Human Brucellosis in Israel: The Saga Continues

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Human brucellosis (HB) is a common, if not the commonest, zoonosis worldwide [1,2]. HB is caused primarily by ingestion of unpasteurized dairy products, such as fresh goat milk or soft cheeses. The disease is highly prevalent in the Arabian Peninsula, Mediterranean region, Eastern Europe, and parts of Mexico and Central and South America [1]. Although several areas traditionally considered to be endemic, such as Latin America and France, have achieved control of the disease, the situation in Israel is more complex as described in the paper by Ghanem-Zoubi et al. in this issue of *IMAJ* [3]. After a decline (but not eradication) of HB in Israel in the late 1990s, rates began to climb again in the first decade of the 21st century [4].

Dr. Ghanem-Zoubi and colleagues [3] describe the current epidemiology of HB in Israel. They clearly show a fourfold increase of HB in the general population from 2009 to 2014, with over 95% of cases occurring among Arabs. Thus, the incidence in the Arab population in Israel was reported to be as high as 33.5 per 100,000 in 2014, whereas the parallel incidence in the total Israeli population was 7.3 per 100,000; high incidence was defined as ≥ 10 per 100,000/year [3]. In comparison, the 2014 HB rates were 1.2, 0.5, and 0.1 for Greece, Portugal, and Spain, respectively, countries with the highest rates within the European Union [5]. HB in Israel is almost exclusively a disease afflicting minorities, mainly Arabs and Druze [3,4,6]. This predilection is multifactorial and probably stems from unlicensed and unvaccinated family-owned flocks of goats and sheep, traditional preparation of homemade unpasteurized dairy foods, door-to-door selling of these products, and insufficient awareness regarding modes of transmission and prevention of disease [4,6]. Additional factors complicate the situation in Israel: inherent difficulties in monitoring and control by the Ministry of Health (MOH) of homemade production and selling of dairy products, premature cancelling in 1997 of a successful *Brucella* eradication program in small ruminants of the Ministry of Agriculture (MOA) due to insufficient funds, political struggles due to lack of sufficient MOA veterinarians for the task of reducing *Brucella* rates in southern Israel, smuggling of small ruminant herds from the Palestinian Authority (PA) into Israel combined with *Brucella* vaccine shortages in the PA, unexpected HB outbreak sources such as unpasteurized camel milk, and the surprising finding that exposure to HB does not enhance safer preventive behaviors, e.g., people living in towns with reported HB continue to consume more dairy products from non-regulated sources [3,4,6-9].

Elucidating the epidemiology of HB in Israel is further complicated by difficulties in HB diagnosis and the under-reporting of disease. Blood cultures provide direct evidence of infection in 60–70% of cases but are rarely used by the Israeli health maintenance organizations in community settings. Serology is used for diagnosis but has limitations and at best can provide indirect evidence of disease. The serum agglutination test, developed by Bruce, remains the most popular diagnostic tool. Titers of 1:160 and above are considered diagnostic in conjunction with a compatible clinical illness [10]. Some recommend using a titer of 1:320 in endemic areas to decrease false-positive rates, but doing so would lower the sensitivity of HB diagnosis from 92% (with a 1:160 titer) to 83% (with a 1:320 titer) as compared to the gold standard of positive *Brucella* blood cultures [11]. Confirmation of local serology testing by the Israeli National Reference Center (Kimron Veterinary Institute, Beit Dagan) is important but not all local tests are sent for confirmation. HB under-reporting, despite mandatory reporting guidelines, is very likely. For example, in the paper by Dr. Ghanem-Zoubi's group, MOH data indicate 301 HB cases in southern Israel in 2010–2012, but in a recent paper focusing on the cost of HB in southern Israel 614 cases were found during the same years using identical case definition, suggesting that only 50% of cases are actually reported to the MOH [3,12]. This of course would cause major underestimation of the true prevalence of HB in Israel.

The title of the paper by Ghanem-Zoubi et al. is "Reemergence of human brucellosis in Israel" [3]. However, reemergence implies disappearance or almost complete disappearance of HB in the past, and this goal has never been achieved. In fact, in most years significant numbers of HB cases occurred in the Negev endemic area in southern Israel with an additional relatively small number of cases in other regions. Also, during the last two decades local outbreaks occurred in areas outside southern Israel such as the Galilee, Hasharon and Jerusalem regions [3,4,6]. Furthermore, the high activity of the disease continued in 2016–18 according to the online weekly data update of the MOH [13]. In the last large epidemic in Israel in 2014, different *Brucella* serovars linked to various geographic areas were detected, implicating multiple local sources and

not necessarily the spread of disease from southern Israel [6].

HB is a disease of low mortality but of high and significant morbidity affecting all ages; furthermore, HB is shown to increase healthcare utilization costs [6,12,14]. HB in Israel is almost exclusively a disease of the Arab population with unfortunately high annual rates of disease. Control of HB is possible, as evidenced in other countries, but in Israel has never been achieved. In order to eradicate brucellosis we must not continue to accept these high rates as a given fact. As a first step in achieving this goal, improved brucellosis data accuracy in both humans and animals is needed. A coordinated and structured multifaceted intervention including the healthcare and agriculture services, community, local authorities, and the media is urgently required. HB, like other infectious diseases, is not limited by borders and boundaries, implying that better cooperation with our neighbors, Jordan and the PA, is an important part of HB control. As witnessed recently, other zoonotic diseases are on the rise in Israel including leptospirosis, west Nile fever, and leishmaniasis, necessitating in-depth rethinking of how to control and prevent these public health threats.

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Capsule

Effects of aerobic and resistance exercise in older adults with rheumatoid arthritis: a randomized controlled trial

Lange et al. evaluated the effect of a moderate-to-high intensity aerobic and resistance exercise with person-centered guidance for older adults with rheumatoid arthritis (RA) through a randomized controlled multicenter trial. Older adults (ages 65–75 years) with RA (n=74) were randomized to either a 20-week exercise intervention at a gym (n=36) or to home-based exercise of light intensity (n=38). Assessments were performed at baseline, at 20 weeks, and at 12 months. The primary outcome was the difference in the Health Assessment Questionnaire disability index (HAQ DI) score, and the secondary outcomes were the differences in physical fitness assessed by a cardiopulmonary exercise test, an endurance test, the timed up-and-go test, the sit-to-stand test, and an isometric elbow flexion force measurement. No significant differences between the groups were found for the primary outcome, HAQ DI score. Within the intervention group there was a significant improvement in the HAQ DI score when compared to baseline ($P = 0.022$). Aerobic capacity ($P < 0.001$) and three of four additional performance-based tests of endurance and strength significantly improved ($P < 0.05$) in the intervention group when compared to the control group. In the intervention group, 71% of patients rated their health as much or very much improved compared to 24% of patients in the control group ($P < 0.001$). At the 12-month follow-up, there were no significant differences in change between the two groups on the HAQ DI score. A significant between-group difference was found for change in an endurance test ($P = 0.022$).

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Eitan Israeli

"The recipe for perpetual ignorance is: be satisfied with your opinions and content with your knowledge"

Elbert Green Hubbard (1856–1915), American writer, publisher, artist, and philosopher