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Anthrax

In human and animals

In kurdistan region

A research submitted to the Council of the Veterinary Department as part of obtaining a veterinary technical diploma

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﴿ ٱللَّهُ لَآ إِلَٰهَ إِلَّا هُوَ ٱلْحَىُّ ٱلْقَيُّومُ ۚ لَا تَأْخُذُهُۥ سِنَةٌ
وَلَا نَوْمٌ ۚ لَّهُۥ مَا فِى ٱلسَّمَٰوَٰتِ وَمَا فِى ٱلْأَرْضِ ۗ مَن ذَا ٱلَّذِى
يَشْفَعُ عِندَهُۥٓ إِلَّا بِإِذْنِهِۦ ۚ يَعْلَمُ مَا بَيْنَ أَيْدِيهِمْ وَمَا
خَلْفَهُمْ ۖ وَلَا يُحِيطُونَ بِشَىْءٍ مِّنْ عِلْمِهِۦٓ إِلَّا بِمَا شَآءَ ۚ
وَسِعَ كُرْسِيُّهُ ٱلسَّمَٰوَٰتِ وَٱلْأَرْضَ ۖ وَلَا يَـُٔودُهُۥ حِفْظُهُمَا
وَهُوَ ٱلْعَلِىُّ ٱلْعَظِيمُ ﴿٢٥٥﴾

سورة البقرة

Dedication

To the light that reveals the darkness of ignorance, the teacher of humanity....Muhammad (may God bless him and grant him peace) To the one who implanted in me the pulse of life and made my life a goal to which I strive...my father

To the world of tenderness, love, mercy, and a symbol of sacrifice....my dear mother

To those who have been the best help for me, my dearest brothers and sisters

To everyone who wanted me to succeed and good.....

we dedicate this fruit of my effort...

we dedicate to all of you the harvest of your planting and our humble effort

Research students

Acknowledgment

Praise be to God, who enlightened the hearts of His pious servants with the light of His clear Book, and made it a guidance and a mercy for the believers, and prayers and peace be upon the most honorable of messengers, our master Muhammad, the trustworthy Arab Prophet, lasting prayers and peace until the Day of Resurrection and Resurrection, and upon his immaculate family, his righteous companions, and those who followed them with kindness until the Day of Judgment. To proceed: I have the honor to extend my thanks, appreciation and gratitude to all my distinguished professors in the veterinary department, and our special thanks to our supervisor, Dr. Hassan Abdullah Muhammad, who provided us with the sources and supported us to complete the research.

We do not forget our families and their support and bear the trouble of studying with us.....

Supervisor approval

I certify that this research decreed (Anthrax in human and animals) in the Kurdistan Region)

Submitted by students: (Nizar Omar Qader Muhammad, Tahsin Suleiman Haji and Mostafa Saber Mostafa Khader)

It took place under my supervision at Shaqlawa Technical College as part of the requirements for obtaining a diploma in veterinary medicine.

Signature

Name: Asist. Proff.Dr. Hassan Abdullah Mohammed

Date:

Based on the available recommendations, I recommend the research for discussion .

Signature :

Head of Department :

Date:

Summary

Anthrax

It is an acute disease caused by the anthrax bacteria. It affects both humans and animals. The most severe form of the disease is highly fatal. There are effective vaccines against anthrax, and some forms of the disease respond well to antibiotic treatment.

Like many other members of the genus Bacillus, anthrax bacteria can form latent bacteria capable of surviving extremely harsh conditions for long periods of time, even decades or centuries. These spores can be found on all continents, even Antarctica. When spores are inhaled, ingested, or come into contact with skin wounds of the host they may reactivate and multiply rapidly.

Anthrax generally affects wild and domestic herbivorous mammals, which eat or inhale the spores while grazing. Ingestion is thought to be the most common way for herbivores to contract anthrax. Carnivores living in the same environment may become infected by preying on infected animals. Sick animals can transmit anthrax to humans, either through direct contact (such as contact with infected blood on open skin) or eating the flesh of sick animals.

The anthrax vaccination is recommended for people at high risk. [It is recommended to vaccinate animals against anthrax in areas where previous infection occurred. Two months of antibiotics, such as doxycycline or ciprofloxacin, after exposure can also prevent infection. If infection occurs treatment with antibiotics and possibly an antidote. The type and number of antibiotics used depends on the type of infection. Antitoxin is recommended for those who suffer from widespread infection.

Anthrax spores can be produced in the laboratory and used as a biological weapon. Anthrax is not spread directly from infected animals or from person to person, but is

spread by germs. These germs can be transmitted through clothing and shoes. The carcass of an animal that died of anthrax can be a source of anthrax spores.

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1. Introduction

It is an acute disease caused by the anthrax bacteria. It affects both humans and animals. The most severe form of the disease is highly fatal. There are effective vaccines against anthrax, and some forms of the disease respond well to antibiotic treatment [1].

Is an acute , febrile , contagious , Zoonotic disease caused by Bacillus anthracis , characterized by : Sudden death with exudation of tarry blood from body orifices of cadaver ,Failure of blood to clot and presence of spleenomegaly , are the most important necropsy finding .

Its highly infectious disease that can affects all vertebrates, transmitted to human by direct contact with infected animals.

Like many other members of the genus Bacillus, anthracis can form latent bacteria capable of surviving in extremely harsh conditions for long periods of time, even decades or centuries. These spores can be present on all continents, even Antarctica [2]. When spores are inhaled, ingested, or come into contact with skin wounds of the host they may reactivate and multiply rapidly. Anthrax is primarily an occupational hazard for of appropriate control measures [1]. Handlers of processed hides, goat hair, bone products, In the 1900s, human inhalation anthrax occurred wool and infected wildlife. It can also be contracted by sporadically in the United States among textile and contact with infected meat [3].

Anthrax generally affects wild and domestic herbivorous mammals, which eat or inhale the spores while grazing. Ingestion is thought to be the most common way for herbivores to contract anthrax. Carnivores living in the same environment may become infected by preying on infected animals. Sick animals can transmit anthrax to humans, either through direct contact (such as contact with infected blood on open

skin) or eating the flesh of sick animal .Therefore, the objectives of this study are to review Energy and water balances impaired by increase in cyclic. anthrax and its public health importance [3].

2. Etiological and bacterial description:

Anthrax is a bacterial disease caused by the polymer of amino acid (D-glutamate), unlike most other spore forming *bacillus anthraces*, a gram positive, rode bacteria which have poly saccharide capsule [4]. It serves as shaped bacterium. It is an aerobic, non-motile that forms one of the principal virulence factor during anthrax centrally located spore. *Bacillus anthracis* belongs to the infection. It is used to inhibit host defense through family Bacillaceae [5]. The first part of bacteria to intact inhibition of phagocytosis of the vegetative cells by with the host, when it is in its spore forms, is the macrophage. In conjunction with lethal toxin and edema exosporium. It is made mostly of protein, with lipid and toxin, whose target cells include macrophages and carbohydrate component [6]. While, the function of the neutrophills, respectively, the capsule allows virulent exosporium is unknown it appears to have Pilli that seem anthrax bacilli to grow in to the infected host [9]. The cells to enhance spore attachment to surface area [7]. *B.* excrete the capsule for protection and virulence. The *anthracis* also has unique capsule which is considered to capsule and s-layer are compatible, but they can both be be majored contributor to its virulence. The capsule formed independently (without the presence of others). Enhances the bacteria's ability to evade host defenses, as. The characteristic mucoid or smooth colony variant is well as inducing septicemia. The s-layer is the layers of correlated with capsule production ability. Virulent strain bacterium the covering of peptidoglycan [6]. The capsule all forms the capsule and rough colony capsule are a has a negative charge which inhibits microphages from virulent. Growth in atmospheric carbon dioxide causes engulfing and destroying the *Bacillus anthraces*

[8].Anti-phagocyte capsule and anthrax toxin proteins to be Anthraces belongs vegetative cells, impeding the synthesized [11], host's immune response [9, 6]. The vegetative *Bacillus*

Figure No. (1) Shows the pathogen Bacillus anthracis

However, vegetative anthrax that escapes from the body through blood or via hemorrhage and carcass opening may form hardy spores.

Risk Factors

Host Factor: The host factor of the disease occurs in all vertebrates but is most common in cattle and sheep and less frequently in goats and horses. Humans occupy an intermediate position between this group and the relatively resistant pigs, dogs and cats. In farm animal the disease is almost invariable fatal, except in pig and even in this species the cause fatality rate is high [10].

Agent Factor: The virulence factors of the virulent strains stems from the section of LF (lethal factor) and EF (edema factor). Toxins along with a spore forming unit known as the protective antigen. The toxin and capsule are the primary virulence factor of the bacillus anthraces. The bacillus anthraces is complex, consisting three protein.

The bacilli are large, cylindrical, with straight, right-angled ends, their dimensions are about (3-10) microns, and their length is (1-1.5) microns, as shown in Figure No. (1). When stained with Giemsa stain, a red capsule appears around them. When the bacterium is seen in Blood slides or in tissues, their groups appear in the form of short chains of bacilli. When the spores leave the body and are exposed to oxygen in the air, within hours they transform from the vegetative form into a spore form that is highly resistant to heat and disinfectants. It has been proven that the spores in the soil remain infectious even after 10 years. Spores can resist boiling if less than 10 minutes or dry heat at 150 °C if less than an hour. It is difficult to eliminate spores in pastures contaminated with the secretions and bleeding of infected animals and the remains of dead bodies. [11].

3. **3.Epidemiological**

The toxicity of anthrax is due to two virulence factors: (i) polyglutamic acid, which protects bacteria from phagocytosis by host neutrophils, and (ii) a triprotein toxin, called anthrax toxin. It is a mixture of three protein components: (i) protective antigen, edema factor, and (iii) toxic agent. The protective antigen, in addition to the toxic agent, produces the toxic toxin, and the protective antigen, in addition to the ascites factor, produces the ascites toxin. These toxins cause death and tissue swelling dropsy, respectively [10].

climate and the efforts put in to spurring its occurrence *B.anthraces* live in soils worldwide. Therefore, when they are isolated from a certain environment, it does not necessarily imply that the specific environment in their habitat [11]. Accidentally ingestion of contaminated bone meal or pasture contaminated by tanner effluent is more common sources. In this circumstance out breaks are few and the number of animal affected is small. The development of an effective live stokes vaccine coupled with the use of penicillin and the implementation of quarantine regulation has caused a marked decline in the occurrence of anthrax in the most countries compared to its satirical incidence [12].

Figure No. (2) Shows the supraacute form in .cows (Mahmoud, 2006)

Anthrax worldwide in distribution. The major enzootic zone of world are found in the tropic & sub tropic – India, Pakistan, Africa & South America.

Large epizootic of *Anthrax* in herbivores have been reported during 1945 in Iran. In Iraqi *Anthrax* is an endemic disease since many reports are available regarding human cutaneous form of anthrax and animal positive cases as shown the following tables.

Table (1): Sheep & goat infected with anthrax in Duhok city from 1999-2004

City / District / Village	Month / Year	Species of dead animal
Duhok / Shingar / Didabun	July – 1999	Sheep
Duhok /Zakho / Derkar	July – 2000	Sheep and goat
Duhok /Zakho / Derkar	July – 2004	Sheep and goat

Duhok Veterinary Directorate (1999, 2000, 2004).

Table (2): Anthrax cases in cow and calf in Erbil city at 2002.

City / District.	Year	Species of dead animals.
Erbil / Soran	2002	Calf
Erbil / Koya	2002	Cow

Erbil veterinary directorate (2002).

Table (3): Table (3): Show human anthrax cases in Erbil city from 2002 – 2003.

Place / distric	Day-month –year	No. of infected persons	Form of *anthrax*
Arbil/ Choman	3-8-2002	2	Cutaneous
Arbil/ mergasoor	7-8-2002	3	Cutaneous
Arbil/Saladin	21-7-2003	2	Cutaneous
Sulaimany/ Rania	22-9-2002	1	Cutaneous

Erbil presidency of health (2002-2003).

Table (4): animal infected with anthrax cases in Sulaimany city.

Place / district (Village)	Year	Species of infected animal
Sulaimany / Dukan (Kany chan)	1970	Sheep and goat
Sulaimany / Penjwen(Ahmed Klwan)	1970	Equine
Sulaimany city	1972-1973	Sheep
Sulaimany / Mawat (Gallalla)	2nd half of 1985	Equine
Sulaimany / Kaladiza (Sangasar)	2nd half of 1985	Equine
Sulaimany / Dukan (Bingird)	2002	Sheep and goat

Sulaimany Veterinary hospital laboratory (1970-2002).

Exposure

This disease affects cows, sheep, and others. It is a disease that affects humans as well. The spores of these germs have the ability to resist difficult environmental conditions and can survive for a period of several years alive in the soil, for example. Alkaline soil is a suitable medium for these spores to transform into the vegetative phase, and it can multiply and multiply when moisture is available. And heat and foodstuffs with alkaline soil, so many cows and sheep can be infected if they graze in such areas, and the germs can be transmitted with water and food or with animal waste or during the inhalation process, and it happens especially to workers in wool shearing or workers in leather tanning, that this disease is It is a common disease between humans and animals, and it may be transmitted to humans locally from contact with infected blood or tissue, and it is called (Malignent putulae), or a fatal pulmonary infection (Wool sorte's disease) may occur as a result of inhalation of spores when dealing with animal waste [13].

4. Clinical signs in human:

The cutaneous form of lining of the blood vessels, resulting in internal bleeding anthrax accounts for over 95% of anthrax cases. Lesions [7]. The Anthrax toxin believed to play roles in two stages usually occur on exposed skin and often commence with of infection. Early during infection, they target the immune itchiness. They pass through several stage, papular stage, response to allow survival in the host and to facilitate vesicular stage with a blister that often becomes dissemination. In systemic disease they target tissues andhaemorrhagic, eschar stage that appears two to six days induce lethality [19].

After the hemorrhagic vesicle dries to become a Up on ingestion of the spores, infection may occur depressed black scab (malignant pustule) which may have

through the intact mucus membrane, through defects in surrounding redness and extensive oedema (swelling). The epithelium around erupting teeth, or through Anthrax lesions are usually painless but pain may result scratches from tough, fibrous food materials. The due to surrounding oedema. Untreated lesions can organism are resistant to phagocytosis, in part due to the progress to involve regional lymphnodes. An presence of the body-D-glutamic acid capsule and overwhelming epticemia can occur in severe cases. Proliferate in regional draining lymph nodes,Untreated cutaneous anthrax has a case fatality rate of subsequently passing via the lymphatic vessels in to the 5–20% but death is rare with early appropriate treat. From tables (3, 2, and,4) it is noted that the disease affected herds of sheep, goats and cows in different regions of the Kurdistan region for the previous years until the year 2008.

5.1Subacute:

Sudden death is preceded by a few symptoms without being noticed by the owner of the animal, or no symptoms may occur. The animal may stagger, then collapse and convulse for a short period before dying. The injured person oozes liquid blood from the nose, mouth, anus, and vagina, and this blood is black in color and does not clot. The severe swelling of the dead animal's corpse is noted as shown in Figure No. (2).

5.2Acute form:

In this type, the body temperature rises with the coldness of the extremities (legs, ears, and horns), and the mucous membranes become congested (red eyes and nose), and the infected animal bleeds from the natural orifices of the body ([20].

This period is estimated at (48 hours), during which depression and discomfort are noted. And the body temperature is high, it may reach 42 m, and breathing is fast and deep.

5.3 subacute form:

They are similar to acute symptoms, but they last for a longer period, and death is preceded by fever and difficulty breathing. Death usually occurs after (2-5) days from the onset. [20].

5.4Chronic form:

Symptoms persist for a long time and some infected animals recover. Infection may occur through the skin, with painless swellings appearing in the neck and lower chest. [20]

6. Forms of disease in humans:

Infection occurs in humans as a result of contact with animals or their products such as wool, leather, contaminated shaving brushes, etc. Or as a result of eating the meat of animals infected with this disease [20]. The incubation period ranges from several hours to five days, and the disease takes several forms, including (Adwa, 1998).

6-1 Cutaneous form: It appears frequently in about 95% of cases in the hands, arms, neck or face (Al-Mubarak, 1996).

(3)figure (4) figure(5) figure (6)

Skin infections of human anthrax bacteria

Table No. (5) shows the number of apparent injuries in recent years in the Kurdistan region, and most of them were of the cutaneous type, as we see that it increased in the year 2008. One spot or several spots appear at the place where the infection entered from the sting of a vector insect, or from the friction of infected skins and animal carcasses with the skin of the neck, shoulder, or hands of workers, where the infection enters from any scratch or wound on the skin. The spot is of a dark red color as shown in Figure (3), then it grows in size within hours and its center becomes brown in color and a bright red circle surrounds it. The patient feels a weeping in this focus, although he does not feel pain. The center of the depression is dark in color with blackness, and the tissues around it become more swollen and inflamed, as shown in Figure (4,5). There are usually general symptoms associated with this focus, which is the affected person's high temperature, headache, nausea, vomiting, general and joint pain, and if the condition is not treated, the infection may become general and spread with the blood and lead to death. (Adwa, 1998).

Table No. (5): shows skin infection with anthrax in humans in different regions of the Kurdistan region for the year (2002, 2003, and 2008).

City/district	Number infection	year	Type of infection
Erbil / Choman	2	2002	skin
Erbil/Merksur	3	2002	skin
Erbil / Salah Al-Din	2	2003	skin
Sulaymaniyah / Rania	1	2002	skin
Duhok	40	2008	skin

Erbil Health Presidency (2002-2003). Acceleration Veterinary Department .(2008)

6-2 pulmonary form:

It appears in the form of fatal pneumonia (pneumonia), as in Figure (6). It occurs as a result of inhaling dust contaminated with bacilli or spores. This type is frequent among workers in the fields of wool spinning, so it is called the disease of the woolens. The patient appears apathy and mild fever, and suddenly symptoms of coughing, shortness of breath, and hemoptysis appear, and finally a systemic disorder occurs and the patient dies of pneumonia [21].

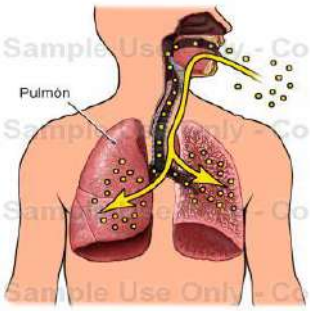

Figure No. (6) Shows pneumonia in humans

6-3 Intestinal form:

It occurs as a result of bacteria entering the mouth with food or water. Thus, the apparent infection is bloody diarrhea, abdominal pain, internal bleeding, congestion of the viscera, especially the spleen, inflammation of the tonsils and the membranes of the mouth, bloody foam on the mouth, with edematous swelling of the tongue and face, as in Figure 7. Where the disease lasts from (1-4) days and ends with the death of the patient. It has been shown that this disease is not transmitted from one person to another.

Figure No. (7) Shows the infection of the face and tongue in humans

7. Anatomical character:

On visual examination, it is noted that the corpse is swollen as a result of rapid decomposition due to the flow of blood. It is noted:

-1Complete absence of throwing stiffness.

-2A bloody exudate comes out of the natural orifices, and the color of the blood is tarry, not coagulated.

-3The occurrence of bloating and putrefaction quickly. Where it is not allowed to open the corpse at all in the case of suspected anthrax to prevent pollution of the environment.

-4In the event that the body was opened by mistake, the following should be noted:

A- Non-coagulation of blood.

B - the presence of bruising on the tissues of the body.

C- Presence of blood-dyed serous fluids in the body cavities.

D severe enteritis.

E - The size of the macroscopic spleen and its softness are among the sure signs of the disease (Arslan et al., 1989).

8. Diagnosis:

1 clinical signs

2 of the anatomical character.

3- Evidence of the presence of pathogenic bacilli in smears of microscopic slides prepared from blood, peripheral or local fluid, or from the aqueous humor (eyes) immediately after death and before decomposition. These Gram-positive bacilli are

seen in pairs or in the form of chains of no more than 5 rods, and spores are not seen.

4- The bacilli can be cultured in microorganisms from blood samples or fresh tissues.

5- Injections of experimental animals, especially mice and guinea pigs. Intraperitoneal injection of rats with fixed samples leads to death within (12-24) hours, while pigs die within (24-36) hours.

6- Carrying out the preciptation test or the ascoli sedimentation test

Preciptation test (Agar) when the corpse has decomposed, where the ear or part of the spleen is taken to the laboratory and examined [21].

9. Treatment:

Antibiotics and serum are used against anthrax, and severely affected animals are not expected to recover. Recovery can be expected in the early stages, especially when fever is noted and before clinical signs of disease are evident. Where penicillin is used at a dose of 10,000 units per kilogram of body weight twice a day, but the use of streptomycin (8-10) gm per day and two doses intramuscularly for cows has a good effect. The use of oxytetracycline at a dose of 5 mg per kg of body weight per day proved more efficient than penicillin in treating clinical conditions in cows after vaccination. (Arslan et al., 1989).

10. Vaccines:1- In the disease-endemic areas, vaccinations are used annually for all animals in the pastures before the season of disease onset.

2- In vacant areas, when the disease is confirmed, no vaccines are given to the animals in contact with the animal until after the vaccine is given. Inactivated vaccines (with dead microbes) that do not contain spores are used for all types of animals. The most important vaccines used include Pasteur No. 1 and No. 2 (non-spore attenuated bacteria), spore-forming vaccine, Carboozoo Vaccine, and Sterne Vaccine. Pasteur 1 vaccine is given, then after a day, Pasteur 2 vaccine is given, which is stronger and used where the disease is endemic. But since the Pasteur vaccine does not preserve well, spore vaccine was used as a substitute for it sometimes. As for the Carbozo vaccine, it is a spores vaccine in Saponin, to reduce the absorption of germs from the injection site, and it gives better immunity, especially if it is injected into the skin. It is sometimes used in humans for a germ-free culture filter filter vaccine. (Al-Mubarak, 1996).

11. Prevention:

1- Burying dead animals under lime after burning them at a deep distance, as well as burning contaminated bedding and tools.

2- Immediate notification of any cases in humans or animals.

3- Immediate detention and isolating the injured person with prompt treatment.

4- Not allowing dead bodies to be opened, skinned, or removed from their hair and wool.

5- Not to slaughter or consume the meat of sick animals.

6- Disinfecting barns and polluted places.

7- It is advised not to graze in areas where the disease has appeared.

8- Not to provide meat from infected dead animals to zoo animals.

[22].

12.Conclusions and recommendations

Conclusions:

1Anthrax is one of the common diseases between humans and animals.

-2The most common condition in humans is the cutaneous type, which accounts for 95%.

-3That the disease is widespread in the different regions of the Kurdistan region, and it is present, and its spread increased in the year 2008 in Ikre.

-4Infection with anthrax of the pulmonary and intestinal type is fatal.

-5There is no evidence of transmission of the disease from one person to another.

Recommendations:

-1Increasing research to know more about the disease and prevent it.

-2Conducting a complete survey of the incidence of the disease in all of Iraq, especially the Kurdistan region, in order to provide a database for dealing with the disease.

-3Working together between the Ministry of Health and the Ministry of Agriculture in order to limit the spread of diseases.

-4Finding a suitable vaccine against the disease in humans and animals.

-5Raising awareness in order to limit the spread of the disease among animals and from there to humans.

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14.پوختە

دوومەڵ نەخۆشیێکی تونده بوویه هۆی لەلایەن بەکتریای دوومەڵ. کار لە هەردووك مرۆڤ و گیانەوەر دەکات. زۆربەی شێوەی نەخۆشیەکە زۆر کوژەرە. کوتانی کاریگەر هەیە دژی دوومەڵ، و هەندێك شێوەی نەخۆشیەکە باش وەڵام دەداتەوە بۆ چارەسەری دژە زیندە. وەك زۆر ئەندامی دیکەی ڕەگەزی باسیل: - لە شیش یا داردەست دەچێت و زنجیرە دەبەستێت، بەکتریای دوومەڵ دەتوانن پەنهان بەکتریا بەتوانای ژیان پێك بهێنن لە یەگجار حالەتی سەخت فۆر لۆنگ ماوەی کات، تەنانەت دەیان ساڵ یان سەدە. ئەمانە ئانثراکس ئیز ئە سەڤیە دیزییز کۆزد بای ئانثراکس باکتیەریە ئەفێکتس بەوث هیوومەنز ئاند ئانەمەلز مەوست فۆمز ئەڤ ذە دیزییز ئار هایلی لییثەل ئیفێکتیڤ ڤاکسیینز ئەگێنست ئانثراکس ئاند سەم فۆمز ئەڤ ذە دیزییز ریسپۆند وێل تو ئانتیبیۆتیك ترییتمەنت لایك مێنی ئەذەر مێمبەز ئەڤ ذە بەسیلەس جیینەس ئانثراکس باکتیەریە کان فۆرم لێیتەنت باکتیەریە کێیپەبەل ئەڤ سەڤایڤینگ ئین ئیکستریییملی هاش کەندیشەنز پیەریەدز ئەڤ تایم ئییڤەن دێکێیدز ئۆر سێنچەریز ذیي کاتێك بەکتریا یان هەڵ دەمژێت قووت دەدرێن یان دەهێن بۆ پەیوەندی لەگەڵ نەخۆشیی پێستی خانەخوێیەکە، ئەوان لەوانەیە چاڵاك بکەن و بەخێرایی زیاد ببن. دوومەڵ کار لە بەشێوەیەکی سەرەکی کێوی دەکات و شیردەری ماڵی، کە یان دەخۆن تۆو ینگەست لەماوەی گرازینگ. کڕکەوتن بیرە کە باوترین شێوەی هەوکردنی دوومەڵ بێت. گۆشت خۆر بژی دەژێێت لە هەمان دەوروبەر لەوانەیە بێت تووش بووی لەلایەن تاڵان بردنی گیانەوەری تووش بوو. گیانەوەری خراپ دەتوانن دوومەڵ بنێرن بۆ مرۆڤ،

وێن باکتیەریە ئار ئینهێیلد ئۆر ئینجێستەد ئۆر کەم ئینتوو کۆنتاکت ویذ ذە سکین لییجەنز ئەڤ ذە هەوست ذێی مێی ئاکتەڤێیت ئاند مەلتەپلای ڕاپەدلی ئانثراکس ئەفێکتس مێینلی وایلد ئاند دەمێستەکێیتەد مامەلز ویچ ئییت ئۆر ئینجێست جێمز دوەرینگ گرێیزینگ ئینکیوبێیشەن ئیز ثۆت تو بیی ذە مەوست کۆمەن فۆرم ئەڤ ئانثراکس ئینفێکشەن لیڤ کانەڤۆز لیڤینگ ئین ذە سێیم ئینڤایەرەنمەنت مێی بیکەم ئینفێکتەد بای ئەڤ ئینفێکتەد ئانەمەلز مەلیگنەنت ئانەمەلز کان ترانزمیت ئانثراکس تو هیوومەن ئەوە ڕا دەسپێررێت تا دوومەڵ کوتان بۆ تاکە کەسی مەترسیی-بەرز. [ئەوە ڕا دەسپێررێت تا گیانەوەر کوتان دژی دوومەڵ لە ڕووبەر ئەو شوێنەی هەوکردنی پێشوو ڕووی دا. دوو مانگی دژە زیندە، وەکو دۆکسیسکلینە یان سیپرۆفلۆکساسین، لەدوای کەوتنەبەر هەروەها دەتوانێت هەوکردن ڕێ بگرێت. لە حالەتی هەوکردن

چارەسەرەکە لەگەڵ دژە زیندە لەوانەیە دژەژەهرن هەبێت. جۆرەکە و ژمارەی دژە زیندە بەکاریان هێنا پشت دەبەستێت بە لەسەر جۆری هەوکردن. دژە ژەهر ڕا دەسپێررێت بۆ ئەوانە کە لە دووچار دەبن

ئیت ئیز ڕێکەمێندەد تو ئانژراکس فۆر ئیندەڤیجەوەلز ئەباندەند ئیت ئیز ڕێکەمێندەد تو ئانەمەلز ئەگێنست ئانژراکس ئین ئێریەز وێیە ذە پرییڤیەس ئینفێکشەن ئەکێد توو مەنژس ئەڤ ئانتیبیۆتیکس ئۆر ئافتە ئیکسپەوجە کان ئۆلسەو پریۆێنت ئینفێکشەن ئینفێکشەن ذە تریییتمەنت ویذ ئانتیبیۆتیکس مێی هاڤ ئانتیدەوت ذە تایپ ئاند نەمبەر ئەڤ ئانتیبیۆتیکس یووزد دیپێندز ئۆن ذە تایپ ئەڤ ئینفێکشەن ئیز ڕێکەمێندەد فۆر ذەوز هوو سەفە فرەم