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호남권 2022-2024절기 동물인플루엔자 인체감염증 예방대응결과

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초 록

조류인플루엔자(avian influenza, AI) 인체감염증은 인플루엔자 바이러스가 감염된 조류 또는 오염된 환경에 노출되어 사람을 비롯하여 조류를 포함한 다양한 종류의 척추동물에 감염을 일으키는 질병이다. 2022-2024절기에 호남권내 AI 인체감염 사례는 보고되지 않았으나, 호남권 가금농가 및 야생조류에서 검출된 AI는 각각 2022-2023절기 고병원성 94건, 저병원성 59건, 미분리 28건이었고, 2023-2024절기 고병원성 31건, 저병원성 19건, 미분리 14건이었다. 호남권 질병대응센터는 지자체 및 유관기관 간 협조 체계를 유지하고, 인체감염 예방조치 및 현장 점검 지원을 통하여 AI 인체감염증 발생 및 확산을 방지하고자 하였다. 인체감염 예방조치가 필요한 고위험군에 속하는 농장 종사자, 살처분 참여자, 대응요원 등은 2022-2023절기에는 총 2,996명, 2023-2024절기에는 총 3,126명이었다. AI 인체감염증 대응 시 고위험군에 대한 관리조사서 작성, 계절인플루엔자 백신 접종 등의 예방조치를 실시하였고, 살처분 참여자의 개인보호구 착탈의 교육 및 착의 상태 점검, 현장 내 보호구역에 대한 현장 점검 등을 실시하였다. 호남권 질병대응센터는 향후에도 AI 인체감염증 발생 및 확산 방지를 위하여 지자체 및 유관기관 간 협조체계 유지 및 정보교류 강화를 통하여 조류인플루엔자 인체감염증 예방에 기여하고자 한다.

주요 검색어: 조류인플루엔자; 인플루엔자 A H5N6; 인플루엔자 A H5N1; 가금류

서 론

조류인플루엔자(avian influenza, AI) 인체감염증은 혈청형 A형 인플루엔자 바이러스에 의해 닭, 오리와 같은 가금류, 사람, 돼지, 말, 밍크 등을 포함한 포유류 등 다양한 종류의 척추동물에 감염을 일으킨다[1-3].

AI 바이러스는 사람의 계절성 독감 바이러스와 다르게 분류되며, 사람 간에는 쉽게 전파되지 않는다. 그러나 AI 바이러스는 직접 및 간접적 전파를 통하여 사람을 감염시킬 수 있다. 이는 경증에서 사망까지 이르게 한다[4,5].

AI 바이러스는 조류가 자연숙주로 1997년 홍콩의 가금류에서 H5N1 유행이 있었고, 2003년 조류 및 기타 인플루엔자 바이러스가 아시아에서 유럽 및 아프리카 지역으로 전파된 적이 있다. 2013년에는 중국에서 H7N9에 의한 인체감염이 보고된 바 있다[5]. H5와 H7 아형의 인체감염에서 40-60%의 높은 치명률을 보일 수 있다. 기존 연구에서 페렛을 통한 공

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핵심요약

① 이전에 알려진 내용은?

조류인플루엔자(avian influenza, AI)는 대부분 고병원성 avian influenza virus에 의해 사람, 닭, 오리와 같은 가금류, 돼지, 말, 밍크 등을 포함한 포유류 등 다양한 종류의 척추동물에 감염을 일으킨다.

② 새로이 알게 된 내용은?

호남권에서 가금농가의 고병원성 AI는 2022-2023절기에 총 38건으로 모두 H5N1형이었고, 2023-2024절기에는 총 26건 중 H5N6형 22건(84.6%), H5N1형 3건(11.5%), H5N1/N6 동시검출 1건(3.84%)이었다.

③ 시사점은?

호남권에서 가금농가 및 야생조류 관련하여 고병원성 AI 바이러스가 지속적으로 검출되고 있고, 이들 간의 순환감염 지속 시 새로운 AI 바이러스의 변이가 가능하므로 인체감염의 위험성에 대한 경각심을 가져야 한다. 이에 따라 지자체 및 유관기관 간 협조체계 유지 및 인체감염 예방조치에 대한 지자체 담당자 교육을 통하여 지자체의 AI 대응 역량 강화가 필요하다.

기전파 가능성 및 AI 감염증의 팬데믹 가능성이 보고되었다[6-8].

AI 바이러스는 폐사율을 고려한 세계동물보건기구가 정한 규정에 따라 고병원성과 저병원성으로 나뉘는데, 고병원성의 경우 집단 사망률이 100%에 근접하고, 모든 H5와 H7이 고병원성을 일으키지는 않지만, H5와 H7 아형 그룹으로 제한된다. 저병원성의 경우 인체감염 시, 경증이거나 호흡기증상을 일으킨다[5]. 인체감염에서의 치료는 뉴라미니데이즈 억제제인 오셀타미비르(oseltamivir) 또는 자나미비르(zanamivir) 등의 항바이러스제 처치를 하며, 바이러스 증식 억제 및 생존기간을 늘려준다. 추가로 오셀타미비르에 대한 내성이 보고된 바 있다[4].

AI 바이러스는 철새의 분변이 차량, 사람, 사료 또는 사양관리 기구 등에 묻은 뒤 이동을 통해서도 전파가 일어날 수 있다. 인플루엔자 바이러스의 자연병원소인 철새를 박멸하는 것은 불가능한 일로 AI 인체감염증은 계속해서 나타날 수 있으며, 공중보건학적인 위험을 최소화하기 위해서 동물과 인구집단 양측에 대한 감시체계에 대한 질적 관리가 이루어져야 한다[4].

본 원고에서는 호남권 2022-2024절기의 AI 인체감염증 예방을 위한 대응 과정과 결과를 정리하여 향후 AI 인체감염증 예방 및 대응에 대한 정책 방향을 결정하는 데에 기초 자료로 활용하고자 한다.

방 법

1. 조류인플루엔자 인체감염증 절기 대비

호남권 질병대응센터는 질병관리청, 농림축산식품부, 농림축산검역본부, 각 시·도 동물위생시험소 등 유관기관과의 핫라인을 구축하여 AI 인체감염증 대응을 위한 감시체계를 가동하였다.

광주광역시, 전북특별자치도, 전라남도 및 각 시·군·구는 AI 발생 대비를 위하여 2022-2023절기, 2023-2024절기 각 10월에 AI 인체감염 대책반을 구성하였다.

호남권 질병대응센터는 AI 대응요원의 역량 강화를 위하여 지자체의 AI 대응요원 및 역학조사관을 대상으로 가금농가 AI 발생 대비 및 현장 대응을 위한 인체감염 예방조치 교육을 실시하였다. 호남권역 내 지자체에 대하여 담당자의 정보 현행화 및 매뉴얼, 국가별 문자안, 리플렛, 포스터 등을 배포하였다.

각 지자체에 실시한 AI 인체감염 예방조치와 관련된 사전점검 사항은 다음과 같았다. 첫 번째, 축산·보건부서 간 협력체계 구축 여부, 두 번째, 교육장소 및 예방조치 동선 계획 등의 장소 확보 사항, 세 번째, 예진의사 등 인력확보 계획, 네 번째, 국가별 관리조사서, 독감백신 예진표, 항바이러스제 처방전, 예방수칙 안내문, 조치확인증 스티커 등의 필요서류 확

인, 다섯 번째, 항바이러스제, 독감백신, 개인보호구 보유 관련 물자점검 사항 등이다.

2. 분석

호남권 질병대응센터는 질병관리청 질병보건통합관리시스템 및 방역통합정보시스템을 통해 2022-2023절기 및 2023-2024절기에 신고된 AI 관리조사서를 활용하여 첫 번째, 가금농가 및 야생조류의 고병원성 AI 발생의 지리적 분포, 두 번째, 국적별 AI 고위험군 현황, 마지막으로 작업 유형별 AI 고위험군 현황을 비교 분석하고자 하였다.

결 과

호남권 AI 신규 발생 시, 지자체 AI 인체감염 대책반이 지자체 동물방역부서의 살처분 진행에 앞서 살처분 인력을 포함한 고위험군에 대한 파악 및 인체감염 예방조치를 실시하였다.

호남권 가금농가에서 검출된 AI 현황을 살펴보면, 2022-2023절기 총 61건 중 고병원성 38건, 저병원성 23건이었고, 고병원성 총 38건(100.0%) 모두 H5N1으로 검출되었다. 2023-2024절기 총 27건 중 고병원성 26건, 저병원성 1건이었고, 고병원성 총 26건 중 H5N6 22건(84.6%), H5N1 3건(11.5%), H5N6/N1 1건(3.8%)이 검출되었다.

호남권 야생조류에서 검출된 AI 현황은 2022-2023절기 총 120건 중 고병원성 56건, 저병원성 36건, 미분리 28건이었고, 2023-2024절기 총 37건 중 고병원성 5건, 저병원성 18건, 미분리 14건이었다.

2022-2023절기와 2023-2024절기의 가금농가 고병원성 AI 분포를 살펴본 결과, 전남 지역에서 전북 지역으로 이동된 양상을 보였으며, 야생조류 고병원성 AI 분포 역시 호남권의 이남 지역에서 이북 지역으로 이동된 양상을 보였다(그림 1).

가금농가 및 야생조류 AI 발생과 관련하여 고위험군은 농장 종사자, 살처분 관계자, 대응요원 등을 포함하여 2022-2023절기 총 2,996명, 2023-2024절기 총 3,126명이었다. 고위험군에 대하여 국적별로 살펴본 결과, 2022-2023절기 외국인은 총 1,707명이었고, 이 중 태국 1,096명(64.2%)으로 가장 높은 분율을 보였다. 2023-2024절기 외국인은 총 2,237명으로 이 중 태국 1,624명(72.6%)으로 2022-2023절기와 같이 높은 분율을 차지하였다(그림 2).

고위험군에 대하여 작업 유형별로 살펴본 결과, 2022-2023절기 AI 대응 관련 살처분 관계자 2,461명(82.1%), 농장 종사자 205명(6.8%), 기타 204명(6.8%), 대응요원 126명(4.2%)이었고, 2023-2024절기 AI 대응 관련 살처분 관계자 2,920명(93%), 기타 14명(1%), 농장 종사자 136명(4.4%), 대응요원 56명(1.8%)으로 살처분 관계자가 높은 분율을 보인 결과는 절기 대비 차이가 없었다(그림 3).

이와 같이 고위험군 중 많은 분율을 차지한 외국인 살처분 참여 인력에 대하여 호남권질병대응센터 및 AI 인체감염 대책반은 질병관리청에서 배포한 16개 외국어의 관리조사서, 13개의 홍보자료를 활용하여 AI 대응 인체감염 예방조치를 실시하였다. 또한, 고위험군이 작성한 관리조사서를 기반으로 노출 후 5일과 10일째 AI 인체감염증 의심증상 확인을 위한 능동감시를 실시하였다.

결 론

최근 H5 아형의 고병원성 조류인플루엔자에서 사람을 포함한 다양한 포유류에서 인체감염 사례가 보고되고 있어 향후 대유행이 우려되고 있다[9,10]. 인체감염 예방조치와 관련한 개인보호구, 항바이러스제 및 계절인플루엔자 백신 등의 자원, 인력 등에 대한 관리를 고려해야 한다[10].

호남권 가금농가에서 검출된 AI 현황에서 2022-2023절기 고병원성이 총 38건(100.0%) 모두 H5N1인데 반해, 2023-2024절기 고병원성 26건 중 H5N6 22건(84.6%)으로

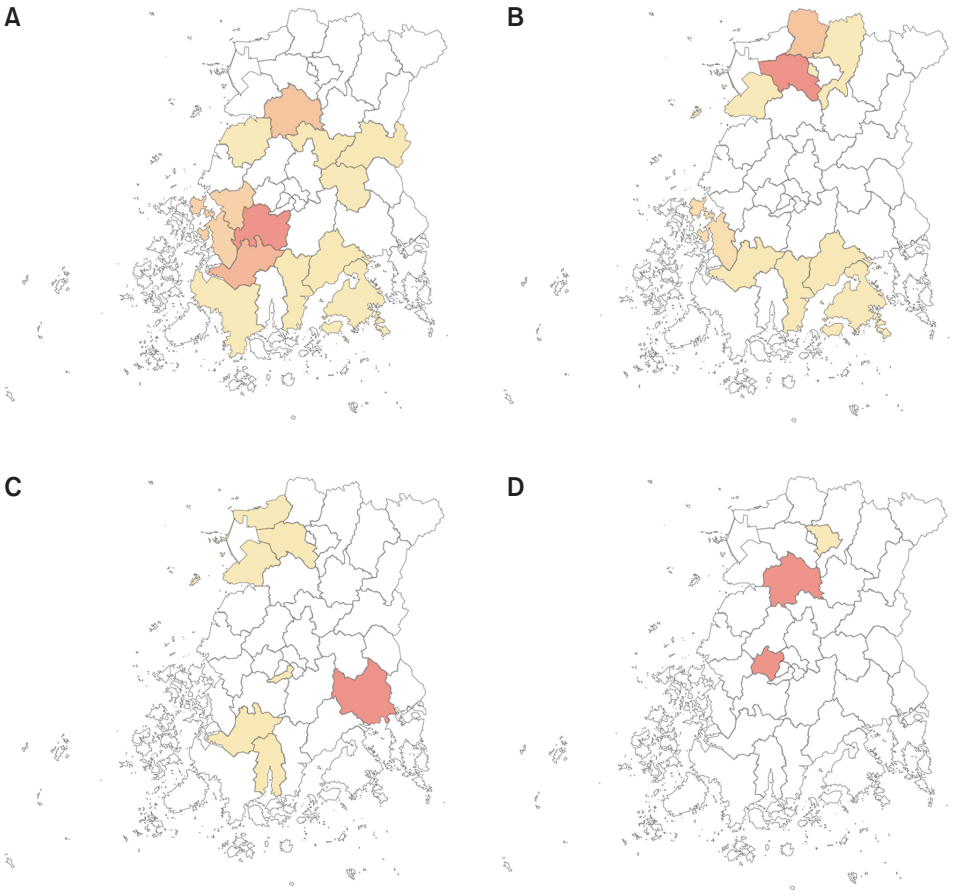

그림 1. 호남권 가금농가 및 야생조류의 고병원성 조류인플루엔자 지역적 분포, 2022–2024년

(A) 2022–2023절기 가금농가, (B) 2023–2024절기 가금농가, (C) 2022–2023절기 야생조류, (D) 2023–2024절기 야생조류

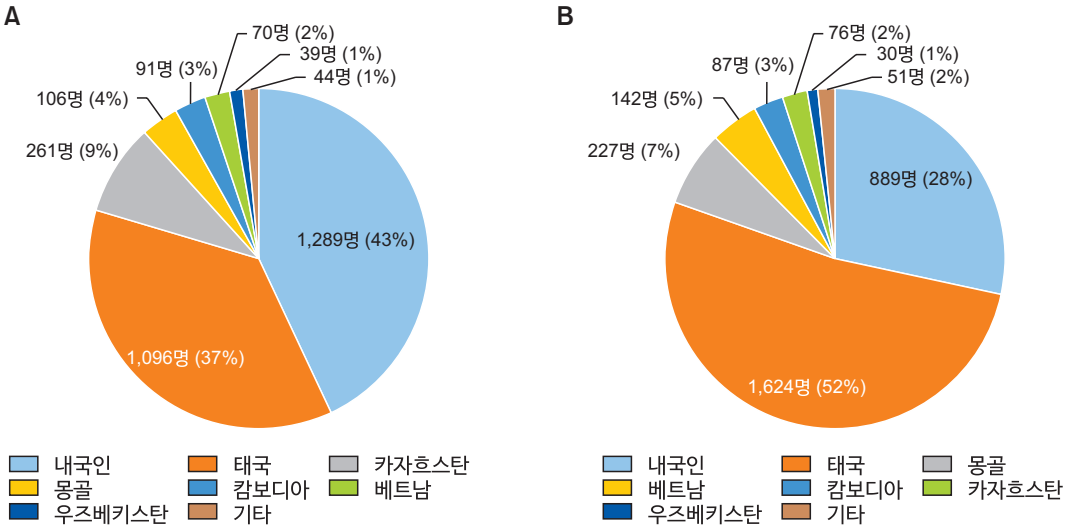

그림 2. 국적별 조류인플루엔자 고위험군 분포

(A) 2022–2023절기, (B) 2023–2024절기

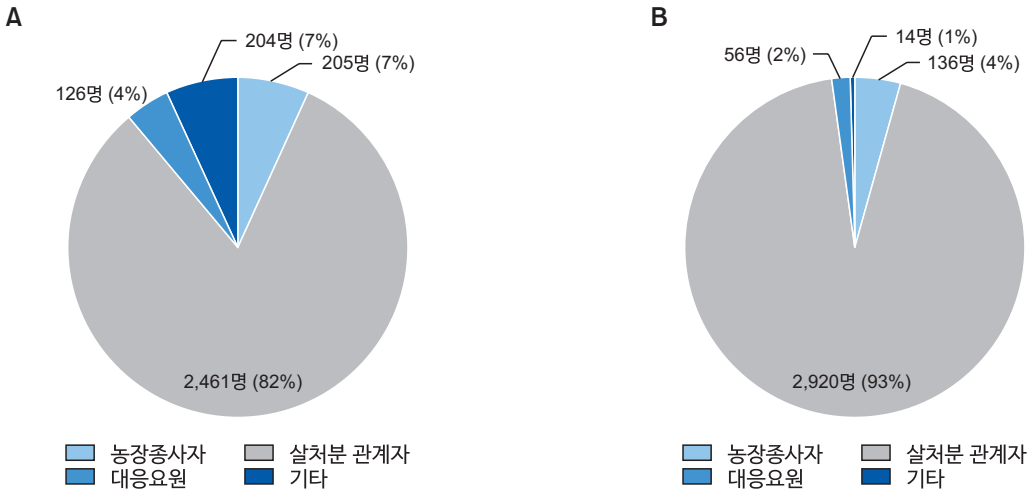

그림 3. 작업 유형별 조류인플루엔자 고위험군 분포
(A) 2022–2023절기, (B) 2023–2024절기

가장 높게 검출되었다. 이는 중국에서 1997년 H5N1, 2013년 H7N9, 2014년 H5N6 인체감염증 변화 양상을 살펴보면, 국내에도 AI 바이러스 변이의 영향이 있음을 알 수 있다[3].

호남권 가금농가 및 야생조류의 고병원성 AI 분포는 호남권 이남에서 이북으로 이동이 관찰되었다. 철새 이주에 영향을 주는 요인으로는 서식지의 가용성, 조류 집단의 성비 역학, 겨울이 제한적일 경우 발생하는 이월 효과가 있다[11,12]. 또한, 기후변화 역시 철새의 이주 지역에 영향을 주는 요인으로 알려져 있다[13,14]. 호남권 내 AI 발생 지역의 분포 변화에 이러한 요인들의 영향을 파악하기 위한 연관성 연구가 필요하다.

호남권 질병대응센터는 AI 인체감염증의 발생 대응 및 확산 방지를 위하여 지자체와 유관기관 간 협조체계 유지 및 정보교류를 원활히 수행하고 있다. 특히 고위험군에 대한 AI 인체감염증을 예방하기 위하여 지자체 AI 대응요원의 역량강화 교육을 실시하였고, 해당 교육에는 동절기 고병원성 AI 방역정책 및 살처분 등 대응상황 내용 공유, 호남권 내 AI 발생 현황 및 대응 방안, AI 인체감염증 예방조치 및 대응 실행기반 훈련이 포함되어 있었다.

농림축산식품부, 질병관리청, 지자체 등과 함께 AI 발생 및 대응 사항을 신속하게 공유하고, AI 대응 유관기관과 협력관계를 유지하여 AI 대응 체계를 유지 및 강화할 예정이다. 또한, AI 인체감염증에 대한 해외 최신 문헌을 검토하여 AI 인체감염증에 대한 호남권의 AI 대응 체계에 대하여 수시로 보완 예정이다.

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Preventive Responses to Avian Influenza Infections in Humans in the Honam Region in the Republic of Korea, 2022–2024

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ABSTRACT

Avian influenza (AI) virus infects various types of vertebrates, including humans, who are exposed to infected birds or contaminated environments. No cases of human AI infection were reported in the Honam area from the 2022–2024 season. Ninety-four cases and 31 cases of high pathogenicity were detected in poultry farms and wild birds in the Honam area during the 2022–2023 season and 2023–2024 season, respectively. The Honam Regional Center for Disease Control and Prevention maintained a cooperative system between local governments and related institutions and attempted to prevent the outbreak and spread of AI human infections through human infection prevention measures and on-site testing support. The number of farm-related workers, culling study participants and response personnel in high-risk groups was 2,996 in the 2022–2023 season and 3,126 in the 2023–2024 season. When responding to human AI infections, we prepared management reports for high-risk groups, implemented preventive measures (e.g., the seasonal influenza vaccination), educated participants on how to put on and take off personal protective equipment, checked the condition of their clothes, and conducted on-site inspections of protected areas. We will continue to contribute to the prevention of human AI infections by maintaining a cooperative system and strengthening information exchanges between local governments and institutions in charge of surviving these infections in order to prevent their outbreak and spread.

Key words: Influenza in birds; Influenza A virus, H5N6 subtype; Influenza A virus, H5N1 subtype; Poultry

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Introduction

Avian influenza (AI) is an infectious disease caused by type A influenza viruses, which have the capacity to infect a wide range of vertebrates, including mammals such as humans, pigs, horses, and mink, as well as poultry such as chickens and ducks [1-3].

These AI viruses are distinct from human seasonal influenza viruses and are not easily transmitted among humans. Nevertheless, they can be transmitted to humans through both direct and indirect means, leading to a spectrum of illness severity ranging from mild symptoms to fatal outcomes [4,5].

Birds serve as the natural hosts for AI viruses. Notably, a significant outbreak of the H5N1 strain occurred among

Key messages

① What is known previously?

Avian influenza is primarily caused by the highly pathogenic avian influenza virus, which infects many types of vertebrates, including humans, chickens, turkeys, ducks, pigs, horses, minks, and seals.

② What new information is presented?

Of the 38 highly pathogenic avian influenza cases in the Honam area during the 2022–2023 season, the H5N1 type accounted for 100.0% of them. In the 2023–2024 season, of the 26 highly pathogenic avian influenza cases, 22 cases of the H5N6 type (84.6%) were identified, along with three cases of the H5N1 type (11.5%), and one case of H5N1/N6 simultaneous detection (3.84%).

③ What are implications?

Highly pathogenic avian influenza viruses have been continuously detected in poultry farmers and wild algae in the Honam area. New mutations of the virus are possible during sustained circulating infections, raising concerns regarding the risk of human infection. Therefore, strengthening the ability of local governments to respond to avian influenza is necessary; thus, maintaining a cooperative system between local governments and related organizations and educating local government personnel on measures to prevent human infections are crucial.

poultry in Hong Kong in 1997, followed by the spread of various avian and other influenza viruses from Asia to Europe and Africa in 2003. Additionally, human infections with the H7N9 strain were reported in China in 2013 [5]. The H5 and H7 subtypes, in particular, have been associated with high case fatality rates of 40–60% in humans. Previous studies have demonstrated the potential for airborne transmission in ferrets and have raised concerns regarding the potential for AI to evolve into pandemics [6-8].

Based on their pathogenicity (disease-causing ability), AI viruses are classified into high or low pathogenicity groups according to regulations established by the World Organization for Animal Health, which assess mortality rates, with highly pathogenic viruses having a high mortality rate of near 100%. Notably, high pathogenicity is predominantly associated with the H5 and H7 subtype groups, although not all subtypes within these groups exhibit high pathogenicity. Conversely, low-pathogenic subtypes generally induce mild or respiratory symptoms [5]. Treatment for humans infected with AI involves the use of antiviral medications such as neuraminidase inhibitors oseltamivir and zanamivir, which impede viral replication and improve survival rates. However, instances of oseltamivir resistance have been documented [4].

Furthermore, AI viruses can be transmitted through migratory bird feces, which may contaminate vehicles, individuals, feed, or livestock equipment. Given the perpetual presence of migratory birds, which serve as natural hosts for influenza viruses, the emergence of AI in humans may persist. Thus, effective management of surveillance systems for both animal and human populations is crucial for mitigating public health risks [4].

This report presents an overview of the procedures and outcomes of efforts to prevent AI in humans during the 2022–2024 seasons in the Honam region. The findings can serve as foundational data for informing policy directions aimed at future disease prevention and response strategies.

Methods

1. Preparing for the Season of AI in Humans

The Honam Disease Response Center established a hotline linking to organizations such as the Korea Disease Control and

Prevention Agency (KDCA), Ministry of Agriculture, Food and Rural Affairs, Animal and Plant Quarantine Agency, and the veterinary service laboratories in each city and province as part of a surveillance system to address AI in humans.

In October during the 2022–2023 and 2023–2024 seasons, Gwangju Metropolitan City, Jeonbuk Special Self-Governing Province, and Jeollanam-do Province each organized AI human infection response teams to prepare for potential AI outbreaks.

To enhance the readiness of AI response personnel, the Honam Disease Response Center conducted training sessions for both response personnel and local government epidemiologists. These sessions aimed to equip participants with the necessary skills and knowledge to effectively respond to potential AI outbreaks in poultry farms, and to implement preventive measures and on-site response protocols in the event of human infection. Additionally, updated information regarding personnel responsibilities, manuals, region-specific literature, leaflets, and posters were disseminated to local governments throughout the Honam region.

The preliminary inspection items pertaining to preventive measures for AI in humans, assessed in each local government, encompassed the following aspects: First, establishment of a cooperative system between the livestock and public health departments; second, provision of suitable venues for training purposes and formulation of movement plans for preventive measures; third, allocation of adequate human resources, including triage personnel; fourth, verification of essential documents such as country-specific management surveys, flu vaccination schedules, prescriptions for antiviral medications, precautionary guidelines, and confirmation of action stickers; and finally, verification of the inventory of supplies, including antiviral medications, flu vaccines, and personal protective equipment.

2. Analysis

The Honam Disease Response Center leveraged AI management survey data reported during the 2022–2023 and 2023–2024 seasons by the KDCA's Disease Health Integrated Management System and Quarantine Integrated Information System. This data enabled them to examine the geographic distribution of highly pathogenic AI outbreaks in poultry farms and wild birds, as well as the current status of high-risk groups by nationality and type of work.

Results

In response to new AI outbreaks in the Honam region, the local government's AI human infection response team prioritized the identification of high-risk groups, including culling personnel, and implemented preventive measures against human infection before initiating culling procedures by the local animal quarantine department.

Regarding the status of AI viruses detected in poultry farms in the Honam region, during the 2022–2023 season, a total of 61 cases were identified, with 38 cases of high pathogenicity, all (100.0%) of which were attributed to the H5N1 subtype, and the remaining 23 cases of low pathogenicity. In the subsequent 2023–2024 season, 27 cases were identified, with 26 cases of high pathogenicity and 1 of low pathogenicity. Among the 26 highly pathogenic cases, 22 (84.6%) were associated with the H5N6 subtype, 3 (11.5%) with the H5N1 subtype, and 1 (3.8%) with a combination of the H5N6 and H5N1 subtypes.

The status of AI viruses detected in wild birds in the Honam region indicated a total of 120 cases during the 2022–2023 season. Among these, 56 cases were classified as highly pathogenic, 36 as low pathogenic, and 28 remained uncategorized. In the subsequent 2023–2024 season, a total of 37 cases were identified, with 5 being highly pathogenic, 18 low pathogenic, and 14 uncategorized.

Analysis of the distribution of highly pathogenic AI viruses in poultry farms across the 2022–2023 and 2023–2024 seasons revealed a seasonal movement pattern from the Jeonnam region to the Jeonbuk region. Similarly, the distribution of highly pathogenic AI viruses in wild birds exhibited a movement pattern, shifting from the southern area of the Honam region to the northern area (Figure 1).

During the AI outbreaks in poultry and wild birds, the high-risk group, comprising farm workers, cullers, and response personnel, numbered 2,996 individuals in the 2022–2023 season and 3,126 individuals in the 2023–2024 season. Examining high-risk groups by nationality, a total of 1,707 foreign nationals were identified in the 2022–2023 season, with 1,096 (64.2%) originating from Thailand. In the 2023–2024 season, the number of foreigners totaled 2,237, with 1,624 (72.6%) originating from Thailand, mirroring the largest proportion observed in the previous 2022–2023 season (Figure 2).

When high-risk groups were categorized by occupation type, the analysis revealed that 2,461 individuals (82.1%) were AI response culling personnel, 205 (6.8%) were farm workers, 204 (6.8%) were employed in other fields, and 126 (4.2%) were response personnel in the 2022–2023 season. In the

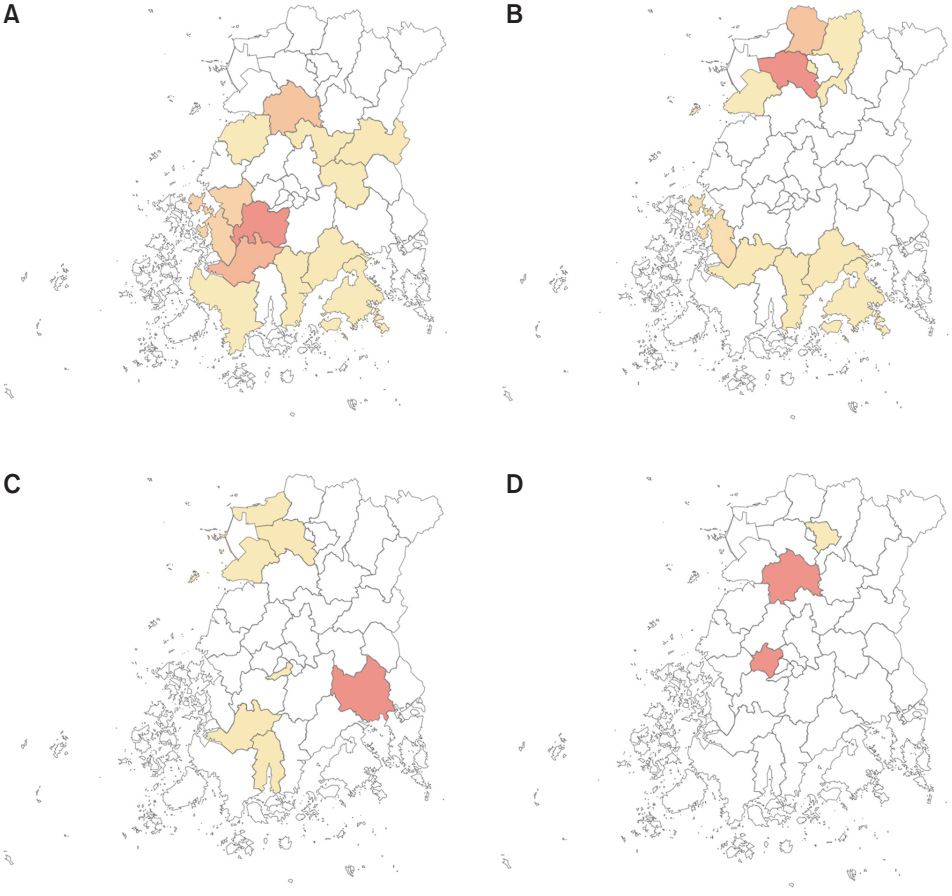

Figure 1. Spatial distribution of highly pathogenic avian influenza cases reported in wild birds and poultry farms in the Honam Region of South Korea, 2022–2024
(A) Poultry farms, 2022–2023; (B) Poultry farms, 2023–2024; (C) Wild birds, 2022–2023; (D) Wild birds, 2023–2024.

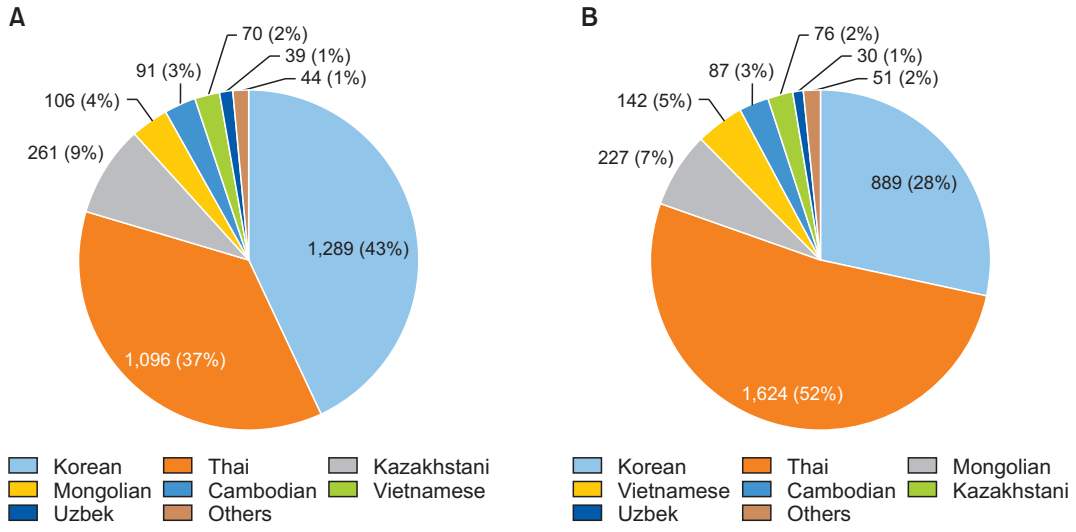

Figure 2. Distribution of avian influenza high-risk groups by nationality
(A) 2022–2023, (B) 2023–2024.

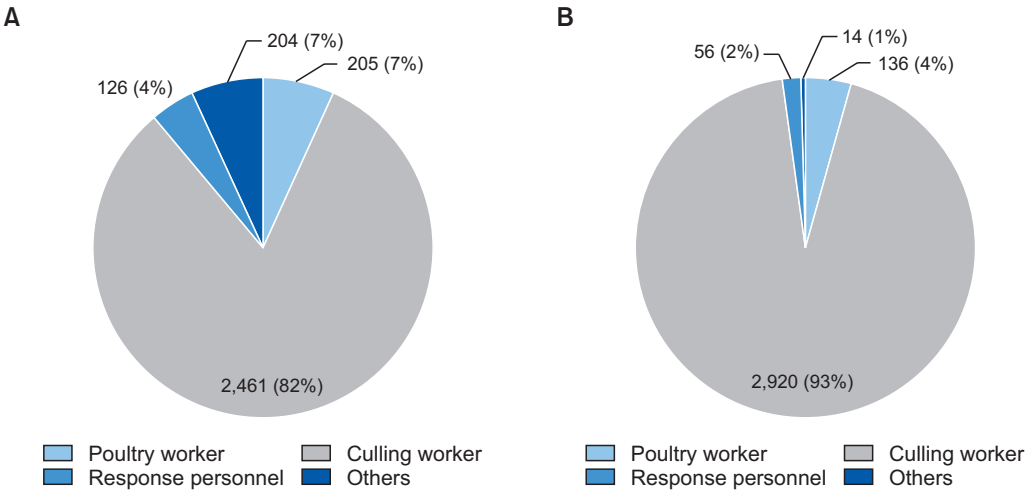

Figure 3. Distribution of avian influenza high-risk groups by task type
(A) 2022–2023, (B) 2023–2024.

subsequent 2023–2024 season, the numbers shifted slightly, with 2,920 individuals (93%) working as culling personnel, 14 (1%) in other occupations, 136 (4.4%) as farm workers, and 56 (1.8%) serving as response personnel. Notably, the data indicates that culling personnel constituted the majority of high-risk groups in both seasons (Figure 3).

For foreign workers, who constituted the largest proportion of high-risk groups, the Honam Disease Response Center and AI human infection response teams implemented preventive measures utilizing 16 management surveys and 13 promotional materials available in various foreign languages distributed by the KDCA. Furthermore, leveraging the management questionnaire completed by high-risk individuals, those exposed to the virus underwent active monitoring on the 5th and 10th days post-exposure for suspected symptoms of AI.

Conclusion

Recently, there have been reports of infections caused by the highly pathogenic H5 subtype of AI in various mammals, including humans, prompting concerns regarding a potential pandemic [9,10]. This necessitates special attention to the management of personnel and resources involved in preventive measures against human infection, including personal protective equipment, antiviral medications, and seasonal influenza vaccines [10].

Regarding AI in poultry farms in the Honam region, all 38 (100.0%) highly pathogenic cases identified during the 2022–2023 season were attributed to the H5N1 subtype, whereas 22 (84.6%) of the 26 highly pathogenic cases identified during the 2023–2024 season were linked to the H5N6 subtype. Examining the trends of AI human infection in China, where the H5N1 subtype prevailed in 1997, followed by H7N9 in 2013, and H5N6 in 2014, suggests an impact of AI viral variants in the Republic of Korea as well [3].

The distribution of highly pathogenic AI viruses identified in both poultry farms and wild birds in the Honam region indicates a movement from southern to northern areas. Factors influencing bird migration include habitat availability, dynamics of bird population sex ratios, and carryover effects influenced by winter conditions in a given year [11,12]. Additionally, climate change has been recognized to alter migratory bird routes [13,14]. Further research is essential to elucidate the impact of these factors on changes in the distribution of AI outbreaks in the Honam region.

The Honam Disease Response Center maintains a collaborative system with local governments and related organizations, facilitating continuous information exchange to prepare for and respond to outbreaks, with a focus on preventing the spread of AI in humans. Specifically, training sessions were conducted for local government AI response personnel to enhance their capacity in preventing AI transmission among high-risk individuals. The training encompassed various response measures, including winter quarantine protocols for highly pathogenic AI viruses, culling procedures, the current status of AI outbreaks in the Honam region, and action-oriented response training.

We intend to promptly communicate cases of AI and response measures to the Ministry of Agriculture, Food and Rural Affairs, the KDCA, and local governments. Additionally, we will maintain and strengthen our AI response system through continued partnerships with relevant organizations. Furthermore, regular reviews of the latest international literature on human AI will inform ongoing updates to the Honam region's AI response system.

Declarations

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