Seroprevalence of *Toxoplasma gondii* infection from swamp buffaloes (*Bubalus bubalis*) nearby Songkhla Lake areas, Songkhla province, Thailand

Tawin Inpankaew1*, Burin Nimsuphan1, Chanya Kengradomkij1, Nongnuch Pinyopanuwat1, Wissanuwat Chimnoi1, Boy Boonaue1, Soichi Maruyama2, Xuenan Xuan3 and Sathaporn Jittapalapong1

ABSTRACT

*Toxoplasma gondii*, an obligate intracellular protozoan parasite, is the causative agent of toxoplasmosis, infected most species of warm-blooded animals including humans, birds and most species of mammals. Swamp buffaloes in Songkhla lake were unique since they were recognized as roaming animal rearing system. These animals might have a threat to humans’ health due to their reservoir roles. The aim of this study was to determine the seroprevalence of *T. gondii* infections of swamp buffaloes in Songkhla Lake, Thailand. A total of 95 swamp buffalo sera from 4 locations of SongKhla province were collected and examined for the presence of *T. gondii* infections by using the commercial latex agglutination test (LAT) kits (TOXOCHECK-MT; Eiken Chemical, Japan). Fourteen out of 95 (14.7%) were found to be positive to *T. gondii* and Krasaesin district had the highest seroprevalence (25.0%) among 4 districts in this survey. The linkage of original source of *T. gondii* infections to swamp buffaloes has been concerned and required further investigation to understand its spreading among different hosts in this area. Moreover, the risk to consume raw or undercook buffalo *T. gondii* infected meat might be the potential source of transmission to human.

Key words: seroprevalence, *Toxoplasma gondii*, swamp buffaloes, agglutination, toxoplasmosis, Thailand

*Corresponding author; e-mail address: vetwi@ku.ac.th

1 Department of Parasitology, Faculty of Veterinary Medicine, Kasetsart University, Bangkok, 10900
2 Laboratory of Veterinary Public Health, College of Bioresource Sciences, Nihon University
3 National Research Center for Protozoan Diseases, Obihiro University of Agriculture and Veterinary Medicine, Inada-cho, Obihiro, Hokkaido 080-8555, Japan
INTRODUCTION

Toxoplasma gondii is an extremely successful obligate intracellular protozoan parasite belonging to the phylum Apicomplexa. T. gondii infects most species of warm-blooded animal including most species of mammals worldwide, birds and humans (Dubey, 2010). Although toxoplasmosis is usually asymptomatic, the parasite can cause a severe disease in immuno-compromized humans and animals (Schlüter et al., 2014). Domestic and wildlife animals play an important role as reservoirs for T. gondii since humans can get the infection via the ingestion of raw meat contain viable tissue cysts (Kijlstra and Jongert, 2008; Dubey, 2010). For clinical signs in domestic animals, T. gondii can cause abortions and stillbirth resulting in significant losses to the livestock industry (Buxton et al., 1998).

In Thailand, swamp buffaloes are commonly reared on public pastures to minimize management costs, thus increasing the chances that these animals might be exposed to the contaminated environment (Inpankaew et al., 2014). Additionally, the seroprevalence of T. gondii infections have been reported in various hosts including humans (Morakote et al., 1984, Maruyama et al., 2000; Sukthana et al., 2000), dogs (Nishikawa et al., 1989; Jittapalapong et al., 2007), cats (Sukthana et al., 2003; Jittapalapong et al., 2007; Jittapalapong et al., 2010), tigers (Thiangtum et al., 2006), rodents (Jittapalapong et al., 2011), elephants (Tuntasuvan et al., 2001), dairy cows (Jittapalapong et al., 2008; Inpankaew et al., 2010) and goats (Jittapalapong et al., 2005). However, T. gondii infections in buffaloes have been reported only in the Northeast Thailand with the prevalence of 5.6 % (Jittapalapong et al., 2010). Therefore, the information of T. gondii infection in buffaloes in the other part of Thailand is still required. The objective of this study was to investigate the seroprevalence of T. gondii infections of swamp buffaloes reared in Songkhla Lake areas, Songkhla province, Thailand.

MATERIALS AND METHODS

1. Sample collection

A total of 95 blood samples was randomly collected from caudal vein of swamp buffaloes in 4 districts of Songkhla province nearby Songkhla Lake including Singha Nakhon, Ranot, Krasaesin and Khuan Niang. The blood was centrifuged at 1448 x G for 20 min and the sera were separated and stored at -20˚C until serological analysis.

2. Serological assay

All sera was tested by commercial latex agglutination test (LAT) kits (TOXOCHECK-MT; Eiken Chemical, Japan) as previously described (Inpankaew et al., 2010). Briefly, 25 µl of latex agglutination buffer was added to each well of a U-shaped 96 well cluster plate (Nalge Nunc, Denmark). Then 25 µl of 1:8 diluted sera was mixed with the buffer in the first well. Serial two fold
dilutions were performed in all wells and the final 25 µl was discarded. Finally, 25 µl of *T. gondii*-coated latex beads were added to each well. The plate was gently shaken and incubated at room temperature overnight. The LAT was considered positive when agglutination was observed at dilutions of 1: 64 or above according to the manufacturer's instructions.

3. Statistical analysis.

The results of the LAT were double entered and validated in Epidata (www.epidata.dk). Infection prevalence rates were calculated.

RESULTS AND DISCUSSION

Seroprevalence of *Toxoplasma gondii*

The seroprevalence of *T. gondii* in buffaloes was previously reported in many part of the world. The reports were shown as the prevalence of 48.7% in Mexico (Alvarade-Esquivel et al., 2014), 41.3% in Brazil (da Silva et al., 2014), 25.4% in Argentina (Konrad et al., 2013) and 7.8% in Trinidad (Persad et al., 2011). There have been a few reports on bovine toxoplasmosis from water buffaloes in Asia including China, Iran, Pakistan and Vietnam and their seroprevalence were ranged from 3 to 15.2% (Huong et al., 1998; Jittapalapong et al., 2008). Moreover, the prevalence of *T. gondii* infections in Thailand tends to be considerably varied relied on areas, animal types, and diagnostic assays (Table 1).

Table 1. Seroprevalence of *T. gondii* infections in cattle and buffaloes in Thailand.

<table>
<thead>
<tr>
<th>Host</th>
<th>Area</th>
<th>Prevalence (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy cattle</td>
<td>Central</td>
<td>3.4</td>
<td>Suteeraparp et al., 1999</td>
</tr>
<tr>
<td>Dairy cows</td>
<td>Northeastern</td>
<td>22.3</td>
<td>Jittapalapong et al., 2008</td>
</tr>
<tr>
<td>Dairy cows</td>
<td>Northern</td>
<td>9.4</td>
<td>Inpankaew et al., 2010</td>
</tr>
<tr>
<td>Water buffaloes</td>
<td>Northeastern</td>
<td>5.6</td>
<td>Jittapalapong et al., 2010</td>
</tr>
<tr>
<td>Beef cattle</td>
<td>Western</td>
<td>25.7</td>
<td>Wiengcharoen et al., 2012</td>
</tr>
</tbody>
</table>

The present study revealed that the seroprevalence of *T. gondii* infection of swamp buffaloes in the south of Thailand was 14.7% with the titers ranged from 1:64 to 1:1,024 (Table 2). This was higher than previously observed in Northeastern, Thailand (Jittapalapong et al., 2010). Krasaesin district has the highest seroprevalence (25.0%), and Ranot, Singha Nakon and Sathing Phra were found the seropositives as 15.8%, 14.8% and 6.9%, respectively (Table 2). Most swamp buffaloes in Songkhla lake are managed as beef animals so that there should be no surprising with the result as high as 14.7% for seropositives of *T. gondii* infections. This indicated that meat from infected water buffaloes might serve as a source of human exposure. Additionally, swamp buffaloes in Songkhla lake were unique and recognized as roaming animals that might have a threat to humans' health due
to their reservoir roles. Moreover, serological surveys in various animals, lived in the surrounding area where infected buffaloes were lived to be accomplished especially cats and wild birds as well as seroprevalence study in the other regions.

Table 2. Seroprevalence of *T. gondii* infection in water buffaloes by latex agglutination test (LAT).

<table>
<thead>
<tr>
<th>Districts</th>
<th>No. of animals</th>
<th>No. of positive animals (%)</th>
<th>Titer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1:64</td>
</tr>
<tr>
<td>Singha Nakon</td>
<td>27</td>
<td>4 (14.8)</td>
<td>1</td>
</tr>
<tr>
<td>Krasaesin</td>
<td>20</td>
<td>5 (25.0)</td>
<td>1</td>
</tr>
<tr>
<td>Ranot</td>
<td>19</td>
<td>3 (15.8)</td>
<td>1</td>
</tr>
<tr>
<td>Sathing Phra</td>
<td>29</td>
<td>2 (6.9)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>95</td>
<td>14 (14.7)</td>
<td>3</td>
</tr>
</tbody>
</table>

CONCLUSION

This study have been described the seroprevalence of *T. gondii* infection in some selected water buffaloes in Songkhla lake areas, Songkhla, Thailand. Further research to assess the risk for infection in humans associated with the ingestion of raw or undercooked meat from water buffaloes infected with *T. gondii* will be needed.

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