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Avian Influenza Risk Perception and Preventive Practice Among Poultry Workers in Jos: A Cross Sectional Study

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Abstract: Highly pathogenic Avian Influenza virus (HPAI) H5N1 commonly called Bird Flu, is a highly infectious viral disease of birds including domestic poultry, and first infected humans in China 1997. Since its widespread and re-emergence in 2003 and 2004, the avian virus has become a global public health threat. The H5N1 is known to be very infectious and has caused death of millions of chickens and other birds around the world with high economic loss. The prevention and control of this virus depend on the awareness and protective practices of the poultry workers as well as the general population. This study aims to assess risk factors related to Avian influenza virus infection among poultry workers in Plateau State, Nigeria. A structured questionnaire was administered to 200 poultry workers age 14 to 63.The results showed that more females (52%) participated in poultry farming than males (48%), and younger population ages 14-23 years (33%) participated more than the older population ages 54-63 years (7%). Also, occupationally hired poultry workers (53%) were more compared to farm owners (18%) with other workers (health workers, cullers, scavengers) (29%). Knowledge about protective measures was high in relation to wearing of coverall (44.5%), hand gloves (20.5%) and boots (17%). Those in contact with the dead birds were more (43%) than those in contact with the carcass (29%) and sick birds (28%). The number of subject that answered yes to risk perception were 66.0%, and those who said no was 34%, the female perception was higher (73%). The study showed that there is moderate preventive practices and awareness about avian influenza virus infection among the poultry workers. Preventive practices might play an effective role in reducing or slowing transmission of influenza. This calls for proper training of poultry workers about avian influenza virus to improve preventive practices that will curb the spread, reduce risk of infection and economic loss.

Keywords: Avian Influenza Virus, Risk Perception, Prevention, Poultry Workers

1. Introduction

In January 2015, Plateau State first localized outbreak of highly pathogenic avian influenza (HPAI) H5N1 virus among poultry was recorded, followed by a second outbreak in January 2016 [1, 2]. This could be considered a potentially serious pandemic threat because the influenza virus appears to be new in this part of the world. Whether H5N1 will be the next pandemic virus is left to be seen, however, H5N1 viruses are taking a vast toll on the poultry industry in many developing countries, and this directly or indirectly may have

negative effect on both economic and public health. The potential impact of HPAI H5N1 virus that resides naturally in wild bird species has received less awareness, which poses a great threat to global health. While H5N1 virus transmission is mostly from infected poultry to humans, and perhaps in reverse order with fatal consequences. H5N1 transmission remains a challenge to our understanding of interspecies transmission of influenza viruses [3].

It was stated by World Health Organization (WHO) that infection of poultry birds with influenza A (subtype H5N1) virus is a primarily responsible for the outbreaks of infection in birds and humans [4]. The most possible way of spread has been from infected birds to humans and from the environment to humans, but evidence for human-to-human spread have not been well established [5]. This virus can be transmitted if an individual has direct contact with infected poultry or surfaces and objects infected by poultry droppings. Poultry workers, who normally have contact with live, sick, dying or prepared raw poultry meat, are at higher risk for avian influenza infection. These poultry workers are at higher risk, because of the process of preparation of raw poultry meat or poultry products and food stuff handling. AI can also will be transmitted from lightly cooked birds or bird products to humans [6].

The influenza virus that appears most threatening is the avian H5N1 strain that since 2003 has infected more than 130 persons in Vietnam, Thailand, Cambodia, Indonesia, and China and has killed more than 70 of them. The influenza A/H5N1 virus being highly pathogenic to poultry had also acquired increased capacity for interspecies transmission [7]. Several cases of HPAI H5N1 outbreak in Nigeria occurred in mixed farms and in rural communities. In Plateau, HPAI H5N1 poultry outbreaks receded and then reappeared in January 2016 which may result in humans acquiring the subtype or other avian influenza from poultry. The HPAIV H5N1 virus spread rapidly through Asia and into Europe and Africa, and wild migratory birds were suspected to play a role in the geographic distribution of HPAIV H5N1, at least in Europe and Africa [8]. Since 2003, the H5N1 HPAI epidemic has claimed over 220 million poultry and other birds either through direct mortality from infection or from preemptive culling [6]. Regardless of the implementation of vaccination of poultry as a device for reducing infection and shrinking the risk of transmission within poultry and, as a consequence, to humans, there are still incidences of outbreaks of the disease.

Nigeria was the first country in Africa to confirm the presence of bird flu [4]. The virus was discovered on Sambawa Farms (Igabi Local Government), Kaduna State on 8 January 2006 and confirmed by the OIE World Reference Laboratory at Padova, Italy, on 7 February 2006. From one state in February 2006, the virus has continued its spread right across Nigeria [4]. As at 6 February 2007, the virus had affected 55 Local Government Areas (LGAs) in 21 states and the Federal Capital Territory (FCT). Of greater concern is that the country recorded its first human case of Avian Influenza fatality on 17 January 2007, with the death of a 22-year old female in Lagos State. The official report of the Federal Government of Nigeria was validated by the World Health Organization [9]. From the foregoing, understanding poultry workers' risk perception and compliance to public health preventive measures is an essential step in designing future effective health preventive strategies to this target population against the virus infection. The study aimed to assess risk factors associated with avian influenza outbreak among poultry workers in Plateau State, Nigeria.

2. Methods

The study location was in Jos Metropolis, the city is located in the north-central of Nigeria with temperature range from 21°C-25°C and has estimated registered poultry farmers' population of 2000. The study subjects were recruited randomly within the period of four (4) months from June to September 2015, after ethical approval was obtained from Health Research Ethics Committee of Plateau State Specialist Hospital. Informed consent was also obtained from each subject, indicating willingness to participate in the study. The study population comprised of all poultry workers from selected infected poultry farms within Jos metropolis. The study subjects were poultry workers employed on poultry farms, Farm owners who had contact with death/carcass or infected births during the outbreak of the influenza virus in Jos (January 2015 and January 2016). Sampling were obtained from 200 subjects. The metropolis has 16 clusters where the poultry workers were found, out of which 8 were selected by simple random sampling technique. The selected respondents were given identification numbers. Advocacy was given during general meeting of the Poultry Farmers' Association of Nigeria, Plateau State branch. The objectives of the study were explain to the group and also to solicit for their members support in ensuring the accomplishment of the study. The members of the association in the identified areas were informed of the research and a day was set aside for the administration of the questionnaires.

The interviewers used structured questionnaires and questions carefully read and sometimes interpreted to those who do not understand English and responses recorded. Socio-demographic information was collected for age, gender, school education and occupational status (paid employee and farm owners. Awareness about avian influenza infection was assessed. Perceptions of risk were assessed by asking question about whether poultry workers, butchers or health workers were at risk for contracting avian influenza (yes/no). Further, subjects were asked about sources of information concerning avian influenza, such as TV, radio and newspapers. Risk was assessed by contacts with sick, dead/carcass, and the use and how often they were using the following preventive measures when dealing with poultry, such as face masks, boots/boots covers and putting on protective body garments. The questionnaire was carefully filled and returned together with the consent forms.

3. Results

The result of age distribution of poultry workers showed

that as the age range increased, the percentage rate of participation on the poultry farms decreased. This was reflected in table 1, where the participation of the age bracket of 14-23 years was 33%; 24-33 (31%); 34-43 (22%); 44-53 (8%) and 54-63 (7%). The result of the study based on sex of poultry workers showed that there was more females (52%) than men (48%). The occupational distribution of the study showed that hired poultry workers were more vulnerable to being infected by the virus with 53% infection, followed by others who had contact with the carcass of birds with 29% infection. The farm owners' level of infection was 18%, which was the least. Subjects who either had contact with sick, dead or carcass of infected birds showed that those who had contact with sick birds were (28%), carcass of birds (29%) dead birds (43%). This shows that those in contact with sick, dead or carcass of infected birds are at higher risk of infection compared to humans. This suggests that poultry workers should be more careful with sick, dead or carcass of an infected birds. The use of personal protective equipment by poultry workers showed that using overall was the most prevalent practice as it was uniformly reported as being used "always" or "often" (44.5%). Use of other personal protective measures, however, seemed to be less commonly used than the use of gloves (20.5%) and face masks 18% was slightly higher and only few stated that they did use boots (17%) (Table 2). Table 3 shows the risk perception of poultry workers who were categorized male and female. The number of subjects that answered yes were 132 (66%), and those who said no was 68 (34%). The females were seen to have higher risk perception (73%) than male (58%).

Table 1. *Associations of socio-demographic characteristics and risk perception of poultry Workers in Jos, Nigeria.*

Characteristics	Number	Frequency (%)
Age Category		
14-23	65	33.0
24-33	61	31.0
34-43	44	22.0
44-53	16	8.0
54-63	14	7.0
Sex		
Male	96	48.0
Female	104	52.0
Occupation		
farm owners	36	18.0
Poultry workers (hired)	106	53.0
Others (Healthcare workers, cullers)	58	29.0

Table 2. *Distribution of poultry workers in relation to risk of contact and use of personal protective equipment (PPE) working with infected in Jos, Nigeria.*

Characteristics	Number	Frequency (%)
Contact		
Sick	56	28.0
Dead	86	43.0
Carcass	58	29.0
PPE USE		
Mask	36	18.0
H/gloves	41	20.5
Boots	34	17.0
Coverall	89	44.5

Table 3. *Frequency of poultry workers risk perception in relation to contracting Avian Influenza virus infection in Jos, Nigeria.*

Characteristics	Number (%)	Number (%)
Risk perception	Yes	No
Male	56 (58.3)	40 (41.7)
Female	76 (73.1)	28 (27.0)

4. Discussion

The result of age distribution of poultry workers showed that as the age range increased, the percentage rate of participation on the poultry farms decreased. Information about the specific risk faced by poultry workers was consistently high especially within the age bracket of 14-23 years. This was in agreement with WHO report of confirmed human cases of avian influenza A (H5N1) from 10 countries of Africa, Asia, and Europe in 30 months which highlighted the skewed age distribution of these confirmed cases toward children and young adults, with relatively few cases in older age categories [4]. These findings were predictable given that the study was conducted shortly after the first AI outbreak from January 2015 and January 2016 respectively in Plateau state [9]. This could also be as a result of increased governmental campaign efforts at promoting awareness after the outbreak had occurred. Also, only few knew about the importance of preventive practices and protective clothing before the government campaign, which was the main message in the campaign. It is known that birds excrete influenza viruses in feces, but it is unknown whether the human infections occurred by inhalation of aerosolized virus; by direct contact with virus in poultry feces; or by some other routes. Poultry-to-human transmission of this virus is unlikely to lead to pandemic influenza, but avian influenza viruses have the potential to reassert or mutate and become more transmissible among humans. The virus subtypes in circulation undergoes a form of antigenic change resulting in the sequential dominance of antigenicity distinguishable with limited cross-sectional genetic diversity [10]. The persistence of HPAIV) H5N1 in Africa is attributed to poor biosecurity compliance at the live bird markets and poultry farms [3]. These outbreaks calls for strong considerations and emphasize on the need for personal protective equipment and continued sensitization to create awareness among poultry farmers and also surveillance to monitor for emerging influenza viruses.

The results of this study also revealed that females (52%) were slightly more involve in poultry farming than males (48%) and also adopt preventive practices more. The female risk perception (73%) was also higher than the male (58%). The use of various personal protective equipment (PPE) and preventive measures are necessary to prevent and control AI [11]. Results also showed that hired poultry workers were at increased risk of infection with H5N1 virus (20.5%); followed by those who used only gloves (18%); this was followed by those who used face masks only (17%); those that used only boots and coverall were at highest risk (44.5%). This is in agreement with the work on poultry workers in Nigeria, who

reported that "low" levels of knowledge about preventive measures was responsible for the high risk encountered by poultry workers [12]. Other researchers however, found higher rates for awareness among poultry workers about face masks, boots coveralls and cleaning procedures [11] than the present study. These findings about precautionary measures are similar to findings from a previous study conducted among poultry workers in the Rupandehi district of Nepal [13]. The result on protective behaviors showed that wearing of protective equipment were fairly high which correspond with findings from an Italian study which reported significantly higher rates of awareness [14]. Low usage rates for protective clothing have also been reported among Nigerian poultry farmers [11-13]. This could possibly be as a result of ignorance as well as limited financial resources. There was a substantial difference in usage rates of protective equipment between poultry farm owners and hired poultry workers. The hired farmworkers had higher likelihoods to use personal protective equipment than the farms owners. Hired poultry workers in plateau state tend to work more often and put in more working hours in the poultry farms than farm owners do. It was observed that hired workers of large farms use more of the protective coverings than those of small scale farms. The owners of small-scale farms may be thinking of short-term savings thereby trading off possible longer-term gains [11, 15]. Many poultry farmers express resentment with governmental emergency control measures. The farmers expressed doubts with government compensation mechanisms, resulting to few reported cases of outbreaks of the disease. Anticipated financial losses due to culling without sufficient compensation, lack of knowledge about how to notify authorities, social considerations such as stigma, are some of the factors hindering early reports of the disease outbreaks [16-17]. If early notification is a key component of prevention and rapid response, trust in government actions, including compensation measures, is crucial to farmers' compliance to early reporting to nib in the bud any AI outbreak [3, 18-22].

Impression about personal protective equipment (PPE) differs significantly among the subjects. Coverall is considered the most operational protective measures to stop contracting AI. The current means of protective practice against contacting AI was discovered to be insufficient. Not any of the subjects was discovered practicing all the PPE against AI. Outside huge measure of mass education fights, awareness to the poultry workers imminent struggles should stressed more strongly on practical trainings to promote protective behaviors. Swift reporting of occurrence and reoccurrences of infection outbreak and adequate response, community support for disease control actions requires a high level of public awareness and knowledge about avian influenza [3].

Limitations of this study include the cross-sectional design and number of variables used which has narrowed down extrapolation and generalization. Also, combining wearing face masks and without measuring sanitation practices such as hand washing as the outcome variable could also be a limitation of this study. Another potential limitation is that this study was not based on national data but on data from Jos Metropolis in the North central zone only, though regional differences were not covered. Therefore, future studies should consider drawing a national sample to explore other possible cross-regional differences in Nigeria. In addition, cross-national comparisons may also reveal interesting variations across countries and cultures in preventive behaviors associated with such emerging infectious diseases.

5. Conclusion

The findings from this study showed that the age group of 14-23 years was more engaged as poultry handlers, and would be at greater risk of contracting AI virus infection. The use of various personal protective equipment (PPE) and preventive measures are necessary to prevent and control AI virus infection. Health authorities should encourage, motivate and check poultry farmers on use of personal protective equipment. Few poultry farm workers knew about the importance of preventive practices and protective clothing before the government campaign. Identifying the current usage of these preventive behaviors provides the public with critical information that can be used to modify interventions to reduce influenza virus infection. The handling of poultry birds should done with caution, improved hygiene and wearing of protective apparels. The reduction of contacts with domestic birds are vital to the prevention and reduction of outbreaks. Also issues of farms location at residential areas should be cared looked into and avoided to reduce contacts with infected materials that can increase risk of infection. The need for active and passive surveillance must not be compromised which can be a potential source of epidemiological data and enhance interventions.

Conflicts of Interest

The authors declared that there is no conflicts of interest

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