E. coli from raw meat causes one in 14 UTIs – US study

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Undercooked meat may be responsible for hundreds of thousands of urinary tract infections (UTIs) every year, scientists have warned, with recent research showing that while E. coli causes up to 90% of all UTIs, about 8% are derived from strains lurking in raw meat like chicken, turkey and pork.

These bacteria can live in the gut before ending up in the urinary tract, causing agonising symptoms like pain in the side or back, and shivering and chills.

In the US, researchers at George Washington University collected blood and urine samples of E. coli infections from local hospitals in Arizona, which they then matched against food-borne zoonotic E. coli strains found in available brands of raw chicken, turkey and pork in nine grocery chains, the Daily Mail reports.

The meats were chosen because they had been identified as most likely to carry the E. coli that cause UTIs.

Writing in the journal One Health, researchers said "approximately 8% of the clinical E. coli isolates in our population appeared to be food-borne zoonotic strains".

They said vaccinating animals against the most dangerous strains of E. coli could be one way to prevent the bacteria from entering the food supply.

"Accurately identifying strains involved in recent animal-to-human spillovers is critical to developing targeted intervention strategies in food animal populations," they wrote.

Lance Price, professor of environmental and occupational health at George Washington University, said: "On an individual level, I would say anyone already prone to UTIs should take extra care when handling raw meat, particularly poultry.

"If people handle raw meat products and don't wash sufficiently – which can be difficult – then the E. coli could be introduced directly into the urogenital tract. This study provides compelling evidence that dangerous strains are making their way from food animals to people through the food supply and making people sick – sometimes really sick."

However, the scientists also acknowledged several limitations of the study, including relying on a single location.

The rate of E. coli from meat triggering UTIs was also assessed without including beef, so the number of FZEC cases may have been under-reported, limiting the findings.

The experts did also not include "isolates from companion animal species', including cats and dogs, preventing them from evaluating their potential roles in transmitting E. coli strains".

Strains of the bacteria are typically found in the intestines of people and animals and are usually harmless.

However, if certain strains get into vulnerable parts of the body, such as the urinary tract – a catch-all term for the bladder, kidneys and tubes connected to them – it can lead to debilitating, and often dangerous, infections.

Antibiotics are the most common treatment, followed by drinking a lot of water to flush bacteria from the body.

But some UTIs also can lead to more serious kidney infections; symptoms include fever, chills, back pain, nausea or vomiting and life-threatening blood infections.

Older people are more at risk, as the bladder works less well with age, and may not empty fully so bacteria remains in the urinary tract.

Studies show that one in 10 women older than 65 will have experienced a UTI in the past year.

This rises to nearly three in 10 for women over 85. In older patients, the infections can trigger delirium. They can also lead to sepsis, which leads to about 10 000 deaths a year.

Study details

Using source-associated mobile genetic elements to identify zoonotic extraintestinal E. coli infections

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Highlights

• Meat may be an important vehicle for human exposure to extraintestinal pathogenic E. coli strains from food animals.

• We present a novel approach for predicting the origins of clinical E. coli isolates.

• Approximately 8% of the clinical E. coli isolates in our population appeared to be foodborne zoonotic strains.

• Foodborne zoonotic E. coli strains were associated with asymptomatic bacteriuria, urinary tract infections, and sepsis.

• We estimate that foodborne zoonotic E. coli strains cause >480,000 urinary tract infections in the U.S. annually.

Abstract

A one-health perspective may provide new and actionable information about Escherichia coli transmission. E. coli colonizes a broad range of vertebrates, including humans and food-production animals, and is a leading cause of bladder, kidney, and bloodstream infections in humans. Substantial evidence supports foodborne transmission of pathogenic E. coli strains from food animals to humans. However, the relative contribution of foodborne zoonotic E. coli (FZEC) to the human extraintestinal disease burden and the distinguishing characteristics of such strains remain undefined. Using a comparative genomic analysis of a large collection of contemporaneous, geographically-matched clinical and meat-source E. coli isolates (n = 3111), we identified 17 source-associated mobile genetic elements – predominantly plasmids and bacteriophages – and integrated them into a novel Bayesian latent class model to predict the origins of clinical E. coli isolates. We estimated that approximately 8 % of human extraintestinal E. coli infections (mostly urinary tract infections) in our study population were caused by FZEC. FZEC strains were equally likely to cause symptomatic disease as non-FZEC strains. Two FZEC lineages, ST131-H22 and ST58, appeared to have

particularly high virulence potential. Our findings imply that FZEC strains collectively cause more urinary tract infections than does any single non-E. coli uropathogenic species (e.g., Klebsiella pneumoniae). Our novel approach can be applied in other settings to identify the highest-risk FZEC strains, determine their sources, and inform new one-health strategies to decrease the heavy public health burden imposed by extraintestinal E. coli infections.