

**STUDY OF PHYSIOLOGICAL CHANGES IN THE PIGEONS
CAUSED BY THE INTESTINAL PARASITES AS WELL AS THE
STUDY OF PHYSIOLOGY OF THOSE PARASITES**

BY

SHAZIA NISAR

A thesis submitted in partial fulfillment of the requirement for the degree
of

Doctor of Philosophy in Zoology

DEPARTMENT OF ZOOLOGY

UNIVERSITY OF KARACHI

KARACHI- 75270

PAKISTAN.

2012.

DEDICATION

This thesis dedicated to my loving parents and my husband Dr. Syed Noman Ahmed for their constant support and encouragement

And

My honourable former supervisor Dr. Kehkashan Akhter (Late) with great honour

Table of Contents

Acknowledgement.....	X
Abstract:.....	XIII
Introduction	1
Review of literature.....	5
Material and method.....	77
Results.....	91
Histochemistry	91
Biochemistry of parasites	110
Histopathology	112
Discussion.....	176
Conclusion:.....	206
References.....	209

Table of Figures

Figure 1 Scolex of <i>C.digonopora</i> 10x2.5.....	114
Figure 2 Segments of <i>C.digonopora</i> 10x2.5	115
Figure 3 Scolex of <i>C.cuneata</i> 20x2.5	116
Figure 4 Segments of <i>C.cuneata</i>	117
Figure 5 Scolex of <i>Raillietina spp.</i> 20x2.5.....	118
Figure 6 Segments of <i>Raillietina spp.</i> 10x2.5	119
Figure 7 Scolex of <i>Raillietina torquata</i> 4x2.5	120
Figure 8 Segments of <i>Raillietina torquata</i> 4x2.5.....	121
Figure 9 Scolex of <i>Ortoanisakis sciaenae</i>	122
Figure 10 Posterior end of <i>Ortoanisakis scianae</i>	123
Figure 11 Intestine of <i>Columba livia</i> infected with cestodes.....	124
Figure 12 Histological section of small intestine of <i>Columba livia</i> infected with <i>C.digonopora</i> showing parasite portion with serosal necrosis.X100	125
Figure 13 Histological section of small intestine of <i>C.livia</i> infected with <i>C.digonopora</i> showing portion of parasite and infiltration of inflammatory cells. X100	126
Figure 14 Photomicrograph of small intestine of <i>Columba livia</i> infected with <i>C.cuneata</i> showing fibrosis and necrosis of gland cells. X50.....	127
Figure 15 Photomicrograph of small intestine of <i>C.livia</i> infected with <i>C.cuneata</i> showing degeneration of villi. X25.....	128

Figure 16 Histological section of small intestine of *Columba livia* infected with *Raillietina* spp. showing atrophy of muscular layer.X25..... 129

Figure 17 Histological section of small intestine of *C.livia* infected with *Raillietina* spp. showing dragging of serosal wall by parasites and villi was peeled off. X50 130

Figure 18 Photomicrograph of small intestine of *Columba livia* infected with *Raillietina torquata* showing dilation of blood vessels in muscular layer. X50 131

Figure 19 Photomicrograph of small intestine of *C.livia* infected with *Ortoanisakis sciaenae* showing migratory tunnel and disintegration of gland cells.X50 132

Tables

Table 1 Level of Alkaline phosphatase in different organs of healthy pigeon.....	133
Table 2 Cholinesterase level in different organs of healthy pigeons.....	134
Table 3 Content of Protein in different organs of healthy pigeons.....	135
Table 4 Level of Cholesterol in different organs of healthy pigeons.....	136
Table 5 Glucose Contents in Different Organs of Healthy Pigeon....	137
Table 6 Levels of Lipase in different organs of healthy pigeon.....	138
Table 7 Level of Alkaline phosphatase in different organs of pigeon infected with <i>C.digonopora</i>	139
Table 8 Cholinesterase level in different organs of pigeon infected with <i>C.digonopora</i>	140
Table 9 Content of Protein in different organs of pigeon infected with <i>C.digonopora</i>	141
Table 10 Cholesterol level in different organs of pigeon infected with <i>C.digonopora</i>	142
Table 11 Glucose Contents in different organs of pigeon infected with <i>C.digonopora</i>	143

Table 12 Lipase levels in different organs of pigeon infected with <i>C.digonopora</i>	144
Table 13 Level of alkaline Phosphatase in different organs of pigeon infected with <i>C.cuneata</i>	145
Table 14 Level of cholinesterase in different organs of pigeon infected with <i>C.cuneata</i>	146
Table 15 Content of Protein in different organs of pigeon infected with <i>C.cuneata</i>	147
Table 16 Level of cholesterol in different organs of pigeon infected with <i>C.cuneata</i>	148
Table 17 Content of Glucose in different organs of <i>Columba livia</i> infected with <i>C.cuneata</i>	149
Table 18 Level of lipase in different organs of pigeon infected with <i>C.cuneata</i>	150
Table 19 Level of alkaline Phosphatase in different organs of pigeon infected with <i>Raillientina spp</i>	151
Table 20 Level of cholinesterase in different organs of pigeon infected with <i>Raillientina spp</i>	152
Table 21 Content of Protein in different organs of pigeon infected with <i>Raillientina spp</i>	153
Table 22 Level of cholesterol in different organs of pigeon infected with <i>Raillientina spp</i>	154

Table 23 Content of Glucose in different organs of pigeon infected with <i>Raillietina spp.</i>	155
Table 24 Level of lipase in different organs of pigeon infected with <i>Raillietina spp.</i>	156
Table 25 Level of alkaline Phosphatase in different organs of pigeon infected with <i>Raillietina torquata</i>	157
Table 26 Level of cholinesterase in different organs of <i>Columba livia</i> infected with <i>Raillietina torquata</i>	158
Table 27 Content of Protein in different organs of <i>Columba livia</i> infected with <i>Raillietina torquata</i>	159
Table 28 Level of cholesterol in different organs of <i>Columba livia</i> infected with <i>Raillietina torquata</i>	160
Table 29 Level of Glucose in different organs of pigeon infected with <i>Raillietina torquata</i>	161
Table 30 Level of lipase in different organs of pigeon infected with <i>Raillietina torquata</i>	162
Table 31 Estimation of Alkaline phosphatase in different organs of pigeon infected with <i>O.sciaenae</i>	163
Table 32 Level of cholinesterase in different organs of pigeon infected with <i>Ortoanisakis sciaenae</i>	164
Table 33 Content of Protein in different organs of pigeon infected with <i>Ortoanisakis sciaenae</i>	165

Table 34 Level of cholesterol in different organs of <i>Columba livia</i> infected with <i>Ortoanisakis sciaenae</i>	166
Table 35 Level of Glucose in different organs of <i>Columba livia</i> infected with <i>Ortoanisakis sciaenae</i>	167
Table 36 Level of lipase in different organs of pigeon infected with <i>Ortoanisakis sciaenae</i>	168
Table 37 Estimation of different enzymes in Nematode.....	169
Table 38 Estimation of Alkaline phosphatase in different cestodes.....	170
Table 39 Lipase Level in different cestodes.....	171
Table 40 Content of Protein in different cestodes.....	172
Table 41 Level of Cholinesterase in different cestodes.....	173
Table 42 Level of Cholesterol in different cestodes.....	174
Table 43 Content of Glucose in different cestodes.....	175

Acknowledgement

In the name of Allah, the Beneficent, the Merciful, Praise and Gratitude are to Allah SWT for giving the strengths and His blessing in completing this thesis. Peace and blessing be upon Prophet Muhammad SAW., remains forever a torch of knowledge and guidance for the entire humanity.

This thesis arose in part out of years research. By that time, I have worked with a number of people whose contribution in assorted ways to the research and the making of the thesis deserved special mention. It is a pleasure to convey my gratitude to them all in my humble acknowledgment.

I would like to record my gratitude to honourable former supervisor Dr. Kehkashan Akhter (Late), Associate professor, Department of Zoology, University of Karachi, for her supervision, advice and guidance from the very early stage of this research as well as giving me extraordinary experiences throughout the work. Above all and the most needed, she provided me unflinching encouragement and support in various ways. Her truly scientist intuition has made her as a constant oasis of ideas and passions in science, which exceptionally inspire and enrich my growth as a student, a researcher and scientist want to be.

I gratefully acknowledge my honourable supervisor Dr. M.Farhanullah Khan, Professor, Department of Zoology, University of Karachi, for his valuable advice, supervision and crucial contribution, which made him a

backbone of this research and so to this thesis. His involvement with his originality has triggered and nourished my intellectual maturity that I will benefit from, for a long time to come.

I would like to acknowledge and extend my heartfelt gratitude to Dr. M. Arshad Azmi, Chairman and Professor, Department of Zoology, University of Karachi, for the constant reminders and much needed motivation.

It is a pleasure to express my gratitude wholeheartedly to my former chairman, Dr. Sohail Barkati and former chairpersons, Dr. Nikhat Yasmin Siddiqui and Dr. Farida Begum, for her continuous support and providing the essential facilities during the progress of this work.

I would also acknowledge Dr. Aly Khan, Director, Crop Diseases Research Institute Pakistan agricultural research council, University of Karachi for his valuable advice and assistance in study of histopathological slides.

Collective and individual acknowledgments are also owed to my colleagues. I also thankful to my sweet friend Uzma Mehboob and Syeda Aisha Amir for giving me such a pleasant time when working.

I will be failing in my duty and sincerity if do not mention the name of the person. I really acknowledge my brother-in-law Mr. Syed Adnan Ahmed for helping me in calculations and thesis composing.

It is pleasure to acknowledge my niece Hamna Imtiaz and nephew Aish-ur-Rehman for helping me during research work.

I would like to express my deepest acknowledgment to my elder brother Iqbal Ahmed who plays a role of father in my life, without him, I would not be able to achieve this tedious task.

MY parents deserve special mention for their inseparable support and prayers. My Father, Nisar Ahmed (Late) in the first place was the person who put the fundament my learning character, showing me the joy of intellectual pursuit ever since I was a child. My Mother, Haseeba Khatoon, is the one who sincerely raised me with her caring and gently love. I gratefully acknowledge to my elder brothers Nehal Ahmed, Ejaz Ahmed, younger brother Imran Ahmed and loving sister Shahina Nisar for being supportive and caring siblings.

I would like to thanks to my mother-in-law Shama Perveen who always being supporting for me and providing me a comfortable environment.

This thesis would have never been possible without my loving husband Dr. Syed Noman Ahmed who were always with me and helped me to keep things in perspective. My lovely kids, Eshal Noman and Syed Aliyan Ahmed who really gave me reason to continue. Words would never say how grateful I am to them.

Finally, I would like to thank everybody who was important to the successful realization of thesis, as well as expressing my apology that I could not mention personally one by one.

ABSTRACT

Parasitic infection put different effect on different organs. Alkaline phosphatase order in healthy pigeons was estimated in liver< intestine< spleen< gizzard< pancreas< crop respectively. Infection of *C.digonopora* increased the ALP level, its estimation in various parts was as intestine< liver< gizzard< spleen respectively and decreased the estimation in pancreas and crop. Infection of *C.cuneata* increased the alkaline phosphatase level, its estimation in various parts was as in liver< gizzard< spleen< pancreas respectively and decreased the estimation in intestine and crop. Infections of *Raillietina spp.* increased the alkaline phosphatase estimation in gizzard and spleen and decreased in the rest of the organs. Its level was as in liver< intestine< pancreas< crop respectively. Infection of *Raillietina torquata* increased the alkaline phosphatase estimation in gizzard and spleen while decreased its estimation in various parts. Its level was as in liver< intestine< crop< pancreas respectively. Infection of *Ortoanisakis sciaenae* increased the alkaline phosphatase estimation in liver and crop and decreased its estimation in various parts. Its level was as in intestine< spleen< gizzard< pancreas respectively. Cholinesterase order in healthy pigeon was estimated in liver< intestine< gizzard< spleen< pancreas< crop respectively. Infection of *C.digonoora* put approximately no change on cholinesterase in gizzard and decreases ChE level in various parts. Its level was as in spleen< pancreas< crop respectively. In intestine and liver, cholinesterase estimation was enhanced. Infection of *C.cuneata* increased estimation of ChE in intestine and decreased its estimation in

various parts. Its level was as in liver< gizzard< spleen< crop< pancreas respectively. Infection of *Raillietina spp.* increased ChE level in various parts. Its level was as in gizzard< liver< pancreas and decreased its estimation in various parts. Its level was as in intestine< spleen< crop respectively. Infection of *Raillietina torquata* increased level of ChE in gizzard and liver and decreased its estimation in various parts. Its level was as in crop< spleen< intestine< pancreas respectively. Infection of *Ortoanisakis sciaenae* increased ChE level and its estimation in various parts was as in liver< pancreas< intestine respectively and decreased its estimation in various parts. Its level was as in gizzard< spleen< crop respectively. Protein content order in healthy pigeon was estimated in gizzard< crop< spleen< pancreas< liver< intestine respectively. Infection of *C.digonopora* enhanced protein content in gizzard and reduced its estimation in various parts. Its level was as in intestine< crop< liver< spleen< pancreas respectively. Infection of *C.cuneata* enhanced protein content in gizzard and decreased its estimation in various parts. Its level was as in intestine< spleen< crop< liver< pancreas respectively. Infection of *Raillietina spp.* increased protein content in gizzard< spleen< pancreas respectively and reduced in liver< intestine< crop respectively. Infection of *Raillietina torquata* enhanced protein level in gizzard and decreased in intestine< liver< spleen< pancreas< crop respectively. Infection of *Ortoanisakis sciaenae* increased protein content in gizzard and decreased its estimation in various parts. Its level was as in spleen< liver< crop< intestine< pancreas respectively. Cholesterol order in healthy pigeon was estimated in gizzard< pancreas< crop< intestine< spleen< liver respectively.