

Experimental infection of pigeon birds with *Giardia lamblia* parasite isolated from human and treatment of infected birds with ginger extract

الاصابه التجريبيه لطيور الحمام بطفيلي الجيارديا (*Giardia lamblia*) المعزول من الإنسان ومعالجه الطيور المصابه بمستخلص الزنجبيل

J.K .Ali

H.A. Swadi

H.H. Alewi

Abstract:

Twenty - three of peogin birds , 31 days age were experimentally infected with a dose of 10000 cyst/bird of *G. lambila* parasite that was isolated from human . Present study was succeeded to confirm experimental infection in pigeons with *G. lambila* for the first time in the country. From the total of 23 pigeons , 20 birds were found infected (86.9%).No significant differences were found between infected male and female pigeons . The prepetant period of infection was 6-9 days and feces of infected birds was liquid if compared with that of uninfected birds , which was soft. Flotation by zinc- sulphate was not exhibited significant differences in the diagnosis of the parasite comparison to the direct examination of feces , while scarping technique from duodenal mucosa was best for diagnosis of the parasite and with significant differences was $P<0.05$ in compared to the direct smear of duodenal contents .

The extract of aqueous ginger (*zingbar officinale*) was exhibited high efficiency in treatment of infected pigeons and the highest efficiency of treatment was by concentration 10% of the extract , which reached 100% , and was in significant difference on level $P<0.05$ comparison to the efficiency of 5% concentration of the extract, that was 62.5 % . untreated infected pigeons continued of shedding the cysts of the parasite until end of the experiment .

المستخلص :

أصيب 23 طيرا من الحمام بعمر 31 يوما تجريبيا بجرعه 10000 كيس /طير من طفيلي الجيارديا لامبليا المعزول من الانسان .اظهرت نتائج الدراسه نجاح الاصابه التجريبيه لطيور الحمام بالطفيلي ولاول مره في القطر , اذ سجلت الاصابه في 20 طيرا من مجموع 23 طيرا (86.9 %) ولم تسجل فروقات احصائيه مهمه في نسبه الاصابه بين الذكور والاناث. ان الفتره قبل البانته تراوحت 6 - 9 يوم , وكان براز الطيور المصابه سائلا مقارنة لبراز الطيور غير المصابه الذي كان ليناً . لم تظهر طريقه التطويق باستعمال كبريتات الزنك افضليه مهمه احصائيا في تشخيص الاصابه بالطفيلي مقارنة بطريقه الفحص المباشر للبراز , بينما سجلت القشطه من مخاطيه الاثني عشري تفوقا في تشخيص الاصابه بالطفيلي للطيور المعالجه مقارنة بطريقه الفحص المباشر لمحتويات الامعاء وعلى مستوى اهميه $P<0.05$ اظهر مستخلص الزنجبيل (*zingbar officinale*) كفاءه عاليه في معالجه الطيور المصابه بالطفيلي وكانت اعلى كفاءه له بتركيز 10% وبلغت 100% وبفارق مهم احصائيا على مستوى $P<0.05$ مقارنة بكفاءه الزنجبيل بتركيز 5% والتي بلغت 62.5 % . في حين استمر طرح اكياس الطفيلي في براز الطيور المصابه غير المعالجه لحين انتهاء تجربه .

Introduction

Giardia sp is a flagellated protozoan which inhabits the small intestine of human and rang of mammals , amphibians and birds [1,2]. The parasite has a worldwide distribution and recognized as a very important causative agent of diarrhea and other symptoms in human and many other host species of mammals and birds [3]. There is evidence indicating that parasite transmission can be occur between different species [4] and in Iraq [5,6] succeeding in transmission of *G.lamblia* isolated from human to dogs and broilers respectively .

Metranidazole consider the best chemical drugs of the parasite but recently many medical plants are used in treatment the infection with the parasite to avoid the side effects of chemical drugs and to made cheap food production [7]. Garlic extract with concentration 15% , 20% show high

efficiency in treatment of broilers infected with *G.lamblia* isolated from human [8]. Many previous research found that ginger extract has larvicidal activity against *shistosoma mansoni* and *Angiostrongylus contonensis* [9,10] .

Our study aimed to report the infection of pigeons with *G. lamblia* and throw light on efficiency of ginger extract in treatment infection with the parasite that infected them.

Material and Methods

Forty -six male and female pigeons, aged 31 days, were divided to group of the experiment (23 pigeons) , that drenching orally with dose 10000 cyst/bird of *G.lamblia* cyst, the second group was control (23 pigeons) that left without any application , the group of experiment was drenching with solution of human faces contain cysts of the parasite , that transported in the same day from AL-Emam Ali hospital in Babylon to laboratory of AL-Mousyab technical institute and mixed with normal saline , then filtered by four folds of gauze ,cysts counted according to [11].

The dose of infection was given by disposable syringe contain narrow tube with 5 cm long. After 5 days all pigeons were tested(involved control group) by direct examination of fecal samples and flotation by zinc-sulphate [12]. The *Zingbar officinale* rhizome was purchased from local commercial sources and shade dried at room temperature before being pulverized with an electric grinder .The extract were then obtained by maceration method (100gm) with one liter of distilled water for 48 hours to obtain a final aqueous concentration of 100mg/ml as stated in the way of [13].

Four of the infected pigeons were died before treatment , the rest birds divided to two groups , each one contain 8 pigeons, the first group treated with 10% of ginger, while the other group treated with 5% of ginger.

After 7 days of treatment the treated pigeons tested by scraping technique from duodenal mucosa and by direct examination of intestinal contents.

Chi-square analysis was used to analysis of the results which considered significant on level $P < 0.05$ and $P < 0.01$ [14].

Results and discussion:

Our study was succeeded for the first time in Iraq to infected pigeons experimentally by *G. lamblia* parasite isolated from human, the study showed that 20 pigeons were infected from the total number of pigeons which was 23 (86.9%) that drenched orally with the parasite . on the other side no infection detected in the control group. No significant differences were found between the infected male and female pigeons. (Table 1)

Table 1:Rate of infection among male and female pigeons experimentally infected with *G.lamblia*

Sex	No. exam.	No. infect.	%	Type of parasite
Males	10	8	80	Cysts , Troph.
Females	13	12	92.3	Cysts , Troph.
Total	23	20	86.9	_____

N S : no significant

The present results is in agreement with [6] that were succeeded in experimentally infection of broilers with *G.lamblia* (70%) . The dose of *G.lamblia* cysts (10000cysts/bird) used to infected the pigeons was enough to cause the infection and it's come in agreement with [15] that reported , the dose 1000 cysts /bird and more was enough to cause infection . The prepatant period of infection was 6-9 days and faces of infected birds change to liquid consistency , the results of [6] exhibited nearly same prepatant period and faces consistency . Flotation of faces by zinc-sulphate was the best method for diagnosis of the parasite cysts comparison to direct examination of faces (Table 2) , the same result was found by [16] who reported that flotation by zinc -sulphate consider typical method for diagnosis of *G.lamblia* cysts.

Table 2 : Methods used to diagnosis the parasite in pigeons

No .bird	Prep. Period (days)	Zinc-sulphate	Direct Exam.	Faces consistency
172	7	++(cysts)	+ (troph.)	Liquid
184	6	+(cysts)	-	Soft
156	8	+++ (cysts)	++(cysts, troph.)	Liquid
187	6	++(cysts)	+(cysts)	Liquid
186	-	-	-	Soft
189	7	++(cysts)	+(troph.)	Liquid
190	6	+++ (cysts)	++(cysts,troph.)	Liquid
169	-	-	-	Soft
177	6	+(cysts)	-	Soft
179	8	++(cysts)	+(troph.)	Liquid
174	9	+(cysts)	+(cysts)	Liquid
160	7	+(cysts)	+(cysts)	Soft
162	7	++(cysts)	+(troph.)	Liquid
192	6	+(cysts)	-	Liquid
173	8	+++ (cysts)	+(cysts,troph.)	Liquid
178	-	-	-	Soft
191	9	++(cysts)	+(cysts)	Liquid
188	6	+++ (cysts)	++(troph.)	Liquid
163	7	++(cysts)	+(cysts,troph.)	Liquid
181	8	+(cysts)	+(troph.)	Liquid
183	6	+(cysts)	+(cysts)	Liquid
165	6	++(cysts)	+(cysts)	Liquid
194	8	+(cysts)	+(troph.)	Liquid

N S : no significant

The previous studies had shown good therapeutic effects of some plant extracts on *G.lamblia* infection [17,18] , other studies shown good effects of ginger against *Schistosoma mansoni* and *Angiostrongylus contonensis* [9,10].

The present study had shown that 10% concentration of ginger given twice daily for two days lead to disappear cysts and trophozoites of the parasite completely from mucosa of duodenum and intestinal contents that examined by scraping technique and direct examination of faces respectively (Table 3) , while 5% concentration of ginger give less efficiency reached 62.5% (Table 4) .

This results found corresponding with [8] that reported increase the efficiency of plant extracts with the increase of concentration.

Table3: The therapeutic efficiency of 10% concentration of ginger against *G.lamblia* infection in pigeons.

No. birds	Before treatment		After treatment	
	Zinc-sulphate	Direct exam.	Scraping	Direct exam.
122	++(cysts)	+(troph.)	-	-
184	+(cysts)	-	-	-
156	+++ (cysts)	++(cysts,troph.)	-	-
187	++(cysts)	+(cysts)	-	-
189	++(cysts)	+(cysts,troph.)	-	-
190	+++ (cysts)	++(troph.)	-	-
177	+(cysts)	-	-	-
179	++(cysts)	+(troph.)	-	-

N S : no significant

Table 4:The therapeutic efficiency of 5% concentration ginger against *G.lamblia* infection in pigeons.

No. birds	Before treatment		After treatment	
	Zinc-sulphate	Direct exam.	scraping	Direct exam.
174	+(cysts)	+(cysts)	-	-
160	+(cysts)	+(cysts)	-	-
162	++(cysts)	+(troph.)	+(troph.)	-
192	+(cysts)	-	-	-
173	+++ (cysts)	+(cysts,troph.)	-	-
191	++(cysts)	+(cysts)	+(troph.)	-
188	+++ (cysts)	++(trophs)	+(troph.)	-
163	++(cysts)	+(cysts)	-	-

*P<0.05

Succeeding of the present study in the experimental infection of pigeons by *G.lamblia* isolated from human consider important from epidemiological aspect because it's explain why there is high rate of infection with the parasite among human , especially those in rural areas that used untreated water as a source of drinkable water , in the same time pigeons always in direct contact with river water that contaminated with its faces , so this study ensure role of this birds (pigeons) as reservoir of the parasite and as a source of human infection[19]. The high efficiency of ginger extract in treatment of *G. lamblia* that isolated from human, throw a light on capacity of using the extract of this medical plant as therapy against giardiasis in human [20].

References:

1. Soulsby , E.J,L (1982) Helminths , Arthropods and Protozoa in Domesticated Animals ,7 th edn , Bailliere, Tindall, London .
2. Stuart, J.M.; Orr, H.J.; Warburton, F.G.; Jeyakanth, S.; Pugh, C.; Morris, I.; Sarangi , J. and Nichols, G.(2003). Risk factors for sporadic giardiasis :A case control study in south western England. Emerging Infect. Dis. , 9 (2) : 229-233.
3. Brooks, G.F.; Butel, J.S. and Morse, S.A.(2001). Medical microbiology . twenty- second ed. Appleton and Lange, United State of America.
4. Ey, P.L.; Bruderer, T.; Wehrli, C. and Kohler, P. (1996). Comparison of genetic groups determined by molecular and immunological analyses of *Giardia* isolated from animals and human in Switzerland and Australia . Parasitol. Res. 82:52-60.
- 5.سوادبي, هشام عطوان (2000) دراسة وبائية لداء الجيارديات في الكلاب في محافظة بغداد. رسالة ماجستير كلية الطب البيطري , جامعة بغداد.
- 6.سوادبي, هشام عطوان , علي , جواد كاظم و حسين, حسين تخيل (2008) الإصابة التجريبية لطيور فروج اللحم بطفيلي الجيارديا (*Giardia lamblia*) المعزولة من الانسان. مجلة جامعة كربلاء العلمية, المجلد 6 العدد 2.
7. Naidoo, V; McGaw, L.J. ; Bisschop, S.P.R.; Duncan, N. and Eloft, J.N. (2008). The value of plant extracts with antioxidant activity in attenuating coccidiosis in broiler chickens. Vet. Parasitol. , 153:214-219.
8. حسين , تخيل حسين , علي, جواد كاظم والربيعي, عبد الرزاق لعبيبي(2008) استخدام مستخلص الثوم المائي في معالجة الإصابة التجريبية بطفيلي الجيارديا (*Giardia lamblia*) في دجاج اللحم. مجلة جامعة بابل المجلد 5 العدد 4.
9. Jyhlin, R.; Yichen, C.; Yuchung, L. and Min Yen, C.(2010). Larvicidal activities of ginger (*Zingibar officinale*) against *Angiostrongylus cantonensis*. Acta Tropica. 115: 69-76.
www.ivst.org.
10. Aly, H.F. and Mantawy , M.M. (2013). Efficiency of ginger (*Zingibar officinale*) against *Schistosoma mansoni* infection during host- parasite association. Parasitol. Internal. 62:380-389.
11. Hewlett, E.L.; Andrews, J.S.; Ruffer, J. and Schaefer, F.W. (1982). Experimental infection of mongrel dogs with *Giardia lamblia* cysts and cultured trophozoite . Infect. Dis. 145(1):89-93.
12. Collins , G.H.; Pope, S.E.; Griffin, D.L.; Walker, J. and Conner, G.(1987). Diagnosis and prevalence of *Giardia* spp. In dogs and cats. Asut. Vet. J. 64(3):89-91.
13. Harbone , J.B.(1973). Phytochemical methods, champman and Hall, Landon.
14. Steel, R.G. and Torrie, J.H.(1980). Principles and produced of statistics : A biometrical approach. 2nd ed. MacGraw Hill Book Co. , New York.
15. Lagac , A.M. ; Labranche, T.P. ; Donoghre, A.R. and Ohu, T.C.(1998) . Efficiency of fenbendazole in the treatment of *Giardia* infection in dogs. Amer. J.Vet. Res. 59(1):61-63.
16. Hoskins, J.D. and Cheney , J.M.(1994). Parasitology and Public Heath . In: Clinclal Textbook for Veterinary Technicians . 3th ed. D.M.McCurnine , W.B.Saunders Co. pp:72-95.
- 17 – الكبيسي, علي حسين مكي؛ حداوي , رياض حاتم ؛ القزويني ، يعرب مضر ؛ والسلمان , منتصر عبد السجاد (2007) تأثير المستخلص المائي لنبات القرع (*Cucurbita* sp.) في طفيلي اللامبلية (*Giardia lamblia*) في الجسم الحي . مجلة جامعة كربلاء العلمية المجلد 5 العدد 2.
18. حمد, هناء كامل (2011) تأثير المستخلصات المائية للفلل الحار (*Capsicum frutescens*) وقشور ثمار الرمان الاسود (*Punica granatum*) على طفيلي الجيارديا اللامبلية (*Giardia lamblia*) خارج الجسم الحي . مجلة جامعة النهرين المجلد 14 العدد 2 .
- 19.Thompson, R.C.A. (1992). Parasitic zoonoses problems created by people , not animals . International J. Parasitol. 22(5) : 555- 561.
20. Busatti, H. G. ; Santos, J.F.G. and Gomes, M.A. (2009) . The old and new therapeutic approaches to the treatment of giardiasis : Where are we? . Biologic : Target and therapy (3) : 273-287.