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OCCUPATIONAL CASES OF TULAREMIA AND THEIR PREVENTION

Maisnikov Iua, 1955 Zh. Mikrob. (Moskva No. 11 Nov. 55.p. 91-94.)  
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There is no literature depicting cases of tularemia which arose during industrial processing of agricultural products (seeds, vegetables, potatoes, etc.). The only existing description of tularemia, which originated through infection during processing of food was written by Beresine (1931). However, in this instance, meat derived from contaminated rabbits was being processed and there was a different type of infection. Most cases of infection were caused through direct contact, which precipitated a bubonic type of disease (buboes in the armpits.)

We conducted this study in one of the central steppe regions of the European U. S. S. R. during the winter of 1948-49, and observed cases of infections contracted at a small plant processing sugar beets. The region where the cases occurred is a non-wooded, intensely industrialized area. There are no rivers in this region; next to the plant there is located a small artificial pond, but its banks lack vegetation. A thorough investigation of the area established a complete absence of water rats, and revealed the the terrain was unsuitable for their existence.

During the Autumn of 1948 there was an average number of field rodents in the vicinity and not more than 200-300 new tunnel entrances had been observed during the past year. The residents of the neighboring villages did not observe a large quantity of mice during the winter of 1948-49. During January 1949 in the neighboring region, the density of rodents in straw stacks did not exceed 0.4 animals per cubic meter (of straw). During this winter there were no unthreshed stacks left in the surveyed district.

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In the sugar beet warehouse where the epidemic occurred, recovery (trapping?) of rodents, at the beginning of 1949, amounted to 12.5% (of what?) which consisted of 5% indoor mice and 7.5% black rats.

During the middle of December, the plant received a load of sugar beets, which was harvested in a distant district which was infested by rodents at the time (of harvest). The sanitation officers of the district from which the sugar beets were sent did not report this (infestation) to the health authorities located at the destination. The shipment was greatly damaged by rodents. Some dead mice and field mice were found, but the number was negligible. Simultaneously with this cargo, another load of beets was received. It originated from districts which were devoid of tularemia (practically no gnawed beets were found).

The beets were transported from the warehouse via a water conveyance for the first processing step. After washing they were unloaded with a screw conveyer, weighed and cut for processing. During the washing and the first step of processing, splashes are formed and the air of the work shop was saturated with a small (fine) watery spray. By the twentieth of December, workmen occupied with the unloading of the contaminated beets started being taken ill. This was followed by cases among the workmen occupied with the first processing step. As the processing of the contaminated beets took turn with the local beets, the source of contamination was protracted until the first ten days of February. Percentages of the total number of cases which occurred during the various time periods are as follows: 20.7% in the last 10 days of December, 34% in the first ten days in January, and 17% in the first ten days of February. All of the residents of (the nearby) populated areas who became ill worked at the sugar beets plant. 94.4% of the cases were in workmen who were utilized during the first processing step in the beet warehouse and 5.6% were in employees of the

plant who had occasion to visit the workshop where the first processing took place. Of the total cases, 58.5% were in men and 41.5 were in women which is representative of the entire strength of workers (apparently, these percentages represent the sex distribution in the plant personnel.)

The younger age group was mainly affected: 90.6% of the stricken individuals were under 40; 26.4% were in the 15-19 age bracket, 45.3% were from 20 to 29 years of age, 18.9% were between 30 and 39 years of age, 5.6% were in the 40-49 year group, and 3.8% were between 50 and 59. (no age distribution for the staff is given).

A tremendous number of individuals contracted tularemia as an infection of internal organs (98.1%) out of these 30.2% were affected in the lungs, which confirms the respiratory character of the infection (watery spray), the abdominal form amounted to 1.9% of the cases whereas the remaining cases of tularemia of internal organs cannot be established, either objectively or subjectively. (Those remaining which are not included in the 30.2% or in the 1.9% where a definite site was established.) The only complaint of the patients was general weakness, with a high temperature, headaches and pain in the arm pits; 1.9% represented patients suffering the angina-bubonic type of tularemia. Most cases were of an average gravity and there were no fatalities.

A considerable number of patients was hospitalized in the local hospital. They were diagnosed for a long time as "grippe" cases or "Suspected typhus". After repeated negative results of the Weil-Felix test, the blood of several patients was sent to the regional laboratory, where after several serological tests, a high titered agglutination with tularemic antigen was observed. After this all patients were examined serologically and showed a high titered agglutination (to tularensis antigen?). It is to be noted that during the previous (?) 10 years there were no tularemia cases in this region.

Following these observations, a study of sugar beets was carried out.

Cultures of *B. tularensis* were obtained by passing (Injecting or feeding?) wash water from the beets into white mice. These animals were also fed with the gnawed portions of the beets (stated as root fructose). The non-existence of infection from the contaminated beets among the local rodents and the absence of human cases of tularemia connected with such a rodent infestation is attributed to the fact that the beets were surrounded by a water filled ditch which mice and other rodents could not traverse.

In view of the tardy report (from the point of shipment?) announcing the epidemic, prophylactic measures were taken only during the latter part of January. All workers, employees and other individuals staying at the beet processing plant were inoculated against tularemia. Only individuals who had had the disease and inoculated persons were allowed to enter the shop where the first processing step was carried out. Within the plant boundaries rodents were exterminated. Among the workers and their families an intensified sanitary program was initiated. However, it is hard to determine if the decrease of the epidemic was due to the prophylactic measures, as the transported shipment of beets had been completely processed by the middle of February (second ten days). In order to explain the significance of the prophylactic measures at the time when the occupational disease broke out, we wish to quote an example of a case which occurred in one of the towns during the same year.

In January the local health board received a report from the health authorities of the shipping point stating that the town, which was stricken by a tularemic epidemic had dispatched a considerable shipment of barley for beer brewing purposes. This town had no previous record of tularemia cases.

All brewery workers were immediately inoculated (vaccinated against tularemia?). To preserve the grain, it was loaded into a warehouse which was secured from the entry of rodents (the storage structure was a stone building with a cement floor, with an entrance door half a meter from the ground and an

iron covered threshold of 30 cm. with a screen covering all ventilation holes.)

The incoming grain shipment was inspected in the freight cars and a corpse of a house mouse was discovered. The corpse, as well as samples of the grain, were taken to the laboratory for analysis. The entire unloading, transportation and storing of the grain was carried out under the supervision of local health workers. In order to avoid the contamination of the local rodents with tularemia, the grain was first processed by a method of heating it to 70° (C?) which made it harmless. The leftover grain which was utilized as cattle fodder was also subjected to this method. Systematic extermination of rodents was carried out at the plant. Although the corpse of the house mouse and the sample of grain showed *B. tularensis* culture, there were no cases among the plant workers nor in the adjacent township.

The above confirms that cases connected with industrial processing of agricultural products, contaminated through rodents, represent a rather well-outlined type of infection. The past cases were distinguished by their concentration (High rate of infection?) and their severity. Individuals working at one plant are stricken. The moment the source is liquidated the cases cease. The past cases were characterized by their considerable extent and wide territory covered and served as a control. (meaning not clear). From the agricultural cases described by us, it appears that they strike entirely occupational workers and usually arise in towns and worker colonies. Finally, from both above mentioned types described by us, the cases were different (from each other?) in that they originated without the increase of the number of rodents and in view of the tularemic epizootic which took place in the district in question. (This seems to mean that the respiratory cases from sugar beet processing were differentiated from the contact cases encountered in meat processing).

All this requires constant inspection on the part of sanitary officials and the carrying out of prophylactic measures which must be different from

the measures carried out in connection with usual (past) agriculture cases.

In connection with this we submit cases connected with the occupational processing of agricultural products. Such cases are singled out into an independent type and we could call it "occupational" including into them (this type?) a group of cases connected with the epizootic among mice and rodents, in line with agricultural past (customary or contact cases) and trench cases (Maisky 1945, Katenever 1948).

The following is characteristic with tularemic cases; (1) the primary source of infection--diseased house mice, gray rodents and their corpses; (2) Factors of passing of infection--products of agriculture, (grain, potatoes, beets, sunflower seeds, etc.) contaminated by sick rodents; (3) Conditions under which the cases occur--processing of agricultural products in factories; (4) affected category--factory workers mentioned above; (5) mechanism of infection assumes an aspiration character (dust, spray) possible alimentary (eating with dirty hands) and contact types (contact with corpses of rodents); (6) The season of infection--a few months following epizootics among mice & rodents (Oct-May);

The procedure of prophylactic measures must include (a) compulsory vaccination against tularemia of all individuals presently working and newly hired on plants occupied with the processing of agricultural products (distilleries, breweries, starch making, vegetable plants, sugar plants, creameries, elevators, and wind mills; (b) Forbidding of shipment from a district struck by a tularemia epizootic of agricultural products without a careful decontamination (in accordance with instructions) (c) If a shipment of products from the above mentioned districts has been accidentally made, the sanitary officials of the destination must be notified immediately (d) Suspicious looking curde products must be isolated from the local rodents (loading into warehouses secured from rodents or when on open platforms they should be

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...surrounded by a moat of 60 cm depth and a width of 40 cm.; (a) carrying out of a careful and regular anti-rat program in the territory of the factory; (f) Decontamination of suspicious curde products received in accordance with instructions of the Ministry of Health of the USSR published in 1948.

A careful and timely program using the above mentioned measures would eliminate entirely not only the occupational but also the sporadic cases.