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RESEARCH ARTICLE

SURVEY ON DNA FROM VARIOUS NORMAL AND MUTATED SAMPLES OF MICROBES FROM AIR, WATER AND SOIL FROM BARKATPURA, HYDERABAD, INDIA

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ABSTRACT

Various microbes were isolated from air, water and soil from Barkatpura, Hyderabad, India. The characterization of these microbes was done using the Gram staining technique. DNA was isolated from the cultures for the pattern study of DNA. The cultures of these microbes were then exposed to UV light and ethidium bromide for mutational study. DNA was isolated from different mutated colonies of the microbes and they were then observed for changes.

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INTRODUCTION

Soil contains a variety of microorganisms that can be found in any natural ecosystem. Microorganisms play an important role for biological balance in the life in our planet (Kummerer, 2004). Soils typically contain 10^9 to 10^{10} microorganisms per gram (dry weight), which may represent more than a million bacterial species (Gans *et al.*, 2005). Water is essential for industrial, pharmaceutical and hospital purposes and processing of medicines and other health products (Penna *et al.*, 2002). The role of contaminated water in spreading communicable diseases is much evident. Contaminated water with faecal coliform severely affects the performance of humans. *Salmonella* sp., *Camphylobacter* sp., *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Clostridium botulinum*, *Vibrio cholerae* and *Escherichia coli* are the main human pathogens responsible for water contamination (He *et al.*, 2007). Microorganisms have been explored as passive and severely stressed riders of atmospheric transport systems. An interest in the active roles of these micro-organisms has emerged along with proposals that the atmosphere is a global biome for microbial metabolic activity and perhaps even multiplication (Morris *et al.*, 2011). In the present study survey of DNA from various

normal and mutated samples of microbes from air, water and soil from Barkatpura area of Hyderabad, India was done.

MATERIALS AND METHODS

Sample collections

Soil samples of 100 g and water sample of 100 ml were collected from Barkatpura, Hyderabad, India and were brought to laboratory of DNA Labs, India, Barkatpura, Hyderabad. Likewise air samples for isolation of microorganisms obtained from same area.

Isolation of Microorganisms

Microorganisms from air, water and soil samples were isolated (Aneja, 2003).

Characterization of microorganisms

Characterization of the different colonies was done by Gram staining (Aneja, 2003).

DNA isolation

DNA from isolated microorganisms were isolated (Kojima and Ozawa, 2002).

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Electrophoresis of isolated DNA

Electrophoresis of isolated DNA was done (Aaij and Borst, 1972).

Mutations and Isolation of DNA

Two types of mutations were carried out on isolated microorganisms: physical and chemical mutations (Ma et al., 2004; Frankl et al., 1997; Offutt, 1994). DNA from mutated microorganisms were isolated (Kojima and Ozawa, 2002) and electrophoresis of isolated DNA was done (Aaij and Borst, 1972).

RESULTS AND DISCUSSION

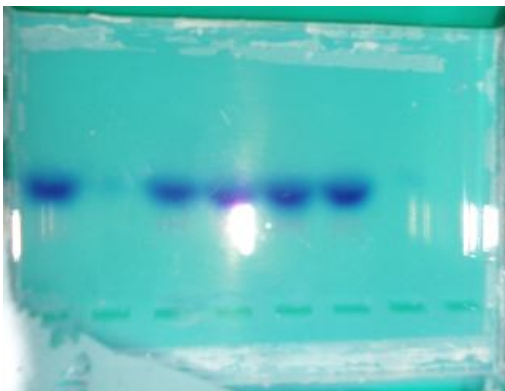
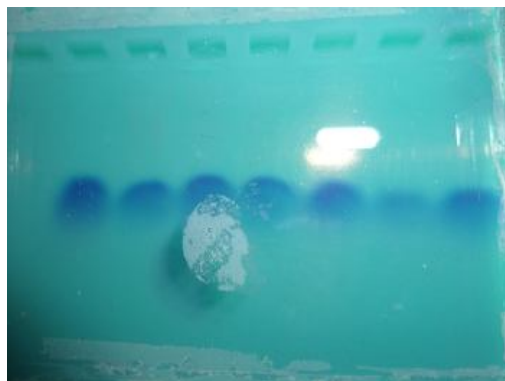
Various colonies from air, water and soil samples were observed on the plates after Gram staining as shown in Table 1.

Table 1. Gram staining of various colonies (W = water sample, A = Air sample and S = Soil sample)

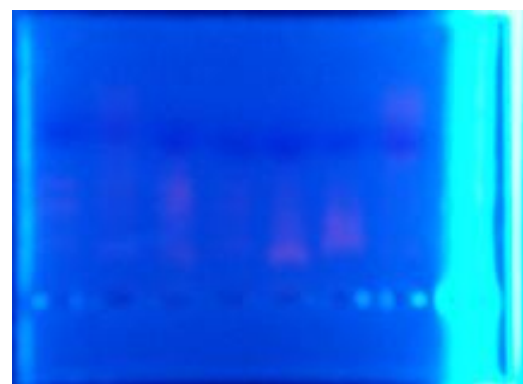
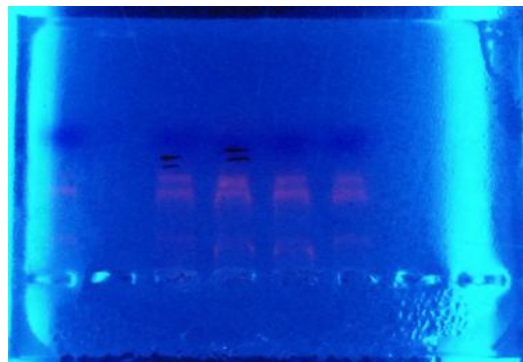
S.No.	Culture code	Observation	Result
1	W-1-1	Purple colonies of <i>Streptobacillus</i> were seen.	Gram positive
2	W-1-2	Purple colonies of <i>Streptobacillus</i> were seen.	Gram positive
3	W-2-1	Purple colonies of <i>Streptobacillus</i> , shortrods were seen.	Gram positive
4	W-2-2	Purple colonies of <i>Streptobacillus</i> were seen.	Gram positive
5	A-1-1	Purple colonies of cocci were seen.	Gram positive
6	A-1-2	Purple colonies of <i>Staphylococci</i> were seen.	Gram positive
7	A-2-1	Purple colonies of cocci were seen.	Gram positive
8	A-2-2	Purple colonies of cocci were seen.	Gram positive
9	S-1-1	Purple colonies of short rods, cocci were seen.	Gram positive
10	S-1-2	Purple colonies of short rods(<i>Bacillus</i>) were seen.	Gram positive
11	S-2-1	Purple colonies of <i>Staphylobacillus</i> , <i>Streptobacillus</i> were seen	Gram positive
12	S-2-2	Purple colonies of <i>Bacillus</i> were seen	Gram positive

Table 2. Effect of physical and chemical mutagens on microorganisms

S. No	Culture code	Observations for UV	Observations for Ethidium bromide
1	W-1-1 (1)	53	38
2	W-1-2 (2)	56	45
3	W-2-1 (3)	37	56
4	W-2-2 (4)	45	47
5	A-1-1 (5)	56	39
6	A-1-2 (6)	32	41
7	A-2-1 (7)	43	52
8	A-2-2 (8)	48	39
9	S-1-1 (9)	39	45
10	S-1-2 (10)	51	51
11	S-2-1 (11)	42	37
12	S-2-2 (12)	35	47



Various DNA samples on the gel when running



Normal

Figure 1. Isolation of various DNA having a little difference in the pattern of their run

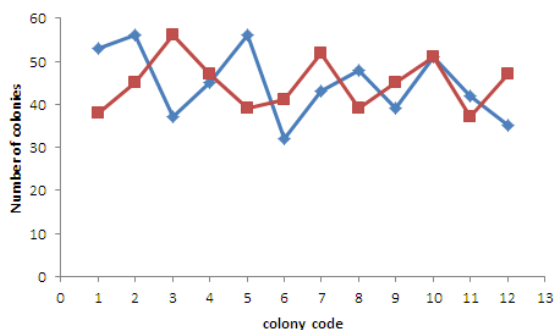


Figure 2. Graph representing effect of mutagens on various colonies

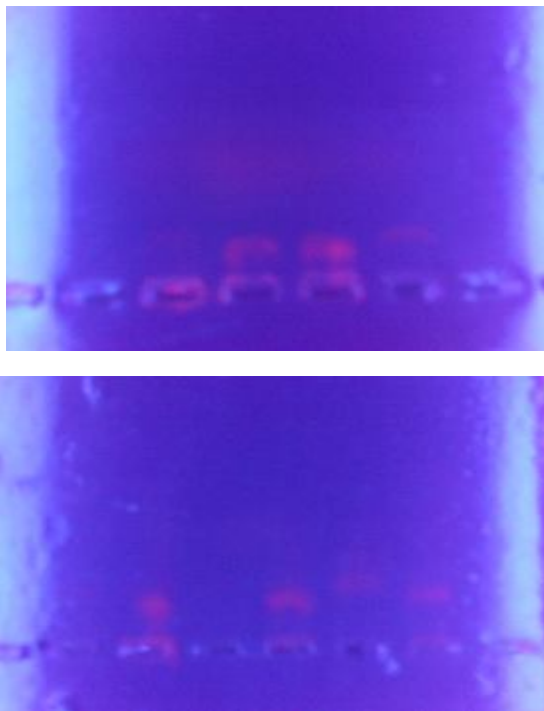


Figure 3. Patterns of various mutated DNA samples on the gel under UV transilluminator

DNA was isolated from the samples successfully which showed patterns in the bands, in which some were showing single band and some were having discrete bands. In two samples there were presence of RNA as the bands formed were in front of the loading dye when electrophoresed as shown in Figure 1.

Normal Figure 1 Isolation of various DNAs having a little difference in the pattern of their run. When microorganism were exposed to physical and chemical mutagens i.e. UV and Ethidium Bromide for 6 min the number of colonies formed were as shown in Table 2 and Figure 2 and 3.

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