	--
Non-traumatic inoculation	47	12	17.5	11	2	18.1
Obstetric inoculation	28	28	100	4	3	75
Iatrogenic	--	--	--	2	--	--
Idiopathic	48	7	14.6	21	5	23.8
TOTAL	297	116	39	85	46	54.1

## Urban and Rural Tetanus

dence is 43-65% for the urban area, and 33-54% for rural areas. This difference is statistically significant ( $X^2=6.2$ ,  $df=1$ ,  $p<0.001$ ). Case fatality rate was lower in the non-traumatic category for the rural group. Perhaps some immunity is induced by sub-clinical infection.<sup>3</sup>

### DISCUSSION

This study of tetanus suggests that the prognosis may be better in the rural group of patients and in those with a longer incubation period.

Previous studies have also indicated that patients with a longer incubation period have a better prognosis.<sup>2,4</sup> The better prognosis and lower fatality rate in rural patients could be due to more exposure to sub-clinical infection on account of repeated trauma experienced in the course of their occupations.<sup>3</sup>

The higher mortality rate in the obstetric category could be due to use of contaminated material for abortion by the patients and the contaminated delivery

conducted by traditional birth attendants at home.

Traditional practices such as circumcision, ear piercing, application of cow manure following minor abrasions and obstetric inoculation which accounted for 36 cases (32 from rural areas), are important factors in the development of tetanus in rural areas.

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