ORIGINAL ARTICLE

COMPARISON OF LATEX AND SILICON INDWELLING CATHETER IN TERMS OF RATE OF BACTERIAL COLONIZATION IN MALES WITH ACUTE URINARY RETENTION AT 5TH DAY OF CATHETERIZATION

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Background: Urinary catheterization is considered as one of the most common, frequently performed and basic skill in patient care while catheter associated urinary tract infections (CAUTI) in the most common nosocomial infection. Catheter material plays an important part in terms of infection and bacterial colonization. With this study, we aim to compare the rate of bacterial colonization in two most commonly used catheter type; Latex and Silicone indwelling catheters in males with acute urinary retention. **Methods:** This 2-arm randomized control trial was conducted in Allied Hospital Faisalabad over the period of 2 months, from Jan 2023 to February 2023. Seventy-two male patients with acute urinary retention were included in this study. Patients were divided into 2 groups. Intervention groups was catheterized with silicon indwelling catheter and control groups was catheterized with latex indwelling catheter. Patients were discharged without antibiotics prescription and at 5th day catheter was removed and tip of catheter was sent for culture and sensitivity. Result was received on OPD basis and added in the record. **Results:** In comparison to the latex catheter, the silicone catheter showed significantly reduced bacterial colonization. In the Silicon indwelling catheter group, out of 36, 8 patients catheters showed bacterial growth while 28 exhibited no growth. In the Latex indwelling catheter group, out of 36, 17 patients catheters showed bacterial growth while 19 exhibited no growth. **Conclusion:** The findings showed that, on the fifth day of catheterization, silicone indwelling catheters significantly reduced the rate of bacterial colonization when compared to latex indwelling catheters.

Keywords: Latex and silicon indwelling catheter; CAUTI; Urinary retention

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INTRODUCTION

According to a study conducted by International Society for infectious diseases (ISID) in 2021 approximately 100 million urinary catheters are being used annually and more than 200 urinary catheters are used by every passing minute. Round about 20% of hospital admitted patients are catheterized at some point during their management. As per nosocomial infection control consortium (NICC) almost 70% of CAUTI are outside of ICUs and 95% of them are in ICUs. Numbers revealed that CAUTI is the most common hospital acquired infection (HAI) and it constitutes approximately 40% of all nosocomial infections.

Acute urinary retention (AUR) in males is most commonly caused by prostate enlargement (PE). According to one estimation, over 50% of men by the age of 60 years and around 90% of men by the age of 85 years exhibit lower urinary tract symptoms (LUTS) and acute urinary retention due to PE. Other causes of AUR includes urethral stricture, vesical stone or neurogenic bladder. At the time of presentation patients are catheterized to provide drainage and short-term relief.

Urinary catheterization is one of the most commonly performed and necessary part of patient care. Latex is the most commonly used material but it can cause allergic reactions, shows poor bio-compatibility and highly receptive to infections and stone formation. Silicone, on the other hand is considered as hypoallergenic and is most bio-compatible material.

MATERIAL AND METHODS

This prospective randomized control trial was conducted in the Department of Urology and Kidney Transplantation at the Faisalabad Medical University Allied Hospital. In this study, 72 male patients were enrolled. Patient who presented in Health facility with AUR, were evaluated by urologist. A general and urological history was

taken before catheterization. Consent was taken. Patients were randomly allocated in both groups using even and odd serial sequence. Patients were divided into two groups, Group-A and Group-B. Group-A in taken as intervention group while Group-B as control group. Group-A patients were catheterized with Silicone indwelling catheter while Group-B patients were catheterized with Latex indwelling catheter. For catheterization the sterilised one hand technique was used. Patients were discharged after catheterization without antibiotics prescription. At 5th day in follow up clinic, catheter was removed and catheter tip was sent for culture and sensitivity. Reports from associated patients of culture was received and checked on OPD basis, data collected and noted in designed proforma.

RESULT

A total number of patients was 72. In Group-A, 8 out of 36 patients exhibited bacterial growth while in Group-B, 19 out of 36 patient showed colonisation of bacteria at catheter tip. The culture exposed that in Group-A; 4 patients were infected by E coli, 2 patients with Pseudomonas and 2 patients with Multi bacterial colonisation. In Group-B; 9 patients showed growth of *E coli*, 4 patients showed Pseudomonas, 1 patient showed Klebsiella and 3 patients with Multi bacterial growth. Round-about 22.22% of patients from Group-A showed bacterial colonisation while 47.22% patients of Group-B exhibited bacterial colonisation on catheter tip.

The results revealed that silicone indwelling catheters remarkably decreased the rate off bacterial colonisation as compared to latex indwelling catheter at 5th day of catheterization.

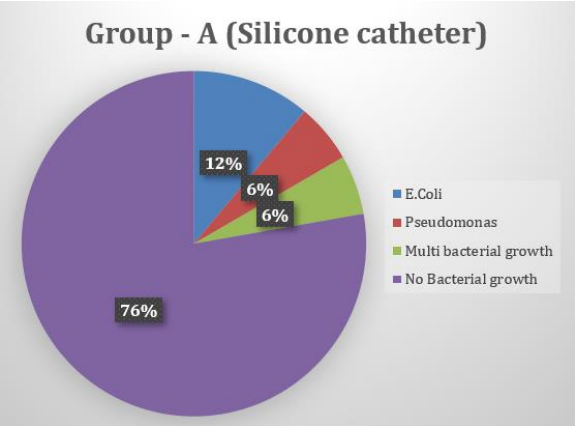

Figure-1: Exhibits the ratio of culture exposed bacterial growth in patients catheterized with silicone catheter.

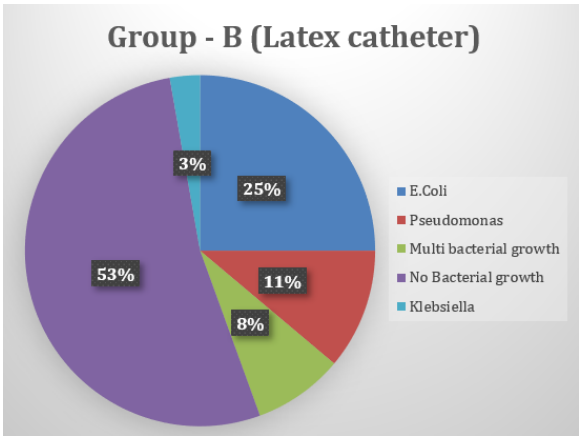

Figure-2: Exhibits the ratio of culture exposed bacterial growth in patients catheterized with latex catheter.

Table-1: Tabulated form of names, numbers and percentages of culture exposed bacterial growth in patients catheterized with silicone catheter.

Bacterial Growth in Group – A (Total 36)		
Group	**Numbers**	**Percentage**
E. coli	4	12%
Pseudomonas	2	6%
Multi bacterial growth	2	6%
No bacterial growth	28	76%

Table-2: Tabulated form of names, numbers and percentages of culture exposed bacterial growth in patients catheterized with latex catheter.

Bacterial Growth in Group – B (Total 36)		
Group	**Numbers**	**Percentage**
E. coli	9	25%
Pseudomonas	4	11%
Multi bacterial growth	3	8%
Klebsiella	1	3%
No bacterial growth	19	5%

DISCUSSION

Indwelling urinary catheters are often seen as a last source of relief in patients with AUR. Urinary catheterization is one of commonly conducted medical procedure. The major issue with urinary catheterization is the development of infections. Multiple insertion techniques and catheter material has been experimented on to reduce the rate of infection. Infection rates increase with the duration of catheterization at rates of 5%–10% per day. The longer the urinary catheter remains in place, the greater the tendency of these organisms to develop biofilm and result in UTI. The latex was the first material used for the manufacture of foley catheter, but it is associated poor biocompatibility and a susceptibility to infection. This led to the application of a range of different coatings to the surface of latex including catheter made entirely of different material. Silicone which is

considered one of the most biocompatible substances also used in the making of urinary catheters.

A study conducted in China compared latex urinary catheters with silicone urinary catheters and demonstrated that silicon causes less injuries, reduce substantially irritation of the urinary mucosa and infection rate. As per by the findings of Amit Verma in 2016, pure silicone catheter is advantageous over the silicone coated latex catheter in terms of incidence of bacterial colonization.

CONCLUSION

Silicone indwelling catheters significantly reduced bacterial colonisation compared to latex indwelling catheters on the 5th day of catheterization in males with acute urine retention. However, advantage of the silicone catheter over latex catheter in terms of bacterial colonization is still a matter of debate. Further studies are required to validate our results.

ETHICAL CONSIDERATIONS

Informed Consent

Prior to enrolling participants in the study, informed consent was obtained from each patient. They were provided with comprehensive information about the study's purpose and their right to withdraw at any time without repercussions.

Patient Confidentiality

Patient confidentiality was rigorously maintained throughout the study. All patient data and records, including medical history and personal information was stored with privacy. Access to sensitive patient information was restricted to authorized personnel only.

Continual Monitoring and Review

Throughout the study, there was an ongoing monitoring of ethical considerations, patient safety, and data quality.

LIMITATION

Limitation of our study is that it is a single Centre study with limited number of patients. As there is not much data available on this topic, there is no benchmark present to which we can relate or compare our study.

CONFLICT OF INTEREST

All authors declare that they have no conflict of interest to disclose.

AUTHORS' CONTRIBUTION

A, MA: Conceptualization of the study. NAW, MA, FA: Data collection, data analysis, interpretation. KL, RI, MM: Review, proofreading.

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