Bacteriological Profile of Urine in Patients with Urinary Calculi

INTRODUCTION
The association between infection of the urinary tract and urinary calculi is well known and has been documented for many years. Incidence of urinary tract infection in stone patients varies from 7% to 60% reported in previous studies [1,3,4,6,7,8,9,10,11,12,13].

Infection favours the formation of urinary calculi. The predominant bacteria found in the nuclei of urinary calculi are Staphylococcus and Escherichia coli. Urease splitting organisms like Staphylococcus and Proteus render the urine alkaline and hence are known to promote stone formation in both clinical and experimental studies [7,8].

Recurrence of urinary tract infection and stone is commonest and major health problem and it is necessary to eradicate infection. For study of etiology and treatment of patients with urinary calculi it is necessary to perform urine and stone culture. Also it is necessary to find out the chemical composition of stone and antimicrobial sensitivity of urine and stone culture isolates.

Most urea splitting bacteria lead to stone formation as hydrolysis of urea increases the carbonate, bicarbonate and ammonium ionic concentration and urinary pH [7,21]. These are the required conditions for the formation of magnesium ammonium phosphate calculi which are generally staghorn. Other bacteria like E. coli commonly observed in urinary infection are not urea splitting [7,21,22].

MATERIAL AND METHODS
1) Urine Culture: Before giving antibiotic treatment preoperative midstream sample of urine was collected in sterile container. Samples were inoculated using calibrated (4mm dia.) loop providing fixed quantity on Blood agar MacConkeys agar.[15] Cultures were incubated at 37oc for 24 hours. Also microscopy and Gram stain of urine samples were performed [1,2,4,9,12,16,17,18].

If no growth observed after 24 hours of incubation samples were considered sterile. If the colony forming units less than hundred was observed then it was considered as significant. And if the colony forming units more than hundred was observed then, it was considered as presence of urinary tract infection [14,15,19].

The growth from culture plate was examined and colony characters were seen. The colony was picked up and inoculated into peptone water, which was used to study the morphology, motility, biochemical test and antibiotic sensitivity. The bacteria present in urine and stones were identified by conventional methods. Also the antibiotic sensitivity of bacterial isolates were done by conventional methods. Also the antibiotic sensitivity of bacterial isolates were done by using disc diffusion (Kirby and Baur) method [15]. The sensitivity of organisms to 14 antibiotics was studied. (Ampicillin, Chloramphenicol, Erythromycin, Kanamycin, Penicillin, Streptomycin, Tetracycline, Gentamycin, Amikacin, amoxicillin, Nolfoxacin, Nitrofurantoin, Nalidixic acid and Ciprofloxacin) [14].

2) Stone Culture: Urinary calculus was collected after the operation in a sterile container whenever possible. Culture of calculus by giving 1, 2, 3, 4 washes and finally by crushing the calculus in sterile mortar and pestle with 5 ml sterile saline, was done on Blood Agar and MacConkeys Agar. Cultures were incubated at 37oc for 24 hours. The growth from culture plates were examined for number of colonies from wash and crush fluids of calculus [1,2,4,5,6,9,16].

The colony was picked up and inoculated into peptone water for study of morphology, motility, biochemical reactions. The identification of bacterial isolates were done by conventional methods. Also the antibiotic sensitivity of bacterial isolates were done by using disc diffusion (Kirby Baur) method [15].

3) Chemical analysis of calculus: Some part of calculus was used for chemical analysis. First the physical characteristics of the calculus were seen, such as size, shape, weight, number, colour, surface and consistency. The chemical analysis of calculus were done by using different qualitative tests. The tests were done to find out inorganic and organic constituents like carbonate, calcium, magnesium, phosphorous, oxalate, ammonia, urate, cystine and fibrin.

RESULTS
A total of 221 patients with a all age groups & either sexes, Clinical diagnosis of urinary calculi were studied. From the 122 ( 55.20%) showed growth in urine culture & 99 (99%)...
were sterile. In total of 42 cases stone cultures were carried out from that 12 (28.57%) showed growth & 30 (71.42%) were sterile. From total of 42 patients in which stone & urine both cultures were carried out from that (19.04%) were positive for both urine & stone cultures. From 6 (14.28%) cases same microorganisms were isolated & 2 (4.76%) cases different microorganisms were isolated. Positive urine culture & negative stone culture was found in 14 (33.33%) cases. Negative urine culture & positive stone culture was found in 4 (9.52%) cases. Both urine & stone cultures were negative in 16 (38.09%) cases.

Table No. 1 Showing frequency of organisms isolated from urine cultures.

| Name of the Organisms | Total No. (%) |
|-----------------------|--------------|
| Escherichia coli       | 36(24.48)    |
| Klebsiella spp.        | 26(17.68)    |
| Coagulase negative Staphylococcus | 25(17) |
| Pseudomonas aeruginosa | 18(12.24)   |
| Citrobacter diversus   | 16(10.88)    |
| Streptococci           | 9(6.12)      |
| Citrobacter freundii   | 8(5.44)      |
| Coagulase positive Staphylococcus | 6(4.08)  |
| Proteus vulgaris       | 3(2.04)      |
| Proteus mirabilis      | 1(0.68)      |
| Klebsiella oxytoca     | 1(0.68)      |
| Total                  | 147 (100)    |

Table No. 2 Showing frequency of organisms isolated from stone cultures.

| Name of the Organisms | Total No. (%) |
|-----------------------|--------------|
| Pseudomonas aeruginosa | 54(41.66)   |
| Escherichia coli       | 2(16.66)     |
| Klebsiella spp.        | 2(16.66)     |
| Proteus mirabilis      | 9(8.33)      |
| Citrobacter freundii   | 4(3.33)      |
| CoNS                   | 8(8.33)      |
| Total                  | 12 (100)     |

DISCUSSION

Urine cultures were found positive in 55.20% of patients. This figure is lower than that noted by Bratell S. & Colleagues who reported 60% of patients with positive urine cultures [3]. It correlates well with figure reported by Bratell S. & Colleagues. The figure is more than the figure reported by Lewi H. (48 %) [13] & Hugosson J. & colleagues (45.67 %) [5]. In present study E. coli (24.48%) is predominant isolated organism from urine culture. It correlates well with Jennis F. & co-workers, they found E. coli (25.7 %).

In present study stone culture were found positive in 28.57% out of total 42 stones examined. Dewan B. & co-workers found 47% positive stone cultures [2]. In present study Pseudomonas aeruginosa (42.66%) was most frequently isolated from stone culture. Gault M. H. & co-workers found more frequent isolations of Pseudomonas, from the stone culture [4].

Most of the isolates from urine culture & stone cultures were sensitive to gentamycin & fluoroquinolone group. But most of the organisms were resistant to routine antibiotics. Failure in therapy, is due to survival of bacteria deep within the calculus which are difficult to eradicate [2]. Also the persistence of stone fragments makes the bacteria difficult to eradicate [7,20].

CONCLUSIONS

Our study showed that for 1m³ M20 grade of concrete consumption of fine aggregate is 775.96 kg. Here in specimen M-3 we replace fine aggregate by 24.62 kg of crumb rubber for 1m³M20 grades of concrete. So, we can say that up to 15% foundry sand utilized for economical and sustainable development of concrete. Uses of crumb rubber in concrete can reduce the harmfulness to the environment and produce a ‘greener’ concrete for construction. An innovative supplementary Construction Material is formed through this study.

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