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Proteolytic versus surgical removal: the therapeutic effect of fig tree latex (*Ficus carica L*) on cutaneous and diphtheric forms of avian pox in pigeons (*Columba domestica*)

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Abstract

The therapeutic effect of topical applications of fig tree latex (*Ficus carica*) on avian pox lesions in pigeon (*Columba domestica*) in comparison with surgical dressing and topical application of tetracycline ointment 3% were evaluated. Fifteen infected pigeons with mixed infection of both cutaneous and diptheric forms of pox have typical lesions on head, eyelids, inside mouth, cere, base of beak, legs, and feet were used in this study. Birds were divided into three equal groups (5 birds) for each group. Group one (G^1) was treated twice daily (BID) with tetracycline ointment 3% applied directly on the lesions, after cleaning of the lesions and removal of the external scabs. Group two (G^2) was treated once a day (during night only), for ten successive days with fig tree latex applied directly on lesions. Group three (G^3) was left without treatment as a control group. The activity of the birds, consumption of feed, regression of nodules was monitored daily till the end of the experiment. In both G^1 and G^3 groups, the pox lesions remained as they were (persisted as such and did not regressed). The activity of the birds fastly declined from unable to fly, to limited movement, depression, decrease feeding and death within 6 days from the beginning of treatment. The fig tree latex (G^2) treated birds survived, the activity of the birds and consumption of the feed increased from the 4th day of treatment. The pox lesions regressed and atrophied and disappeared within 10 days of treatment and by this time all birds returned to the normal life. In conclusion, the fig tree latex has beneficial effect in treating the pox lesions with unclear mechanisms of action.

Keywords: Fig tree latex; Avian Pox; Therapeutic effect; Surgical treatment
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التأثير العلاجي لعصارة شجرة التين على الشكلين الجلدي والدفثيري لجدري الطيور في الحمام (التحلل البروتيني مقابل الازالة الجراحية)

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الخلاصة

جرى تقييم التأثير العلاجّي الموضعي لعصارة (لبن) شجرةِ التين ومقارنته بالتضميد الجراحي والاستعمال الموضوعي لمرهمِ التتراسايكلين ٣% على آفات جدري الطيور في الحمام المنزلي. استعملت في هذه الدراسةِ خمس عشْرة حمامة مُصَابة بالعدوى المُخْتَلَطةِ لجدري الطيور لكل من الشكل الجلديَّ والشكل الدفثيري (الخناقي) المصحوبة بآفات مثاليةُ على الرأسِ والجفون وداخل الفَمِّ وعلى قاعدة المنقار وعلى السيقان والأقدام. قُسّمتْ الطيور إلى ثلاث مجموعاتِ متساويةِ (٥ طيور) لكُلّ مجموعة. المجموعة الاولى وفيها عولجت آفات الجدري بعد تنظيفها وإزالةِ القشرة الخارجيةِ منها مرتين في اليوم بالاستعمال الموضعي المباشر لمرهم التتراسايكلين ٣%. المجموعة الثانية عولجت لمدة عشْرة أيامِ متتاليةِ بالاستعمال الموضعي المباشر لعصارة شجرةِ التين لمرة واحدة في اليوم (أثناء الليلِ فقط).

المجموعة الثالثة تركت بدون معالجةً كمجموعة سيطرة. وقد جرى مراقبة نشاط الطيور ، واستهلاكها من الغذاءِ ، وتراجع آفات الجدري (العقيدات) يوميا حتى نّهاية التجربةِ. في كلتا المجموعتين الاولى والثالثة وخلال فترة المعالجة بقيت آفاتِ الجدري كما كانت في بداية التجربة ومن دون اي تراجع ، كما وتراجع نشاط الطيور بشكل سريع مِنْ كون الطير غير قادر على الطَيَرَاْن، الى كون الطير غير قادر على الحركةِ، ثم الوهن وضعف النشاط الوظيفي، ثم نقصان التغذية وتوقفها، والموت خلال ٦ أيامِ مِنْ بِداية المعالجةِ. أما الطيور في المجموعة الثانية والمعالجة بعصارة شجرة التين فقد بقيت حية، وازداد نشاط الطيور وازداد استهلاك الغذاءِ ابتداء مِنْ اليومِ الرابع مِنْ المعالجةِ. أما آفات الجدري فقد تراجعت وضَمرتْ واختفت خلال العشرة أيامِ فترة المعالجةِ وبهذا الوقتِ عادتْ كُلّ الطيور إلى الحَياةِ الطبيعيةِ. نستنتج من ذلك ان لعصارة شجرةَ التين تأثيرُ مفيدُ في مُعَالَجَة آفات الجدري في الطيور وبآليات عمل غير واضحة.

Introduction

Pox infection is enzootic among domesticated, caged and captive birds in Iraq (1,2). Avian pox virus is a member of the family poxviridae and genus Avipoxvirus. Ten definite species (Canary, fowl, junco, mynah, pigeon, psittacine quail, sparrow, starling, turkey) and other two tentative species (peacock and penguim) are recognized. Three forms are seen, cautaneous, diphtheric, and systemic forms (3). The cutaneous and diphtheric forms are more common.

The virus is spread by direct and indirect contact. The direct spread is through ingestion of infected carcasses or physical contact with infected birds. The indirect spread is through contact with contaminated feed and water and inhalation of contaminated dander (3). Mosquitoes are capable of the extrinsic transmission of the virus from bird to bird and have been responsible for wide spread outbreaks during summer months (4). The mites assist in spread of pox virus also (3). There is some variation in forms and severity in different bird species. The incubation period is 4-10 days (3), after that small vesicles appear, one of the three forms or in a combination may seen. Cutaneous lesions of the head region (base of beak, cere, eyelids, and periocular area) or on the featherless areas such as (the legs, feet, keel, wing, and vent), small vesicles forms first, which develop to scabs, secondary infection do occur which may lead to severe scaring. Diphtheric lesions of the mouth region or infection of the nasal champers may develop. Birds can be affected with both forms of the disease at one time. The course of the disease is about 3-4 weeks, but if complications are present the duration may be longer. Mortality is low with the cutaneous form if eating and respiration are not severely affected. Symptoms seen with the systemic form include wart-like masses on the skin, depression, cyanosis and anorexia; these birds may die acutely (3,5,6).

Presence of typical cutaneous lesions usually is sufficient for diagnosis of the disease, although avian pox can be confirmed by histological identification of eosinophilic intracytoplasmic inclusion bodies (Bollinger bodies) (3,7). Generally for birds there is no specific treatment of avian poxvirus infection (3). Treatment includes the use of antibiotics to control bacterial infection, proper management and supportive care, tube –feeding and fluid, vitamin (A) to aid healing and immunization (7).

One of the traditional methods of treatment of keratinized cautaneous lesions in human and animals in rural areas is the topical using of fig tree (Ficus carica L) latex as a topical remedy. Fig tree latex (a milky excrete of leaves and fruits of the common fig tree), also called ficin, has some therapeutic effects such as anthelmintic (8,9), antineoplastic (10-12), anti-inflammatory (12), antioxidant and antibacterial (12-15), antispasmodic and antiplatelet activities (16), hypocholestrolemic effect (12,17), normalize the antioxidant status in diabetic rats (18), and hypoglycemic (12,19). Also fig tree latex is used for treatment of bovine papillomatosis (20), and common warts (verruca vulgaris) in man (21). The therapeutic effect of topical applications of fig tree latex on cautanous and diphtheric pox virus lesions in pigeon versus the surgical dressing and tetracycline ointment 3% application in the present study were evaluated.

Materials and methods

Fig tree latex (Ficus carica L) the milky juice of plants were collected from the severed ends of leaves or fruit during July. The droplets of latex were collected directly with sterile syringe and kept refrigerated at 4C° until its use on the lesion in the night of the same day. Fifteen infected pigeons with mixed infection of pox virus (cutaneous and diphtheric forms) were used in this experiment. Pigeons were suffering from typical lesions on eyelids, inside the mouth, cere, and base of beak, legs, and feet. Pigeons were divided into three equal groups. The first group (G1) treated with tetracycline ointment 3% ((Julphar): Gulf Pharmaceutical Industries, UAE) applied twice daily (BID) (morning and evening). The ointment was topically applied on the lesions after cleaning of the lesions with normal saline and after removal of the external scabs. The second group (G2) treated with the refrigerated fig tree latex which applied directly on the lesion once a day (during night only) for ten successive days. The third group (G3) was left without treatment as a controlled group.

All birds were housed in the same environment; water and feed were given freely. Activities of the birds,

consumption of feed, regression of nodules (pox lesion) were monitored daily till the end of the experiment.

Results

The pox lesions on head, periocular area, eyelids, inside the mouth, cere, base of beak, and on legs, remained as they were, and not regressed in all birds of G1, and G3. The activity of the birds had fastly declined from unable to fly to limited movement, depression, decrease consumption of feed, off feed, and after six days all birds in both groups died (Fig. 1) (Table 1).

Birds in G2 were survived. The activity of birds and consumption of feed was increased from the fourth day of treatment. Cutaneous nodules on head, eye, beak, mouth, and legs gradually decreased in size, regressed and atrophied. All lesions disappeared within 10 days of treatment and the birds returned to normal life (Fig. 2) (Table 1).

Figure 1: The pox lesions on head, cere, base of beak, beak, and inside the mouth.

Figure 2: Bird 10 days after treatment with Fig tree latex shows disappearance of pox lesions from the head and peak.

Discussion

Morbidity and mortality due to the poxvirus infection may be very high in pigeons (3), while in some individual birds it is not fatal but it can reduce the viability and predispose affected birds to secondary infection. The diptheric or wet form affect the digestive and upper respiratory tract causing high mortalities, while the mortalities is low in cutaneous form if the eating and respiration are not severely affected (3).

No successful treatment for the lesions of poxvirus infection is available at present. Proper husbandry should be practiced to reduce the stress on birds, and medicinally antibiotics can be administered to control the secondary infections, particularly in birds with respiratory and gastrointestinal lesions (7). Maintenance of respiration and feeding is important in treatment of the visible lesions on naris and mouth of bird. Good management and surgical dressing may minimize the effect of lesions and increase the number of surviveness. In caged birds lesions are treated surgically as open wounds including debridement, washing with diluted chlorhexidine and application of silver

Table 1: The data of observation during 10 days of treatment, G1 birds treated with tetracycline ointment 3% n = 5, G2 birds treated with fig tree latex n = 5, G3 control (untreated birds) n = 5.

	Day of observation																													
	Day1			Day2			Day 3			Day 4			Day 5			Day 6			Day 7			Day 8			Day 9			Day 10		
No. of birds	G 1	G 2	G 3	G 1	G 2	G 3	G 1	G 2	G 3	G 1	G 2	G 3	G 1	G 2	G 3	G 1	G 2	G 3	G 1	G 2	G 3	G 1	G 2	G 3	G 1	G 2	G 3	G 1	G 2	G 3
Activity of birds																														
Normal (active and flight)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	2	-	-	3	-	-	4	-	-	5	-	-
Unable to flight	5	5	5	4	5	5	1	5	1	-	5	-	4	-	-	4	-	-	3	-	-	2	-	-	1	-	-	-	-	-
Less movement	-	-	-	1	-	-	3	-	2	2	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depression	-	-	-	-	-	-	1	-	2	2	-	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Death	-	-	-	-	-	-	-	-	-	1	-	1	2	-	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Total	5	5	5	5	5	5	5	5	5	5	5	5	4	5	4	2	5	2	0	5	0	0	5	0	0	5	0	0	5	0
Consumption of feed																														
Feed actively																						2			3			4		
Feed independent										1			2			2			3			1			1			1		
Feed with help	5	5	5	5	5	5	3	5	3	4			3			3			2			2			1					
Off feed							2		2	4		4	2		2															
Regression of nodules																														
Presence of large nodules	5	5	5	5	5	5	5	5	4	3	4	2	2	2	2	2			1											
Moderate nodules										2			2			1			2			1								
Small nodules													1			2			2			3			2			1		
Disappear																						1			3			4		

sulfadiazine ointment 1% (6). In Falcons, thermocautery or electrocautery followed by debridement of the upper epithelial layers and dressing with solvent –based tinctures or antibiotics or corticosteroid ointment will assist to minimize scab formation. If the scab is already formed, surgical debridement and dressing with hydrocolloid past is used to promote granulation tissue (22).

Fig tree latex therapy is a traditional therapy in rural areas for keratinized skin lesion (20,21). No earlier report was available on its therapeutic effect on skin pox lesions in birds. Application of the fig tree latex on pox lesions showed continuous regression and shrinking of the nodules from the fourth day of treatment. Lesions were atrophied and disappeared within the 10th day of treatment comparing with no effect of application of tetracycline ointment on pox lesions. Cureness of the lesions on mouth and naris recuperate the birds and facilitate best respiration and self dependence feeding, since most of mortalities in birds occur due to difficulties in respiration and starvation (3).

The exact therapeutic mechanism of fig tree latex in regressing and disappearance of pox lesions is not fully understood. These phenomena may impute to the proteolytic and keratolytic activities of the latex (20). The fig leaves and latex contain many alkaloids, flavonoids, and tannin (17), several organic acids like (oxalic, citric, malic, quinic, shikmic, and fumaric acids), and high quantity of phenolic compounds, aldehydes, alcohols, ketone, monoterpenes, and sequiterpenes (23,24), and proteolytic enzymes (25). The photo toxicity could be the reason at the back of the regression of pox lesions. Photo toxicity of plant may be used therapeutically. Park, et. al. (26) observes depletion of epidermal langerhans cells and local suppression of immune response by photo toxicity of some oriental medical plants. The main phytochemical substance in the fig leaves and latex responsible for photo toxicity is furocumarins. The furocumarins (psoralens) are natural constituents of many plants combinant like fig (ficus carica) latex and leaves, these substances produced by the plant for self protection from microorganisms and fungi, they exhibit phototoxic and photo-genotoxic properties in combination with UV radiation (27). Direct contact of the skin to the furocoumarin containing part of fig (leaves and latex) lead to phytophotodermatitis in human (28-30). The controllable using of the latex (during night only) in the present study may play a role in curing the pox lesions and not develop severe reaction of phytophotodermatitis. Recently antiviral activity of water extract of ficus carica leaves was reported (31), which strongly support the beneficial result of the fig latex in the present study.

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