تأثير الكوبليت ٦٠ المشـع على فاعليـة نيو أسكارس فيتلورم في ذكور فيران الأبينو

د٠/منصور ، د٠/توفيق ، د٠/ذكى

الملخص العربى

فى اليوم السادس الذى تلى عدوى ٤٠فأرا ذكرا من نوع الألبينو بواسطة بيض معدى بالنيواسكارس فيتلورم وبيض آخر معرض لاشعاع الكوبليت (٦٠) ومصاب أبيضا بالبيوضات لوحظ الآتى :

أولا : أن عدد يرقات النيو اسكارس فيتلورم التى تم الحصول عليها من الرئة كان قليلا بالنسبة لليرقات فى الفيران المصاب بالبيض الذى تم تعرضه لاشعاع الكوبليت ٦٠

ثانيا : أن التغيرات الباثولوجية لأنسجة الكبد والرئة للفئران المصابة بالبيض المعرض للاشعاع كانت أقل نسبيا من التغيرات التى حدثت بالنسبة للفئران المصابة بالبيض الذى لم يتم تعرضه للأشعاع ٠

ثالثا : أن التغيرات الباثولوجية فى أنسجة خصى الفيران المصابة بالبيض الطبيعى وكذلك بواسطة ٥٠ر٠٠٠ بيضة معرضة لاشعاع الكوبليت ٦٠ قد أظهرت تغيرات باثولوجية شملت الحيوانات المنوية فى أطوارها المختلفة بينما ظهرت هذه التغيرات فى الحيوانات المنوية البالغة فى خصى الفئران المصابة بواسطة ١٠٠ر٠٠٠ بيضة معرضة لاشعاع الكوبليت ٦٠

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EFFECT OF COBALT-60 ON THE INFECTIVITY OF NEOASCARIS VITULORUM IN MALE ALBINO RATS*.

(With 3 Figures)

By

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SUMMARY

On the 6 *the* day after the infection of 40 male albino rats with either normal or cobalt-60 irradiated *Neoascaris vitulorum* infective eggs, it was found that:

1—The number of *N. vitulorum* larvae from the rat lungs were decreased in those infected with irradiated ova than in those infected with normal ones.

2—The pathological and histopathological changes of both liver and lungs of rats infected with irradiated ova were less in degree than those with normal ones.

3—The histopathological findings in rat testes infected with normal and 50.000 rad-CO-60 irradiated ova showed degenerative changes involved spermatozoa, spermatid and spermatocytes. While it included only spermatozoa of testes of rats infected with 100,000 rad-CO-60 irradiated ova.

Recently, there is a great interest in the feasibility of using ionizing radiations as a possible mean of reducing or controlling certain parasitic diseases of animals. By using this method, the damage caused by parasites can be minimized.

VILLELLA, GOULD and GOMBERG (1958) studied the effect of Cobalt-60 on the infectivity of Ascaris eggs in guinea pigs. They observed that doses of 30,000 and 100,000 rep retarded the development of embryo inside the egg. They also showed that a dose of 100,000 to 150, 000 rep was necessary to prevent the development of viable larvae in the lungs and at a dose of 250,000 rep a slight degree of pneumonitis was still produced.

The present investigation was planned to study the effect of Cobalt – 60 on the infectivity of *Neoascaris vitulorum* in albino rats in order to attain a more reliable information for combating that parasite.

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MATERIAL AND METHODS

The present study included a total number of 40 male albino rats (Rattus albinus). They were housed in cages of 10 rats each and received diet of standard rodent pellets as well as fresh drinking water.

Preparation of Infective N. vitulorum Eggs :

Eggs from ascaris worms were incubated at 28°C. in petri-dishes containing 2% potassium dichromate solution for 2 weeks. Then, they were washed several times with saline and their numebr was determined.

Experimental Infection of Male Rats :

Four groups of 10 rats each were used in the present experiment. The first group was infected with non-irradiated (normal) *N. vitulorum* eggs, the second and third ones received eggs exposed to 50,000 and 100,000 rod Co-60 respectively. The last group of rats was left as non-infected control.

Each rat received 20,000 infective eggs by means of a plastic syringe, to its needle a piece of fine rubber tubing was attached.

The rats were sacrificed after 6 day post infection as had been stated by TAWFIK (1970) that *N. vitulorum* larvae invaded the different organs of rats by that time. Lungs, liver and testes were removed separately to study the macroscopic appearance for any pathological lesions present. From each organ, a portion was fixed in 10% formol-saline, embedded in paraffin wax and sectioned at 6 u. The sections were stained with haematoxlin and eosine.

Five lungs and five pairs of testes from each group of rats were triturated separately and digested according to the method adopted by LAMINA (1964), then examined for the presence and counting the number of larvae.

RESULTS

Effect of Cobalt-60 on the Number of Recovered Larvae of N. vitulorum from the Lungs of Infected Rats:—

The number of *N. vitulorum* larvae recovered from the lungs of rats on the 6*th* day after their infection with either normal or irradiated eggs are shown in table 1.

Table 1 indicates that the number of *N. vitulorum* larvae recovered from the rat lungs of the first group is higher than the other two groups. Comparison of the number of recovered larvae from rat lungs of group II and those of group III showes a significant decrease in the number of larvae that migrated after 6*th* day from the infection. It can be seen that the larval migration is retarded with the exposure of the infective eggs of *N. vitulorum* reversely to increasing radiation doses.

Effect of Cobalt-60 on the pathological picture induced by the migration of N. vitulorum larvae in rats :—

Liver :—The gross appearance of the rat livers of the three groups that were infected with either normal or irradiated eggs showed pin head haemorrhagic spots under its capsule.

The microscopic findings in the liver of rats in the first group which were infected with non-irradiated eggs were conspicious oedema and congestion. The hepatic cells were disorderly arranged with distortion of lobular architecture. Focal infiltration with mononuclear cells and lymphocytes, were found within the parenchymatous tissues arround the larvae. The liver showed migratory tracts lined by ragged cells. (Fig 1).

TABLE 1.—**Number of N. vitulorum Larvae Recoved from Rat Lungs on the *6th* day after their Infetion with Either Normal or Irradiated eggs.**

No.	Group	Animal No.	No. of Larvae	Mean GroupValua
I	Animals infected with non-irradiated (normal) eggs.	1	5987	
		3	5061	5382
		4	4725	
		5	6148	
		7	4989	
II	Animals infected with eggs irradiated with 50 000 rad-Co-60	12	1150	
		13	2201	
		15	998	1585.8
		17	1280	
		20	2300	
III	Animals infected with eggs irradiated with 100,000 rad-Co-60	21	21	
		23	6	
		24	5	10.2
		27	11	
		29	8	
IV	Non-infected control animals	32	0	
		33	0	
		35	0	0
		38	0	
		40	0	

In the 2nd group of rats that was infected with *N. vitulorum* eggs exposed ot 50.000 rad Co-60, the histopathological changes of the livers were less in degree than those of the 1*st* group, with the livers group of rats infected with irradiated eggs (100,000 rad-Co-60) showed slight degree of cellular infiltration than the other groups.

Lung :- The naked eye appearance of lungs obtained from rats infected with non-irradiated *N. vilulorum* eggs revealed numerous haemorrhagic spots and congestion under the pleural surface. Microscopically, haemorrhage and focal granulomatous pneumonitis producing consolidation of more than half the total area of parenchyma were observed. Moreover, the inflammatory changes characterized by thickening of the alveolar wall and cellular infiltration were seen. In the vicinity of the pneumonic regions, areas of emphysema were also noticed. Bronchitis, recognized by desquamation and sloughing of the epithelial linning and accumulation of excudate intermingled with inflammatory cells in the lumen of the bronchi were clear. (Fig. 2

In the second group of rats which were infected with 50,000 rad-Co-60 irradiated N. *vitulorum* eggs, the macroscopic appearance of their lungs revealed numerous petechial haemorrhage beneath the pleural surface. Microscopically, haemorrhage and focal granulomatous pneumonitis producing consolidation of less than half the total area of the parenchyma were observed. Moreover, bronchitis was also recognized.

Concerning the pathological changes of rats lungs of the third groups that were infected with 100,000 rad-Co-60 irradiated eggs, they showed a mild degree of petechial haemorrhage under the pleura. While histopathologically, sections of the lungs indicated mild focal granulomatous pneumonitis affetcing about 10% of the total area of the parenchyma. Slight bronchitis were also observed, but no haemorrhages or recognizable larvae could be traced.

Testes :-The testes of rats in the three groups infected with either non-irradiated or irradiated *N. vitulorum* eggs showed no gross pathological lesions. The histopathological sections of testes in the three infected groups reflected different degrees of activity, i.e., spermatogenesis. The seminiferous tubules of rat testes in the infected groups contained less spermatozoa than those of the control ones. Slight degenerative changes leading to total disappearance of spermatozoa, spermatids or spermatocytes were observed in the first and second groups. While the changes among rat testes of the third groups involved nearly spermatozoa (Fig. 3). The interstatial cells apparently showed no changes.

Discussion

Experimental infection of rats with *N. vitulorum* eggs irradiated by cobalt-60 at a dose of 50,000 and 100,000 rad had showed a difference in the effects produced in the different organs compared to those infected with non-irradiated ones.

The present results showed a considerable decrease in the number of larvae recovered from lungs of the first group of rats which were infected with non-irradiated eggs than those of the second and third groups that received eggs irradiated with 50,000 and 100,000 rad-Co-60 respectively. A dose of 100,000 rad Co-60 was effective in reducing the number of *N. vitulorum* larvae recoverable from the lungs to only a few, compared with the several thousands of those infected with nonirradiated eggs. This is agreed with the findings of VILLELLA *et al.* (1958) who stated that doses of 30,000 and 100,000 rep Co-60 retarded the development of Ascaris eggs and at a dose of 100,000 to 150,000 rep the development of eggs were prohibited in the lungs of guinea pigs. Moreover, VARGA (1964a & b) concluded that there was a linear relationship between the dose of irradiation and worm count (*Ascaridia galli*) of fowls.

The obtained results indicated that both the pathological and histopathological changes of liver and lungs of rats infected with eggs irradiated by 50,000 and 100,000 rad-Co-60 were less in their severity than those of the group that infected with non-irradiated eggs. Thus, the liver and lung damages were negligible after the infection of rats with irradiated. *N. vitulorum* eggs. In this respect, the present results resembled those of VILLELLA *et al.* (1958), CASAROSA, FAVATI and MACCHIONI (1964) and LEIDAHI (1970). So, it can be said that irradiation is considered as one of the descisive factors in the attempts to achieve attenuation to the pathogenicity of *N. vitulorum* larvae.

Despite the absence of any gross pathological lesions in the rat testes of the infected groups with either normal or irradiated eggs, yet the lumen of the seminiferous tubules contained less spermatozoa than those of the control group. Besides, histopathological changes were more pronounced among rat restes of the first and second groups, in the form of degenerative changes leading to the disappearnce of spermatozoa, spermatids or spermatocytes. While, these changes involved only spermatozoa in rat testes of the third group.

As it was impossible to recover any larvae from rat testes in the present investigation, it could be concluded that the histopathological changes may be due to the effect of toxins secreted by the migrating larvae. Similar conclusion had been stated by DESCHIENS (1948) with *Ascaris megalocephala*.

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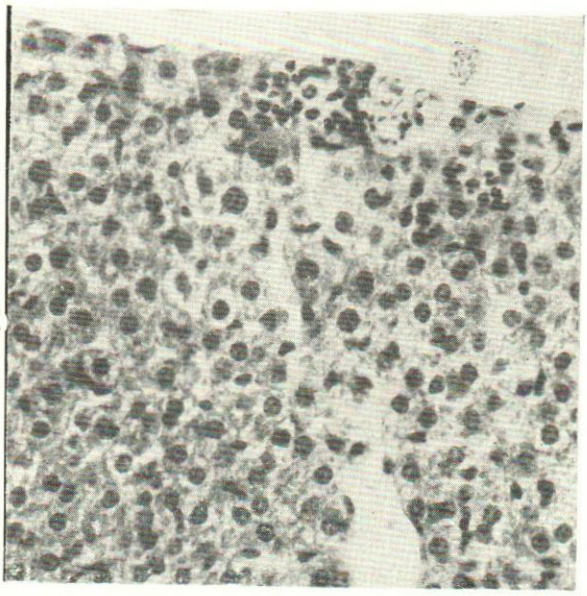

Fig. 1. Liver of rat infected with normal *N. vitulorum* eggs., 6*th* day post infection, showing focal infiltration of mononuclear cells arround larvae and larval migratory tract.(720 X).

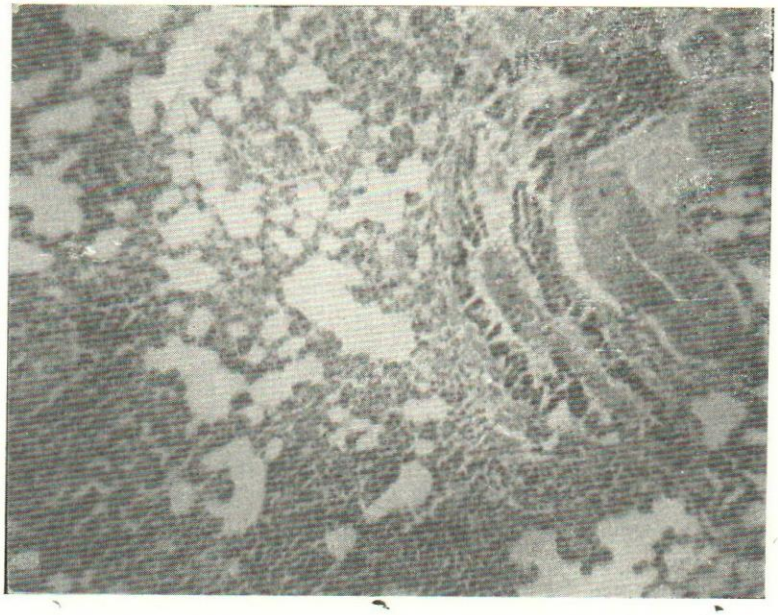

Fig. 2. Lung of rat infected with normal *N. vitulorum* eggs, 6*th* day post infection, showing haemorrhage, focal granulomatous pneumonitis and thickening of the alveolar well (180 X).

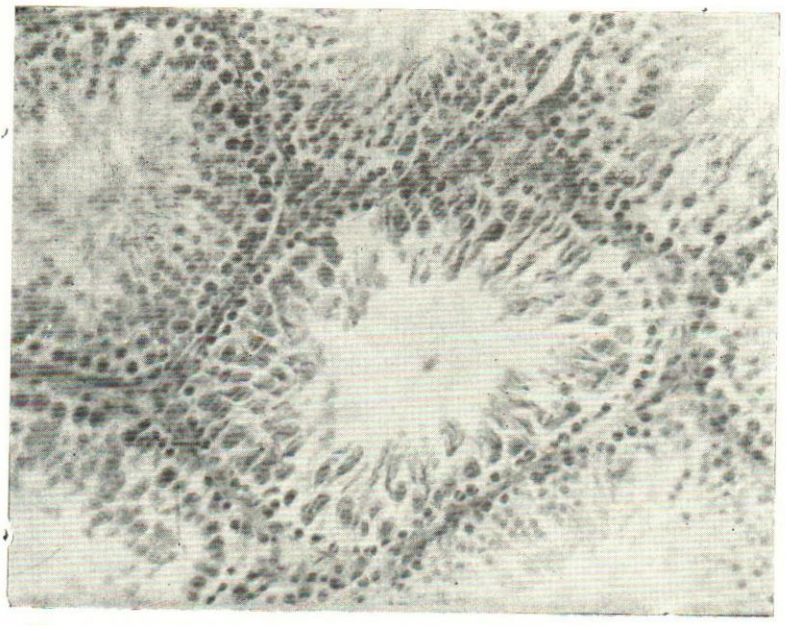

Fig. 3. Testis of rat infected with *N . vitulorum* eggs exposed to 100,000 rad-Co-60 , *6th* day post infection, showing slight degenerative changes involving nearly spermatozoa. (450 X).