Some aspects of epidemiology of Tetanus in the world

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Tetanus is ubiquitous disease which strikes people and animals everywhere, in all regions of the world. So far there is no state on the globe where people may declare that all of them at last are safe from the hazard of this dreadful infection. However the risk to be a victim of tetanus is enormously different depending on the place, time and the state of immunity of the given population. Recently it was again clearly demonstrated that the high mortality from tetanus was observed in the tropical areas, where the majority of developing countries were situated (Matveev, 1960; Bytchenko, 1966). Here it happened very often that on the background of various communicable diseases tetanus rarely attracted attention of Public Health authorities because:

1. it was not a notifiable disease in more than half the countries including even Great Britain, Spain, Switzerland etc;.
2. Statistics on tetanus practically did not exist in rural areas of the majority of developing countries, where conditions for tetanus were the most favourable;
3. tetanus did not cause epidemics and did not leave paralytic or any other sequelae, as some other diseases did.
4. those who were killed by tetanus in the world in the most cases were new born children, who died within a very short period of time without complaining and before anyone could understand and help (Matveev, 1962; Bytchenko, 1966 b).

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5. poverty, ignorance, illiteracy, fear of phenomena, which could not be explained, witch doctors and local midwives ("dais" of India; "ducun" of Indonesia, "monthamyae" of Thailand etc.) all these helped tetanus to remain hidden.

It would be wrong to try to convince any one that tetanus is a problem number one among other communicable diseases known in the world. However it is one of the gravest infections which kills people of all ages while it can be easily avoided.

According to the approximate estimation prepared on the basis of statistics and various reports available to WHO, the number of deaths from tetanus in the world during the period of 1951-1960 was about 1,60,000 per year (Table No. 1).

It is of interest to note that the number of deaths per year from some selected communicable diseases notified to WHO at that time (1956-1960) was as following:

Smallpox	78000
Cholera	46000
Rabies	840
Plague	283
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Total	125123

Table No. 1.

Yearly number of deaths from tetanus in the world during the period of 1951–1960 (Bytchenko, 1966 b).

Continent	Number of countries provided data on tetanus	Actual number of registered deaths per year	Estimated number of deaths per year for the whole continent	Estimated mortality rates per 100000 population
America	23	3584	19550	8.5
North America	2	312	312	0.17
Central & South America	40	12955	17391	9.3
Asia	25	19058	122850	8.4
Europe	22	2622	3149	0.77
Oceania	13	98	945	6.3
Total	128	38629	164197	—

Recently Suri (1966) confirmed the correctness of our estimation with regard to mortality from tetanus in India. He considered that about 50000 persons were the victims of tetanus every year in this country.

At the last International conference on tetanus in Berh Veronesi (1966) concluded: "If tetanus, instead of killing a person, left paralytic sequelae, as poliomyelitis does, we would see every 10 years, more than one million tetanus crippled individuals in the streets of world and confronted with this situation, perhaps, peoples, and governments would ask immediately for measures to control the problem."

The following tendencies of tetanus mortality are observed in various parts of the globe:

- 1) to decrease slowly during several decades;
- 2) to decrease rapidly within a few years;
- 3) to remain on the same level;
- 4) to increase rapidly.

The first tendency was noted in the countries quickly developing their industries even before tetanus toxoid was applied for immunization. (Europe, USA, Canada etc.). Such a tendency has been also observed in Japan. (Ebisawa, 1966).

The second tendency has place in those areas, where the vast programmes of immunization against tetanus was launched since last decade (Bulgaria, Hungary, Roumania, Israel, the USSR etc.).

The third tendency is common for some islands (Mauritius, Trinidad and Tobago etc.).

And the fourth one is very typical for the majority of developing countries, where due to gradual improvement of medical services and statistics the cases of tetanus are more and more often detected (Colombia, Congo, India, Nigeria, Senegal, Sierra Leone, Somalia, Tanzania etc.).

Two major factors, closely related with each other, determine tetanus morbidity and mortality in the world:

- 1) Socio-economical conditions;
- 2) natural conditions.

In our modern life existence of human tetanus as well as some other easily preventable diseases, is a shame for the mankind. The incidence of infection entirely depends on socio-economic conditions of the given community. Tetanus could be eliminated through active immunization of all people many-years ago, providing that medical services were good, vaccine easily available and population cooperative in that struggle. Such immunization is conducted in some countries of the world (Bulgaria, Hungary, Italy, Roumania, USA, USSR etc.).

For example in the USSR, where intensive immunization of the total population against tetanus was conducted in Moldavia (SSR), Krasnodar (Kraj), Rostov region and Ukraine (SSR) the morbidity from this disease since 1957 dropped 4 to 6 times (Sergeeva & Matveev, 1966).

Poor socio-economical conditions are always accompanied by the lack of medical care (particularly in rural areas), high incidence of deliveries and abortions at home, high incidence of injuries, burns, skin diseases, otitis and other conditions which serve as predisposing factors of tetanus (Bytchenko, 1966 a). Certain rituals keep the disease flourishing in some areas of the world. In particular the following habits are dangerous to be complicated with tetanus:

Cutting umbilica with sharp dirty instruments and making dressing of wound with earth, ashes, cowdung, juices and oils; piercing of ears, circumcision, excision, etc.

It is of importance to emphasize here that under the circumstances where more and more doctors and paramedical personnel become involved in the programmes of mass vaccination campaigns against smallpox, cholera, TB etc., as well as in the programmes of family planning they must be beware of tetanus due to negligent medical procedures.

Presently and in the past a number of tetanus cases were reported after vaccinations, injections and surgical operations (Armstrong 1927; Patel and Mehta, 1960; Armengand et al., 1963; Bytchenko, 1966 b; Puri, 1967, etc.)

The influence of natural condition on tetanus mortality is obvious from geographical and seasonal distribution of the disease (Bytchenko, 1966 a).

The population that inhabits the areas with warm damp climates and fertile soil is more prone to tetanus than the population inhabiting mountain, desert etc. (Matveev, 1960; Denchev, 1962; Bytchenko & Grewal Singh, 1963).

The variations in mortality rates from tetanus in different countries of the world may be great. For example in Central America, the frequency of deaths from tetanus per 100,000 population is more than 100 times higher

than in the USA and Canada.

Inside of any area tetanus cases as a rule are distributed unequally concentrating in some certain districts.

Ecological studies on *cl. tetani* distribution in the soils reveled that higher morbidity rates fish tetanus were connected with those places, from where isolations of toxigenic strains were more frequent (Matveev, 1960; Denchev, 1962; Sirgeeva and Matveev, 1966).

Recent report by Sakurai (1966) indicates, that human cases of tetanus were closely related to the areas of the high incidence of veterinary tetanus.

Seasonal distribution of disease is pronounced in the countries with the cold winter, while on tropical areas the incidence of tetanus was not so variable. The variations depends both on natural and socio-economical conditions. During the winter time in cold climates snow, heavy cloths and little works in the fields diminish human contacts with the soil and this results in temporary disappearance of disease. In the spring and summer the influence of these factors inhibiting tetanus gradually becomes weaker and infection is taking its crop with the predominance of traumatic cases (Masar, 1966).

Contrary to such situation in tropical areas, where winter is mild and the soil is open for contacts all year round, the incidence of disease remain variable mainly in connexion with intensivity of field work (Uttley, 1959).

Variations in the frequency of tetanus neonatorum usually are very small and one should remember that such cases predominate in tropical countries.

Presently the opinion, that tetanus is a soil-born infection gains more and more supporters. Experimentally it was shown that *cl. tetani* behaved like soil organism being able to survive and multiply in the environment (Tarkev, 1965). This is a challenge to generally accepted view that *cl. tetani* a soil contaminant and therefore it cannot normally exist outside of animal intestine.

Much work is needed to illucidate the history of *cl. tetani* variations in the environmental conditions. So far it was proved, that at least in toxigenicity strains isolated from soil differ greatly from each other (Sergeeva and Orzuev, 1965).

Recent enquiry on the situation concerning tetanus in the world has shown that up to the present time with the exception of some developed countries the overwhelming majority of the world population is not protected against tetanus and remains obscure with regard to the preventive measures against this disease (Bytchenko, 1966 b).

Scientifically there is no other way to combat tetanus in possibly short time but active immunization of the total population through long-term special programmes.

Women, children, agricultural and industrial workers should be the primary choices for immunization.

Vaccination of women before and during pregnancy would reduce the incidence of tetanus neonatorum remarkably, (Schofield, 1966; Newell et al. 1966).

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