Chlorohexidine versus Povidine Iodine in The Prevention of Catheter Associated Urinary Tract Infection among Critically Ill Patients

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Abstract

Background: Urinary tract infections are the most frequently occurring infections associated with healthcare in the Intensive Care Unit (ICU). Prolonged catheterization stands out as the primary risk factor for developing UTIs. **Aim**: compare chlorohexidine versus povidine iodine in the prevention of catheter associated urinary tract infection among critically ill patients. **Design**: Quasi experimental study was carried out at Damanhur Medical National institute, Egypt. **Sample**: a Purposive sample of 180 patients selected and divided equally to two groups, Group (A) used chlorhexidine gluconate, Group (B) used 10 % povidone Iodine solution in the insertion of urinary catheter. **Results**: Majority of the sample were male and 40% of povidine iodine group and 43.3% of chlorohexidine group were in age group from (31 < 41). Also, There was a highly statistically significant difference between the povidine iodine group and chlorohexiedene group regarding total catheter associated urinary tract infection assessment profile as chlorohexidene group is less symptoms than povidine iodine group with p-value = (0.000). **Conclusion**: using chlorhexidine gluconate in insertion of urinary catheter was statistically significant difference in reducing catheter associated urinary tract infection among critical patients than povidine iodine. **Recommendation**: Comparison between soap and Chlorohexidine in reducing Catheter associated urinary tract infection.

Key words: Chlorohexidine, Povidine-iodine, Urinary tract Infection.

Introduction:

Hospital-acquired infections (HAIs) affects nearly 30% of patients admitted to intensive care units. World Health Organization states that, hundreds of millions of patient's experience HAIs every year (9). ICU patients are particularly at high risk for developing urinary tract infections (UTIs), which are the most common type of HAIs. In acute care settings, including ICUs, approximately 93,300 UTIs are reported annually. Most healthcare-related UTIs are associated with urinary tract instrumentation. It is estimated that, 12% - 16% of hospitalized patients will require a urinary catheter inserted during their hospital stay (12).

Health care associated infections are among the common adverse outcomes of healthcare services for hospitalized patients, significantly impacting patient outcomes with higher mortality rates and substantial societal costs. These infections typically develop 48 hours after admission or between 7 to 30 days post-discharge, rather than during the initial hospitalization or incubation period (7). On average, about 7% of developed countries' patients and 10% of developing countries experience at least one type of nosocomial infection during their hospital stay, with around 10% of these patients succumbing to the infection (17).

Catheter associated urinary tract infections (CAUTI) is an infection that occurs in patients who have an indwelling urinary catheter in place or had one removed within 48 hours prior to the onset of symptoms, and who meet specific clinical criteria. Identified risk factors for CAUTI include old age, urinary tract dysfunction, compromised immune status, female gender, obesity, extended duration of catheter use, prolonged immobility, and prolonged antibiotic therapy. Additionally, the practice of catheterization without a clear medical indication can increase the risk, particularly when patients have extended ICU or hospital stays (3).

Preventing CAUTI requires strict compliance with the guidelines of Centers for Disease Control and Prevention (CDC). Key preventive strategies include thorough hand hygiene, appropriate perineal care, and the use of sterile techniques and equipment. Cleaning the meatus with antiseptic solutions such as chlorhexidine, povidone-iodine, in accordance with hospital protocols, is also crucial. Additional measures involve using single-use catheters for each insertion attempt, ensuring proper balloon inflation, keeping the collection bag below bladder level without ground contact, and regularly assessing the necessity of the catheter to shorten the catheterization period (14)(8).

Many intensive care units (ICUs) have adopted CDC guidelines for inserting the urinary catheter to improve client outcomes. These guidelines highlight the critical role of disinfectant solutions in reducing CAUTI rates, both before catheter insertion and during perineal care. Previous research has investigated the efficacy of povidone-iodine in lowering CAUTI rates, as well as the effectiveness of other solutions such as chlorhexidine gluconate and sterile water for urethral cleaning in CAUTI prevention (5). ICU nurses play a crucial role in preventing and managing (HAIs. Their duties involve delivering basic hygiene care, performing continuous clinical evaluations, and supervising high-risk areas like catheter sites and surgical wounds. Also, they are tasked with identifying and evaluating systemic signs of infection to ensure prompt intervention and prevent the spread of infections (2).

A crucial aspect of their work is leading and implementing quality improvement measures that enhance infection control protocols. These often involve promoting hand hygiene, maintaining sterile techniques, and applying patient care practices designed to lower the risk of infection. Additionally, ICU nurses ensure that microbiological samples are collected properly to maintain accuracy and avoid contamination, aiding in precise diagnosis and timely treatment (19). ICU nurses also play a key part in antibiotic stewardship by collaborating with healthcare teams to ensure antibiotics are used appropriately, reducing the risk of developing resistant bacteria. Their adherence to best practices is essential in developing treatment plans that help curb the spread of multidrug- resistant organisms (MDROs) (13).

Significance of the study

CAUTIs are the most prevalent hospital-acquired infection among critically ill patients. As a result, various strategies are employed to prevent its occurrence before, during, and after the insertion of urinary catheter. Povidone-iodine is widely used as an antiseptic for skin disinfection. However, Chlorhexidine, an antiseptic with antimicrobial properties similar to those of povidone-iodine, offers a notable advantage by maintaining its effectiveness even in the presence of blood and serum proteins, ensuring a longer- lasting disinfecting effect on the skin. Numerous studies indicate that chlorhexidine outperforms iodine in hand and surgical site disinfection (7).

Aim of the study:

The aim of the study was to compare chlorohexidine versus povidine iodine in the prevention of catheter associated urinary tract infection among critically ill patients.

Research hypotheses

At the end of the study:

Patients who will receive chlorohexidine have a lower rate of catheter associated urinary tract infection than those who will receive povidone iodine.

Subjects and Method:

Study Design:

A quasi experimental research design was used in this study to fulfill the aim of the study. A quasi experimental design is seeks to determine a cause-and-effect relationship between an independent and dependent variable.

Setting:

The study conducted in the general intensive care units (ICUs) at Damanhur Medical National Institute, Egypt, which are categorized into General ICU I (13 beds), General ICU II (7 beds), and General ICU III (10 beds). These ICUs accommodate patients with various acute conditions, who are admitted directly from the emergency department, hospital wards, or transferred from other healthcare facilities.

Subjects: The study included a purposive sample of 180 patients (90 patients for each group), representing 30% of the total number of cases admitted between January 1, 2023, and December 31, 2023. The sample was conveniently selected and evenly divided into two groups: (Group A =90 patients) which used chlorhexidine solution, and (Group B= 90 patients) which used 10% povidone-iodine solution for perineal and urethral meatus care prior to insertion. The data was collected from January to August 2024

Exclusion criteria: patients with UTIs or other systemic infections, comatose intubated individuals, and immuno- compromised patients.

Tools of data collection:

Three tools were formulated by the researchers after extensive literature review:

Tool I:Structured interviewing questionnaire : It was developed by the researcher based on literature review included two parts:-

1st part: **Socio-demographic characteristics of the studied patients:** to assess patients' characteristics, included information such as the patient's age, gender, marital status, occupation, level of educational and place of residence.

2nd part: Patients' medical data: this part used to assess patients' medical data regarding; current diagnosis, weight, height, chief complaint, present history, past medical, surgical history, and types of treatment.

Tool II: **Catheter Associated Urinary Tract Infection Assessment Profile (CAP):** it was adopted from **Inouye et al., (1990)** to assess the following clinical symptoms of CAUTI through physical examination such as: fever, and flank tenderness. The catheter assessment profile tool contains assessment of each clinical sign and symptom immediately after insertion, 72 hrs, and 5 days after insertion the catheter.

Tool III: Infection Assessment Sheet: It was developed by the researcher based on literature review and consisted of two parts:

1st part: Catheter Urinary Tract Infection Assessment Sheet: It was used for indicating the systemic and local signs of infection immediately after insertion, 72 hrs, and 5 days after insertion the catheter as the following;

-Systemic signs of infection which included; fever, chills, swelling, allergy, pain, and acute change in mental status.

-Local signs of infection which included; turbid urine, dysuria, hematuria, purulent discharge from catheter site, nocturia, redness near the catheter site, pain near the catheter site and an increase of WBCs in urine.

2nd part: Laboratory Investigations; the researcher utilize specific laboratory investigations to assess presence of urinary catheter infection as, urine analysis to detect incidence of bacteria, white blood cells, and CRP, and urine culture for isolation of different organisms.

Validity and Reliability

The tools of the study underwent content validity testing by a panel of seven experts in the relevant field, with necessary modifications made based on their feedback. Reliability was done using Cronbach's Alpha Coefficient, yielding high reliability scores of 0.835 and 0.791 for the two tools, respectively

Pilot study

Prior to conducting the main study, a pilot study was performed on 10% of the patients (18 patients) who admitted in the general ICU to evaluate the feasibility of the study and the application of the tools.

Legal and Ethical Considerations

Official approval was obtained from the Research Ethics Committee at the Faculty of Nursing, Helwan University, to proceed with the proposed study. Official permission to conduct the study was obtained from the director of the Damanhur Medical National Institute in Egypt, the head of the general intensive care unit. The researcher secured written informed consent from patients after clearly explaining the study's objectives. Participants were assured of confidentiality, privacy, voluntary participation, and their right to withdraw at any time. This information was personally conveyed by the researcher.

Procedure for Data Collection:

The researcher assessed all patients from both groups who met the inclusion criteria immediately after admission and once they were clinically stable, utilizing Tool I (Parts 1 and 2). After obtaining informed consent, patients were randomly allocated to one of two groups: Group A, where catheters were inserted using a chlorhexidine disinfectant solution, and Group B, where a 10% povidone-iodine disinfectant solution was used.

Urinary catheter insertion and maintenance care for both groups followed the 2020 nursing guidelines and recommendations of the Centers for Disease Control and Prevention **(CDC, 2020)** Before catheter insertion, the researcher followed all CDC- recommended steps for both groups: verifying the physician's order, selecting the catheter size, explaining the procedure and its potential side effects to the patient and/or family, maintaining privacy and proper lighting, performing hand hygiene, and ensuring pre-urethral cleansing with the respective disinfectant solution. A sterile catheterization set was opened on a clean bedside table using sterile techniques, and all supplies were organized within reach. Sterile gloves were donned, and patients were appropriately draped.

For each group, the assigned disinfectant solution was prepared: chlorhexidine for (Group A) and povidone-iodine for (Group B). Perineal care was performed by cleaning the area, moving from front to back for females and in a circular motion from top to bottom for males. Using the dominant (sterile) hand, the meatus opening was cleaned with the designated antiseptic solution, for each group, using a sterile dressing for each pass. The disinfectant was then allowed to air dry before proceeding with catheter insertion.

After removing the gloves and performing hand hygiene, new sterile gloves were donned, and sterile lubricant was applied to the catheter tip. The catheter was connected to the drainage system, and the emptying port of the drainage bag was clamped. The non- dominant hand was used to identify the urethral meatus, while the dominant (sterile) hand inserted the catheter until urine flow was observed, advancing an additional

2–3 inches. The balloon was inflated with sterile water or normal saline from the prefilled syringe. The catheter was then secured to the patient's inner thigh (for females) or lower abdomen (for males). Following the procedure, gloves were removed, hand hygiene was performed, and the drainage bag was positioned below the bladder level. The patient was covered to ensure privacy.

Both groups underwent daily disinfection and maintenance care of the urethral meatus, catheter tubing, and irrigation using their designated disinfectant solutions.

The urine collection bag was replaced daily, and the urine evacuation port was disinfected with the same solution. The effectiveness of the two disinfectant solutions was assessed using Tools II and III at three intervals: immediately after insertion, 72 hours later, and on the fifth day. Urinalysis and urine cultures were performed to evaluate the solutions' effectiveness. All patients continued to receive routine medical and nursing care with follow-up evaluations in the inpatient department to assess the impact of the disinfectant solutions on reducing CAUTIs. All the studied subjects were assessed and followed after 24hours, 72hours, and after 5 days.

Statistical Analysis

Numerical data were expressed as mean and standard deviation (SD), while qualitative data were represented as frequencies (n) and percentages (%). The questionnaire's reliability was evaluated using Cronbach's alpha reliability coefficient, which ranges from 0 to 1, with values above 0.7 indicating acceptable reliability. Spearman's correlation coefficient was employed to assess relationships between variables. A significance level of $P \leq 0.05$ was established. Statistical analysis was performed using IBM SPSS Statistics Version 26 for Windows.

Results

Table (1) shows that, 40% of povidine iodine group and 43.3% of chlorohexidine group were in age group from (31 < 41). Concerning gender, 65.6% of povidine iodine group and 80% of chlorohexidine group were male, while 34.4% of povidine iodine and 20%of chlorohexidine group were female. As regards to educational level, 23.3% of povidine iodine group and 13.3% of chlorohexidine group were able to illiterate, while 20% of povidine iodine group and 11.2% of chlorohexidine group were university educated. Regarding residence level, 53.3% of povidine iodine group and 60% of chlorohexidine group lived in urban area, while 46.7% of povidine iodine group and 40% of chlorohexidine group were living in rural area. Also, there was no statistically significant difference between the two studied groups regarding their socio-demographic characteristic, which indicates homogeneity of the studied sample.

Table (2) reveals that, 36.7% of povidine iodine group and 40% of chlorohexidine group were suffering from diabetes mellitus, while 16.7% of povidine iodine group and 13.3% of chlorohexidine group had liver disease. Concerning surgical history, 70% of chlorohexidine group and 63.3% of povidine iodine had no surgical history. As regards to medical diagnosis, 20% of povidine iodine group and 6.7% of chlorohexidine group had cardiovascular disorder, while 6.7% of povidine iodine group and 20% of chlorohexidine group had neurological disorder. Regarding body mass index, mean and standard deviation of BMI of povidine iodine group were 31.02±11.02, while chlorohexidine group were 32.01±12.45. Also, there was no statistically significant difference between the two studied groups regarding their socio-demographic characteristic, which indicates homogeneity of the studied sample.

Table (3) demonstrates that, there was a highly statistically significant difference between the povidine iodine group and chlorohexiedene group regarding the total catheter associated urinary tract infection assessment profile as chlorohexidene group is less symptoms than povidine iodine group with p-value = (0.000). Regarding symptoms immediately, 93.4% of povidine iodine group and 90% of chlorohexidene group had no symptoms, while after 5 days 40% of povidone iodine group has mild symptoms and 23.3% of

chlorohexidene group, while 16.7% of povidone iodine group has moderate symptoms and 10% of chlorohexidene group has moderate symptoms.

Table (4) illustrates that, there was a highly statistically significant difference between the povidine iodine group and chlorohexiedene group regarding total systemic manifestations level and local urinary tract infection level with p-value (0.000, and 0.001). Also, there was a highly statistically significant difference between the povidine iodine group regarding total systemic manifestations level and local urinary tract infection level with p- value (0.000 and 0.000), while there was no statistically significant difference between the chlorohexiedene group regarding total systemic manifestations level and local urinary tract infection level with p-value (0.22 and 0.121).

Table (5) shows that, there was a highly statistically significant difference between the povidine iodine group and chlorohexiedene group regarding leukocytes count, CRP, urine culture, and type of microorganism with p-value (0.000, 0.009, 0.003, and 0.002 respectively).

Table (6) illustrates that, there was a highly statistically significant difference between the povidine iodine group regarding catheter associated urinary tract infection assessment profile, local manifestation immediately and occupation after 72hrs with p- value (0.04 and 0.02). Also, there was a highly statistically significant difference between the chlorohexidene group regarding catheter associated urinary tract infection assessment profile, local and systemic manifestation level immediately and after 7hrs with p-value (0.000 and 0.000), while there was no statistically significant difference among the povidine iodine group and chlorohexiedene group regarding catheter associated urinary tract infection assessment profile, age, gender, marital status, educational level, residence, past medical history, surgical history, current diagnosis, and body mass index.

Table (1): Comparison between the povidine iodine group and chlorohexidene regarding socio-demographic characteristic (n=180):-

Items	Povidine Iodine Group (n = 90)		Chlorohexidine Group (n = 90)		χ^2	P
	No	%	No	%		
Age:						
• 18 < 31	9	10	0	0	3.432	0.325
• 31 < 41	36	40	39	43.3		
• 41 < 51	18	20	18	20		
• 51-60	27	30	33	36.7		
Mean±SD	36.34±12.54		38.94±11.67		t=1.125	0.982
Gender:						
• Male	59	65.6	72	80	0.980	0.754
• Female	31	34.4	18	20		
Marital status:						
• Married	51	56.7	24	26.7	3.397	0.665
• Single	9	10	51	56.7		
• Divorced	18	20	0	0		
• Widow	12	13.3	15	16.7		
Educational level:						
• Illiterate	21	23.3	12	13.3	0.360	0.719
• Read and write	36	40	47	52.2		
• Secondary education	15	16.7	21	23.3		
• University educated	18	20	10	11.2		
Occupation:						
• Not working	36	40	6	6.7	0.821	0.814
• Employee	42	46.7	78	86.6		
• House wife	12	13.3	6	6.7		
Residence:						
• Rural	42	46.7	36	40	0.271	0.795
• Urban	58	53.3	54	60		

**: Significant at P ≤ 0.05, χ^2= chi-square test.*

Table (2): Comparison between the povidine iodine group and chlorohexidene regarding medical history (n=180):-

Items	Povidine iodine group (n = 90)		Chlorohexidine group(n = 90)		χ^2	P-value
	No	%	No	%		
Past medical history:						
• Renal disease	18	20	15	16.7		
• Liver disease	15	16.7	12	13.3		
• Hypertension	21	23.3	33	36.7	8.613	0.298
• Diabetes mellitus	33	36.7	36	40		
• Heart disease	24	26.7	12	13.3		
Surgical history:						
• Yes	33	36.7	27	30	0.295	0.785
• No	57	63.3	63	70		
Medical diagnosis:						
• Cardiovascular disorder	18	20	6	6.7		
• Respiratory disorder	12	13.3	21	23.3		
• Neurological disorder	6	6.7	18	20		
• Endocrine disorder	15	16.7	9	10	9.485	0.290
• Gastrointestinal disorder	13	14.2	9	10		
• Renal disorder	15	16.7	18	20		
• Musculoskeletal disorder	12	13.4	9	10		
Weight:	80.32± 16.72		89.45±11.19		t=0.073	0.156
Height:	170±10.28		176.26 ±5.19		t=2.964	0.104
BMI	31.02±11.02		32.01±12.45		t=1.486	0.208

**: Significant at P ≤ 0.05, χ^2= chi-squre test.*

Table (3): Comparison between the povidine iodine group and chlorohexidene regarding total Catheter Associated Urinary Tract Infection Assessment Profile (n=180):-

Total Catheter Associated Urinary Tract Infection Assessment Profile level	Povidine Iodine Group						Chlorohexidine Group						χ^2, P-value
	Immediately		After 72 hours		After 5 days		Immediately		Afte72 hours		After 5 days		
	No	%	No	%	No	%	No	%	No	%	No	%	
• No symptoms	84	93.4	24	26.7	27	30	71	90	68	86.7	60	66.7	
• Mild	3	3.3	52	46.7	36	40	6	6.7	6	6.7	21	23.3	20.686,
• Moderate	3	3.3	18	20	15	16.7	3	3.3	6	6.6	9	10	0.000*
• Severe	0	0	6	6.7	12	13.3	0	0	0	0	0	0	
χ^2, p	14.021, 0.000*						20.686, 0.05*						

**: Significant at P ≤ 0.05, χ^2= chi-squre test.*

Table (4): Comparison between the povidine iodine group and chlorohexidene regarding total systemic manifestations level and local Urinary Tract Infection level (n=180):-

Items	Povidine Iodine Group						Chlorohexidine Group						χ^2, P-Value
	Immediately		After 72 hours		After 5 days		Immediately		After 72 hours		After 5 days		
	No	%	No	%	No	%	No	%	No	%	No	%	
Total Systemic manifestation level													
▪ Mild	87	96.7	63	70	51	56.7	71	73.3	68	86.7	72	79.9	
▪ Moderate	3	3.3	18	20	18	20	9	10	12	13.3	6	6.7	6.014,
▪ Severe	0	0	9	10	21	23.3	0	0	0	0	12	13.4	0.000*
χ^2, p	11.541, 0.000*						19.500, 0.22						
Local UTI level													
• Mild	68	86.7	69	76.7	58	53.4	27	90	24	90	23	76.7	
• Moderate	12	13.3	9	10	21	23.3	3	10	4	13.3	5	16.7	5.024,
• Severe	0	0	12	13.3	21	23.3	0	0	2	6.7	2	6.6	0.001*
χ^2, p	5.604, 0.000*						19.517, 0.121						

**: Significant at P ≤ 0.05, χ^2= chi-squre test*

Table (5): Percentage distribution of Laboratory Investigations for the studied patients (n=180):-

Laboratory Investigatios	Povidine Iodine Group						Chlorohexidine Group						Q, p
	Immediately		After 72 hours		After 5 days		Immediately		After72 hours		After 5 days		
Leukocytes count Range Mean±SD	7-23.1 14.79±4.28		12.1-40.2 16.149± 4.727		16.2-50.7 17.383±5.579		4.5-27.2 13.203±4.423		5.2-33.1 13.596±4.995		7.5-33.2 12.290±7.21		0.038, 0.000*
CRP (mg/l) Mean±SD	52.716±34.87		72.666±56.49		68.476±51.40		40.01±40.01		54.106±43.52		49.70±44.83		0.750, 0.009*
Q, p	7.121, 0.001*						6.240, 0.204						
Urine culture	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**f, p**
Colony count/ml													
None	84	93.3	18	20	18	20	90	100	30	33.3	21	23.3	5.711, 0.003*
Sterile	0	0	48	53.3	15	16.7	0	0	39	43.3	39	23.3	
<10,000	6	6.7	18	20	21	33.3	0	0	9	10	18	20	
(10,000-100,000)	0	0	0	0	24	26.7	0	0	12	13.4	12	13.4	
>100,000	0	0	6	6.7	12	13.3	0	0	0	0	0	0	
Microorganisms													
None	84	93.4	66	73.3	33	36.7	90	100	69	76.7	60	66.6	7.021, 0.002*
E.coli	3	3.3	9	10	36	40	0	0	15	16.7	15	16.7	
Klebsiella	0	0	9	10	12	13.4	0	0	3	3.3	6	6.7	
Pseudomonas	0	0	6	6.7	3	3.3	0	0	3	3.3	6	6.7	
Candida	3	3.3	0	0	3	3.3	0	0	0	0	3	3.3	
E.coli & Klebsiella	0	0	0	0	3	3.3	0	0	0	0	0	0	

** : Significant at level P < 0.05, Q= Cochrane q test, f = anova test.*

Table (6) Correlation between Catheter Associated Urinary Tract Infection Assessment profile, socio-demographic characteristics, local Urinary Tract Infection manifestation, and systemic manifestations levels among the studied groups:-

Items	Catheter Associated Urinary Tract Infection Assessment Profile (CAP)											
	Povidine Iodine Group						Chlorohexidine Group					
	Immediately		After 72 hours		After 5 days		Immediately		After72 hours		After 5 days	
	r	p	r	p	r	p	r	p	r	p	r	p
Age:	-0.03	0.851	0.138	0.467	0.006	0.975	0.051	0.788	0.187	0.322	0.203	0.283
Gender:	-0.367	0.046	0.190	0.314	0.183	0.333	0.013	0.947	0.062	0.743	0.02	0.915
Marital status:	0.245	0.192	0.054	0.778	0.071	0.710	0.146	0.443	0.059	0.759	0.010	0.958
Educational level:	0.156	0.410	0.068	0.721	0.100	0.60	0.069	0.718	0.283	0.130	0.187	0.323
Occupation:	0.382	0.037	0.530	0.003*	0.479	0.02*	0.103	0.589	0.024	0.900	0.047	0.807
Residence:	0.101	0.596	0.004	0.985	0.165	0.385	0.073	0.701	0.165	0.382	0.116	0.542
Past medical history:	0.236	0.210	0.069	0.716	0.067	0.727	0.184	0.329	0.050	0.792	0.085	0.657
Surgical history:	0.174	0.357	0.207	0.272	0.007	0.973	0.017	0.930	0.184	0.331	0.027	0.889
Current diagnosis	0.051	0.789	0.296	0.112	0.339	0.067	0.092	0.630	0.059	0.756	0.215	0.254
BMI:	-0.142	0.455	0.022	0.910	0.034	0.858	0.037	0.845	0.066	0.728	0.145	0.444
Local manifestation	0.370	0.04*	0.046	0.811	0.269	0.151	0.660	0.000*	0.649	0.000*	0.338	0.068
Systemic manifestation	0.168	0.375	0.282	0.131	0.129	0.498	0.599	0.000*	0.682	0.000*	0.343	0.063

** : Significant at level P < 0.05, r= correlation coefficient.*

Discussion

Hospital infections are a significant cause of morbidity among ICU patients. Catheter-associated urinary tract infections (CAUTIs) account for approximately 5% to 15% of all nosocomial infections, and 60% to 80% of urinary system infections occur in patients with indwelling urinary catheters (10).

Finding of the present study revealed about three quarter of the studied patients in the two groups were male with the mean and standard deviation of age was (36.34±12.54 and 38.94±11.67). This finding was similar to **(Abd Elbaky et al., 2020)** in their study about "Comparative Study of Different Disinfectant Solutions on Reducing Catheter Associated Urinary Tract Infections among Critical Patients" who said that; the majority of the studied sample were male aged (38.77 ± 9.95, and 36.77 ± 11.4) years.

Chlorhexidine demonstrates better outcomes in reducing both the prevalence and severity of CAUTI-related symptoms compared to povidone-Iodine. This is evident in lower rates of fever, tenderness, and overall CAP scores in which within povidone-Iodine group majority of the studied patients (93.4%) had no symptoms, but this drastically dropped to about one third of them (30%) after 5 days. The proportion of patients with severe infection increased progressively, indicating worsening symptoms over time, while within chlorhexidine group; a higher percentage of patients remained symptom-free, with majority of the studied patients (90%) having no symptoms immediately and two thirds of them (66.7%) symptom- free after 5 day. This finding is similar to **(Atkins et al., 2020)** 18 entitled "Reducing catheter-associated urinary tract infections: a systematic review of barriers and facilitators and strategic behavioural analysis of interventions" who said that, choloroxidine is more effective in reducing prevalence of CAUTI.

According to the results of **(Movahedi et al., 2022)** about "Impact of Povidone-iodine Versus Chlorhexidine for Periurethral Cleaning Before Catheterization on Pyuria and Bacteriuria Among Emergency Department Patients" There was no difference in the bacteriuria rate and pyria rate in the two groups immediately, 72hours, and five days after catheterization. In this study the laboratory findings suggest that Chlorhexidine is more effective in controlling systemic inflammation (lower CRP and leukocyte counts) and preventing urinary tract infections (lower colony counts and microorganism prevalence), While povidone iodine demonstrated some effectiveness, its higher rates of microbial growth and persistent inflammation indicate a comparatively lower efficacy in managing infections over time.

These results support the preference for Chlorhexidine in reducing both systemic and localized infections in this clinical, while this finding is in contrast with **(Vahabi, Ghafari, & haghighat, 2019)** in their study about "10% povidone-iodine versus 2% chlorhexidine gluconate for Periurethral cleansing before catheterization among hospitalized patients: A randomized controlled trial" who mentioned that positive bacteriuria and micro-organism number had no significant difference between chlorhexidine gluconate and 10% povidone-iodine group 72 hours and 5 days after catheterization. Mild infection levels were higher in the Chlorhexidine group (90%) than in the Povidone Iodine group (53.3%) after 5 days. Severe UTI levels were more frequent in the Povidone Iodine group (23.3%) compared to the Chlorhexidine group (6.6%).

This finding supported by (**Abd-El Hak et al., 2022)** in their study titled with "Efficacy of Protocol of Hygienic Care by Chlorhexidine Gluconate on the Occurrence of Catheter Associated Urinary Tract Infection among Critical Ill Patients" who concluded that, chlorhexidine shows a A positive result in reducing Catheter-Associated Urinary Tract Infections (CAUTI) was observed, as there was a significant improvement in the total mean scores of laboratory studies both immediately after and one week following catheter insertion The chlorhexidine group had a significantly higher percentage of mild infection cases and fewer moderate-to-severe cases compared to the povidone iodine group in which fever, chills, inflammation, swelling, and allergies were consistently lower in the chlorhexidine group, particularly after 5 days. This suggests that chlorhexidine has better anti-inflammatory and antimicrobial properties within urinary catheterization.

This finding was in congruent with **(Mitchell et al., 2022)** entitled with "Effectiveness of meatal cleaning in the prevention of catheter-associated urinary tract infections and bacteriuria" who found that chlorhexidine was more effective than povidone iodine in reducing infection severity in urinary catheterization. Symptoms such as inflammation, fever, and swelling were consistently lower in the chlorhexidine group after five days, aligning with its superior anti-inflammatory and antimicrobial properties. This effectiveness highlights its potential for improving patient outcomes during catheter use.

Conclusion

The current study concluded that, using chlorhexidine gluconate in insertion of urinary catheter was statistically significant difference in reducing catheter associated urinary tract infection among critical patients than povidine iodine.

Recommendation

For patients

1- Performing perineal care with water or chlorhexidine prior to urinary catheter insertion can help decrease the risk of CAUTI.

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