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REDUCING ANTHRAX INFECTION IN MAN THROUGH ANIMAL VACCINATION IN IRAN

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Anthrax is one of the most dreadful infectious diseases of animals which is transmissible to man. Its definite diagnosis occurred no earlier than a century ago.

Although preventive measures have been long in use in all countries, its incidence among both animals and man is still noteworthy.

The designation used for human anthrax in Iran is Siah-Zakhm, which means black-eschar. The animal anthrax is called, by peasants and farmers, Seporzi or Esbol-Tow (Spleen Fever) in Eastern and Western parts and Khunshash (Hemoglobinuria) in other parts of the country.

The first diagnostic case of animal anthrax in Iran, was reported by Poinsignon, 1905, a French Veterinarian with the Iranian Royal Breeding Stud. Two years later, Carée recorded 18 cases of horse anthrax from a herd of 40 horses.

Carpentier, Head of the Veterinary Laboratory of the Iranian Army, too, reported various cases of horse anthrax.

During the years 1907–1909 from two to three cases out of 1200–1300 sheep and goats and 15–20 cows slaughtered in Tehran Slaughter-house, were daily recorded as infected.

Razi State Institute incorporated the clinical diagnosis of both animal and human anthrax into its daily activities some years following the Institute's establishment.

A detailed description of works and studies on anthrax by Louis Delpy and his colleages has been published.

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Along with animal anthrax, cases of human infection had been recognized in Iranian towns and villages by Physicians, Veterinary surgeons and the common farmers at various periods, and they treated the patients by removing, excising and cauterizing the lesion parts and by using the antiserum and chemical compounds such as Lugol or antiseptic. The antiserum was prepared by Razi State Institute or imported from European countries.

In the past, Iranian farmers used to kill the infected animals at the very critical moment when the animal was about to die of the disease. This they would do for economy reasons and in a hasty effort to avoid a loss while obeying an Islamic religious law for legitimate slaughtering.

Such slaughtering at the critical moment, that is in the septicemic state which exists in the few minutes before death when the animal blood is infested with a large number of anthrax bacilli and gains virulence, can contaminate the pasture and stable and is dangerous for the slaughterer, the slaughterer's family and neighbouring people.

Fortunately, consumption of anthrax infected meat does not carry much harm, since the micro-organisms in fresh meat live in vegetative form and are destroyed by diagestive juices.

A very important factor in the spread of anthrax is the effusion of blood from an infected animal slaughtered in the pasture.

The hide, also, may carry germs which, when exposed to the air, will change into spores and as an airborne contagion may be dissipated far and wide.

Many Iranian farmers and villagers had been affected through manipulation of the infected meat, hide, skin and other products from animals slaughtered at the point of death. The story points out the vital need for establishing an extensive immunization through mass vaccination of animals and stimulating an informed awareness of the hazards that threaten the lives of farm animals and the farmer's own family members.

Mention must be made here of the large scale efforts recently made by the national organizations to develop a public realization of the significant role of live-stock sanitation and animal health in eliminating such fatal diseases as anthrax.

As a result of their effort not a single case of horse anthrax has been encountered for a period of twenty years now, though horses once offered the only source for diagnosis of anthrax in Iran. Much has been done by the live-stock sanitary and public health officials in combatting the disease during the past years.

MODES OF TRANSMISSION :

Human anthrax infection is usually through a skin lesion, generally a slight abrasion, scratch or a small wound on an exposed surface. The organism may gain entry cutaneously through an accidental injection. The internal form, which occurs generally in animals, most frequently occurs in people who use the products of an animal which died from the disease or in workmen at the woolsorters and gut-dressers. The wool sorters develop mostly pulmonary anthrax infection by inhalation of spores. While the internal form of the disease is very hard to diagnose and in most cases only post-mortem findings tend to confirm traces of the infection, the external form of the disease is very easy to diagnose.

Human infection may appear in the following forms :

1– *Industrial Anthrax :* Contaminated hair, wool, gut, bone and hides are the most common industrial sources of infection. Thus, brush-makers, woll-sorters, gut-dressers, carpet-weavers, and tanners most often develop anthrax. Workmen at fertilizer plants and slaughter-houses are also susceptible to anthrax infection.

2– *Occupation Anthrax :* Anthrax may occur in Veterinarians, shepherds, armers, and all those who are in direct contact with infected animals.

The laboratory technicians who manipulate the anthrax bacilli are susceptible to infection.

3– *Accidental Anthrax :* This kind of infection may be through consumption of infected meat from an infected animal, falling down on contaminated earth, and wearing clothing made out from unsterilized wool, etc.....

As mentioned in previous headings, anthrax bacilli is most prevalent in areas where carcases of animals which died from the disease have been disposed of. Pastures in which infected animals have roamed may remain contaminated for years and prove fatal to any stock turned thereon to graze. An infected herd may carry infection into stables or farm premises.

Experimental evidence has been reported to indicate that anthrax spore can still germinate after being stored for more than 40 years. They may survive for long periods until the time that a susceptible animal picks up the spores through fed or water. It is clear that when the organism is in contact with air it produce spores that are very resistant to heat and freezing, drying and chemical disinfectants.

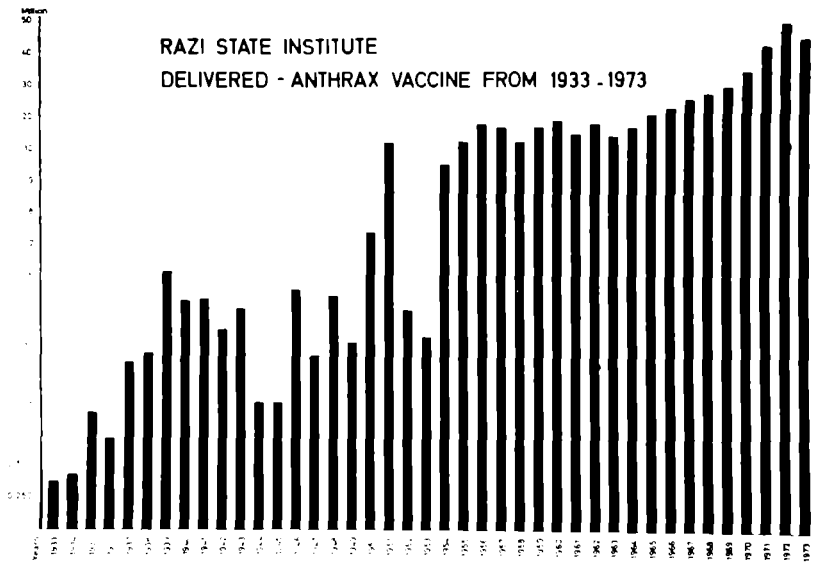
PREVENTION :

It is now quite clear that preventive measures should be taken as an im-

portant start in combatting the disease. There are, in principal, two ways of doing this: a) Removal of infection from contaminated pastures. b) Establishing an immunity through extensive vaccination. The first method is infrequently feasible and at times almost impossible, and the second measure, thgough sometimes difficult to continue, is more practical, sure and tends to check an outbreak.

Since 1933 the Iranian live-stock population has been annually inoculated according to a plan which says that the stock should be given an annual vaccination for several years, and that Razi State Institute should be assigned the responsibility for production of anthrax vaccine. The Veterinary Services have responsiblity for vaccination of the live-stock animals.

As confirmed by Graph No. 1, Razi State Institute has all along been able to keep up with the social, scientific and economic developments which have taken place during the past 40 years of Iranian history and has successfully fulfilld its role in meeting the demand for anthrax vaccine on a national scale.



NATURE OF VACCINE :

In 1932 after preliminary studies, Razi State Institute decided and has since continued to use the attenuated spores vaccine. Only in recent years, upon making extensive investigations, did the Institute begin to prepare vaccine from Stern like strain which had been isolated from virulent type of Bacillus anthracis in Iran, diluted in 1 % saponin solution.

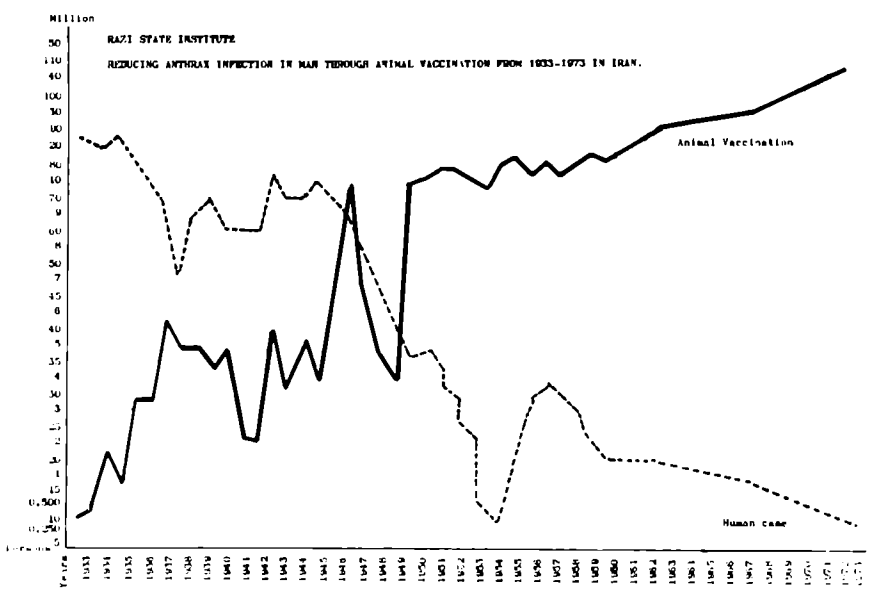
The isolated strain in Iran was more resistant to penicilline than Stern's strain, and the inoculation of 4 ml of 24 hours broth culture of this strain was harmless to guinea pigs while 2 ml of 24 hours culture prepared by the Stern strain killed the animal. Examinations of the immunity rate of vaccine produced from both strains confirmed that they produce the same degree of immunity in vaccinated animals.

4–6 million of spores is a dose of vaccine for sheep and goats and 20 million spores is a dose for horses and cattle.

COMPARISON OF HUMAN CASES FROM 1933–1973 :

As already stated, the tradition of legitimate slaughtering of diseased animals and consumption of meat and other animal products have been some of the causes of human infection cases in Iran. There are few thorough statistics of human cases recorded in the past, since the farmers and the sheep owners could not easily reach the far off sanitary stations and the infection was so very often mistaken for other diseases.

Graph No. 2 shows the relation between the increase of the employment of vaccine and the drop in the number of human cases. An apparent increase in the number of human cases since 1962 is attributed to the activities of the Health Corps which is working in all villages of the country and can diagnose the disease. The increase of employment of vaccine is also related to the activities of this corps and the Educational Corps which trains the farmers and villagers



PER CENT OF ANTHRAX LESIONS IN MAN IN IRAN :

According to the information submitted by the hospitals and health clinics almost ninety per cent of human infections have been in the form of cutaneous or localized anthrax, as folow:

Face	56 %
Neck	8 %
Arms and hand	21 %
Chest region	5 %
Abdominal region	2 %
Hip region	2 %
Feet	4 %
Nose cavity	1 %
Anus	1 %

The internal form of the disease has occurred as intestinal and pulmonary infection which in most cases have been followed by death.

PERCENTAGE OF INFECTION AMONG VOCATIONAL GROUPS IN IRAN

Anthrax infection may occur in people of various professions. We recently collected data which perfectly show the distribution percentage of human cases in the following professions :

Veterinarian	5 %
Vaccinators	1 %
Slaughterers	7.5%
Butchers	4 %
Tanners	12 %
Woolsorters	13 %
Gut-dressers	10 %
Grooms	5.5%
Farmers & Sheep owners	31 %
Soldiers	1 %
Miscellaneous	15 %

SUMMARY :

The following may be presented as conclusions of this study :

1) – Anthrax has been very important in the economics of live-stock husbandry and as a serious human infection disease.

2) – Vaccination of live-stock should be effectively continued for several years until the animals have the immunity and the disease is eradicated.

3) – Farmers and sheep owners should be educated and taught about the hazards of the disease, and educational live stock sanitary measures among farmers exposed to infection should promulgated. Slaughter of the animals outside the slaughter-house without inspection should be prohibited.

4) – Anthrax districts should be clearly specified and kept under close watch and in cases of early appearance of the disease prompt preventive measure should be taken.

5) – Promptness of diagnosis and treatment are of great imprtance. Today, antibiotics are the most recommended treatment in human and animal cases.

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