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Review Article

Zoonoses Occupationally Acquired By Abattoir Workers

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Abstract

Many occupational zoonotic diseases of multiple etiologies are encountered in abattoir workers who deal with the slaughter of different species of food animals for human consumption. As a result abattoir workers constitute a major group at risk of occupational zoonosis, due to the close contact that exists between them and animals/tissue of animals during slaughtering or processing. Clinical signs may be suggestive but confirmation of disease requires standard laboratory diagnostic techniques such as microbiological, immunological and molecular. Prevention and control of occupational zoonoses in abattoir workers depend on avoidance of cuts, abrasion, wound, immediate medical attention to the skin injury, high standard of personal hygiene, provision of protective wears to the employees, vaccination of high risk groups, sanitation in abattoirs and meat processing plants, strict meat inspection of food animals, elimination of disease in animals, health education of employees in meat industry and good coordination among physician and veterinarian. It is hoped that close coordination between medical and veterinary specialists will be very helpful in combating the zoonotic diseases which are of pivotal significance from public health as well as economic point of view.

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INTRODUCTION

Zoonoses are described as those diseases and infections which are naturally transmitted from animals to humans. They represent about 70% of the number of emerging infectious diseases in recent time [1]. There are over 300 zoonotic diseases of diverse etiologies which cause high morbidity and mortality [2]. Zoonotic diseases occur in both sexes, in all age groups, in all seasons, in all climatic zones and in rural and urban settings [3,2]. Increasing demand for meat and meat product by human population has made human contact with animals unprecedented, coupled with movement of animals across international frontiers to supplement the local supply and increasing the risk of zoonotic diseases especially from endemic zones [4]. Transmission of zoonotic infections occurs through various routes [5, 6]. However, direct contact seems to be the most common mode of entry of infectious agent

in the employees working in slaughter houses [7]. The employees of meat industry are at particular risks of acquiring many zoonotic infections, due to the close contact that exists between them and animals/tissue of animals during slaughtering or processing [3,2,8]. The present paper focuses on zoonoses of abattoir workers who slaughter different types of food animals such as cattle, buffalo, goat, sheep, camel, horse, pig, deer, reindeer, kangaroo, rabbit, poultry and fish.

Erysipelothricosis-This is an infectious bacterial disease caused by *Erysipelothrix rhusiopathiae*. The disease is sometimes called Fish finger, Pork, finger or Whale finger [2]. Human infections are usually acquired by occupational exposure in meat or chicken slaughterhouses or fish plants. Localized skin lesion in man is termed "Erysipeloid" which is characterized by a self-limiting, painful, red swelling of the fingers with or without lymphadenopathy. It is worldwide in

distribution, and the major reservoir of *E. rhusiopathiae* is domestic pig. Infection is recorded in pig, sheep, cattle, horse, fish, birds and reindeer [2]. Disease is most common in abattoir workers, fish handlers, butchers, and meat inspectors, and poultry processing workers [7]. Infection is acquired through abraded skin and bite wounds of fish and crustacean.

Brucellosis- This is one of the major anthroozoonoses of public health significance and is caused by *Brucella abortus*, *B. suis* and *B. melitensis* [9]. It has been reported in buffalo, cattle, camel, horse, pig, sheep, goat, deer, and poultry [2]. Human brucellosis commonly referred to as 'undulant fever' or 'Malta fever' is important zoonoses that often coincide with livestock infection. Serological surveys in many countries have revealed antibodies to *B. abortus* in abattoir workers and veterinarians. Man gets infections by direct contact with infected discharges and materials of animals and by inhalation [10]. All slaughter house workers who are engaged in the actual handling of livestock, dressing of carcasses, disposal of condemned organs are at greater risk of acquiring brucellosis. Clinical signs of brucellosis in man include anorexia, fever, headache, backache, weakness and sweating [5, 2]. Death may occur due to endocarditis [2].

Listeriosis – The etiologic agent, *Listeria monocytogenes* is a rod-shaped bacterium, first recovered by Murray in 1926 from rabbit and guinea pig [2]. Infection occurs in buffalo, cattle, goat, sheep, house, bird, rabbit and fish [2]. Veterinarians and abattoir workers can acquire a primary cutaneous listeriosis from direct exposure to diseased animals or infected discharges/ tissues [7]. Cutaneous listeriosis is manifested with an initial reddish rash which later develops into vesicular or pustular lesions, about 1-2 mm in diameter with either dark or light centre [7]. Sometimes, it may lead to a generalized form of disease. The disease appears to be more common in temperate zones. The incidence of cutaneous listeriosis has been reported to be higher in U.K. About 1,700 cases of sporadic listeriosis with 550 deaths occur annually in USA [6]. The mortality is higher in immunocompromised individuals. The pregnant women should not be allowed to work in meat processing plants [2].

Glanders- It is a bacterial zoonosis caused by *Burkholderia mallei*, a non-motile, Gram negative, non-capsulated organism [6]. The first case of human glanders was reported in 1723 by Dr Sainbel of England. In the past, it has caused serious mortality both in equines as well as human beings. Glanders in man is contracted in most cases, as an occupational exposure among persons working in close association with diseased horses or wound infection during autopsy or handling of meat of diseased animal [7]. The mode

of transmission of disease in abattoir worker is through the abrasions in the skin. The nodule develops at the seat of inoculation. Later, the lymphatic vessels and lymph nodes become inflamed and may extend infection to the nasal mucous membrane or lungs. Inhalation of organisms may lead to fatal pneumonia. Biohazard cabinet must be used to work with *B. mallei* [2].

Anthrax- This is an occupational disease caused by *Bacillus anthracis*, a Gram positive, aerobic, sporulated organism [11]. The disease is recorded in all food animals. The spores under favorable conditions may remain viable for 40-50 years in contaminated soil and 150-250 years in the bones of dead hosts. Global incidence of anthrax in man is estimated to be 20,000 to 100,000 cases per annum. The cutaneous form also known as malignant pustule accounts for 95-99% of human cases throughout the world [6]. It is endemic in many countries including Asia and Africa. Abattoir workers usually contract infection by inoculation through a skin wound. Cutaneous anthrax appears to occur more commonly on the hands and arms of meat handlers [7]. It is characterized by the small pimple that rapidly develops into a large vesicle with a black necrotic center- the so called "Malignant Pustule". Cutaneous form may become generalized in 10% of cases when fatal septicemia ensues. In untreated cases, the outcome is fatal [2]. Pulmonary form is responsible for febrile respiratory tract disease, mild onset, then sudden onset of second stage with dyspnea, sweating, cyanosis, and death within 24 hours (100% case fatality rate). Additionally, the intestinal form results in febrile gastrointestinal disease. Transmission is usually by direct contact with infected animal. Also, by ingestion of undercooked meat or, occasionally, by inhalation of spores in wool from infected ruminants. Spores are found in bone meal, soil, water, and on vegetation. Spores form readily when vegetative form is exposed to air, are long-lived, and are very resistant to environmental extremes and disinfectants [5, 6].

Leptospirosis- It is a global bacterial zoonosis known by several synonyms such as Weil's disease, Mud fever, Canicola fever, Rice-field worker's disease; and is caused by pathogenic spirochetes in the genus *Leptospira* [12]. The disease affects both humans and animals, occurring widely in developing countries and is reemerging in the United States [13]. Leptospirosis is encountered in many species of food animals such as cattle, buffalo, camel, horse, goat, sheep, deer and pig [2]. Poultry are said to be resistant to *Leptospira* infection. Transmission occurs by direct contact with diseased animals and their tissues or indirectly with contaminated environment especially water contaminated with urine of infected food animals [14]. In Jamaica, Brown and co-workers [15] studied the

environmental risk factors associated with leptospirosis in butchers. Infection usually takes place through the penetration of the abraded or traumatized skin with the urine of the sick animals. Rodents serve as natural reservoir of leptospirosis [16, 12]. Organisms can survive for weeks in the soil and water contaminated by urine of carriers, particularly if the pH is alkaline. After an incubation period of 7-14 days, the patient exhibits signs of a flu-like syndrome characterized by sudden high fever, headache, vomiting, nausea, chills and conjunctivitis. If immediate treatment is not given, patient may develop hepatitis, jaundice, nephritis, pneumonia, anemia, kidney failure, internal bleeding and meningitis. Death may occur due to renal failure [2, 17].

Tularemia- Disease is also known as Deerfly fever, Rabbit fever and is caused by *Francisella tularensis*, a Gram negative, non-sporulated, aerobic organism [2]. The disease is reported in rabbit, deer, horse, pig and calf [2]. It is an occupational disease of rabbit butchers. The skinning of infected rabbits and hares is the common means of human infections. In USA, about 2000 cases of human tularemia are reported each year [7]. The first sign in man is usually a papule at the site of initial infection, often a finger which ulcerates. The organisms are carried by lymph nodes which enlarge, become painful and may suppurate. The disease is accompanied by fever, headache, muscular pain and lasts for 2-4 weeks. Mortality rate in ulceroglandular form is 5%. Transmission occurs by direct inoculation of organisms into the skin, mucous membrane or conjunctiva with diseased animals or their excretions/tissues. Bite of infected arthropods can also transmit the disease [2].

Tetanus- It is a bacterial disease, caused by *Clostridium tetani*, a Gram positive, spore forming, anaerobic organism. Natural infection is recorded in horse, sheep, cattle and pig [2]. The pathogen enters the body through the infection of the wound, injury or laceration with soil or dust contaminated with spores of *C. tetani*. Incubation period is 4-10 days. The tightening of jaw muscles is the earliest sign of tetanus. The disease in man is called "Lock Jaw" [2]. The fatality rate is high in patients who delay medical attention. The disease is prevalent in all parts of the world as the organism is a common inhabitant of the soil. Endospores of *C. tetani* can be killed by autoclaving at 121°C for 15 minutes. Immediate attention to wound/injury is imperative [2].

Melioidosis- It is caused by the bacterium, *Burkholderia pseudomallei*, a Gram negative, motile, aerobic [2]. Man acquires the infection by direct contact of injured skin with contaminated soil or water. Inhalation of infectious dust through respiratory tract can also produce disease. Disease occurs in camel,

goat, horse, pig, sheep and kangaroo [2]. Organism can survive for many months in soil and water. The patient develops vesicles and pustules on hand and feet. Pulmonary, extrapulmonary and septicemic forms are seen. Disease is highly endemic both in man and animals in Australia [7].

Staphylococcal infection- It is primarily caused by *Staphylococcus aureus*, a Gram positive, non-sporulated and non-motile bacterium [2]. The disease is recorded in cattle, buffalo, camel, horse, goat, pig, rabbit and poultry. Abattoir workers usually contract infection while dealing with carcass of food animals. Lesions may appear as boil, pustule, furuncle and abscess on hands and arms of the workers. In India, *S. aureus* was isolated from the skin lesions of a meat inspector and a butcher [M.Pal, Personal communication].

Streptococcal meningitis- The disease is caused by *Streptococcus suis* type-2. The infection is reported in meat factory workers, abattoir employee's butchers and veterinarians [7]. The bacteria enter the skin through cut, wound or abrasion. The patient may show febrile condition with severe headache, numbness of fingers, rigors, erythema besides meningitis, septicemia, arthritis, lymphangitis. Patients respond slowly with antibiotic treatment over a period of several days. The disease is widespread in pigs in U.K. The infection has also been encountered in goat, horse and sheep [7].

Tuberculosis- *Mycobacterium bovis* is the cause of bovine tuberculosis which is a major zoonosis. Global distribution of *M. bovis* infection in animals and humans varies widely. In some of the developing countries, *M. bovis* is responsible for 5-10 % of all human tuberculosis [18]. Disease is reported in cattle, buffalo, sheep, goats, horse, pig and deer [2]. Transmission of *M. bovis* from animal to man takes place due to direct exposure to infected animal or carcass at abattoir (occupational exposure). Tuberculous lesions occur in the skin, tendon and localized lymph node among the persons who handle infected carcass in the slaughterhouse. The cutaneous tuberculosis was diagnosed and treated in an abattoir worker in India [P.Dave, Personal Communication].

Necrobacillosis- It is a bacterial disease of cattle, goat, horse, pig and man. Transmission of disease in human takes place by direct contact of the injured or abraded skin or wound to infected tissues of animals. Disease is caused by *Fusobacterium necrophorum* which is a Gram-negative, non-sporulated, anaerobic organism. Necrotic pustules develop at the site of inoculation of the organism [2].

Dermatophilosis- Disease is caused by *Dermatophilus congolensis* which is a facultative anaerobic actinomycete. The condition is sometimes referred to as

“rain scald” as it often looks like raindrops have just fallen on the skin. The condition is initially seen as pustules that are often over-looked. However, the pustules quickly come to together to form large oval crusts as the longer hairs become stuck together in the scab [4]. It has worldwide distribution; and is recorded in cattle, goat, sheep, horse, camel, deer and rabbit [19]. Transmission of disease in man occurs by direct contact with infected animal. Skin infection in man is localized. The most common locations of the lesions in cattle are rump, topline, udder and teats as well as the belly [4]. Lesions in humans occur as discrete, cutaneous pustule on the hands, fore arms or legs [2].

Chlamydiosis: It is a highly infectious global disease caused by *Chlamydophila psittaci*, which is an intracellular organism. The infection has been reported in cattle, sheep, horse, goat, pig, buffalo, and birds [4]. Human exposure to infective aerosols or dust-infected bird droppings and nasal discharges and sheep fetuses and membranes can result infection [7, 21]. The persons working in domestic poultry processing plants are at a greater risk of contracting the disease. The disease may vary from being inapparent, as also recognized by the Centre for Disease Control and Prevention (CDC) [21], to fatal [22] in untreated patients. Symptoms include fever, gastrointestinal pain, vomiting, headache, arthralgia, keratoconjunctivitis and anorexia [2]. Mild attacks of disease may be confused with influenza. The disease is rarely fatal in properly treated patients. Therefore, early diagnosis and awareness are important. In India, the chlamydial infection was diagnosed in a bird handler [M.Pal, Personal Communication].

Q fever- It is an important rickettsial disease caused by *Coxiella burnetii*. The organism remains infective in wool and farm dust for very long periods. Disease occurs most often in cattle, goats and sheep. Infection in man can occur through inhalation, direct contact or bites of ticks [2]. The symptoms usually take the form of fever, anorexia, chills, frontal headache, myalgia, weakness, cough, chest pain, pneumonia and severe sweating [2]. In more severe cases, pericarditis, endocarditis, and hepatitis is observed. In a study of workers in an abattoir in Edinburgh, 21.1 % showed antibodies to phase 2 antigen of *C. burnetii* [7]. Australian studies in the last two decades have shown evidence of infection in abattoir workers [23,24].

Cowpox- This viral zoonosis is caused by cowpox virus (DNA virus) and man acquires infection by direct contact with diseased cattle. Cowpox is an acute viral disease characterized by typical vesicular eruptions on the skin and mucous membrane. In man, erythema, vesicle, pustule and scab formation is noticed [2]. Lesions occur on the hands, arms and face and; often accompanied by lymphadenitis and fever. The

disease is self-limited. The typical cowpox lesions were observed on the hand of a butcher [P.Dave, Personal Communication].

Pseudo cowpox- Also known as “Milker’s nodules” is caused by Pseudocowpox virus (DNA). Infection occurs by occupational exposure. Papule occurs on the finger, hand or arm disease is mild and self limiting [25].

Buffalo pox: It is caused by Buffalo pox virus (DNA) which belongs to family Poxviridae. Disease was noted first time among water buffaloes in India in 1934. Buffalo pox is also reported from Indonesia, Pakistan, Egypt and Russia. The virus is transmitted to man by direct contact with infected food animals [26]. Multiple pocks lesions occur on fingers, hands, wrists and fore arms. Occasionally, lymphadenopathy may occur [26].

Camel pox- It is a viral zoonosis caused by Camel pox virus (DNA) of family Poxviridae. The disease is reported from several countries of Africa, Asia and Middle East. Human infection can occur by direct contact with diseased camel [2]. Pox lesions occur mainly on the hands of animal handler [2].

Contagious ecthyma: - It is an occupational disease caused by *Orfivirus* (DNA) of family Poxviridae. Disease is reported in camel, goat and sheep. The virus can enter through abraded /injured skin [2]. Man gets infection by direct contact with diseased animal. Most cases are encountered in adults especially men. Disease occurs frequently in abattoir workers, butchers and meat handlers. Papule, vesicle and pustule occur mainly on the finger, hand, wrist, fore arm and sometimes on the face [7]. The lesions heal in 15-30 days, and occasionally, ocular lesions may occur [2].

Foot and mouth disease- It is a economically important infectious disease caused by FMD virus (RNA) of Family Picornaviridae; and is reported in cattle, buffalo, camel, goat, sheep, pig and deer [2]. Transmission of infection occurs by close contact of abraded skin with diseased animals or their discharges. Animal hides can be a source of virus for a long period of time. It is a mild disease in man and vesicles occur on the finger, palm of hand, sole of feet or oral cavity [2].

Newcastle disease - It is a fatal disease chicken, caused by Newcastle disease virus (RNA) of Family Picornaviridae [2]. Persons working in poultry slaughter house get the infection. Transmission occurs by handling diseased poultry or carcass. The affected person shows redness, watery discharge from eye, edema of eye lids, conjunctivitis and subconjunctival haemorrhage [27]. The conjunctivitis due to Newcastle disease virus was diagnosed in a poultry handler from India [M.Pal, Personal Communication].

Rift Valley fever - The disease was first described in 1931 from Kenya and is caused by Rift Valley fever virus (RNA) of Family Bunyaviridae. Man gets infection by direct contact with diseased animals or infected tissues [28]. Bite of mosquitoes can also produce disease in man and animals. Disease is recorded in cattle, camel, goat and sheep. Clinical signs in man include fever, headache myalgia, nausea, vomition, retinitis, jaundice and encephalitis [2].

Swine influenza- Also known as swine flu or pig flu is a highly infectious emerging viral zoonosis of global significance and is caused by a new strain of influenza A virus subtype H1N1, a RNA virus of the family Orthomyxoviridae. These viruses infect a variety of species including humans, swine, equine species, aquatic mammals and birds [29]. Evidence exists demonstrating transmission of influenza viruses from humans to pigs [30,31,32,33,34,35] as well as from pigs to humans [36, 37]. Influenza A virus transmission between humans and swine often results in the emergence of new strains with the potential of spreading among both populations [38, 39,40]. Persons, who work with diseased pigs (swine abattoir employees, pork producers, veterinarians), are at risk of catching swine flu [3]. Clinical signs in man include fever, chills, sore throat, cough, severe headache, running nose, weakness, besides vomition and diarrhoea [41]. Severe fatal infections are recorded in adults between the ages of 30 to 50 years. Rajão and co-workers [42] reported 38.3% positive human serum samples in serological survey. Continuous exposure of the abattoir workers to animals suffering from subclinical influenza virus infections provided an environment conducive to the occurrence of interspecies infections and the emergence of new potentially pathogenic viral variants [43]. Pregnant women are at greater risks of acquiring swine flu. Control measures include use of face mask and gloves at pig farm, personal hygiene, good biosecurity measures and vaccination of pigs [3, 42,].

Louping ill: - It is a viral disease of cattle, goat, horse, pig, sheep, deer and man; and is caused by Louping ill virus (RNA) of Family *Togaviridae*. Infection can occur by inhalation, ingestion or needle prick [2]. Infection in sheep is transmitted by ticks. Cuts and abrasions frequently predispose the workers to infection [7]. Disease is encountered in abattoir worker, and slaughter man. The affected person exhibits signs of fever, headache, flu-like symptoms, conjunctivitis and meningoencephalitis [2]. In Scottish abattoir workers in 1966, an incidence of 8.3 % of louping ill infection was reported [7].

Bird flu- It is an emerging viral zoonosis which resulted a loss of over US Dollar 10.0 billion to Asian poultry Industry [2]. Infection can be contracted with

sick or dead birds and also during slaughtering, feathering and dressing of diseased birds [2]. Disease is caused by influenza type A virus (H5N1) belonging to family *Orthomyxoviridae* (RNA). Patient shows high fever, chest pain, respiratory distress and hoarse voice. Biosecurity measures at poultry farm and use of protective clothing can help in control of disease [2].

Dermatophytosis (Ringworm) - This is most commonly encountered mycotic disease of humans and animals. It is caused by dermatophytes of Genus *Microsporum* and *Trichophyton*. Disease is diagnosed in cattle, buffalo, deer, horse, pig, goat, sheep and rabbit [2]. Human gets infection by having direct contact with diseased animals [44, 45]. Lesions on the skin show redness, scaling, vesicle, irritation and itching [45]. If hair is involved, hair shaft become fragile and break off a short distance above the skin leaving short stub in a bald circular patch. Hands, arms and forearms are mostly affected [5, 45]. Lesions occur on human head or body, and on most species, are circular or annular because of central healing. Usually scaling or hair loss or breakage, occasional itching occurs. Sometimes erythema, induration, crusting, or suppuration occurs. Maceration, abrasions, and cuts of the skin constitute the predisposing factors [7]. Several cases of ringworm due to *Trichophyton verrucosum* were diagnosed in abattoir workers [M.Pal, Personal Communication].

Aspergillosis: Commonly known as brooder pneumonia is a highly fatal fungal disease and is principally caused by *Aspergillus fumigatus*. Infection is mainly acquired by inhalation. Sick person exhibits signs of low grade fever, productive cough breathlessness and haemoptysis. Pal and Torres-Rodreguez [46] recorded pulmonary aspergillosis in a poultry worker who was occupationally exposed to fungal spores of *A.flavus*. Use of face mask in poultry processing industry can prevent *Asperillus* infection [2]

Scabies- It is an ectoparasitic zoonosis caused by *Sarcoptes scabiei*. Disease is world wide in distribution and is reported in cattle, buffalo, camel, sheep, goat and pig [2]. Transmission occurs by direct contact with scabiatic animal [47]. Lesions occur on the hand and arms and rarely on parts of body. It consists of papules and vesicles and may be intensely pruritic [50].

The name of disease, etiological agent, host and reservoir of occupational zoonoses of abattoir workers are summarized in tabular form.

Name of Disease	Etiologic Agent	Host	Reservoir
Erysipelothricosis	<i>Erysipelothrix rhusiopathiae</i>	Pig, sheep, cattle, horse, fish, birds and reindeer	Domestic pig
Brucellosis	<i>Brucella abortus</i> , <i>B.suis</i> and <i>B. melitensis</i>	Buffalo, cattle, camel, horse, pig, sheep, goat, deer, and poultry	Animals
Listeriosis	<i>Listeria monocytogenes</i>	Buffalo, cattle, goat, sheep, horse, bird, rabbit and fish	Decomposing plant matter
Glanders	<i>Burkholderia mallei</i>	Horse, mule, donkey	Equines
Anthrax	<i>Bacillus anthracis</i>	Cattle, sheep, pig, horse	Animals, soil
Leptospirosis	Leptospira	Cattle, buffalo, camel, horse, goat, sheep, deer and pig	Mainly rodents
Tularemia	<i>Francisella tularensis</i>	Rabbit, deer, horse, pig and calf	Rodents, tick
Tetanus	<i>Clostridium tetani</i>	Horse, sheep, cattle and pig	Soil
Melioidosis	<i>Burkholderia pseudomallei</i>	Camel, goat, horse, pig, sheep and kangaroo	Soil
Staphylococcal infection	<i>Staphylococcus aureus</i>	Cattle, buffalo, camel, horse, goat, pig, rabbit and poultry	Cattle
Streptococcal meningitis	<i>Streptococcus suis</i>	Pig, goat, sheep and horse	Pig
Tuberculosis	<i>Mycobacterium bovis</i>	Cattle, buffalo, sheep, goats, horse, pig and deer	Cattle
Necrobacillosis	<i>Fusobacterium necrophorum</i>	Cattle, goat, horse and pig	Animals, soil
Dermatophilosis	<i>Dermatophilus congolensis</i>	Cattle, goat, sheep, horse, camel, deer and rabbit	Mainly cattle
Chlamydiosis	<i>Chlamydoiphila psittaci</i>	Cattle, sheep, horse, goat, pig, buffalo, and birds	Birds and mammals
Q-fever	<i>Coxiella burnetii</i>	Cattle, goats and sheep	Cattle, sheep, goat and tick
Cowpox	<i>Cowpox virus</i>	Cattle	Rodents
Pseudo cowpox	<i>Pseudo cowpox virus</i>	Cattle	Cattle
Buffalo pox	<i>Buffalo pox virus</i>	Buffalo	Buffalo
Camelpox	<i>Camel pox virus</i>	Camel	Camel
Contagious ecthyma	<i>Orf virus</i>	Camel, goat and sheep	Sheep, goat, cattle, camel
Foot and mouth disease	<i>FMD virus</i>	Cattle, buffalo, camel, goat, sheep, pig and deer	Mainly cattle
Newcastle disease	<i>Newcastle disease virus</i>	Poultry	Birds
Swine influenza	<i>Influenza A virus (H1N1)</i>	Pig, equine, aquatic mammals and poultry	Pig
Louping ill	<i>Louping ill virus</i>	Cattle, horse, pig, sheep, deer	Sheep, deer, tick
Bird flu	<i>Influenza type A virus (H5N1)</i>	Poultry	Aqatic birds mainly water fowl
Dermatophytosis	<i>Microsporum and Trichophyton</i>	Cattle, buffalo, deer, horse, pig, goat, sheep and rabbit	Animals
Aspergillois	<i>Aspergillus fumigates</i> and rarely other species	Cattle, Sheep, Goat, mainly poultry	Environment (soil, poultry litter)
Scabies	<i>Sarcoptes scabiei</i>	Cattle, buffalo, camel, sheep, goat and pig	Animals

CONCLUSION

During the evisceration step, the spread of zoonotic bacteria out of carcass surface is mainly due to the presence of carrier animal and, therefore, in the slaughterhouses, good hygienic practices and equipment cleanliness are relevant both to prevent and to reduce the level of carcass contamination. The slaughterhouse is an environment that is conducive to the transmission of zoonotic diseases to humans, for in few other locations are so many animals brought into close contact with so many people. As discussed above, slaughterhouse workers directly contact animal tissues and so it would be expected that they would be exposed to these agents regularly. Exposure to these agents may also be indirect (environment and processing equipments). There should be adequate disease reporting systems and sufficient collaboration and communication between human health and veterinary specialists. Vaccination, standard and additional precautions (also known as universal precautions), hand-washing, education and training and the use of personal protective equipment where appropriate are the main control strategies for the prevention of occupationally-related infections in the abattoir employees. As animal infections are often a sentinel for human infection, the veterinarians should report the incident of zoonotic disease to the health authority.

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