



RESEARCH ARTICLE

SEROPREVALENCE OF COXIELLA BURNETII IN BULK TANK MILKSAMPLES OFFERED FOR SALE IN ERZURUM

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Abstract

Coxiellaburnetii is an obligate intracellular Gram-negative bacterium that causes Q fever in humans. Detection of Coxiellaburnetii in raw milk sample is accomplished by polymerase chain reaction (PCR) or enzyme-linked immunosorbent assay (ELISA) methods. This study was aimed to determine the seroprevalence of coxiellaburnetii in bulk tank milk samples of 24 cattle and 8 goats, which were offered for sale in Erzurum, Turkey. Moreover, pH values were also measured to detect possible relation with pH value and C. burnetii seropositivity of milk sample. C. burnetii was found positive in 16 (66.7%) of the 24 cattle bulk tank milk samples, and 1 (12.5%) of the 8 goat milk. No statistically significant relation was observed between pH values and positivity of cattle bulk tank milk samples. In conclusion, seropositivity of the milk samples were very high in Erzurum, Turkey. The raw milk sold in local market may cause shedding of Q fever. Therefore, the raw milk should be subjected to heat treatment before consumption to prevent possible transmission of Q fever disease.

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Introduction:-

Coxiellaburnetii is an obligate intracellular Gram-negative bacterium that causes Q fever in humans. The disease has been reported in all regions of the world, except New Zealand and Antarctica [1]. C. burnetii may causes to the outbreaks of the disease in humans [2]. These outbreaks can be related to abortions in goat and sheep farms [3]. In cattle, Q fever is mainly subclinical and associated with reproductive disorders [4]. Although shedding of C. burnetii differs among animals, milk is the main route in cattle [5]. Shedding of C. burnetii via the milk causes transmission of the disease to humans [6].

Detection of C. burnetii in raw milk sample is accomplished by polymerase chain reaction (PCR) or enzyme-linked immunosorbent assay (ELISA) methods [7]. ELISA is the widely used test to detect C. burnetii antibodies in milk. Even though the technique is cost-effective and provides the seroprevalance, it can not show the shedders in contrast to real-time PCR [8]. The detection of antibodies in milk samples by using ELISA is more sensitive than the serum [5]. The main disadvantage of the technique is the overestimation of prevalence in milk samples [9].

This study was aimed to determine the seroprevalence of C. burnetii in bulk tank milk samples offered for sale in Erzurum, Turkey.

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Materials and Methods:-

This study was carried out with bulk tank milk samples of 24 cattle and 8 goats, which were offered for sale in the markets of Erzurum, Turkey. The 10ml of milk samples were obtained from the local markets and then transported to the laboratory under a cold chain ($4 \pm 1^\circ\text{C}$) for laboratory analysis. The milk samples were analyzed to detect the antibodies against *C. burnetii* with a commercial ELISA (Idexx Q fever Antibody Kit, LOT No: SN K921 QFT1135T) according to the manufacturer's instructions. Analyzed samples were read in the ELISA reader at 450 nanometer light wavelength. The pH value of milk samples was measured with a pH meter (Orion 3 Star pH Benchtop, Thermo Scientific, USA).

Chi-square test was used to determine the relationship between the seropositivity and the pH of samples. The significance level was accepted as $P < 0.05$. Data were presented as mean $\pm$ standard deviation. All data were analysed using the SPSS20 (IBM Company, Version 20.0, SPSS Inc, USA, 2018) statistical package.

Results:-

Coxiellaburnetii was found positive in 16 (66.7%) of the 24 bulk tank milk samples of cattle. The pH value of *C. burnetii* positive in cattle sample was 6.37 ± 0.24 , whereas the mean value of negative samples was 6.45 ± 0.61 . No statistically significant association was observed between pH values and positivity of cattle milk samples ($P > 0.05$). *Coxiellaburnetii* was found positive in 1 (12.5%) of the 8 bulk tank milk samples of goat. The pH value of *C. burnetii* positive in goat sample was 6.71 ± 0.14 , whereas the mean value of negative samples was 6.82 ± 0.26 . The pH values of both milk samples did not show significant difference ($P > 0.05$).

Discussion:-

Several studies from various countries have investigated the presence of *C. burnetii* in bulk tank milk [10-14]. A study conducted in the Belgium, 57.8% of the 206 samples were reported positive for *C. burnetii* [8]. In a similar study done in Denmark was reported 59% positive for *C. burnetii* [11]. Similar results have also been reported from Netherland [12] and Spain [13]. In this study, *C. burnetii* seropositivity of bulk tank milk of cattle and goat were found as 66.7% and 50%, respectively. The data obtained from this study were consistent with previous report from Iran [14], whereas it was relatively higher than previous report from Turkey, which reported a prevalence of 10.3% for bovine bulk milk samples and 16.8% for ovine bulk milk samples [15]. Another study in Turkey, has reported a *C. burnetii* prevalence of 10% in cows' bulk milk and 4% in goats' or ewes' bulk milk samples [16].

In this study, the higher rates of prevalence of the *C. burnetii* was observed in bovine milk samples compared to the goat milk samples. This finding was in agreement with previous reports [7, 16]. This may be because infected cattle can shed the *C. burnetii* longer time than small ruminants.

The pH value of seropositive cattle and goat bulk tank milk samples were found as 6.37 and 6.71, respectively. This finding was compatible with previous reports [17, 18]. The pH values of both of two milk samples showed a normal distribution. Moreover, the positivity of *C. burnetii* did not effect the pH values of both milk samples as expected.

The main limitation of the current study is the lack of PCR analysis of samples. The number of samples in the studied city was small, which also may effect the rates of the seropositivity. Future work with large sample size is needed to confirm our results.

Conclusion:-

In conclusion, the risk of *C. burnetii* infection by consuming unpasteurized milk may be not negligible. Further studies on the prevalence of *C. burnetii* in bulk tank milk by employing PCR in Turkey are required.

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