IMMUNITY AGAINST TETANUS IN SOME AGE GROUPS

N. Atabey, M.D.** / M. Gökoğlu, M.D.*

* *Assistant Professor, Department of Microbiology, Faculty of Medicine, Cumhuriyet University, Sivas, Turkey.*
** *Specialist, Department of Microbiology, Faculty of Medicine, Cumhuriyet University, Sivas, Turkey.*

SUMMARY
In this study, tetanus antitoxin titres were measured in Sivas in certain age groups. In Turkey, childhood primary vaccination program is in effect against tetanus for many years. However, in spite of this vaccination program, deaths still occur from neonatal tetanus and tetanus in Turkey. On this basis, immunity against tetanus was examined in randomly sampled 400 subjects with ages ranging from 1 day to 85 years. Tetanus antitoxin titres were determined by Turkey Red Blood Cells Passive Hemagglutination (TRBC-HA) technique. The highest number of unprotected people against tetanus were found among subjects above 30 years of age (75%) and most of them were female (81.1 %).

Key Words: Tetanus Immunity-Passive Hemagglutination Technique.

INTRODUCTION
In many parts of the world, the incidence of tetanus had decreased as a result both of rising standards of living and routine childhood immunization program. But tetanus is still a serious problem for many developing countries. It is still the major cause of deaths of newborns. It is estimated that one million deaths occur due to this disease in the world each year. Approximately 50% of these deaths are due to neonatal tetanus (1,2). In Turkey, tetanus is still a serious health problem, too.

The prevention of tetanus depends on active immunization (2-5). In Turkey, primary vaccination against tetanus has been recommended as a routine, beginning in the second or third month of life, three doses at intervals of 4-8 weeks. 1 cc. plain vaccine containes 12 Lf/ml tetanus toxoid (6,7). One booster dose should be given one year later. It is continued during school-period at five year intervals. No routine revaccination to adults has been advised. However primary vaccination or revaccination with tetanus has been administered to men in military service and to pregnant women. For pervention of tetanus, revaccination has been recommended in wounded patients, if the time period after the last vaccination was more than 5 years (7). But neonatal tetanus still persists to be one of the causes of deaths among infants (8,9) and tetanus is a major health problem for people above 30 years of age, too (10). On this basis, we examined tetanus antitoxin titres in sera from 400 subjects, which were randomly sampled.

MATERIALS AND METHODS
Human Sera: Serum specimens were obtained from 400 individuals. They were collected between 1987 and 1988. Sera were separated from blood and stored at -20°C just after collection. All sera were inactivated at 56°C for 30 minutes before testing, then they were absorbed with TRBC to prevent spontaneous agglutination (11,12).

The age and sex distribution of 400 subjects were shown on Table I.

Table I. The age and sex distribution of 400 persons.

AGE (Year)	No. of Females	No. of Males	TOTAL	%
< 5	21	23	44	11
6 - 15	22	28	50	12.5
16 - 30	43	139	182	45.5
> 30	53	71	124	31
TOTAL	139	261	400	100

Passive Hemagglutination Test: The passive hemagglutination test, as described by Mai and Rossin (13) and modified by Pitzurra et al. (11), was used. Standard erythrocyte suspension and tannic acid suspension were prepared according to Neter's Method (14). The antitoxin content was expressed in hemagglutination Unit (HU). 1 HU corresponds to 1 IU of the reference serum (15).

6-15 year-age group, 61.5% of 16-30 year-age group, 13.7% of the subjects above 30 years of age were protected. 8.0% of 6-15 year-age group, 10.4% of 16-30 year-age group and 10.5% of the subjects above 30 years of age were partially protected. The number of unprotected subjects was high in the age group above 30 years (75.8%). The rate of unprotected females above 30 years of age was 81.1%. The most striking

Table II. Comparison of the degree of protection against tetanus in some age groups by TRBC-HA antibody levels.

AGE GROUP (years)	Degree of protection							
	Protected (> 0.5)		Partially protected (0.5-0.125)		Unprotected (< 0.125)		Total	
	No.	%	No.	%	No.	%	No.	%
< 5	31	70.5	6	13.6	7	15.9	44	100
6-15	40	80.0	4	8.0	6	12	50	100
16-30	112	61.5	19	10.4	51	28.1	182	100
> 30	7	13.7	13	10.5	94	75.8	124	100
TOTAL	200	50.0	42	10.5	158	39.5	400	100

RESULTS

The serum antitoxin concentrations against tetanus toxoid in the individuals of 0-85 years of age were documented on Table II.

70.5% of children under 5 years of age were protected and 13.6% of them were partially protected. 80% of

difference between males and females was found in young subjects. In the 16-30 year-age group, 58.1% of females and 18.7% of males were unprotected. The rate of distribution of unprotected males and females in age groups was shown in Figure 1.

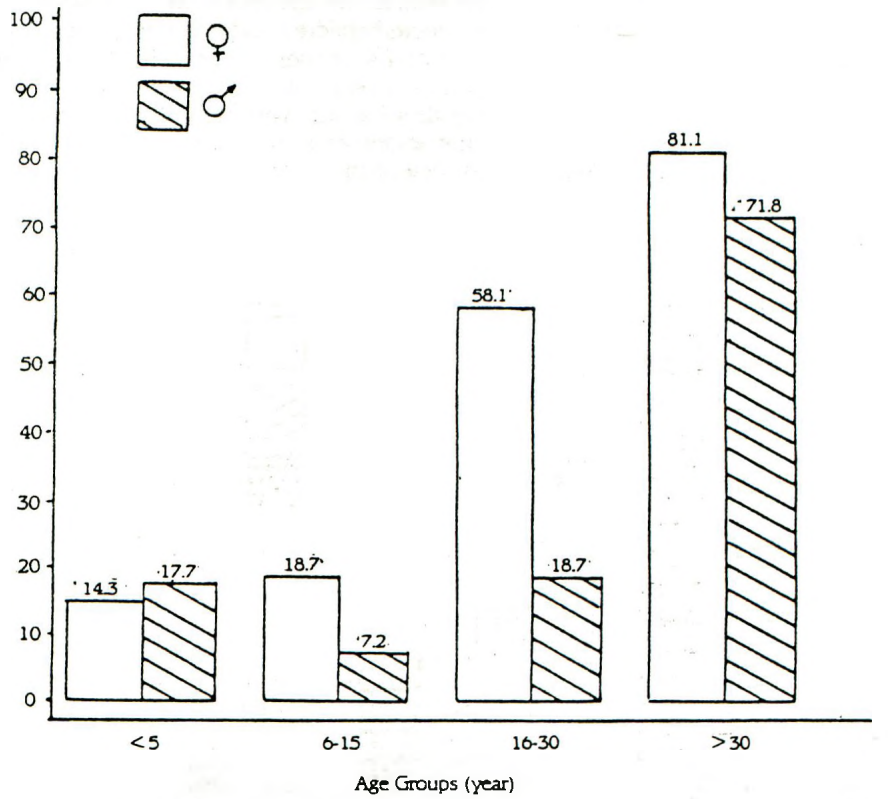

Fig. 1. Unprotected males and females against tetanus in some age groups. (Serum antitoxin titres <0.125 HU/ml)

All subjects (400) were assessed according to their immunization status against tetanus as follows: 233 58.2% of them had primary immunization and 91.7% of which were protected and partially protected. 25.2% of subjects had no complete course of toxoid, 16.5% of subjects were not vaccinated or their immunization status were unknown. The serum concentrations of these subjects according to their immunization status were shown on Table III. All of 33 children under 5 years of age who had been primarily immunized were protected. All protected and partially protected groups were shown in Figure 2.

Table III. Comparison of the degrees of protection against tetanus in 400 persons as judged by anamnestic criteria and by TRBC-HA antibody levels.

Immunity status based on anamnestic data	Status of protection	Age group (year)									
		< 5		6-15		16-30		> 30		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%
Complete course of primary vaccination	Protected	33	100	43	95.6	121	88.9	17	89.4	214	91.7
	Unprotected	—	—	2	4.4	15	11.1	2	10.6	19	8.3
	Total	33	100	45	100	136	100	19	100	233	100
One or two doses of vaccine	Protected	3	60	1	33.3	10	24	10	19.6	24	24.4
	Unprotected	2	40	2	66.7	32	76	41	80.4	77	75.8
	Total	5	100	3	100	42	100	51	100	101	100
No vaccination	Protected	1	16.7	—	—	—	—	3	5.5	4	6.6
	Unprotected	5	83.3	2	100	4	100	51	94.5	62	93.3
	Total	6	100	2	100	4	100	54	100	66	100

DISCUSSION

In the present study, 50% of all subjects were protected and 10.5% were partially protected against tetanus. Men consisted 70.2% of them. 70.5% of the age group under 5 years were protected and 13.6% of them were partially protected. In Sweden and Italy adsorbed tetanus vaccine, is routinely administered and therefore 100% of the children under 5 years of age are completely protected (1,3). This difference between Turkey and those countries explains the fact that either all unprotected infants of this age group had not completed their immunization program or plain vaccine used in Turkey is not sufficient for protection. In the age group under 5 years 28.6% of unprotected children had complete primary vaccination and 71.4% of them were infants whose vaccination program had not been started yet. 16.7% of these newborn group were protected. These results show that vaccination program applied to pregnants is not sufficient in Turkey.

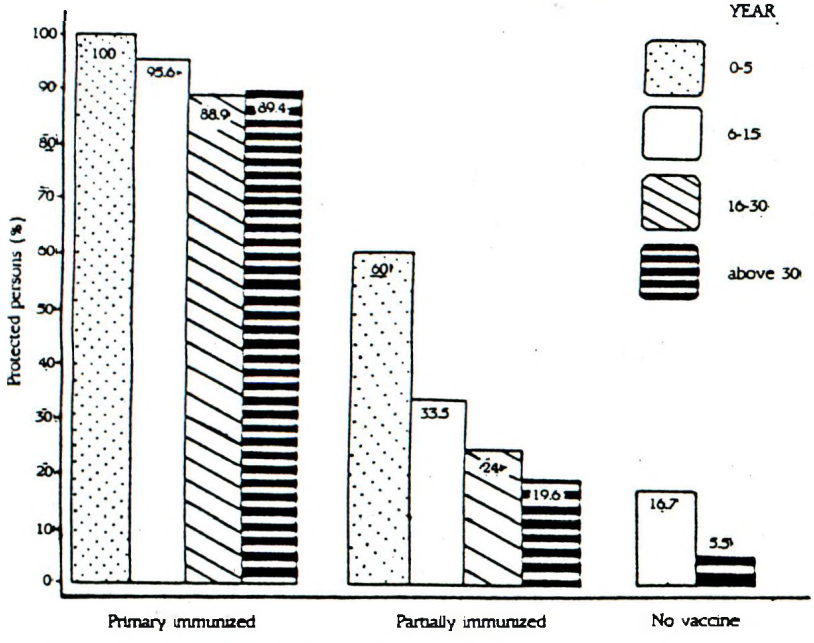

Fig. 2. Comparison of the protected persons against tetanus as judged anamnestic data.

We detected that 80% of 6-15 years old subjects had protective and 8% had partially protective serum antitoxin levels against tetanus. These ranges are similar to those in the literature (1,3). 90% of the age group of 6-15 years had complete primary vaccination. The rates of protected and partially protected subjects of 6-15 years were 61.5% and 10.4% respectively.

The lowest antitoxin levels were found among the subjects above 30 years of age. The percentages of protected and partically protected subjects of this age group were 13.7% and 10.5% respectively. In some countries, e.g. in the USA and Denmark, where the absorbed vaccine is used, tetanus antitoxin titres were found protective in 40-75% of this age group (16-18). This difference may be due to the administration of plain vaccine in Turkey and not applying the booster dose to this age group and consequently the decrease in the immunity by age.

The percentages of unprotected females and males against tetanus were 54% and 29.8% respectively. The most striking difference between males and females was in the age group 16-30 years. 25.6% of females and 73.4% of males in this age group were protected, 16.3% of females and 7.9% of males were partially protected. This may be due to the administration of tetanus vaccine to men in military service. But immunization is very important for females in this age group. Because this period is child-bearing age and protection of these women are important for preventing neonatal tetanus. No neonatal tetanus case has been reported in Sweden and Denmark since 1950. Because people in these countries are administered to complete vaccination program with absorbed vaccine (1,19).

As a resut, the below mentioned measures are important to prevent tetanus and neonatal tetanus in our country:

1) The vaccination against tetanus should be given properly to children, pregnant and child-bearing aged women, people older than 30 years and wounded people.

2) The protective effects and protection period of the vaccine should be examined by using a sensitive and cheap technique after vaccination program.

3) Because adsorbed vaccine is better than plain vaccine, its protection period is longer and booster doses can be applied at longer intervals, adsorbed vaccine should be used.

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