

Groundwater quality and antibiotic resistance of coliform bacteria in Wilgamuwa, an area of Chronic Kidney Disease of unknown etiology (CKDu) in Sri Lanka

SU Galketiyahegawa¹, C Abayasekara¹, R Chandrajith², BN Dissanayake³, A Ekanayake³

Introduction

Wilgamuwa is a hotspot of Chronic Kidney Disease of unknown aetiology (CKDu). Groundwater is the main source of drinking water in Wilgamuwa. A preliminary study was carried out to enumerate and identify coliform bacteria in drinking water obtained from Wilgamuwa and investigate their antibiotic resistance. The results were compared with drinking water samples from Minipe area which is considered as a CKDu non-prevalent region.

Methods

Membrane filtration technique was performed to obtain total and faecal coliform counts on 26 and 25 groundwater samples collected during January-October 2019 from Wilgamuwa and Minipe respectively. Randomly selected typical coliform colonies were identified using standard methods. Antibiotic sensitivity testing for 12 antibiotics was carried out on these coliforms using the CLSI method.

Results

The coliform count in more than 80% of tested groundwater samples from both study regions exceeded the permissible values stipulated by WHO guidelines and Sri Lanka Standards (SLS). The average total coliform counts from the samples in Wilgamuwa and Minipe were 19.3 and 16.7 CFU/100 mL, respectively, while the average faecal coliform counts were 5.2 and 5.0 CFU/100 mL. Out of a total of 120 isolates, *Escherichia coli*, *Klebsiella* sp. and *Yersinia* sp. were identified in both areas, while *Enterobacter* sp. was identified only in Wilgamuwa. Antibiotic resistance was significantly higher in ground water from Wilgamuwa (Table 1).

Table 1: Antibiotic Resistance of total and faecal coliforms isolated from Wilgamuwa and Minipe

	Area	β- Lactam			Cephalosporins			Carbapenems		Quinolone	Aminoglycosides			MDR %
		AP	Co-amox	PIP-TAZ	CXM	CTX	CAZ	IM	MEM	CIP	GM	AK	NET	
TC	1 n=44	24	2	1	2	2	3	2	1	1	2	1	1	2
	%	54.5 ^a	4.5 ^a	2.3 ^a	4.5 ^a	4.5 ^a	6.8 ^a	4.5 ^a	2.3 ^a	2.3 ^a	4.5 ^a	2.3 ^a	2.3 ^a	4.5 ^a
TC	2 n=32	10	1	0	1	0	1	0	0	0	0	0	0	0
	%	31.3 ^b	3.1 ^a	0 ^b	3.1 ^a	0 ^b	3.1 ^b	0 ^b	0 ^b	0 ^b	0 ^b	0 ^b	0 ^b	0 ^b
FC	1 n=23	11	3	0	2	3	1	1	0	1	0	0	1	0
	%	47.8 ^x	13.0 ^x	0 ^y	8.7 ^x	13.0 ^x	4.3 ^x	4.3 ^x	0 ^x	4.3 ^x	0 ^x	0 ^x	4.3 ^x	0 ^x
FC	2 n=21	9	1	1	1	0	0	0	0	0	0	0	0	0
	%	42.9 ^x	4.8 ^y	4.8 ^x	4.8 ^y	0 ^y	0 ^y	0 ^y	0 ^x	0 ^y	0 ^x	0 ^x	0 ^y	0 ^x

Conclusion

This preliminary study has detected both total and faecal coliform counts exceeding permissible levels with significantly higher drug resistant isolates in the CKDu area which merits further investigation.

Keywords: CKDu, drinking water quality, Wilgamuwa, antibiotic resistance.


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¹Department of Botany, Faculty of Science, University of Peradeniya, Sri Lanka

² Department of Geology, Faculty of Science, University of Peradeniya, Sri Lanka

³ Department of Microbiology, Faculty of Medicine, University of Peradeniya, Peradeniya

Address for correspondence: S.U. Galketiyahegawa. Telephone: +94775002547 Email: sajiniupekha@gmail.com

 <https://orcid.org/0000-0001-6600-7086>