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Full length Research paper

Antibiotics resistance of a stain of *Streptococcus faecalis* isolated from sewage oxidation pond

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This study was carried out to characterize a strain of *Streptococcus faecalis* isolated from sewage oxidation pond in Obafemi Awolowo University, Ile-Ife, Nigeria. The isolated strain was gram positive, citrate negative, indole positive, MR positive, VP negative. It was able to ferment galactose, glucose, inositol, lactose and mannitol with production of gas. It was catalase positive and able to hydrolyse starch. The strain of *S. faecalis* was sensitive to amoxicillin, ofloxacin, chloramphenicol, pefloxacin, ciproflaxin, tetracycline and cotrimoxazole. However, it was resistant to gentamycin, augmentin, streptomycin and ceftriazone.

Key words: Sewage, *Streptococcus faecalis,* oxidation pond.

INTRODUCTION

Sewage is the liquid waste from toilets, baths, showers, kitchens and sinks that is disposed from household waste through sewers. The waste from toilets is termed 'foul' waste while the waste from items likes basins, baths and kitchens are termed 'sullage water'. Industrial and commercial waste is termed 'trade waste'. A lot of sewage also includes some surface water from roofs or hard-standing areas (Winkter, 1993). Waste water originates from domestic, industrial, ground water and meteorological sources and they are referred to as domestic sewage, industrial waste infiltration, and storm-water drainage respectively (Valentin et al., 2000). The quantity and character of industrial waste water is highly varied depending on the type of industry, the management of its water usage and the degree of treatment that the sewage receives before it is discharged (Brock and Madigan, 1999).

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MATERIALS AND METHODS

Specimen collection and isolation

The collection of specimen for this research was done under aseptical conditions. The organism used was isolated from Obafemi Awolowo University, Ile-Ife, Nigeria sewage oxidation pond and maintained on nutrient agar slant.

Biochemical test and staining techniques

Biochemical tests carried out were Gram stain, oxidation-fermentation test, catalase test, Koser's citrate utilization test, Methyl red – Voges – Proskaeur (MRVP) test, indole production test, starch hydrolysis test, sugar fermentation tests, gelatin hydrolysis and coagulase test.

Antibiotics sensitivity test

Antibiotics sensitivity tests were carried out. Diagnostic sensitivity test (DST) agar (Oxoid) and antibiotics multodisks. (Gram positive discs) (Oxoid) were used.

Table 1. Results of biochemical characterization of isolated *S. faecalis* from sewage oxidation pond in Obafemi Awolowo University, Ile-Ife, Nigeria.

Test	Result
Citrate utilization	Negative
Indole production	Positive
Methyl red	Positive
Voges-Proskauer	Negative
Oxidation – fermentation	Positive
Starch hydrolysis	Positive
Catalase	Negative

Table 2. Fermentation of sugars by *S. faecalis* isolated from sewage oxidation pond in Obafemi Awolowo University, Ile-Ife, Nigeria.

Sugar	Result
Galactose	AG
Glucose	AG
Inositol	AG
Lactose	AG
Mannitol	AG
Xylitol	NR

AG – acid and gas produced; NR – no reaction.

RESULTS

The result showed that the organism was gram positive cocci when viewed under the microscope with x100 objective. The citrate broth remained green in colour after incubation at 37°C for five days. The organism lacked the ability to utilize citrate as sole carbon source (Table 1). There was colour change in the test tube after the addition of Kovac's reagent. There was development of deep red colour in the presence of indole (Table 1). After incubation, the original solution was divided into two portions and labeled M and V respectively. Addition of Methyl red after 5 days caused a development of red colour. Addition of 0.5 ml ∀-naphthol solution and 0.5 ml KOH to the culture in test tube labeled V showed no visible reaction, indicating an MR positive reaction but VP negative reaction (Table 1). Sugars used were galactose, glucose, inositol, lactose, mannitol and xylitol. Colour changes observed in the test tubes used for oxidation and fermentation was from green to yellow, confirming positivity (Table 1). At the end of incubation of inoculated starch agar plate, it was flooded with Gram's iodine solution. The colonies appeared as a clear zone while other areas of the plate where organism did not grow gave blue colouration.

Appearance of clear zone by the colonies confirmed That the isolate hydrolyzed starch (Table 1). The result did not show presence of air bubbles in the catalase test. It indicated that the isolate was catalase negative (Table 1). The isolate was sensitive to tetracycline, aprofloxcin, ofloxacin, cotrimoxazole, pefloxacin, ofloxacin, chloramphenicol but was resistant to gentamycin, streptomycin, ceftriazone and augmentin (Table 3).

DISCUSSION

This research was carried out to characterize a strain of *S. faecalis* from sewage oxidation pond in Obafemi Awolowo University, Ile-Ife, Nigeria. The presence of *S. faecalis* indicated excretal pollution of human origin (Zoy et al., 1999).

The results of the sugar fermentation tests showed that the organism fermented sugars like galactose, glucose, lactose, mannitol and inositol. This has been attributed to the production of acids like lactate, ethanol, succinate and evolution of gas.

The result of the Gram staining showed that the organism was a Gram positive cocci. This showed that the cell wall is less complex, with tetrapeptide chains being cross linked by pentaglycine chain (Nestle et al., 2004).

The ability of the organism to produce enzyme trptophanase enabled it to utilize tryptophan to produce indole, which is a precursor to the synthesis of vitamins and biologically active substances (Prescott, 1999). Its inability to utilize citrate medium for carbon source was confirmed by not changing from green to blue (Cheesbrough, 2000). This was in line with previous reports on *S. faecalis* (Ryan, 2004).

The results of antibiotics sensitivity pattern showed that the isolate, *S. faecalis* was sensitive to amoxycillin, ofloxacin, chloramphenicol, pefloxacin, ciprofloxacin, erythromycin, tetracycline and cotrimoxazole. It was however resistant to gentamycin, augmentin, streptomycin, and ceftriazone. This is in line with previous reports by Lamikanra et al. (1989).

The need to treat effluent from sewage oxidation pond cannot be overemphasized since water might find its way

Table 3. Antibiotics resistance and sensivity pattern of *S. faecalis* isolated from sewage oxidation pond in Obafemi Awolowo University, Ile-Ife, Nigeria.

Antibiotics	Concentration (g)	S	R	Zone of inhibition (cm)
Amoxycillin	25	-	+	0.0
Ofloxacin	5	+	-	1.3
Streptomycin	10	-	+	0.0
Chloramphenicol	30	+	-	1.0
Gentamycin	10	-	+	0.0
Pefloxacin	5	-	+	0.0
Cotrimoxazole	25	+	-	1.0
Ciprofloxacin	10	+	-	0.75
Erythromycin	5	+	-	1.3
Augmentin	30	-	+	0.0
Ceftriazone	30	-	+	0.0
Nitrofuran	200	-	+	0.0
Tetracyclin	30	+	-	1.0

S – sensitive; R – resistance.

back into streams that serve as drinking water for villagers. Such polluted streams become unsafe, resulting in infection and transmission of water-borne diseases.

It has therefore become inevitable that effluent from oxidation pond must be adequately treated before flowing into adjoining streams.

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