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REPORT ON ZONOSSES AND FOOD HYGIENE IN LEBANON



FOR THE

SEMINAR ON ZONOSSES FOOD HYGIENE AND VETERINARY

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الجمهورية اللبنانية  
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Republic of Lebanon  
Office of the Minister of State for Administrative Reform  
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## Lebanon : Ecological Background

Lebanon is situated at the eastern shore of the Mediterranean sea, and roughly comprises three distinct topographical zones, namely:

- (i) The coastal strip, lying between the mountains and the sea and varying in width from a few meters up to four kilometers.
- (ii) The main range of the Lebanon mountains running parallel with the coast and rising in places to a height of almost 3000 meters.
- (iii) The inland plateau (The Bekka'a) lying between the Lebanon and Anti-Lebanon Mountains.

The climate shows two distinct seasons in the year, namely, a cool wet season from November to April and a hot dry season from May to October. The mean annual temperature lies between 20°C and 25°C but ~~actual~~ winter and summer temperatures vary considerably according to altitude and distance from the coast. Agriculture is extensively practised and a wide variety of crops grown. Irrigation, made necessary by the long dry season, is almost universally practised. There is no discernable pattern in the use of fertilizers; chemical fertilizers are now almost everywhere employed.

Lebanon has an area of 4000 sq. miles and an estimated population of 2,000,000.

Politically Lebanon is<sup>a</sup> Republic and is divided into 5 governorates (Mohafaza) of North Lebanon, Mount-Lebanon, Bekaa, South Lebanon and Beirut. Each of these, except Beirut, is divided into districts (Aqdyat).

From the religious point of view, Lebanese population is equally divided into Christians and Moslems, each of these being subdivided into many sects.

1. Echinococcosis is an important problem in Lebanon, in human and animals as well. It is known that hydatid cysts are frequent in sheep and cattle in the Middle-East. In 1936 Turner and al<sup>(33)</sup> reported an incidence of 22.1 % of hydatid infection among 1156 sheep and goats at Beirut abattoirs. The incidence was 28.5 % in Damascus, 41.4 % in Homs and 27.8% in Aleppo. In 1948 Pipkin and al.<sup>(23)</sup> found that 32.9 % of 237 stray dogs harbored T. echinococcus; in a first series of 2100 slaughtered sheep they found 6.6 % with hydatid cysts; in a second series of 500 slaughtered female sheep the incidence was 11.6 %. As for the human disease they reported 385 human cases for the period 1923-1949, including Lebanon, Syria, Palestine and Iraq.

Hospital records are the only source of data on human hydatid disease in Lebanon at the present time, since Echinococcosis is not a reportable disease. It follows that surgeons were the first to make report studies on human echinococcosis; Dr. A. Makhlouf and Dr. Y. Jidejian. The latter<sup>(16)</sup> reported a series of 190 cases, of these 100 were women and 90 were men 120 were christians, 56 moslems, 14 Jews; 112 were Lebanese, 41 Syrians, 21 Iraqis, 12 Palestinians, 3 Turks and one Rumanian; 106 had cysts in the liver, 57 in the lungs, 8 in the kidneys, 7 in the spleen, 12 in other locations.

An extensive study on the epidemiology of echinococcosis in the Middle-East was undertaken by C.W. Schwabe and al.<sup>(29)</sup> Case findings of human infections in Lebanon showed that for the period 1949-1959, the average number of surgical cases of hydatid disease per year among Lebanese was 63. The case rate was 3.82 per 100.000 population per year. The heaviest concentration of cases was in Beirut and its outskirts.

Case rates were much higher among christians (5.00) than among moslems (2.24) and among armenians (8.18) than among the general population. Age specific rates for age at operation for patients from Beirut showed that operations were performed with equal frequency among individuals 20 to 60 years of age. An unusually high percentage of infected males were shoemakers.

Finally, Garabedian and al.<sup>(6)</sup> of the American University of Beirut, developed an Indirect Hemagglutination test for the serological diagnosis of hydatid disease.

## 2. Other parasitic diseases:

Taenia saginata infections have been studied along with other intestinal parasites and many reports of their incidence exist in the medical journals. The most extensive study was made by Watson and al.<sup>(36)</sup> in which T. saginata infection is reported to be 19.8 % of the total population of Lebanon. This high incidence reflects the fondness of the population for raw meat.

Trichinosis is actually non existant. The most recent outbreak was reported by Mérab and al.<sup>(22)</sup> in 1951 and occured at Becharreh, a village of North-Lebanon; 17 people were ill after eating pork meat which was declared unsafe by the sanitary inspector. Previously in 1939 an outbreak of 500 cases occured in Beirut.<sup>(26)</sup> An investigation in the abattoirs revealed that, of the 3000 porks slaughtered, 25 % were infested with Trichinella spiralis; rats were infested in the proportion of 36 % .Another small outbreak occured in 1945<sup>(34)</sup>, and a review was then made by Rizk and Berberian<sup>(24)</sup>. However, since 1951, Trichinosis has not been reported in Lebanon.

In 1905 Dr. A.Khoury<sup>(17)</sup> described a local disease, characterized by edematous congestion of the naso-pharynx, which, in severe cases, resulted in dyspnea, dysphagia, deafness, asphyxia and death. He attributed the condition to young immature forms of Fasciola hepatica - (He named it Halzoun) - following ingestion of raw liver of sheep, a food habit of the Lebanese people. There is, however, no proof for this etiology and Witenberg<sup>(37)</sup>, in discussing "Halzoun", suggested leech infestation as a more probable etiology, while the report of Watson and Abdel Kerim<sup>(35)</sup> is suggestive for a possible dual etiology. The question was reviewed by C.W. Schwabe<sup>(28)</sup> who pointed out to the need for more investigations and to the cooperation of physicians to the solution of this problem.

### 3. Bacterial diseases:

Statistics on bacterial zoonosis are non existing or not reliable in this country.

Bovine tuberculosis exists but we do not know to what extent. However human tuberculosis of bovine origin is extremely rare. From 1958 to 1963 the Central Public Health Laboratory could not isolate a single bovine type of Mycobacterium tuberculosis from human sources; 100 human type were isolated out of 1550 specimens, mainly sputa<sup>(5)</sup>.

Using serological methods, Asmar<sup>(2)</sup> demonstrated the presence of Leptospirosis in animals (cattle, dogs, rats). Garabedian and Mattossian<sup>(7)</sup> isolated Leptospira icterohemorrhagiae from kidney biopsies of Rattus norvegicus captured in various sections of Beirut city.

However human leptospirosis has never been reported in Lebanon so far.

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The extent of Salmonellosis in animals is not exactly known, although Salmonella food poisoning is frequent in this country but not reported. Only important outbreaks are investigated. In one such outbreak, 600 people were involved after eating bull meat; <sup>(20)</sup> S.dublin was isolated from the meat and from the patients. Salmonella isolated from other outbreaks are: S. enteritidis, S. bovismorbificans and <sup>(20)</sup> S. typhimurium.

Anthrax occurs occasionally in Lebanon in the form of a "malignant pustule"; but the extent of the disease in animals and humans is not known. In 1961 Ghossain and Hatem <sup>(10)</sup> reported a case of intestinal anthrax in a young man and in 1963 they published about <sup>(11)</sup> 14 cases of intestinal anthrax from the Baalbeck district, and a retrospective diagnosis of 27 other cases which occurred before 1961 but were not diagnosed at that time. Mass vaccination of sheep and cattle by the Ministry of Agriculture reduced greatly the incidence of human infection but did not eradicate it completely.

The extent of animal Brucellosis in Lebanon was shown by L. M. Stephen in 1957 <sup>(31)</sup>. Blood samples obtained from Lebanese dairy cows were examined and revealed that 36.3% of 11 herds contained infected cows, and 21.4% of 126 cows were infected with brucellosis. Examination of milk sold in the streets of Beirut showed that 18.3% of 60 samples were positive to the milk ring test. Of 15 herds pooled shipments of milk to two pasteurizing plants in Beirut, 26.6% were positive with the milk ring test.

Statistics are not available on human Brucellosis.

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4. Viral Diseases:

Excellent statistics for human Rabies exist in Lebanon since all bitten persons must consult at the "Rabies Institute" of the Ministry of Health, located in Beirut. For the period 1948-1958<sup>(12)</sup>; 5,501 were vaccinated against rabies; 34 persons died from rabies, of these 21 were not treated; 13 died in spite of vaccination. Statistics on animal rabies are not available. Since April 1964 the Virology Department of the Central Public Health Laboratory has made available a regular and complete diagnosis of rabies.

<sup>(25)</sup> Rizk has demonstrated the endemicity of Q fever in Lebanon, Syria, Jordan, Palestine, Iraq, Saudi Arabia and Cyprus, among sheep, goats, cattle and camels as well as in humans by the use of the complement-fixation test. A total of 1429 human sera tested revealed a percentage of 7.4 positive reactors. Similar serological investigations<sup>(8)</sup> were carried out by Garabedian and al on 450 human sera, which revealed an average of 19.3% positive reactors in all age groups, the highest incidence<sup>(22%)</sup> was found in the group age 0-4 years. The number of positive reactors in the occupational group which included dairy workers, farmers and butchers, was found to be much higher (39%) as compared to the numbers of positive reactors in other occupational groups (14 to 20%).<sup>(32)</sup> Stephen demonstrated also that Q fever was endemic in cattle and goats in Lebanon. Garabedian and al<sup>(9)</sup> demonstrated the presence of C. burneti in cattle, sheep and goat milk by guineapig inoculation. The authors believe that raw milk and raw milk products are probably an important way of transmission of Q fever to children in Lebanon.

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Other possibilities are the inhalation of contaminated dust and the eating of raw meat. Serological diagnosis of clinical manifestations of Q fever was made on 3 occasions: Scott<sup>(30)</sup> reported two cases in foreigners but there is strong evidence that the infection was acquired elsewhere. Saliba<sup>(27)</sup> reported 2 cases of acute pericarditis due to Q fever, and Hatem<sup>(13)</sup> reported the diagnosis of Q fever in a case of febrile illness in a woman returning from the Mecca pilgrimage. More clinical and epidemiological studies are needed to comprehend the various manifestations of the disease in Lebanon.

Serological evidence of Psittacosis in humans was shown by Garabedian and Matossian<sup>(7)</sup> during 1960-1961. 544 blood samples obtained from healthy Lebanese residents in various age-groups from Beirut, were studied by the use of C.F. test using "Lygranum" as antigen. Since L.G.V. is a rare disease in Lebanon and since trachoma is localized in certain Southern and Northern underdeveloped areas, it was assumed that the antibodies were due to infection with the psittacosis-ornithosis group. Antibodies start developing early in life and reach a percentage of 10-15% in adult life. Similar observations were made by Hatem<sup>(13)</sup>. The first evidence of human infection confirmed by laboratory test was provided by Hatem<sup>(13)</sup> in a case of pleuro - pericarditis. The patient, a soldier, was hospitalized at the Military Hospital in Beirut, and Q fever was suspected by Dr. E. Stephan. However the laboratory brought definite evidence of infection with the Psittacosis-Ornithosis group of viruses. The infection was traced back to a pet bird (not psittacine) but unfortunately no laboratory investigations could be done on the bird.

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Pigeons are suspected to be the main source of infection in Lebanon but this needs confirmation and more extensive studies on humans and birds.

Laboratory studies of arthropod-borne viruses in Lebanon are carried out by G. Garabedian and R. Matossian<sup>(7)</sup> since 1955. It is apparent from the results that a large percentage (43% in the age group 30-69 and 15% in the age group 0-29) of residents in Lebanon show H-I antibodies to group B arbo-viruses tested. Yellow fever is absent from Lebanon and the last epidemic of dengue fever occurred in Lebanon in 1946. Thus, it is most likely that the antibodies encountered against group B arboviruses in H-I tests, were in all probability, due to infection with West Nile virus. Nevertheless such a conclusion should be accepted with great reservation.

The extent of Rickettsiosis was investigated and reviewed recently by Matossian and al<sup>(19)</sup> : 16.74% of serum samples from humans and 35.8% of serum samples from rats were found to contain antibodies for typhus rickettsiae. C.F. antibodies against spotted fever group antigen are present in the blood of a low percentage of the population of Lebanon. Furthermore the disease appears to be endemic in domestic and/or wild ~~rats~~<sup>animals</sup> of Lebanon, as evidenced by the presence of antibodies among dogs, badgers, foxes, donkeys and hedgehogs. However, as to whether the presence of the antibodies to spotted fever antigen in humans and animals is the result of infection with R. conori (boutonneuse fever) or to some other antigenically related rickettsiae, remains to be determined.

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Food-borne diseases and Food hygiene in Lebanon

1. Food-borne disease is frequent in Lebanon, the origin of it being mostly meat, milk and their products. Botulism has never been reported in this country. Poisoning due to fruits or vegetables, contaminated with insecticides<sup>(21)</sup> of the organo-phosphorus group, are on the increase. Intestinal anthrax<sup>(11)</sup>, is localized to some rural areas of the Bekaa. Poisoning due to mushrooms<sup>(18)</sup> is extremely rare. Trichinosis<sup>(22)</sup> has not been reported since the last outbreak of 1952. Q fever<sup>(8)</sup> and Brucellosis<sup>(31)</sup> are mainly occupational and rural diseases in people concerned with slaughtering and handling of animals and drinking raw milk. The incidence of bovine tuberculosis in humans is certainly negligible. The incidence of parasitism with T. saginata is 19.8% according to Watson<sup>(36)</sup>.

It is thought that the most important food-borne disease in Lebanon is due to the Staphylococcus enterotoxin. Its main vehicle is home-made white cheese produced from non-pasteurized milk and in poor sanitary conditions. This was first shown by A. Berberian<sup>(4)</sup> in 1945. Another vehicle is locally-produced ice-cream. An outbreak involving 200 persons was reported by Hatem<sup>(14)</sup> in 1960. Next in importance are food-borne diseases due to Salmonella, as already pointed out in the chapter on Zoonoses; a report on two outbreaks were reported in 1953 by Azar and Dowdeswell<sup>(3)</sup>.

An idea of the extent of food-borne disease can be gathered from the study made by Merab and al<sup>(20)</sup> in 1961. 77 outbreaks occurred in 2 1/2 years, totalizing 1100 patients, 80% of which were

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caused by meat or milk or their products. This concerned only the city of Beirut and its vicinity. 36% of the outbreaks were of staphylococcal origin, 23% were caused by Salmonella, and 5.2% by insecticides.

4. Food-hygiene: It is apparent that food hygiene in Lebanon is not ideal yet. Legislation on food, milk, food-handlers, slaughtering of animals and inspection of meat: does exist but cannot be enforced due to lack of trained and qualified personnel. Also, education of the public is needed greatly.

However some achievements have already been done: The Ministry of Health (Director General: Dr. J. Anouti) and the Central Public Health Laboratory (Director: Dr. E. Hayek) provide laboratory facilities for the control of food & milk products. <sup>(15)</sup> ~~Ha~~tem pointed out, the importance of this laboratory in the sanitary control of milk products.

The Animal Health Laboratory of the Ministry of Agriculture is devoted to research and prevention of animal disease and specially to chicken disease. Within a year, modern abattoirs will serve Beirut and its vicinity, and other smaller abattoirs are also planned for other towns. Laboratory examination of food-handlers are carried out at the Central P.H. Laboratory for the last 2 years but are limited in number due to the lack of laboratory personnel. An important project for the production of pasteurized milk is under study. No doubt that food hygiene has improved and is improving but definitely more qualified personnel is needed for sanitary inspection, laboratory investigations and public health educations.

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Food Habits in Lebanon:

Many socio-economic factors play an important role in food hygiene and food borne disease. The custom of eating raw meat and raw sheep liver and drinking raw milk constitute the leading factors in the etiology of many food borne disease: Taenia saginata infection, intestinal anthrax, brucellosis, Q fever, Salmonellosis, tuberculosis and others. Poor standard of living, poor hygiene, and lack of education are important factors in the etiology of staphylococcal food-poisoning. The increasing number of refrigerators available in the population has decreased the incidence of staphylococcal food-poisoning.

However, positive contributions of the peoples of the Middle-East and of the Far East have been made since prehistoric time in the preservation of food materials; such antique methods, still used to day, include parboiled wheat (burghul), dried milk (jubjub), butter oil (Ghee, Samneh), leban or yoghurt, kishik, fish sauce (Nuoc Mam) and fish paste (bagoong), to which must be added all varieties of cheese.

This aspect of food hygiene was reviewed and investigated recently by Adolph<sup>(1)</sup> in 1955 who pointed out that these early discoveries are worthy of more detailed study.

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