



## INCIDENCE OF *YERSINIA ENTEROCOLITICA* IN MILK AND SOME MILK PRODUCTS

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### ABSTRACT

This study investigates the incidence of *Y. enterocolitica* as food borne pathogen in milk samples of different animal species and in some milk products. Moreover, the virulence of the isolated *Y. enterocolitica* was also investigated. Therefore, 225 milk samples from different animal species including buffaloes, cows, sheeps and goats as well as some milk products including cheese, ice cream, yogurt and whey were collected. *Y. enterocolitica* was isolated from 13 samples in an overall percentage of 5.78%. Results of this study highlight the role of milk as a transmission vehicle of potentially pathogenic *Y. enterocolitica* strains, with consequent risks for consumer's health via the consumption of raw milk and unsafe milk products.

**KEYWORDS:** *Y. enterocolitica*, milk samples, consumer's health.

### INTRODUCTION

The genus *Yersinia* comprises 17 Gram-negative species many of which are quite commonly isolated from the environment (Jack and Mikael, 2015). Only 3 species, namely *Y. enterocolitica*, *Y. pestis* and *Y. pseudotuberculosis* are of clinical importance (Skurnik & Toivonen, 2011). Recently, however, the remaining species thought to be non-pathogenic to humans, have been found to possess novel virulence mechanisms, and some of them have been associated with human disease (Bottone, 1997 and Sulakvelidze, 2000). *Yersinia enterocolitica* is a psychrotrophic, gram-negative, facultative anaerobic zoonotic bacterium belonging to the family Enterobacteriaceae (Fredriksson-Ahomaa *et al.*, 2010). The species *Y. enterocolitica* contains a very heterogeneous group of strains that are classified into 6 and over 70 bio- and serotypes, respectively. Biotype 1B and 2-5 strains are considered pathogenic and contain the few serotypes associated with human infections *e.g.* 0:3, 0:5, 27, 0:8 and 0:9 (Anna & Jordi, 2012). A large number of researchers argue that *Yersinia enterocolitica* is a pathogen that can

contaminate most food products, among which we mention pork, beef and lamb meat, milk and milk products, especially raw milk, pasteurized milk, milk powder, cream and ice cream, vegetables, seafood *etc.* (Diana *et al.*, 2007; Floccari *et al.*, 2003; Hanifian and Khani, 2012; Hudson *et al.*, 2008 and Nusrat *et al.*, 2009). *Yersinia enterocolitica*, is responsible for self-limiting enteritis, acute mesenteric lymphadenitis and septicemia, Reiter's syndrome, erythema nodosum, and other conditions (Robins-Brown, 2007).

### MATERIALS & METHODS

225 milk samples from different animal species including 30 buffaloes, 30 cows, 30 sheeps and 30 goats as well as some milk products including 30 cheeses, 30 ice creams, 30 yogurt and 15 whey were collected.

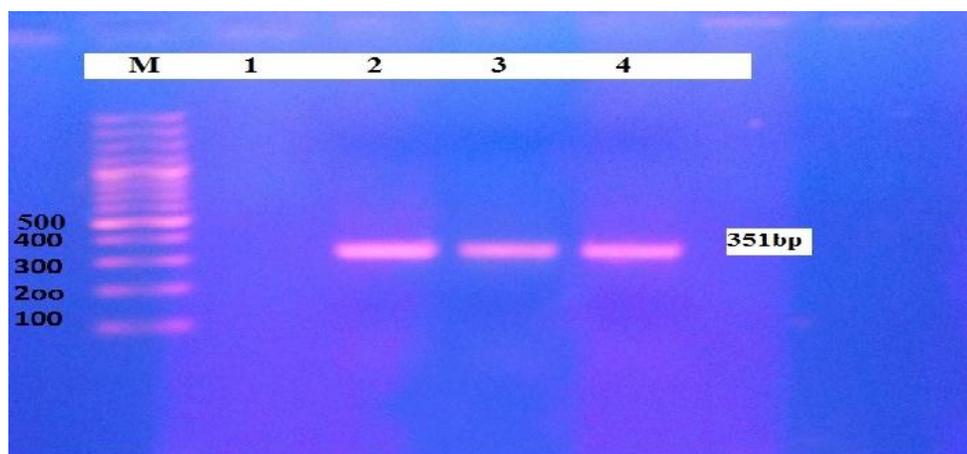
#### *Isolation of Yersinia enterocolitica*

A simplified procedure for isolation was used (according to iso 10273:2003). Biochemical identification and Confirmation of *Yersinia enterocolitica*: (according to FDA-BAM 2007). *PCR for ail gene*: (according to Thoerner *et al.*, 2003).

### RESULT

Table: Total isolation of *Yersinia enterocolitica* from milk and milk product samples.

| Type of samples  | No. of samples | No. of positive | % of positive |
|------------------|----------------|-----------------|---------------|
| Buffalo milk     | 30             | 2               | 6.67%         |
| Cow milk         | 30             | 3               | 10%           |
| Sheep milk       | 30             | 1               | 3.33%         |
| Goat milk        | 30             | 1               | 3.33%         |
| Cheese           | 30             | 2               | 6.67%         |
| Ice cream        | 30             | 3               | 10%           |
| Zabady (yoghurt) | 30             | 0               | 0%            |
| Whey             | 15             | 1               | 6.67%         |
| Total            | 225            | 13              | 5.78%         |



**FIGURE 1:** positive amplification of 351 bp specific of *ail* gene

From 225 examined milk and milk product samples 13 were positive with percentage (5.78%), positive results distributed to buffalo milk, cow milk, sheep milk, goat milk, cheese, ice cream, yogurt and whey samples with percentage (6.67%, 10%, 3.33%, 3.33%, 6.67%, 10%, 0% and 6.67%) respectively. PCR was positive for the two strains.

## DISCUSSION

*Yersinia* spp. specially, *Y. enterocolitica* comprised of strains with different degrees of pathogenicity. In 2007, there were 8,792 reported cases of human yersiniosis in the European Union, making yersinia the third most important zoonotic agent implicated in human enteritis, in terms of the number of cases, after campylobacter and salmonella (EFSA-ECDC, 2012, Tan *et al.*, 2014). *Y. enterocolitica* has a particular public health importance, because of its capability of growing in raw milk and viability at refrigeration temperatures for long time. Therefore, consumption of milk and dairy products especially raw ones give a higher chance for infection by *Y. enterocolitica* in humans (Rahimi *et al.*, 2014). In this study, 225 samples of different milk samples and milk product samples were tested. *Yersinia enterocolitica* was isolated from buffalo milk, cow milk, sheep milk and goat milk in percentage 6.67%, 10%, 3.33% and 3.33% respectively. In buffalo milk nearly similar result was obtained by (Lobna, 2008) 7% and (Khairalla, 2006) 6%. In cow milk results were lower than that detected by (Angy, 2013) 39.1%, and higher than that detected by (Ruusunen *et al.*, 2013) 7.7% and (Enas & Amal, 2002) 3.33%, and nearly similar result was obtained by Subha *et al.* (2009) concerned that 10.6% of raw cow milk samples were significantly contaminated with *Y. enterocolitica*. In sheep milk *Y. enterocolitica* failed to be detected by (Ahlam & Gamel, 1994) and (Enas & Amal, 2002). In goat milk similar results obtained by (Enas & Amal, 2002) 3.33%. While failed to be detected by (Ahlam & Gamel, 1994) and (Naima, 2007). In this study, *Yersinia enterocolitica* was isolated from cheese in percentage of 6.67%. This result is higher than that obtained by (Hanifian & Khani, 2012) 4% and (Ozdemir & Arslan, 2011) 5.5% and lower than that obtained by (Abd El Aal and Atta 2009) 8%,

and nearly similar result was obtained by (Laila, 2009) 6%. While (Abou El-Makarem, 2009) could not detect *Yersinia enterocolitica* in samples of locally manufactured kareish cheese. Ice cream was also tested for incidence of *Yersinia enterocolitica* & *Yersinia enterocolitica* was found in 10% of tested samples. Similar result was obtained by (Nashwa *et al.*, 2007) 10%, in other hand, this result was lower than that obtained by (El-Sherbini, 1999) 26.25% and (Hassan, 1999) 14%, and slightly higher than that obtained by (El-Gmiey 1994) 9%. In this study *Yersinia enterocolitica* failed to be detected in yogurt samples. On the other hand, two of the confirmed isolates were positive for detection of pathogenicity using PCR assays targeting chromosomal *ail* gene. In a previous study, 7.6% of yersinia spp. isolated from bulk raw milk (n = 354) found to be *ail* gene positive by PCR (Hanifian and Khani, 2012). In another study, out of 88 dairy samples, pathogenic *Y. enterocolitica* was detected in (5.7%) samples (Ye *et al.*, 2014). The prevalence of pathogenic *Yersinia enterocolitica* in general is considered to be high which constitute a public risk for milk consumers.

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