تأثير البيض العادى والمشع للنيواسكارس فيتولـــورم على الحالة الغـذائيـة للفأر الابيض وخصوصا على معدلات الكالسيوم والفوسفور فى الدم

م ٠ أ ٠ منصـور ، م ٠ أ ٠ توفيـق ، ك ٠ ذكـــى

تم القيام بعمل عدوى لأربعين (٤٠) ذكر فأر البينو بواسطة بيض اسكارس فيتولـورم العـادى ، وأخـر تعرض للاشعاع ٠ ولقد وجـد أنه هناك نقص غير مميز فى وزن الجسم الحى فـى المجموعـات التى تم عـلاجها عنـه فى المجموعات المراقبـة ٠ وعلـى الرغم من ذلك وجـد أن كـل من مستوى الكالسيوم السيرمـى والفوسفور الغير عضـوى قـد ارتفـع فى الفيران المعداه ببيض الاسكارس فيتولورم الطبيعى ، ونقص فـى الفيران المعداه بالبيض المعـرض للاستطلاع بواسطة ٠٠٠ر٥٠ ، ٠٠٠ر١٠٠ وحـدة اشـعاع كهالـت ٦٠ قبـل القيـام بالعـدوى ٠

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INFLUENCE OF NORMAL AND IRRADIATED NEOASCARIS VITULORUM EGGS ON THE NUTRITIONAL STATUS OF ALBINO RATS WITH SPECIAL REFERENCE TO THEIR EFFECT ON THE LEVEL OF CALCIUM AND INORGANIC PHOSPHOROUS IN SERUM*

(With Six tables)

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SUMMARY

Following the infection of 40 male albino rats with normal and irradiated Neoascaris vitulorum eggs there is a non significant decrease in the live body weight in the treated groups than in the control one. However , both the level of serum calcium and inorganic phosphorus is significantly higher in rats infected with normal N. vitulorum eggs and decreases in those infected with eggs exposed to irrediation by 50,000 and 100,000 rad-cobalt-60 before its infection.

INTRODUCTION

It had been known that parasitic infection played an important role on the nutritional status of their hosts (SPINDLER, 1947 & 1950; GORDON, 1958; REID and CARMON,1958 and DAVEY, 1964). They stated that the weight gain and productivity of infected animals were decreased.This can be considered as a source of serious economic losses interfering with the field trials of grazing animals.Therefore,

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there is a great tendency to use ionizing radiation for controlling parasitic diseases to minimize their effects.

SPINDLER (1947) concluded that the growth of infected pigs with Ascaris summ was interfered with, firstly at the time of larval invasion of the lung and again after the worms had attained sexual maturity.

The present investigation was planned to study the effect of infection with either normal or cobalt-60 irradiated N.vitulorum eggs on the live body weight, calcium and inorganic phosphorus levels in the serum of albino rats.

MATERIAL AND METHODS

N.vitulorum eggs obtained from the terminal portion of dissected uteri of freshly collected worms were incubated at 28°C. in petri-dishes containing 2% potassium dichromate solution for 2 weeks. They were washed several times with saline and their number per ml. of the suspension was estimated.

Four groups of 10 male albino rats (Rattus albinus) each were used in the present investigation. They recieved a diet of standard rodent pellets produced by the Cairo- Company for Oil and Soap, as well as green vegetables.The first group was infected with normal (non-irradiated) N. vitulorum eggs, the second and third ones recieved eggs irradiated by exposure to 50,000 and 100,000 rad-cobalt-60 respectively . The last group of rats was left as a control. Each rat in the infected groups was fed 20,000 infective eggs by means of a plastic syringe to its needle a piece of fine rubber tubing was attached.

The rats were individually weighed before and or the sixth day after their infection with either normal or irradiated eggs. At the same time, they were sacrified by ble-

eding. Blood serum was individually collected in clean, sterile, marked test tubes ready for determination of calcium and inorganic phosphorus.

The Clark-Collip method, modification of the Kramer-Tiadall method, (1925) was that of choice for the determination of calcium level in blood serum.

For the determination of inorganic phosphorus in the blood serum Fiske and Subbarow method (1925) was employed.

Analysis of variance between the various treated groups was done according to Snedecor (1956).

RESULTS

The effect of normal and irradiated N. vitulorum eggs on the live body wieht of rats after 6 days from their infection is shown in table I.

Analysis of variance between the various treated and control groups proved to be non significant at 1% and 5% levels (Table II).

Meanwhile, table III illustrated the calcium level in serum of rats in relation to their infection with either normal or irradiated N.vitulorum eggs.

Statistical analysis revealed that the difference between calcium level in serum of rats in the different groups was highly significant.

The level of inorganic phosphor us in serum of rats was found to be variable according to their infection with normal or irradiated N.vitulorum eggs (Table V).

Difference in the level of serum inorganic phosphorus among rats in the different groups was highly significant (P 0.01) as shown in table VI.

The present investigation indicated that there was a non-significant decrease in the live body weight among groups of rats infected with either normal or irradiated N. vitulorum eggs as compared with the non-infected control group. The highest body weight was obtained in group IV (non-infected control rats), followed by group III (rats infected with eggs exposed to 100,000 rad-Co-60), then group II (rats infected with eggs irradiated by exposure to 50,000 rad-Co-60). The lowest body weight was recorded among rats of group I that were infected with normal eggs. At the same time, the present results showed that irradiation minimized the harmful effect of N.vitulorum in reducing the live body weight. VILLELLA, GOULD and GOMBERG (1958) and DEO, SOKOLIC and GANGADHARA RAO (1971 a&b) who stated that infested birds with Ascaridia galli eggs had better growth rate than those subjected to the same challenges of non-irradiated infective eggs. Moreover, SPINDLER (1947) added that the growth of infected pigs with Ascaris suum was interferred with firstly at the time of larval invasion to the lung and again after the worms attained sexual maturity.

The decrease in the live body weight was suggested to be related to the fact that ascarids live in the small intestine of the host from where they derive their nourishment (DAVEY, 1964). Moreover, EUZEBY and BUSSIERAS (1959 found that helminth parasites adversely affected the absorption and utilization of proteins, glucosides, minerals and vitamins.

The chemical determination of calcium and inorganic phosphorus levels in the serum of rats infected with non-irradiated and cobalt-60 irradiated N.vitulorum eggs revealed that there was a highly significant increase in the infected groups. Moreover, it was found that the highest

level of both calcium and inorganic phosphorus was obtained in rats infected with non-irradiated eggs (group 1), followed by the second group (rats infected with eggs exposed to 50,000 rad-Co-60), then the third group (rats infected with eggs exposed to 100,000 rad-Co-60). The lowest level was noticed among the fourth non-infected control group. The increase in the level of calcium and inorganic phosphorus in the serum of infected rats may be due to penetration of the N.vitulorum larvae to the intestinal mucosa causing an increase of mucosal permeability for minerals (HURWITZ, SHAMIR and BAR, 1971). In addition, the increase of calcium may be related to the increase of the total serum protein (TAWFIK, 1970), hence, the statement of CLARK and COLLIP (1925) who mentioned that about half of the total amount of calcium present in the serum was combined with that protein. Similarly, the increase in the inorganic phosphorus level may be due to the damage produced by N.vitulorum in the kidney (CASAROSA, FAVATI and MACCHIONI, 1964) causing nephritis,which results in the increase of serum inorganic phosphorus level. Also, HAIBA and GENEIDY (1965) attributed the high level of inorganic phosphorus in serum of chickens infested with Ascaridia galli to the abnormal phosphate catabolism.

Besides, irradiation to the infective stages of N. vitulorum by various doses of cobalt-60 reduced their harmful effects as indicated by the gradual decrease of both calcium and inorganic phosphorus levels in serum of infected rats with the increase of the dose of irradiation.

REFERENCES

Casarosa, L., Favati, V. & Macchioni, G. (1964): Resistance to embryonated Neoascaris vitulorum eggs induced by orally administered cobalt-irradiated eggs in guinea pigs. Zooprofilassi, 19: 241-251.

Clar, A. & Collip, P.(1925): J.Biol. Chem., 63: 461.Cited by Howk, P.B., Oser, B.L. & Summerson, W.H. (1954) : Practical Physiological Chemistry. 13th ed. McGrow-Hill Book Co. Inc.

Davey, K.Q. (1964): The food of Ascaris. Canad. J.Zool., 42: 1160-1161.

Deo, P.G., Sokolic, A. & Gangadhara Rac.Y.V.B. (1971 a): Investigations on immunity developed in chickens against Ascaridia galli using irradiated eggs of this helminth. Ind. J.Anim.Sc., 4(4): 306 - 310.

Deo, P.G., Sokolic, A. & Gangadhara Rao, Y.V.B. (1971b):Further investigation on the use of irradiated eggs to develop immunity against Ascaridia galli in chickens. Brit. Vet.J., 127 (9): 430-435.

Euzeby, J. & Bussieras, J. (1959): Metabolic disorders caused by helminths. Goh. Med.Vet.,28: 117-135.

Fiske, B. &Bubbarow, W.(1925): J.Biol.Chem.,66:375. Cited by Howk, P.B., Oser, B.L. & Summerson, W. H. (1954) : Practical Physiological Chemistry. 13th ed. McGrow-Hill Book Co. Inc.

Gordon, H.M.L. (1958): The effect of worm parasites on the productivity of sheep. Proc. Aust.Sec.Anim. Prod., 2: 56 - 68.

Haiba, M.H. & Geneidy, A.A. (1965): The effect of ascariasis on some trace elements and mineral levels in serum of Egyptian Chickens. Z.Parasitenk., 25: 399 -404.

Hurwitz, S.,Shamir, N. & Bar, A.(1971): Effect of Ascaridia galli on protein and electrolyte absorption from chicken intestines. Isotopes and Radiation in Parasitology, III: 61-65.

Reid, W.M. & Carmon, J.L. (1958): Effects of numbers of Ascaridia galli in depressing weight gains in chickens. J.Parasit., 44: 183 - 186.

Snedecor, G.W. (1956): Statistical methods. 5th ed. Iowa State College press. Ames.

Spindler, L.A. (1947): Effect of experimental infections with ascarids on the growth of pigs.Proc. Helminth. Soc., Wash., 14: 58-63.

Spindler, L.A. (1950): Effect of parasites on swine production. Proc. 54th Ann.Neeting, U.S.Livestock Sanit. Ass.pp.241.

Tawfik, M.A. (1970): Biological studies on Neoascaris Vitulorum infesting Bullaloes. M.D.Thesis, Fac.of Vet. Med., Cairo University.

Villella, J.B.,Gould, S.E. & Gomberg, H.J.(1958): Effect of cobalt-60 and X-ray on infectivity of Ascaris eggs. J. Parasit., 44: 85-92.