

Prevalence of multi-drug resistant zoonotic bacteria from Neonatal Calf Diarrhea (NCD) disease animals, Pakistan

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Abstract

Statement of the Problem: Neonatal calf diarrhea (NCD) disease is an established zoonosis all over the world¹. U.S. National Animal Health Monitoring System reported 57% of weaning calf mortality attributed to diarrhea. A limited research is reported about the fate and prevalence of multi-drug resistant bacteria and their resistance gene pool reservoir in NCD disease animals of Pakistan. The present study aimed to understand bacterial patho-biome and the antibiotic resistance potential in fecal ecology of NCD diseased animals.

Methodology, Theoretical Orientation & Findings: A total of 51 (morphologically different) bacterial strains were isolated from feces of bovine diarrheic animals up to 3 months of age, collected from various livestock farms located in different villages of district Okara, Faisalabad, Multan, Abbottabad, Muzafargarh and Islamabad Capital Territory (ICT) of Pakistan. On the basis of 16S rRNA gene sequence and phylogenetic analysis, the isolates belonged to 17 genera with a diverse prevalent rate (Accession numbers: LC488898 to LC488948 – Fig 1). Majority isolated strains (90 %) exhibited multi-drug resistance (against at least three antibiotics) with highest level of minimum inhibitory concentrations for *Shigella* spp. (MIC up to 70 µg/L) (Fig 2). Using PCR for Extended-spectrum β-lactamase (ESBL) and metallo-β-lactamase (MBL) producing bacteria, 60% isolates were positive for blaTEM antibiotic resistance gene whereas 55% were positive for blaNDM gene with the highest prevalence rate in *Shigella* spp.

Conclusion & Significance: These preliminary findings conclude the highest load of multi-drug resistant bacteria and antibiotic resistance genes, harbouring in diarrheic animal feces and pose the potential public health risk. These antibiotic resistance genes can transfer to other bacteria (horizontal gene transfer). Niche of neonatal calf diarrhea (NCD) animal feces is a major threat of zoonotic diseases and thus may be included in surveillance program of cattle infectious diseases in Pakistan. Results of these studies also showed the presence of candidate novel species of bacteria that may be validated as a new species from Pakistani ecology by poly-phasic taxonomic characterization.

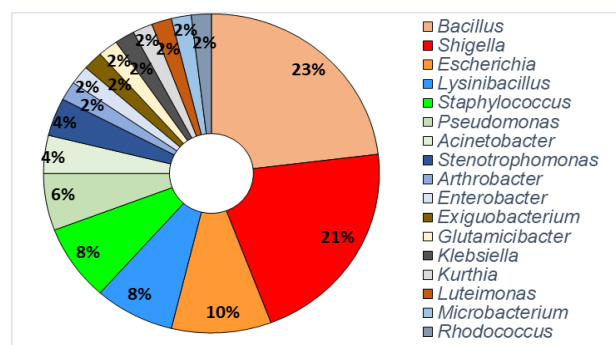


Figure 1: Genus-wise percentage distribution of bacterial strains isolated from neonatal calf diarrhea (NCD) disease animals

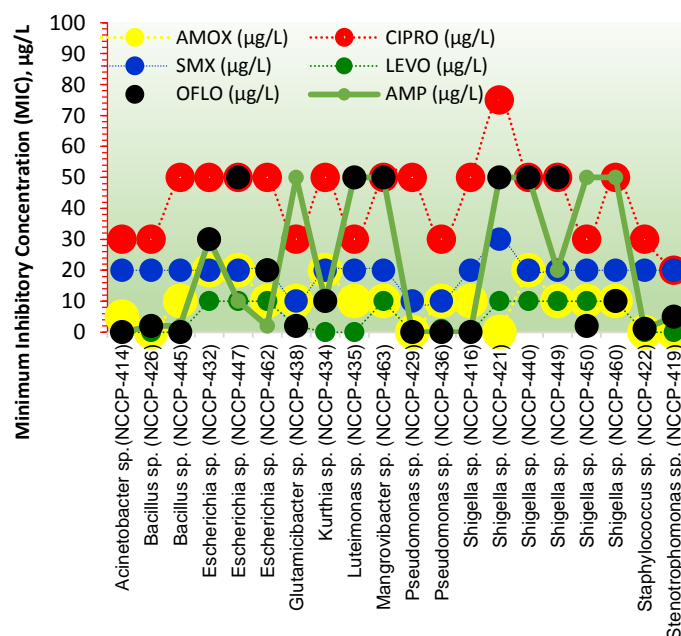


Figure 2: Minimum inhibitory concentrations (MIC) of selected isolates against six antibiotics (i.e. Amoxicillin, Ampicillin, Ofloxacin, Levofloxacin, Ciprofloxacin and Sulfamethoxazole)



Biography:

Ahmad Ali is currently works as Scientific Officer at the National Culture Collection of Pakistan (NCCP), Bio-resources Conservation Institute (BCI), National Agricultural Research Centre (NARC), Islamabad. Ahmad does research in Molecular Biology, Microbiology and Biotechnology. His current project is identification of zoonotic bacteria from neonatal calf diarrhea diseased animals. Genomics and taxonomic characterization of novel species of bacteria from Pakistan is another subject of his interest. He is also involved in the establishment of "National Microbial Culture Collection of Pakistan (NCCP)".

Speaker Publications:

1. De Verdier K., Nyman A, Greko C, Bengtsson B; "Antimicrobial resistance and virulence factors in *Escherichia coli* from Swedish dairy calves"; Acta Veterinaria Scandinavica/ (2012). 54, 2.
2. Umpiérrez A, Bado I, Oliver M et al.; " Zoonotic Potential and Antibiotic Resistance of *Escherichia coli* in Neonatal Calves in Uruguay". Microbes and environments/ (2017) 32, 275-282.

[7th World Congress and Exhibition on Antibiotics and Antibiotic Resistance](#); London, UK- March 16-17, 2020.

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