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Occupational health hazards in veterinarians- A review

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Abstract

Veterinarians are the medical professional who protects the health and well-being of animals. Role of veterinarians are diagnose, control and treat the animal diseases with proper care and restraining. The close contact with the animals makes them susceptible to many harmful health hazards and great risk of being infected or injured. Physical, chemical and biological hazards are very common in veterinary profession. Veterinarians deal with small animals to wild animals and health inspection to meat inspection. This kind of various activities makes them to expose different health hazards. Lack of knowledge about occupational health hazards and safety precautions in the working environment may enhance the risk of several occupational hazards in veterinarians. Hence, awareness about the occupational health hazards, nature and sources of various hazards, safety and preventive measures, health and safety guidance followed in the working environment should be strictly followed to avoid occupational health hazard in veterinary field and maintain a healthy profession.

Keywords: Occupational health hazards, veterinarians

Introduction

Veterinary personnel are handling more than hundreds of animals each day, which increases the risk of exposure to occupational hazards on a daily basis. Accordingly, these risks are classified as physical, chemical and biological hazards (Fritschi *et al.* 2008) ^[1]. In recent years, there are many infectious and zoonotic diseases are easily spreading among the animal workers and veterinarians with animal exposures. In addition to this high rate of allergic diseases, physical injuries, chemical injuries and psychological stress also have been reported in veterinary personnel. Veterinarians are involving in so many activities related with animals from treatment aspect to slaughter house activities. These complex and varied work nature bring the veterinarian at great risk of being infected and injured because they come across a large and uncooperative animal patients and also handling various chemicals and drugs in the work place. Among these, biological risks are particularly important, mostly because of its zoonotic nature. Similarly, occupational and environmental pollutants always have hazardous impact on all living organisms (Katole *et al.* 2013) ^[2]. Apart from this, veterinarians have a special role to play in the development of occupational safety and health strategies since they are very familiar with animal diseases. Therefore improving occupational health and safety among animal workers represents a global health challenge that will require increased communication and cooperation between human health and animal health care providers. This review explains about the common risks associated in the veterinary profession and health hazards associated with veterinarians in their different fields of practice.

Veterinary Profession

The veterinarians are involving in multidisciplinary and risk related work. Veterinarians interact with different kind of animal species in the working environments which carry occupational hazards and risk of injury. The veterinarians are engaged in the large field of activities like animal health and welfare to food safety and public health. There are different types of veterinarians include large animal practitioners, companion animal practitioners, equine practitioners, food animal veterinarians, food safety and inspection veterinarians, wild life practitioners, research veterinarians and laboratory veterinarians with various specializations like pathology, microbiology, virology, pharmacology, chemistry etc. (Bureau of Labor Statistic, 2015) ^[3]. Several occupational diseases exist that possibly involve staff working in animal husbandry and related activities (Battelli *et al.* 1984) ^[4]. Zoonotic diseases may affect many occupational categories including, personnel working in abattoirs (direct and indirect workers) and meat processing sectors (Schwabe, 1984) ^[5].

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Risks involved in veterinary activities

Occupational hazards/ Risks are classified as physical, chemical and biological hazards (Fritsch *et al.* 2008) ^[1] according to the nature of incidents. Physical risk data like chronic or significant injuries and trauma were due to contact with large animals in veterinary medicine were reported particularly in horses and cows (Jeyaretnam and Jones (2000) ^[6]; Epp and Waldner (2012) ^[7]). Chemical risk is another important risk factor for veterinarians with the majority of exposures related to medicines, chemicals and anaesthetic gases in particular for veterinarians who deals with small and large animals (Fritsch, 2000) ^[8]. Biological hazards are zoonotic diseases caused by various microorganisms (bacteria, viruses, fungi, etc.). The most reported animals which can cause zoonosis in literature are primarily food animals in particular swine and cattle, and companion animals in particular dogs, cats and, to a lesser extent, birds. Equine are mentioned in a few studies (Jordan *et al.* (2011) ^[9]; Loeffler *et al.* (2005) ^[10]).

The prevalence of allergic diseases increased with the length of occupational exposure and female veterinarians in practice were more likely to develop allergies than were male veterinarians (Nienhaus *et al.* 2005) ^[11]. Rhinitis was the most frequent one, followed by cough/chest tightness, wheezing and airways obstruction. 6 studies reported skin problems: dermatosis was the most frequent disease (Reijula *et al.* 2003) ^[12]. Lack of knowledge in the field of occupational health hazards and safety precautions for hazard free working conditions may enhance the risk of various occupational hazards in varying intensity among the veterinarians working in different nature of job (Landge *et al.* 2011) ^[13].

Physical Hazards

Physical hazard is an agent/ extraneous factor present in the form of occupational hazard or environmental hazard. Physical hazards are a common source of injuries. Trauma or wound is the utmost physical injury to veterinarians which are caused by any bites, scratches and injuries while handling and controlling or restraining the animals for treatment. Injuries from sharp instruments such as syringes, needles, scalpel blades, nose tongs for cattle, halters, calf pulling equipment, metal cattle chutes and injuries from falls on slippery surfaces also common in veterinary field.

Large animals are the most likely to cause injury, but also dog bites, cat bites, scratches and horse kicks are particularly results in dangerous injuries (Nienhaus *et al.* (2005) ^[11]. Equipment used in veterinary practice such as calf pulling equipment, metal cattle chutes, restraining equipment, cage doors, ropes, dental drills, hanging scales and even ophthalmoscopes may cause injury especially on fingers, wrists and hands (Landercasper *et al.* 1988) ^[14].

The practice of veterinary medicine involves the risk of physical injury through contact with animals and equipment, repetitive motion, and motor vehicle accidents. Strains, sprains, back injuries and other repetitive motion injuries may occur when lifting, restraining, and treating animals (CDC, 2018) ^[15]. Individuals who work with large animals are often in compromised situations that expose them to physical injury. Injuries due to penetration wounds may also lead to serious viral and bacterial infections (Jeyaretnam and Jones, 2000) ^[6].

Major physical hazards encountered in veterinary field activity are stamping on foot (96.66%) and scratches (96.66%) followed by needle prick injuries (93.33%), kicking

by animal (93.33%), slip or fall during work (93.33%), injury during handling dystocia (83.33%), injury by instruments (76.66%), crushing (70.00%), animal bite (66.66%), injury by horn (16.67%), automobile accidents (10.00%), electric shock (3.34%) and fracture by animal (3.34%) (Hosure *et al.* 2018) ^[16]. Animal bites also a reason for majority of the injuries in the veterinary field Wilkins and Bowman (1997) ^[17]; Pillai (2011) ^[18]; Jeyaretnam and Jones (2000) ^[6].

Chemical Hazards

Chemical hazard is the ability of a chemical substance to cause an undesirable effect in a biological system. A number of potentially harmful chemicals are being commonly used by veterinarians and associated personnel. Adverse health effects due to exposure to chemical hazards have long been experienced by members of the veterinary profession. Veterinary practitioners are using a large number of chemicals to treat different kind of animals.

These include medicines, anaesthetic gases, disinfectants, antiseptic solutions, injectable anaesthetic agents, antineoplastic drugs, antibiotics, heavy metals, immobilising agents and chemicals used for x-ray processing. The chemicals may possess a number of severe toxic effects. The main forms of chemicals are solids, dusts, liquids, gases, vapours and aerosols.

Corrosive chemicals can destroys or damages the living tissue on contact, irritant substances can produce local irritation or inflammation sensitizers can cause an allergic reaction, explosive products can burn or explode if a source of ignition is present (Mathews, 1993) ^[19]. Many substances used in veterinary practice can cause hazardous effects due to their mutagenic, teratogenic, carcinogenic and acute toxic nature (Hill *et al.* 1998) ^[20].

Exposure to waste anaesthetic gases has been associated with renal and hepatic diseases, spontaneous abortions, congenital malformations, cancer and neurological and psychological disorders (NIOSH, 1986) ^[21].

Formaldehyde is often used by veterinarians to sterilise tissues or as a preservative for pathological specimens. It causes adverse health effects such as dermatitis and irritation of the eyes and respiratory tract, and sensitization to formaldehyde may lead to asthma (Loomis, 1979) ^[22]. Apart from physical damage caused by needle stick injuries, there is also the possibility of introducing chemicals and biological agents causing disease (Bowman and Wilkins, 1991) ^[23].

Pesticides such as organophosphates, carbamates and pyrethrins have been frequently used in veterinary practices. These agents are used directly on animals or applied to the area where the animal is confined. It is suggested that failure to take precautions such as wearing gloves when handling chemicals, could contribute to adverse reactions (Jeyaretnam and Jones, 2000) ^[6].

Improper selection and use of personal protective equipment while handling disinfectants, irritants and cold substances could be the reason for chemical injury. Further it could be attributed to the dusty environment in the field, animal sheds and feed units. Steele and Wilkins (1996) ^[24]; Nienhaus *et al.* (2005) ^[11] reported that majority of the respondents had exposure to dust and disinfectants. Veterinarians are majorly exposing to dust (96.66%) followed by disinfectants (76.66%), irritants (50.00%), frost bite (40.00%), pesticides (36.67%), sterilizing agents (33.34%), acaricides (30.00%), corrosive agents (30.00%), scald (20.00%), anesthetic gases (10.00%) and sedative (6.67%) Hosure *et al.* 2018) ^[16].

Biological Hazards

Biological risks are being as a main occupational risk for veterinarians and it is present in all work activities where there is risk of exposure to biological agents. The potential occupational health hazards include biological hazards which are zoonotic diseases, injuries due to bites and scratches and allergies. Sources of these biological hazards may include bacteria, viruses, insects, plants, birds etc. More than 1,400 recognized human diseases are zoonotic in nature and more than 70% of emerging or re-emerging diseases have been originated from animals. For example, rabies, leptospirosis, tuberculosis, brucellosis, anthrax and Q fever. Frequent exposure to allergens of animal origin including blood proteins, ascarid worms and ectoparasites increase the probability of veterinarians developing occupational allergic respiratory diseases, allergy-related diseases and zoonotic diseases (Elbers *et al.* 1996) [25]. Veterinarians are constantly at the risk of acquiring the infection being a part of their job activities (Pillai, 2011) [18].

Veterinary practitioners including zoo veterinarians are in frequent contact with a wide range of animals and are exposed to allergens from animal hair, dander, urine, saliva and other body fluids as well as chemicals that can cause irritation or allergic reactions (Lutsky *et al.* 1985) [26]. Persons at biological risk includes pet owners, laboratory animal and veterinary technicians, researchers, veterinarians and others who have prolong and close association with animals (Katole *et al.* 2013) [2].

Zoonosis and allergic reactions like respiratory symptoms or allergic contact dermatitis are occurs mainly by exposure to animal hair, dandruff and feathers. These are proved to be the most frequent cause of occupational diseases in veterinary practice (Nienhaus *et al.* 2005) [11]. Women have become an increasingly significant proportion of practitioners in the veterinary profession. There are more number of allergic substances have been involved in cancer development or abortion in female veterinarians (Shirangi *et al.* 2007) [27]. Zoonotic diseases with teratogenic and abortifacient effects include brucellosis, tuberculosis, cryptococcosis, listeriosis, lymphocytic choriomeningitis, Q fever, toxoplasmosis and Venezuelan equine encephalitis. Toxoplasmosis and listeriosis are of main concern for the veterinary profession as they cause abortions in female veterinarians (Milligan *et al.* 1983) [28]. Public health veterinarians are more at risk of developing zoonotic diseases such as brucellosis, tuberculosis, leptospirosis, salmonellosis, and Q fever (Schnurrenberger, 1982) [29].

Close contact of veterinarians with the affected animals, ingestion/intake of contaminated food and water, lack of hygienic practices and improper use of personal protective equipment could be the main reasons for exposure. Entry of these organisms could be through the abraded skin, mucosal tissues, ingestion, inhalation and missed injection (Babeiker (2008) [30]; Jackson and Villarroel (2012) [31]. Some recent studies reported that majority of biological hazards affected the veterinarians in the field were E.coli (40.00%), salmonellosis (26.67%), brucellosis and staphylococcus (20.00%) and Coxiella burnetii (3.34%) in the category of bacterial infection. The viral diseases affected were influenza (23.34%), herpes virus (6.67%) and measles (3.34%). The fungal infection found was dermatophytes (30.00%). The parasitic disease infestations were giardia (33.34%), entamoeba (16.67%) and trypanosomosis (3.34%) (Hosure *et al.* 2018) [16]. Several epidemiological studies showed a strong

association between intensity of exposure to laboratory animal allergens and elevated prevalence of allergic diseases. Veterinarians working with laboratory animals are most commonly exposing to rats and mice which are the reason for many allergic conditions. The prevalence of allergy against rats in laboratory animal's workers ranged from 12-31% in some recent studies, and for mice ranged from 10-32% (Kruize *et al.* 1997) [32].

Fink-Gremmels (1999) [33] reported that in the past years contact with biological agents, in particular mycotoxins and bacterial endotoxins, could also result in poisoning. Mycotoxins are toxic substances produced by the metabolism of fungi or molds, which develop, under certain conditions on grass silage, grain and feed business or industrial; the most common agents are Aspergillus, whose aflatoxin is carcinogenic, hepatotoxic, immunosuppressant, Fusarium, whose fumonisin is neurotoxic, carcinogenic, genotoxic and zearalenone is estrogen-like, and Penicillium, whose ochratoxin is nephrotoxic, teratogenic, immunosuppressant and carcinogenic. Contamination can occur on the field or during the later stages of transport, processing and storage. While the mycete can be considered a pathogen for the plant, ingestion of mycotoxins can cause acute and chronic toxicity in humans and in animals.

Conclusion

Veterinarians have a special role to play in the development of occupational safety and health strategies for animal workers because they are intimately familiar with animal diseases and the necessary procedures involved in animal care and handling. Since the veterinarians are working with small to large animals the usage of equipment and chemicals/ drugs also used in large quantity. So the handling and maintenance should be done with proper care. Veterinarians should follow some strict hygienic practices in the work place such as proper hand washing and vaccination to animals as the major preventive measures. Apart from this appropriate handling technique, use of sleeve gloves and face mask, using gumboots, proper deworming and vaccination of animals, sanitation and sterilization of equipment also important to prevent occupational health hazards. Use of personal protective equipment helped in reducing contact with various physical and chemical hazardous substances. Proper hand washing, deworming and vaccination are the most important things to follow in the veterinary field to avoid many biological hazards. Awareness about the occupational hazards and their preventions should be included in their basic degree programmes as well as in each training programmes. Additionally, regular prophylactic vaccinations against the prevalent zoonotic diseases for all veterinarians along with regular medical check-ups, organizing workshops and seminars is recommended at the university campus on occupational hazards especially for animal workers, medical health insurance and free medical facilities to veterinarians also needed for the veterinarians to make a healthy profession.

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