Concepts of Animal Disease Diagnosis, Classification and its Treatment

Abebe Mequanent

University of Gondar College of Veterinary Medicine and Animal Science, Department of Veterinary Clinical Medicine, Gondar, Ethiopia, P.O. Box: 196.
E-mail: abebemequanent@gmail.com

Abstract: Health is the state of complete physical, mental and social wellbeing not merely the absence of disease or infirmity. Disease is any deviation from health is disease. Animal disease majorly classified in to three categories that are: classification on the basis of etiological factor involved (specific and nonspecific disease), classification on the basis of causative organism (infectious and noninfectious disease) and classification on the basis of onset of clinical sign (peracute, acute, subacute and chronic disease). Veterinary diagnosis relies on knowledge of Anatomy, Physiology, Pathology and Animal behavior, skills in the methods and techniques of clinical examination, clinical sign and pathogenesis of the diseases which are the basic requirements for clinician in his/her good diagnostic approach. Disease problems in veterinary medicine are invariably presented to the clinician through the medium of the owner's complaint, which is a request for professional assistance by giving animal history. In any clinical examination procedures, it is necessary to employ some suitable means of restraint: physical, chemical or verbal, in order to be able to carry out the examination safely and without danger to the clinician or his assistants. Inspection, Palpation, percussion and auscultation are the commonly used methods of physical examination for assessing pathophysiological or anatomical abnormalities of given animal during clinical examination. Taking of vital parameters like: body temperature, respiratory rate, heart rate, pulse rate and capillary refill time is very important in animal disease diagnosis.

Key words: Animal; classification; diagnosis; disease; treatment.

1. Introduction

In the investigation of any animal disease problem, the veterinarian must, of necessity, undertake a careful and thorough clinical examination with the object of recognizing the nature of the affection, so that effective treatment and, where practicable, control measures are adopted. The situation is rendered complex by the necessity to deal with a variety of species of domestic animals and birds. Increasing specialization on the part of practicing veterinarians will resolve some of the apparent problems thus presented. In general, however, the same principles may be applied in all cases to deal with the diverse difficulties that clinical diagnosis presents (Ararsa, 2016).

The success of clinical examination relies heavily on the knowledge of the clinician and usually assumes a single condition is responsible for the abnormalities. Many clinicians begin their examination by performing a general examination which includes a broad search for abnormalities. The system or region involved is identified and is then examined in greater detail using either a complete or a problem oriented examination. For this sound knowledge of Anatomy, Physiology, Pathology and Animal behavior, skills in the methods and techniques of

clinical examination, knowledge of etiology, clinical sign and pathogenesis of the diseases are the basic requirements for clinician to make diagnosis (Ararsa, 2016).

2. Definitions

2.1. Veterinary medicine is the branch of science that deals with the diagnosis, treatment, prevention and general study of animal diseases, especially domesticated one.

2.2. Veterinary therapeutics is the subject that deals with the treatment of diseases in domesticated animals. It includes the administration of medicine, vaccine and sera and ancillaries' hygiene, dietetics, management and nursing of sick animals.

2.3. Farm animal medicine is the part of veterinary medicine that deals with the diseases farm animals.

2.4. Pet/companion animal medicine is the part of veterinary medicine that deals with the diseases of pet/companion animals.

2.5. Food animal medicine is the part of veterinary medicine that deals with the diseases of the animals reared for food.

2.6. Veterinary clinical medicine (bed side medicine, internal medicine and curative medicine) is the part of veterinary medicine that deals with the **art of making correct diagnosis** of diseased animals and related remedial and curative measures.

2.7. Preventive veterinary medicine deals with all measures to control and prevent animal diseases (Ballard and Rockett, 2009).

2.8. Health is the state of complete physical, mental and social wellbeing not merely the absence of disease or infirmity.

2.9. Disease is any deviation from health is disease that is any deviation from physical, mental or social wellbeing. It is also inability perform normal physiological functioning to maintain optimum production with adequate nutrition and optimum environmental condition.

2.10. Carrier: animals that harbor the pathogenic organisms in the body without showing any clinical signs.

3. Major classification of animal diseases

3.1. Classification of animal diseases on the basis of etiological factor involved

3.1.1. Specific diseases is a diseases caused by specific etiological factor or agent. Example FMD is caused by specific FMD virus, Tetanus is caused by specific causative factor (clostridium tetanus) etc.

3.1.2. **Nonspecific diseases** are diseases caused multiple etiological factors or agents. Example vomiting can result from gastritis, intestinal parasite and renal failures etc.

3.2. Classification of animal diseases on the basis of causative organism

3.2.1. Infectious diseases are diseases caused by living organism. Example: viral diseases, bacterial diseases, parasitic diseases and fungal diseases (Ballard and Rockett, 2009).

Contagious disease is a disease spread by any intimate contact with diseased animals. Example: Canine parvo viral enteritis, FMD, CBPP etc. All contagious diseases are infectious diseases (that is caused by living organisms), but all infectious diseases are not contagious diseases example AHS, Blue tongue and Tetanus (Ballard and Rockett, 2009).

3.2.1.1. Viral diseases can be classified in to DNA viral diseases and RNA viral diseases. **DNA viral diseases** includes Lumpy skin Disease (LSD), sheep and goat pox, Orf (Contagious Ecthyma), Malignant Catarrh Fever (MCF), lymphocystis, Epidermal papillomatosis, infectious canine hepatitis and **RNA viral diseases** includes Rabies, Foot and mouth Disease (FMD), Render pest, peste des petitis ruminant (PPR), Rift valley Fever, African horse sickness (AHS), Blue tongue, canine distemper, corona virus etc.

3.2.1.2. Bacterial diseases can be classified as **gram negative bacterial diseases and gram positive bacterial diseases**. Thanks to gram stain

laboratory procedure you can say gram positive or gram negative bacteria. Gram negative bacterial diseases are brucellosis, Pseudomoniasis, Actinobacillosis, Haemophilus spp, pasteurellosis, Shipping fever, Shigellosis, Salmonellosis, colibacillosis, Campylobacter, Moraxella and Glander etc. And gram positive bacterial diseases are bacillus spp (Anthrax), clostridium spp (tetanus, botulism, black leg and bacillary hemoglobinuria), listeria spp, Corynebacterium spp, Mycobacterium spp (TB, Bovine TB and Avian TB), Actinomyces spp, Nocardia Spp and Dermatophilosis etc.

3.2.1.3. Parasitic diseases can be classified as helminthic parasites, protozoan parasites and arthropod parasites. **Helminthic parasite** again categorized in to **round worms** (nemathelminths (nematode)) and **flat worms** (Platyhelminthes (Trematodes and cestodes)) parasites or generally you can classify parasites in to two groups that are internal parasites (round and flat worms) and external parasites (Arthropods). *Nematodes* are hemoncus spp, ostertagia spp, strongyle spp, ascaris spp, dictyocaulus spp (lung worm), dirofilaria immitis (Heart worm), thelazia spp and nematode parasites are identified by floatation laboratory procedures. *Trematodes* parasites are fasciolosis, paramphistomum and schistomosis and trematodes parasites are identified by sedimentation laboratory procedures. **Cestodes** are moniezia spp and taenia spp. **Arthropod parasites** are ticks, mites, fleas, demodex and lice etc. **Protozoan parasites** are Coccidia, Babesia spp, Trypanosome spp, Toxoplasma spp, Trichomonia spp and Leishmania spp and so on (Ballard and Rockett, 2009).

3.2.1.4. Fungal diseases are Dermatophytosis (ring worm), Aspergillosis, Candidiasis, Epizootic lymphangitis and Sporotrichosis.

3.2.2. Non infectious diseases are the diseases caused by other than living organisms. Example: vitamin deficiency, hereditary disease, nutritional diseases and production or metabolic diseases (ketosis, milk fever/parturient paresis/hypocalcemia, pregnancy toxemia).

3.3. Classification of animal diseases on the basis of onset of clinical sign

A) Per-acute disease: sudden onset of sign occurs within 24-48 hours of entry of organisms in to the body. Example: peracute pasteurellosis, peracute anthrax and peracute mastitis etc.

B) Acute disease: Signs develop over 3 to 7 days of acquiring infections. Example: bacterial enteritis (Ballard and Rockett, 2009).

C) Sub acute disease: clinical signs develop over 8 to 14 days (one to two weeks). Example: less pathogenic bacterial infections.

D) Chronic disease: disease that develop over more than two weeks of time period. Example: blood parasite, internal parasite and tuberculosis etc.

4. Snap shot diagnosis: diagnosis which is declared at the very approach of a patient at glance. This may be biased or liable to be erroneous.

5. Differential diagnosis: This is the ART of differentiation of diseases by comparison and contrasts with similar diseases. For example: differentials of red/coffee colored urine in cattle are cystitis, enzootic hematuria, bovine babesiosis, bovine theileriosis, leptospirosis, pyelonephritis, urinary calculi etc.

6. Tentative diagnosis (presumptive diagnosis): diagnosis based on clinical/physical examinations finding, until precise diagnosis (confirmatory diagnosis) is made on the basis of laboratory or special investigations.

7. Clinical signs: outward manifestations of the disease observed through objective evidence. Example: vomiting in renal failure, rough hair coat in chronic protein malnutrition etc.

8. Subjective symptoms: indicates the feeling expressed by patients. Mainly applicable in human medicine, because they can narrate what they feel.

9. Objective symptoms: symptoms observed by clinicians through various methods of examinations. Example: ascites, limb edema etc.

10. Syndrome: denotes a group of different symptoms or clinical signs due to the disease affecting a particular body system. Example: nephrotic syndrome

11. Diagnosis is the ART of recognition and determination of the nature of disease. Correct diagnosis of the disease is critical of veterinary medicine. We learn the clinical sign of the disease and its physical examination changes to come to a reliable diagnosis. Diagnosis further confirmed by making laboratory procedure or imaging test. So diagnosis is ART plus science. Clinicians enjoy veterinary practice only if he/she develops the skill to make a good diagnosis of disease (Ballard and Rockett, 2009).

12. Key points in Animal disease diagnosis

12.1. History taking

Disease problems in veterinary medicine are invariably presented to the clinician through the medium of the owner's complaint, which is a request for professional assistance. For completeness and accuracy of history taking, the following points should be well considered (Patient data, Immediate/present history, past history, Management and Environment history).

12.2. Method of restraints

Since animals often resist many of the clinical examination procedures, it may be necessary to employ some suitable means of restraint, in order to be able to carry out the examination safely and without danger to the clinician or his assistants. The methods available may be classified as:

•**Physical restraint** when various instruments are employed.

•**Chemical restraint w**hen drugs inducing varying degrees of sedation or immobilization are administered.

• **Verbal/Moral restraining w**hich can be more practiced by owner.

12.3. Physical examination methods

Objective-To apply general inspection, palpation, percussion and auscultation methods used to detect clinical signs of abnormalities.

Training materials: Live animals (equine, cattle, sheep and goats)**,** Pleximeter, hammer**,** Stethoscope **and** Gloves (Ballard and Rockett, 2009).

Procedure

12.3.1. General inspection: It is done some distance away from the animal; sometimes go round the animal or herd/flock, in order to get the general impression about the case. Attention should be paid to the following items: (Behavior, Appetite, Defecation, Urination, Pasture, Gait, Body condition, Body conformation). Lesions on outer surface of the body can be observed: (Skin and coat, Nose, Mouth, Eyes, Legs and hoofs, Anus)

12.3.2. Palpation:

Objective: To detect the presence of pain in a tissue by noting increased sensitivity

Method: Use fingers, palm, back of the hand, and fist, in order to get the information about the variation in size, shape, consistency and temperature of body parts and lesions, e.g., the superficial lymph nodes (Kahn, 2010).

The terms, which can be used to describe the consistency of parts during palpation, are: **Resilient**: when a structure quickly resumes its normal shape after the application of pressure has ceased (e.g., Normal rumen), **Doughy**: when pressure causes pitting as in edema, **Firm**: when the resistance to pressure is similar to that of the normal liver (e.g., neoplasia/tumor), **Hard:** when the structure possesses bone-like consistency (e.g., Actinomycotic lesion), **Fluctuating**, when a wave-like movement is produced in a structure by the application of alternate pressure (e.g., hernia, hemorrhage/hematoma) and **Emphysematous,** when the structure is swollen and yields on pressure with the production of a crepitating or crackling sound (e.g., Black leg).

12.3.3. Percussion:

Objective: To obtain information about the condition of the surrounding tissues and, more particularly, the deeper lying parts (Kahn, 2010). Percussion can examine the area of the subcutaneous emphysema, lungs, rumen and rump

Method: By means of striking a part of the body to be percussed

Immediate percussion: Using fingers or hammer directly strike the parts being examined.

Mediate percussion: Finger-finger percussion; Pleximeter-hammer percussion

The quality of the sounds produced by percussion is classified as:

Resonant: is the characteristic of the sound emitted by air containing organs, such as the lungs, *Tympanic:* The sound produced by striking a hollow organ containing gas under pressure, e.g., tympanitic rumen or caecum, *Dull:* Sound emitted by a solid organ like the liver or heart (Frandson *et al.*, 2009).

Modified percussion:

• **Ballottement percussion:** Used to detect late pregnancy in small ruminants, dogs and cats

Procedure: Apply a firm and interrupted push on the uterine region of the abdomen of small ruminants. Detection of rebound of floated material shows pregnancy (Kahn, 2010).

• **Fluid percussion:** Used to detect fluid in the abdomen

Procedure: Apply a push on one side of the abdomen, percussion on the other side. The presence of wave-like fluid movement shows accumulation of fluid in the abdomen, e.g., ascites. (Frandson *et al.*, 2009).

12.3.4. Auscultation:

Objective: To listen the sounds produced by the functional activity of an organ located within a part of the body. This method used to examine the lung, trachea, heart and certain parts of the alimentary tract (Kahn, 2010).

Direct auscultation:

Procedure: Spread a piece of cloth on the part to be examined using two hands to fix the cloth and keep your ears close to the body, then listen directly.

Indirect auscultation: Use stethoscope.

Procedure: Fix the probe of the stethoscope firmly on the part of the body to be examined and listen to the sounds produced by the functional activities of the body carefully.

12.3.5. Vital parameters

12.3.5.1. Temperature taking:

Materials:

• Live animals, Thermometer, Lubricant (soap or petroleum jelly) and Antiseptics.

Procedure:

• The places which can be used to take temperature are rectum or vagina (approximately 0.5 degree centigrade higher in vagina).

• The thermometer should be sterilized by disinfectant (antiseptics) before use.

• It should be well shaken before recording of temperature to bring the mercury column below the lowest point likely to be observed in different species of animals.

• The bulb end of the thermometer should be lubricated with liquid paraffin or glycerin or soap especially in case of small pup and kitten.

• Insert the thermometer in a rotational way and gentle manner.

Care should be taken so that the bulb of the thermometer remains in contact with the rectal mucous membrane.

• The thermometer should be kept in site for at least 3-5 minutes.

• Pull out the thermometer, clean it and read the number.

• Evaluation: Read the value to define and explain a state of fever, hypothermia, and febrile or non-febrile animals.

12.3.5.2. Pulse taking: Pulse can be adapted from the number of heart beats per minute by using stethoscope in less manageable animals. The rhythm of pulse should also be noticed while taking pulse. *Materials:* Live animals, Stethoscope *and* Watch (Kahn, 2010).

Procedure:
• Place the digits on the artery to be examined
• Applying gentle pressure until the pulse wave can be detected
• Note the pressure or pulsation of the arteries felt on the finger digits

• Count the number of beats per minute (counting should be done at least for 30 seconds and multiplied by 2); notice the quality and rhythm of pulse (Table 1). So strongly observe the pulse taking site in animals of different species. This is very important for good and correct diagnosis approach in elsewhere of clinical field experience.

Table 1: The site of pulse taking for different species of animals.

S.no	Species of animal	Site of pulse taking
1	Horse	External maxillary artery, Transverse facial artery, Median artery and Great metatarsal artery
2	Cattle	Facial artery, Median artery and Middle coccygeal artery
3	Sheep/goat, dog, cat, pig, and calf	Femoral artery

12.3.5.3. Respiration taking
Materials: Live animals, Stethoscope, Watch, Gloves and Crash.
Method: The respiration rate is measured through counting of either contraction or expansion of the thorax and abdomen which can be observed during clinical examination.
Procedure: A method for respiration rate taking includes:
• **Inspection:** Stand behind and to one side of the animal, and observe the movement of the thoracic and abdominal areas of the body.
• **Palpation:** Put one hand in front of the nostril, feel the exchange of the gas; or put one hand on the lung area or the thorax and feel the respiratory movements.
• **Auscultation:** Use stethoscope, listen to the respiration sound in the trachea or lung area.
12.3.5.4. Capillary Refill Time (CRT):
Method:
• This is taken by compressing the mucosa of the mouth or vulva to expel capillary blood, leaving a pale area.
• Recording how long it takes for the normal pink color to return.
• In healthy animals the CRT should be less than 2 seconds.

• A CRT of more than 5 seconds is abnormal, and between 2 and 5 seconds may indicate a developing problem.
13. The five methods of making diagnosis
13.1. The syndrome or pattern recognition method: in the syndrome/pattern recognition method the clinician makes a diagnosis instantaneously on the basis of past experience. The present case is compared with previous case in the clinician memory. There is no need to seek further supporting advice and the diagnosis made then and there. This method is good in the hand of experienced or well-trained clinicians because it is quick and reasonably accurate. **Example**: the behavior of horse with abdominal pain-**colic**, pale mucus membrane-**anemia**, yellowish discoloration of mucus membrane-**jaundice**, bluish discoloration of mucus membrane-**cyanosis**, wart like proliferative lesion on the skin and udder cow-**papilloma**, sudden onset of weakness immediately following parturition-**parturient paresis**, swollen, painful udder with changes in milk-**mastitis** and all local inflammatory lesions-**laminitis, dermatitis, rhinitis, otitis** (Frandson *et al*., 2009).
13.2. The hypothetico- deductive reasoning method: in this method the clinician listens to the owner's complaint and draw up a short list

(usually three or four) of diagnostic possibilities (differential diagnosis/differentials). That is clinician generates multiple hypotheses from the initial cues. He/she then asks questions and conduct clinical examinations that test the hypotheses (Jackson and Cockcroft, 2002). The question and examinations should be directed at supporting or discounting the diagnoses (the confirm/exclude technique). The original list of hypotheses is finally reduced to two or three. This is the tentative diagnosis and therapy is directed at managing all the diseases together. Example: fever with red/coffee colored urine- theilera/babesia/post parturient hemoglobinuria/cystitis in bovines, stomatitis in cow- local bacterial stomatitis or FMD, PPR, fever with anemia- theilera/anaplasma in cows. Because of memory is unreliable hypothetico- deductive method is subject to error by omission (Chauhan and Agarwal, 2008).

13.3. The algorism method: is an extension of method 2 in which the clinician remembers all the diagnostic possibilities of the case under consideration. This method works well if the possible diagnosis is complete and is frequently updated. Error by omission is not a risk in this method, because the algorisms all the recorded diagnostic possibilities. This method is good for developing software program (Frandson *et al.*, 2009).

13.4. The key abnormality method: this is a more time consuming method. The key abnormality or clinical cue is identified from the history and clinical signs and the confirmatory diagnosis is made in five steps. i) Determine the abnormality of function present in the animal, ii) determine whether the a particular body system or system involved or whether the entire body as a whole is affected, iii) determine the location of lesion within body system or the organ affected, iv) determine the type of lesion and v) determine the specific cause of lesion (Chauhan and Agarwal, 2008).

13.5. The database method: in the database method (also referred to as the problem oriented method) the clinician conducts a complete clinical and clinicopathologic examination of the animal to acquire a comprehensive animal data base. The problems (key signs) in this data base are then identified and matched with the diagnostic database. The clinical and laboratory data are recorded in an orderly, systematic and consistent manner. This system is now used widely in well-equipped veterinary teaching hospitals with hospital disease management software (Chauhan and Agarwal, 2008).

14. Treatment

Treatment is a medical care for an illness or injury. It can be: a) symptomatic treatment is done based on symptoms, b) specific treatment is done by identification specific infectious agent, c) palliative treatment is a type of treatment in case of incurable diseases to prolong the life span of the patient (Example: HIV/AIDS treatment in human), d) empirical treatment is treating patients by experience gained through a long time trial and error methods (Jackson and Cockcroft, 2002). It is not always possible to explain the specific action of therapy or exact pathology of the disease. Usually the pharmacological actions of the agents used are unknown and e) rational treatment is the scientific method of administration of the drugs based on precise diagnosis, knowledge of etiology and action of the drug employed (Frandson *et al.*, 2009).

15. Prognosis

Prognosis is forecast or foretelling the probable course or termination of the disease. It may be graded as good/favorable, doubtful, poor/grave. Prognosis **always performs after diagnosis** (Jackson and Cockcroft, 2002).

16. Sequelae

It denotes affections which may arise after the apparent recovery of a primary disease. Example: nervous abnormalities after recovery from canine distemper infections (Frandson *et al.*, 2009).

Corresponding authors

Dr. Abebe Mequanent, department of veterinary clinical medicine, Tewodros campus, University of Gondar, Ethiopia, telephone: 0918220138/0934348664,

E-mail: abebemequanent@gmail.com

17. References

1. Ararsa Duguma, (2016). Practical Manual on Veterinary Clinical Diagnostic Approach. *Journal of Veterinary Science & Technology*, pp 1-10.
2. Ballard, B. and Rockett, J (2009). Restraint and Handling for Veterinary Technician and Assistants. Delmar, Cengage Learning, USA.
3. Chauhan, R.S. and Agarwal, D.K. (2008). Textbook of Veterinary, Clinical and Laboratory Diagnosis. 2nd edn. Jaypee Publishers, New Delhi, India.
4. Frandson, R.D., Wilke, W.L. and Fails, A.D (2009). Anatomy and Physiology of Farm Animals. 7th edition. Wiley-Blackwell, USA.
5. Jackson, P. and Cockcroft, P (2002). Clinical Examination of Farm Animals. Blackwell Science, UK.
6. Kahn, CM (2010). Merck Veterinary Manual. 10th edition. Whitehouse Station, Merck, NJ, USA.

August 16, 2024