

SERO-PREVALENCE OF *Toxoplasma gondii* IN PIGS AND PREGNANT WOMEN OF BHAKTAPUR DISTRICT



Alina Prajapati

T.U. Reg. No. 5-2-20-467-2006

Symbol No. 13089

Batch: 2066/2067

A thesis submitted in partial fulfillment of the
requirements for the award of the degree of Master of
Science in Zoology with special paper Parasitology

Submitted to

Central Department of Zoology
Institute of Science and Technology
Tribhuvan University
Kirtipur, Kathmandu

Nepal

2014

SERO-PREVALENCE OF *Toxoplasma gondii* IN PIGS AND PREGNANT WOMEN OF BHAKTAPUR DISTRICT



Alina Prajapati

T.U. Reg. No. 5-2-20-467-2006

Symbol No. 13089

Batch: 2066/2067

A thesis submitted in partial fulfillment of the requirements for the award of the degree of Master of Science in Zoology with special paper Parasitology

Submitted to

Central Department of Zoology

Institute of Science and Technology

Tribhuvan University

Kirtipur, Kathmandu

Nepal

2014

RECOMMENDATIONS

This is to recommend that the thesis entitled “**SERO-PREVALENCE OF *Toxoplasma gondii* IN PIGS AND PREGNANT WOMEN OF BHAKTAPPUR DISTRICT**” has been carried out by Alina Prajapati for the partial fulfillment of Master’s Degree of Science in Zoology with special paper Parasitology. This is her original work and has been carried out under our supervision. To the best of our knowledge, this thesis work has not been submitted for any other degree in any institutions.

Date

.....

Prof. Dr. Ranjana Gupta
Head and Supervisor
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

Date

.....

Dr. Dhan Raj Ratala
Co-supervisor
National Zoonoses and Food Hygiene Research Centre
Chagal, Kathmandu

LETTER OF APPROVAL

On the recommendation of supervisor, this thesis submitted by Alina Prajapati entitled **“SERO-PREVALNECE OF *Toxoplasma gondii* IN PIGS AND PREGNANT WOMEN OF BHAKTAPUR DISTRICT”** is approved for the examination and submitted to the Tribhuvan University in partial fulfillment of the requirements for Master’s Degree of Science in Zoology with special paper Parasitology.

Date

.....

Prof. Dr. Ranjana Gupta

Head of Department

Central Department of Zoology

Tribhuvan University

Kirtipur, Kathmandu, Nepal

CERTIFICATE OF ACCEPTANCE

This thesis work submitted by Alina Prajapati entitled “**SERO-PREVALENCE OF *Toxoplasma gondii* IN PIGS AND PREGNANT WOMEN OF BHAKTAPUR DISTRICT**” has been accepted as a partial fulfillment for the requirements of Master’s Degree of Science in Zoology with special paper Parasitology.

EVALUATION COMMITTEE

.....
Head and Supervisor
Prof. Dr. Ranjana Gupta
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

.....
External Examiner

.....
Internal Examiner

Date of Examination:

DECLARATION

I hereby declare that the work presented in this thesis has been done by myself, and has not been submitted elsewhere for the award of any degree. All sources of information have been specifically acknowledged by reference to the authors and institutions.

Date.....

.....
Alina Prajapati

ACKNOWLEDGEMENTS

Firstly, I would like to express my sincere gratitude to my honorable supervisor Prof. Dr. Ranjana Gupta, Head, Central Department of Zoology, Tribhuvan University for her kind supervision, timely suggestion, critical comments and administrative supports throughout this research work and thesis preparation. I am greatly thankful to Dr. Mahendra Maharjan, Associate Professor, Central Department of Zoology for his kind co-operation and valuable suggestion during this thesis work.

I am heartily indebted to National Zoonoses and Food Hygiene Research Centre for providing me lab facilities during my research work. My sincere thanks goes to Late Dr. Durga Dutta Joshi, Ex-Executive Chairman, NZFHRC for his noble guidance and well supervision. It is humble attempt of my co-supervisor Dr. Dhana Raj Ratala, NZFHRC for completing this thesis providing constructive suggestion. I would like to thank Anita Ale, NZFHRC for helping me in collection of pig blood samples. I am thankful to all the staffs of NZFHRC for their guidance and valuable support.

I would like to acknowledge Dr. Bimal Prasad Dhakal, Medical Superintendent, Bhaktapur Hospital for permission granted to do my research work. I also want to thank Mr. Padmananda Bhandari, Medical Technologist and all the staff of Laboratory Department, Bhaktapur Hospital for their kind co-operation during blood collection and questionnaire from pregnant women seeking prenatal checkup. I am thankful to all the pregnant women who interact to make my thesis successful.

I am much obliged to get help from pig farmers of Bhaktapur district.

I would like to express my sincere thanks to all my friends Suman Dheke, Monica Shrestha, Saru Sakha and Neelam Shakya for their constant support and generosity throughout my research work.

I owe great gratitude to my parents and family members for their encouragement and valuable support.

.....
Alina Prajapati

ABSRTACT

Toxoplasmosis is one of the medically and veterinary important disease caused by an obligate intracellular protozoan parasite *Toxoplasma gondii*. There is scarce information about the epidemiology of *T. gondii* infection in pregnant women and pigs in Bhaktapur districts. Therefore, this study aimed at determining the seroprevalence of *T. gondii* among pigs and pregnant women in Bhaktapur district. A total of 91 blood samples, 41 from farmed pig (3rd June 2012 to 6th June 2012) and 50 from pregnant women (10th July 2012 to 26th July 2012) seeking prenatal check up in Bhaktapur Hospital were collected. After a questionnaire applied to the pregnant women and pig farmers, all the collected specimens were tested for IgG anti-*T. gondii* antibodies by enzyme-linked immunosorbent assay (ELISA). The overall seroprevalence of anti-*T. gondii* antibody in the study area was 22% among pregnant women whereas seroprevalence in sampled pigs blood was observed null during study period. The present percentage of prevalence rate in pregnant women is low as compared with those reported in other region of Nepal. No significant relations were observed between anti-*T. gondii* IgG antibodies and any of the possible risk factors viz, cat ownership, playing habit with cats, working in garden, raw and pork meat consumption, drinking untreated water, age group, level of education and occupation during study period.

CONTENT

| | Pages |
|--------------------------------|-------|
| Declaration | i |
| Recommendations | ii |
| Letter of Approval | iii |
| Certificate of Acceptance | iv |
| Acknowledgements | v |
| Abstract | vi |
| CONTENT | vii |
| List of table | x |
| List of figure | xi |
| List of photograph | xii |
| List of Abbreviations | xiii |
| 1. INTRODUCTION | |
| 1.1 Background | 1 |
| 1.2 Toxoplasmosis in human | 1 |
| 1.2.1 Congenital Toxoplasmosis | 2 |
| 1.3 Toxoplasmosis in livestock | 3 |
| 1.4 Immune response | 4 |
| 1.5 Objectives of the study | 4 |
| 1.5.1 General objectives | 4 |
| 1.5.2 Specific objectives: | 5 |
| 1.6 Rational of study | 5 |
| 1.7 Limitations of the study | 5 |

| | |
|---|-----------|
| 2. LITERATURE REVIEW | 6 |
| 2.1 Discovery of pathogen | 6 |
| 2.2 Transmission | 6 |
| 2.3 Prevalance of Toxoplasmosis in Global Context | 7 |
| 2.3.1 In Human | 7 |
| 2.3.2 In animals | 10 |
| 2.4 Toxoplasmosis in Nepal | 12 |
| 2.5 Diagnosis | 14 |
| 3. MATERIALS AND METHODS | 15 |
| 3.1 Study Area | 15 |
| 3.2 Study Design | 16 |
| 3.3 Sampling Technique and Sample size | 16 |
| 3.4 Blood collection and Serum Preparation | 16 |
| 3.5 Instrumentation | 19 |
| 3.5.1 Questionnaire | 19 |
| 3.5.2 Materials and chemical used in laboratory purpose | 19 |
| 3.6 Serum test (Sample Processing) | 20 |
| 3.6.1 Determination of antibodies for <i>T. gondii</i> | 20 |
| 3.6.1.1 Principal of the EIA test | 20 |
| 3.6.2 Assay Procedure | 20 |
| 3.6.2.1 Validity of the Assay | 21 |
| 3.7 Calculation | 21 |
| 3.8 Statistical analysis | 23 |

| | |
|--|-----------|
| 4. RESULTS | 24 |
| 4.1 Seroprevalence of <i>T. gondii</i> | 24 |
| 4.2 Sociodemographic description of the study population | 25 |
| 4.3 Factors associated with seropositivity | 26 |
| 5. DISCUSSION | 30 |
| 6. CONCLUSION AND RECOMMENDATIONS | 33 |
| 6.1 Conclusion | 33 |
| 6.2 Recommendations | 33 |
| REFERENCES | 34 |
| APPENDIX | |

LIST OF TABLES

| Table | Title of tables | Pages |
|--------------|--|--------------|
| 1 | Overall seroprevalence of toxoplasmosis | 24 |
| 2 | General characteristics (age, sex and breed) of farmed pigs | 24 |
| 3 | Distribution of <i>T. gondii</i> in pregnant women on basis of demographic characteristics | 25 |
| 4 | Factors associated with <i>Toxoplasma gondii</i> infection among the pregnant women (n=50) in Bhaktapur district | 26 |

LIST OF FIGURES

| Figure | Titles of figures | Pages |
|---------------|--|--------------|
| 1 | Study area | 15 |
| 2 | Toxoplasmosis based on cat ownership and playing habit with cats | 28 |
| 3 | Distribution of <i>T. gondii</i> infection in pregnant women with different characters | 28 |
| 4 | Toxoplasmosis in relation to type of water | 29 |

LIST OF PHOTOGRAPHS

| Photograph | Title of photograph | Pages |
|-------------------|--|--------------|
| 1 | Collecting blood from pig | 17 |
| 2 | Questionnaire with pig farmer | 17 |
| 3 | Collecting blood from pregnant women at Bhaktapur hospital | 18 |
| 4 | Questionnaire with pregnant women | 18 |
| 5 | Testing serum samples in lab | 22 |
| 6 | ELISA results | 22 |

LIST OF ABBREVIATIONS

| Abbreviated form | Details of abbreviations |
|-------------------------|--|
| AIDS | Acquired Immunodeficiency Syndrome |
| BOH | Bad Obstetric History |
| CDC | Centers for Disease Control |
| CNS | Central Nervous System |
| CMV | Cytomegalovirus |
| DT | Dye test |
| DNA | Deoxyribo nucleic acid |
| EFSA | European Food Safety Authority |
| ELISA | Enzyme Linked Immunosorbent Assay |
| GDP | Gross Domestic Product |
| HIV | Human Immuno-deficiency Syndrome |
| HSV | Herpes simplex virus |
| IFA | Indirect fluorescent antibody |
| IgG | Immunoglobulin G |
| IHAT | Indirect hemagglutination test |
| IU | International Unit |
| LAT | Latex agglutination test |
| MAT | Modified agglutination test |
| MLA | Microlatex agglutination |
| NZFHRC | National Zoonoses and Food Hygiene Research Centre |
| OD | Optical Density |
| PCR | Polymerase chain reaction |
| TORCH | <i>Toxoplasma gondii</i> , rubella virus, cytomegalovirus and Herpes simplex virus |
| VDC | Village Development Committee |
| VIDAS | Vitek Immuno Diagnostic Assay System |

