

Exposure of abattoirs workers to rift valley fever virus infection in Southwestern Saudi Arabia

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ABSTRACT

Objective: To measure seroprevalence of Rift Valley Fever virus infection among abattoirs workers in Southwestern Saudi Arabia. **Materials and Methods:** Abattoirs in the region (Jazan, Aseer and Al Qunfuda) were visited. Veterinarians and butchers were studied. Blood samples were then taken and tested for RVF-specific IgG and IgM (ELISAs). **Results:** The present study included 62 abattoir workers. None of whom tested were positive for RVF specific IgM. The overall prevalence of RVF IgG among butchers reached 8% (95% CI: 1.3 - 75.8). Among the 31 Bengali butchers 3 were RVF IgG positive giving a prevalence of 9.7 % (95% CI: 2.0 - 25.8), while among four Saudi butchers one was RVF IgG positive (25%, 95% CI: 1.3 - 75.8). **Conclusions:** The study documented the lack of recent RVF activity among abattoirs workers. High-risk, occupationally exposed abattoir workers represent a useful sentinel population for surveillance of RVF, especially in the absence of clinical disease.

Keywords: Rift Valley Fever; Sero-Epidemiologic Studies; Abattoirs; Saudi Arabia

1. INTRODUCTION

Rift valley fever virus infection (RVF) outbreaks have been reported in the southern region of Saudi Arabia [1,2]. By the end of the outbreak (22 September 2001) the total number of hospitalized cases amounted to 884 of whom 843 were laboratory confirmed [3]. No RVF outbreaks or human cases have been reported in the Kingdom of Saudi Arabia since then.

Slaughterhouse work involves stressful and tiring tasks. Those workers suffer from serious occupational

injuries and health problems including musculoskeletal disorders, zoonoses, skin conditions and injuries related to animals and sharp instruments. Studies in developed countries showed that abattoir workers are generally low-skill staff have no control over their job tasks and may not be aware of the determinants affecting their health [4].

The objective of the work was to estimate seroprevalence of Rift Valley Fever virus infection among abattoir workers in Southwestern regions of Saudi Arabia.

2. MATERIALS AND METHODS

2.1. Study Area

The study area (**Figure 1**) included Jazan, Aseer regions and Al Qunfuda area in the Makkah region. Jizan area is located in the southwest of Saudi Arabia, bordering the northwestern region of Yemen. The Aseer region is located in the southwest of Saudi Arabia The region extends from the high mountains of Sarawat to the Red Sea, and lies few kilometers from the northern border of neighboring Yemen. The Aseer region is bordering Jazan and is located to its northeast. Al Qunfuda is a further northward extension of this coastal plain in the Makah region [5].

2.2. Study Population

Abattoirs within the study areas were identified. Communication with preventive sectors in the concerned directorate of health affairs and local municipalities were made. Letters of approval (explaining the objectives of the project and asking for their consent and cooperation) were given to each abattoir director to ensure full cooperation. During late 2008 and through a series of field trips, abattoirs were visited. Workers (Veterinarians, butchers and clerks) present during the visit were included in the study. Informed consents were obtained from each individual to be included in the present study.

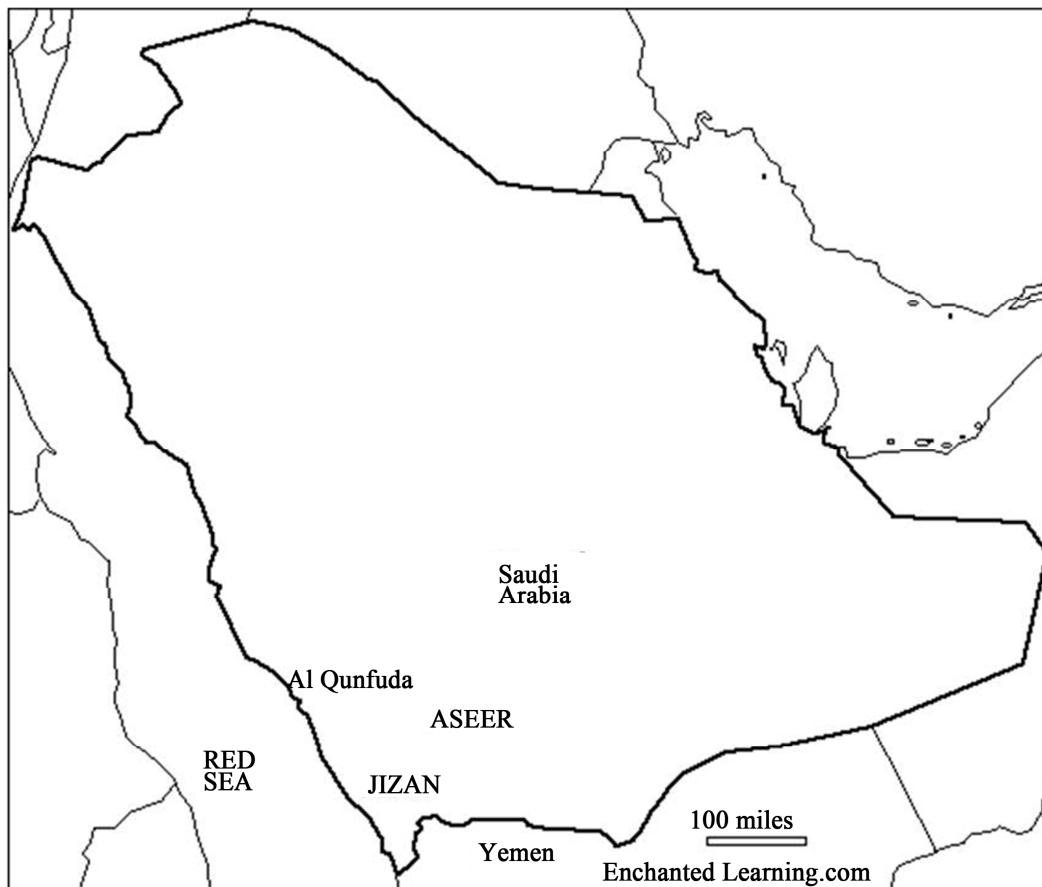


Figure 1. Map of Saudi Arabia showing the study area; Jizan, Aseer and Al Qunfuda area.

2.3. Blood Sampling

About 5 - 10 ml venous Blood samples in plain tubes were taken from each participant and were allowed to clot at room temperature (range 18°C to 20°C). Samples were then centrifuged at 10,000 rpm for 10 minutes and the separated sera were aliquotted into 2 portions and stored at -20°C until transported in Styrofoam boxes containing dry ice (solid carbon dioxide, -40°C) to the Virus Lab of Abha college of Medicine. All samples were received there in a frozen state, and were grouped by the area of collection and stored in classified boxes in deep freezers at -20°C.

2.4. Serologic Tests

Testing of Sera for RVF-Specific IgG and IgM Antibodies

RVF kits were provided as bulk reagents to be further processed prior to testing. The kit "RVF IgG ELISA" (Batch # 2007-11), is manufactured, standardized and provided by the National Institute of Communicable Diseases, Special pathogens Unit, Johannesburg, South Africa. All relevant reagents were supplied with the kits

including the controls. RVF-specific IgM assays were performed utilizing kits from the supplier mentioned above (RVF IgM ELISA, Batch # 2007-11). The manufacturer's protocols were strictly followed in performing and evaluating the results.

2.5. Statistical Analysis

Data were coded, validated and analyzed using SPSS PC + version 13 software package. Frequency, percentage, arithmetic mean, median, mode and 95% confidence intervals of the estimate were used to present the data.

3. RESULTS

3.1. Description of the Study Sample

The present study included 62 persons working in abattoirs in the study regions (**Table 1**). They included 50 butchers (80.6%), 10 veterinarians (16.1%) and 2 clerk workers (3.3%). Their age ranged from 19 years to 60 years with an average of 36.77 ± 10.29 years and a median of 35 years. The majority of butchers were Bengali (31.62%), followed by Indians (5.10%), Saudis (4.8%) Sudanese (4.8%) and Egyptians (3.6%). Veterinarians

Table 1. Seroprevalence of RVF IgG among the study sample of abattoirs workers in Southwestern Saudi Arabia (N = 62).

Variables	No. Examined	%	No. Positive	Prevalence (%)	95% Confidence Interval
Occupation Group					
Butchers	50	80.6	4	8	2.8 - 17.4
Veterinarians	10	16.1	0	0	-
Clerks	2	3.3	0	0	-
TOTAL	62	100	4	6.5	1.8 - 15.7
Nationality of Butchers					
Saudi	4	8	1	25	1.3 - 75.8
Bengali	31	62	3	9.7	2.0 - 25.8
Indian	5	10	0	0	-
Sudanese	4	8	0	0	-
Yemeni	3	6	0	0	-
Egyptian	3	6	0	0	-
TOTAL	50	100	4	8	-

were mostly Egyptians (8.80%) and Sudanese (2.20%). The clerks were Saudis. The period of stay of non Saudis in slaughter houses ranged from 3 year to 35 years with an average of 10.38 ± 7.24 years and a median of 8 years. The majority of workers (39, 62.9%) had no complaints at all in the six months period prior to the survey. The most frequent complaints were back pain (9, 14.5%) followed by headache (4, 6.5%).

3.2. Sero-Prevalence of Rift Valley Fever Virus Infection

3.2.1. Seroprevalence of RVF-Specific IgM

None of the 62 samples tested for Rift Valley Fever IgM, were positive giving a Seroprevalence of zero %.

3.2.2. Seroprevalence of RVF-Specific IgG

Out of 62 samples tested for Rift Valley Fever IgG, four samples were positive giving a Seroprevalence of 6.5%. The prevalence of RVF IgG among butchers reached 8%. On the other hand, the prevalence among veterinarians and clerk workers was zero percent. Among the studied four Saudi butchers one was positive (25%). Among the 31 Bengali butchers 3 were positive giving a prevalence of 9.7%. On the other hand, none of the studied Egyptian, Sudanese and Indian butchers was found positive. The study showed that the 4 positive cases of Rift valley Fever IgG had no complaints at all in the past 6 months.

4. DISCUSSION

Abattoir workers and herdsmen are at a high risk of acquiring RVF virus infection [6,7]. Among butchers in the studied abattoirs, the RVF IgG seropositivity rate was 8%. This figure is higher than the overall seroprevalence of 6.0% among community based general population

found in a recent study in the same region [8]. A seroprevalence figure of 7.3% was found among abattoirs workers in Tanzania in 2004 before 2007 epidemics [9]. A higher rate of 40% has been documents among abattoir workers in Kenya [7]. Again the higher rate in the Kenyan study could be attributed to cumulative previous exposures to RVF virus. Interestingly, the seropositive abattoir workers were all butchers, among whom the seropositivity rate was 8%. This variability in prevalence may also be explained by mere chance. The seropositive butchers were a Saudi and three Bengalis and were residents of the study region during the outbreak of 2000-2001. Only the Saudi recalled the fact that he was diagnosed as a case of RVFV infection and most likely the remaining 3 were subclinically infected during the outbreak and none of the rest of the abattoir workers gave a history of any illness during 6 past months. This argument is probably true since the entire sero-negative abattoir workers were appointed after the outbreak of 2000-2001 and none of them was positive for RVF-specific IgG or IgM thus ruling out any evidence of previous exposure or recent infection.

While it is difficult to segregate slaughterhouse activities involving exposure to animal tissue, findings during the 1993 outbreak in Egypt demonstrated that those tasks with highest exposure to animal blood, *i.e.*, cutting animals' throats and handling animal parts, were associated with increased risk of infection with RVF virus. This provides further evidence that direct contact with potentially infected animals is a prominent mode of transmission of the virus [10].

The results of the present survey suggest that high-risk, occupationally exposed abattoir workers represent a useful sentinel population for surveillance of RVF, especially in the absence of clinical disease. Abattoir workers in the study regions must adhere to protective measures.

The present study documented a high prevalence of RVF-specific IgG among those workers compared to the general population. These protective measures should include the wearing of masks, gloves, aprons and other protective barriers. Regular use of soap, water and anti-septics on exposed body parts should be encouraged during their practices. The researchers observed the lack of regular adherence of abattoir workers to these protective measures. More comprehensive training program in the region for abattoir workers is needed. A recent study in Portugal among butchers affirmed education as an important link to the two variables: knowledge and attitudes; customs and environment in abattoirs [11]. The training programs for abattoirs workers in the region should incorporate activities that support skills development relevant to real life situations in which the workers can put information into practice. There is a need to develop training methods that proved to change behavior as well as imparting knowledge.

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