IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 8, Issue 10 Ver. I (Oct. 2015), PP 37-39
www.iosrjournals.org

Hemato-Biochemical, and Minerals Status in Mixed Parasitic Infection in Arabian Foals

Noha Y. Salem[1*], Shimaa G. Yehia[1], Mohamed A. El-Sherif[1]
[1]*Department of Internal Medicine and Infectious diseases, Faculty of Veterinary Medicine, Cairo University, Giza, Egypt*

Abstract: *In equine practice, parasitic infestation comprises a major health and management problem especially in foals. This study was designed to investigate hematological, selected biochemical and minerals levels in foals infected with both Parascaris equorum and Oxyuris equi. A total number of twenty-two Arabian foals were examined in this study; the main problem was inappetence, tail scratching and failure to gain weight. The hematologic findings showed marked eosinophilia. Serum biochemical findings showed significant decrease in TP and Albumin values along with significant increase in the cholesterol level. Zinc level showed significant decrease while the copper and iron levels showed decrease in values in comparison to control data however, differences are considered to be not statistically significant. The parasitic burden appeared to directly affect the mineral status level.*

Key word: *Foal, Hematology, Mineral status, Parasite.*

I. Introduction

The nematodes, particularly belonging to Oxyuroidea and Ascarididae families are the most common diagnosed parasitic agents in horses especially foals [1-2].

Ascarididae infection especially "*Parascaris equorum"* is mostly found in foals and yearling horses with age tendency below 1 year [3-5]. The classical presentations of *Parascaris equorum* are lethargy, inappetence and failure to gain weight [6-7]. Intestinal obstruction, perforation and even death may ensue heavy parasitic burden [6, 8].*Oxyuris equi* is one of most widespread parasite affecting equine population worldwide [9]. Puriritis, scratching and even tail damage usually alert both veterinarian and owner to consider *O. equi* as causative agent [10]. Laboratory findings, principally alterations associated with hematology and serum biochemistry are of significant stature in confirming or excluding certain illnesses [11].

Zinc plays a role in T-cell mediated responses for host protection against parasite invasion [12]. Copper is essential component of ceruoplasmin, which help load iron into transferring [13].

Trace minerals are essential for wellbeing and growth of animals; copper, zinc and iron are minerals, which involved in vital processes in body, the deficiency or excess in their levels affect these processes [14].

This study was designed to investigate hematological, selected biochemical and minerals levels status in foals infected with both Parascaris equorum and Oxyuris equi.

II. Material And Methods

A total number of twenty-two (22) Arabian foals were examined in this study; the main problem was inappetence, tail scratching and failure to gain weight.

Fecal parasitological examination was performed using fecal flotation method to detect *Parascaris equorum* egg, and presence of grayish-yellow, scale-like egg masses on the perineal skin was indicative for *Oxyuris equi* [15], the confirmation was done by presence of oval, flattened one sided with operculum egg retrieved from around anus area. Blood samples for hematologic evaluation were taken. Sera of infected foals were analyzed for total protein, albumin, globulin, cholesterol, triglycerides and mineral profile (Zinc, copper and iron) with respective test kits (Stanbio® Inc. USA, Spectrum-Diagnostics).

Student t-test (STATISTICA for Windows, version 5.1., StatSoft, Inc.) was used, $P \leq 0.05$ significant.

III. Results

The most recorded clinical signs in this study were inappetence, tail scratching and failure to gain weight, one case showed signs of severe tail damage.

Fecal parasitological examination findings showed the presence of spherical, brown egg with thick outer layer identified as *Parascaris equorum* egg.

For *Oxyuris equi*, presence of grayish-yellow, scale-like egg masses on the perineal skin was diagnostic, the confirmation was done by presence of oval, flattened one sided with operculum egg retrieved from around anus area.

The mean hematologic values are shown in Table 1. No statistical significance deference recorded in RBCs, PCV and hematocrit in this study in the infected foals. Though the total leukocyte count showed an increase compared to control data, this increase was considered to be not quite statistically significant.

Significant increase in eosinophils in infected horse when compared to control data; no significant changes were recorded in neutrophil, lymphocyte and monocyte values.

Table 1. Hematological findings in infected foals compared to control data

Parameter	Control Data	Patient Data	P value
Hg	15.133±0.87	14.219±0.388	0.272
PCV	43.30±2.72	39.96±0.83	0.1508
RBCs	8.457±0.954	7.33±0.184	0.0782
WBCs	8.825±1.36	10.85±0.492	0.0882
Neutrophil %	49.86±8.89	40.52±1.63	0.105
Lymphocyte %	33±7.45	25.96±1.02	0.0835
Eosinophils %	5.243±1.91	28.696±2.07	0.001
Monocytes %	5.629±2.02	4.826±0.56	0.594

The mean serum biochemical and trace mineral data are shown in Table 2. Significant decrease in TP and Albumin values in infected foals when compared to control data, the cholesterol level showed significant increase when compared to control data while the triglyceride values considered to be not statistically significant.

Zinc level showed significant decrease in infected foals when compared to control data, the copper and iron levels showed decrease in values in comparison to control data however, differences are considered to be not statistically significant.

Table 2. The mean serum biochemical and trace mineral data in infected foals compared to control data

Parameter	Control Data	Patient Data	P value
Total Protein	6.842±0.222	5.912±0.252	0.0257
Albumin	3.542±0.220	2.648±0.254	0.0356
Globulin	3.345±0.235	3.135±0.175	0.552
Cholesterol	92.60±13.28	150.94±12.9	0.0257
Triglycerides	44±9.81	55.44±5.83	0.310
Copper	112.575±11.708	101.885±7.44	0.438
Zinc	99.62±7.58	67.39±5.2	0.0039
Fe	163.363±24.28	144.681±21.744	0.583

IV. Discussion

In equine practice, parasitic infestation comprises a major health and management problem especially in foals. Helminthes especially *Parascaris equorum* and *Oxyuris equi* are the most common diagnosed parasitic agents in horses especially foals [1-2]. The infection was found in foals, it is well established that pinworm and *Parascaris equorum* are frequently found in young ages (weanlings, yearlings and young adult) than adult horses [2, 16-17].

In mixed parasitic infection in this study, the most recorded clinical signs were inappetence, tail scratching and failure to gain weight, one case showed signs of severe tail damage, these signs described elsewhere [10, 18-19]. In *Oxyuris equi* infection, the anal pruritis is associated with egg lying activities of adult female worm leading to constant rubbing against fixtures causing hair loss and tail abrasions [20].

Significant increase in eosinophils in infected horse when compared to control data; eosinophilia was recorded in *Parascaris equorum* infection [21]. Eosinophils play an integral role in host defense mechanism against parasitic infection by lowering number of infectious agents [22]. However, eosinophilia is a rare event in horses [23] when occurs, it is usually associated with parasitic or allergen exposure [24], in other reports discussed heavy intestinal parasitic burden in equine, eosinophil found to be within normal to low in count [25].

Significant reduction in total protein and Albumin in this study, the reduction can be attributed to poor absorption capability of gastrointestinal tract to absorb and assimilate the dietary content because of the gastrointestinal disturbance resulting from parasitic infestation [26-27].

Significant increase in cholesterol level was found in this study, the stress resulting from parasitic infection might lead to increase epinephrine and cortisol output with a resultant elevation in serum cholesterol and enhanced lipolysis [11, 26].

Non-significant decrease in copper and iron levels were observed in this study, the animal suffering from decrease in copper level, the serum cholesterol level elevated [14]. The decrease in copper leads to impairment of normal iron absorption [28]. Significant reduction in zinc level in infected foals, in a rat model, deficiency in zinc induced hyperchoterolemia [29-30]. Zinc deficiency has been reported to decrease in other

intestinal parasites especially *G. lamblia* [31-32]. The poor intake and impaired absorption of zinc might be factored in zinc deficiency [33]; however, Giardia found to cause mechanical damage to epithelial lining of intestine causing mal-absorption of minerals especially "Zinc" [34], the same concept could be applied in *Parascaris equorum* infection.

In conclusion, foals suffered from *Parascaris equorum* and *Oxyuris equi* infection showed significant eosinophilia along with mild reduction in total protein and albumin. The increase in cholesterol level appeared to be correlated with parasitic infection. Parasitic infection affecting the mineral status levels in foals.

References

[1] E.T. Lyons, and S.C. Tolliver, Prevalence of parasite eggs (Strongyloides westeri, Parascaris equorum, and strongyles) and oocysts (Eimeria leuckarti) in the feces of Thoroughbred foals on 14 farms in central Kentucky in 2003, Parasitology Research, 92, 2004, 400–404.

[2] C. R. Reinemeyer, and M. K. Nielsen, Review of the biology and control of Oxyuris equi, Equine Veterinary Education, 26(11), 2014, 584-591.

[3] H.S. Adair, What is your diagnosis?, J Am Vet Med Assoc, 196, 1990, 1023-1024.

[4] D.G. Bucknell, R.B. Gasser, and I. Beveridge, The prevalence and epidemiology of gastrointestinal parasites of horses in Victoria, Australia, International Journal for Parasitology, 25(6), 1995, 711-24.

[5] B. Fritzen, K. Rohn, T. Schnieder, and G. von Samson-Himmelstjerna, Endoparasite control management on horse farms--lessons from worm prevalence and questionnaire data, Equine Vet J., 42(1), 2010, 79-83.

[6] H.M. Clayton, and J.L. Duncan, Clinical signs associated with Parascaris equorum infection in worm-free pony foals and yearlings, Veterinary Parasitology, 4,1978, 69-78.

[7] S.H. Ryu, J.D. Jang, U.B. Bak, C. Lee, H.J. Youn, and Y.L. Lee, Gastrointestinal impaction by Parascaris equorum in a Thoroughbred foal in Jeju, Korea, Journal Veterinary Science, 5, 2004, 181–182.

[8] L.L. Southwood, G.M. Baxter, C. A. Baxter, and G. E. Bennett, Ascarid impaction in young horses. Compendium on Continuing Education for the Practicing Veterinarian, 20(1), 1998, 100-106.

[9] G.C. Coles, F. Jackson, W.E. Pomroy, R.K., Prichard, G. von Samson-Himmelstjerna, A. Silvestre, M.A. Taylor, and J. Vercruysse, The detection of anthelmintic resistance in nematodes of veterinary importance. Vet Parasitol, 136, 2006, 167–185.

[10] D. Wolf, C. Hermosilla, and A. Taubert, Oxyuris equi: lack of efficacy in treatment with macrocyclic lactones, Veterinary parasitology, 201(1), 2014, 163-168.

[11] H. R. Parsani, R. R. Momin, A. Lateef, and D. Hemen, Haemato-biochemical alterations in helminths infected donkeys, WJAS, 3, 2011, 112-114.

[12] H.N. Shi, M.E. Scott, M.M. Stevenson, and K.G. Koski, Energy restriction and zinc deficiency impair the functions of murine T cells and antigen-presenting cells during gastrointestinal nematode infection, J Nutr, 128, 1998, 20-27.

[13] P. Evans, and B. Halliwell, Micronutrients: oxidant/antioxidant status, Br J Nutr, 85, 2001, 67-74.

[14] R. B. Rucker, A. J. Fascetti, and C. L. Keen, Trace Minerals, in J.J. Kaneko, J.W. Harvey, and M.L. Bruss, (Eds.), Clinical biochemistry of domestic animals, 6 (Academic press, 2008).

[15] L.R. Ballweber, The practical veterinarian: veterinary parasitology (Butterworth-Heinemann publications, USA, 2001).

[16] J.H. Drudge, and E.T. Lyons, Oxyuris infection, in N.E. Robinson (Ed.), Current Therapy in Equine Medicine, (Philadelphia: W.B. Saunders, 1983) 288-289.

[17] E.T. Lyons, S.C. Tolliver, and S.S. Collins, Prevalence of large endoparasites at necropsy in horses infected with Population B small strongyles in a herd established in Kentucky in 1966, Parasitol Res, 99, 2006, 114-118.

[18] S.M. Austin, J.A. DiPietro, and J.H. Foreman, Parascaris equorum infections in horses, Compendium of Continuing Education for the Practicing Veterinarian, 12, 1990, 1110-1119.

[19] N. C. Cribb, N. M. Cote, L. P. Bouré, and A. S. Peregrine, Acute small intestinal obstruction associated with Parascaris equorum infection in young horses: 25 cases (1985–2004), New Zealand veterinary journal, 54(6), 2006, 338-343.

[20] M.K. Nielsen, C.R. Reinemeyer, and D.C. Sellon, Nematodes, in D.C. Sellon, and M.T. Long (Eds.,), Equine infectious diseases, 2 (Saunders, Elsevier, 2014).

[21] S. Srihakim, and T.W. Swerczek, Pathologic changes and pathogenesis of Parascaris equorum infection in parasite-free pony foals, Am J Vet Res. 39(7), 1978, 1155-1160.

[22] B.J. McEwen, Eosinophils: a review, Vet Res Commun, 16, 1992, 11-44.

[23] E.G. Welles, Interpretation of equine leukocyte responses, in D.J. Weiss, and K. J. Wardrop (Eds), Schalm's veterinary hematology, 6 (Wiley-Blackwell, 2010).

[24] B.M. McCraw, and J.O. Slocombe, Strongylus equinis: development and pathological effects in the equine host, Can J Comp Med, 49, 1985, 372-383.

[25] N.C. Jain, Schalm's Veterinary Hematology, 4(Philadelphia: Lea and Febiger, 1986) 140-177.

[26] C.S. Hayat, M. Khalid, Z. Iqbal, and M. Akhtar, Haematological and Biochemical disturbances associated with Toxocara vitulorum infection in buffalo calves, Int J Agri and Bio, 1(4), 1999, 247-249.

[27] S. Halmandge, V.R. Kasaralikar, and P. Kumar, Haematological and biochemical study in ascariosis in buffalo calves, Indian Vet J, 82, 2005, 374-376.

[28] B. L. O'Dell, and R. A. Sunde, Handbook of nutritionally essential mineral elements, (New York: Dekker, 1997).

[29] S. Hughes, and S. Samman, The effect of zinc supplementation in humans on plasma lipids, antioxidant status and thrombogenesis, J Am Coll Nutr, 25, 2006, 285- 291.

[30] S. G. Fekete, and D. L. Brown, Veterinary aspects and perspectives of nutrigenomics: a critical review, Acta Vet Hung, 55, 2007, 229-239.

[31] A. Jendryezko, H. Sodowska, and M. Drozdz, Zinc deficiency in children infected with Giardia lamblia, Wiadlek, 46, 1993, 32-35.

[32] P. Ertan, K. Yereli, O. Kurt, I.C. Balcioglu, and A. Onag, Serological levels of zinc, copper and iron elements among Giardia lamblia infected children in Turkey, Pediatr Int, 44(3), 2002, 286-288.

[33] M.E. Scott, and K.G. Koshi, Zinc deficiency impairs immune responses against parasitic nematode infections at intestinal and systemic sites, J Nutr, 130(Suppl), 2000, 1412-1420.

[34] M. Nazari, Zinc deficiency in children infected with Giardia lamblia, Medical Journal of the Islamic Republic of Iran, 7(3), 1993, 171-172.