Healthy under-five children in day care centres of Accra, Ghana, harbour multidrug resistant bacteria in their nasopharynx: A Call for Further Research!


Key Messages

- Did you know that healthy under-five children could harbour pathogenic bacteria in their nasopharynx?
- In this first-ever, cross-sectional study conducted in Accra Ghana, we found that about 14% of under-five children attending day care centres harboured pathogenic bacteria (technically termed as aerobic Gram-negative bacteria) in their nasopharynx.
- Escherichia coli, Klebsiella pneumoniae and Enterobacter cloacae were the most common bacteria isolated.
- About 67% of the bacteria were multidrug resistant (MDR, defined as resistance to three or more classes of antibiotics).
- These findings are concerning and pose two risks: i) a risk of future illness among carriers and ii) potential spread of infection to other vulnerable children. We recommend that the Ghana Health Services and the Ghana Education Services jointly commission follow-up research to quantify the extent of these risks and develop strategies to address them.

What is the problem and why is it important?

- It has been commonly observed that healthy infants and under-five children harbour pathogenic bacteria in their nasopharynx. These include both Gram-positive and Gram-negative bacteria.
- Whilst there are many studies on nasal carriage of Gram-positive bacteria, there are no studies on Gram-negative bacteria from Ghana.
- Such information is crucial for two reasons:
  - It helps in understanding the common Gram-negative bacteria prevalent in Ghana and the most appropriate antibiotics to treat them.
  - It serves as a baseline for monitoring future trends.
- Hence, we undertook a study to assess the prevalence of nasopharyngeal carriage of Gram-negative bacteria and their antibiotic resistance patterns in under-five children of Ghana.
How did we measure it?

- We conducted a cross-sectional study among healthy under-five children attending randomly selected, seven day-care centres in the Accra metropolis of the Greater Accra region of Ghana from September to December 2016.
- Frozen nasopharyngeal swabs of children collected in 2016 were re-analysed in 2021-22 for the presence of Gram-negative bacteria and their antibiotic resistance patterns.
- All the tests were conducted using standard, quality-assured protocols in an accredited laboratory at the University of Ghana Medical School.

What did we find?

- We examined a total of 410 children, of whom 57 (14%) had Gram-negative bacteria.
- A total of nine bacterial species were isolated – the most common ones were *E. coli* (26%), *K. pneumoniae* (25%) and *E. cloacae* (18%).
- MDR was observed in 67% of isolates.
- The organisms were highly resistant to cefuroxime (74%), ampicillin (65%) and amoxicillin/clavulanic acid (60%).
- The organisms were least resistant to gentamicin (7%), followed by amikacin (9%) and meropenem (9%) – indicating these are the most effective antibiotics for treatment.

Implications and Recommendations

- There is a risk that nasal carriage leads to future illness and spread of infections to other children. We recommend that the Ghana Health Service and the Ghana Education Service jointly commission follow-up research to quantify the extent of these risks and develop strategies to address them.
- A single study from one city may not be nationally representative. We recommend that the University of Ghana/College of Health Sciences undertake a national survey.
- The resistance patterns are useful in informing the choice of antibiotics, in case of invasive infections caused by Gram-negative aerobic bacteria. We recommend that the Ministry of Health considers updating the national treatment guidelines in light of these findings.