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RESEARCH ARTICLE

A COMPARATIVE STUDY TO EVALUATE THE EFFECTIVENESS OF BETADINE VS NORMAL SALINE FOR CATHETER CARE IN REDUCING URINARY TRACT INFECTION AMONG PATIENTS WITH INDWELLING CATHETER IN A SELECTED HOSPITAL AT PERAMBALUR DISTRICT

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ABSTRACT

Objective: To compare the effectiveness between Betadine (Group I) and Normal saline dressing (Group II) for catheter care among patients with indwelling catheter. **Hypothesis:** There is a significant difference between the pre test level of urinary tract infection among patients with indwelling catheter in Group I, & Group II. There is no statistically significant association between the urinary tract infection among Group I, Group II patients with indwelling catheter with their selected socio demographic and clinical profile. **Design:** Quasi experimental design. **Setting:** patients in a selected hospital at Perambalur district. **Sample:** 60 catheterized patients, 30 patients were assigned for Betadine group and 30 patients assigned for Normal saline group. **Sampling technique:** Purposive sampling technique. **Intervention:** catheter protocol was followed for catheter care except for altering the solution. The catheter care was given till the day of removal of catheter and after six days clinical symptoms of UTI was assessed and if the symptoms are present above the score of 7, then the urine specimen was obtained for urine culture and microscopic analysis by the investigator. **Tool:** UTI clinical symptoms checklist was assessed and the data were interrupted and analyzed. **Results:** Clinically there was a significant difference in the rate of Urinary Tract Infection between the betadine & normal saline groups but statistically it's not proven. **Conclusion:** This study supported that the usage of 5% betadine was not inferior to Normal saline for catheter care. Hence the 5% betadine solution can be recommended in clinical practice, to reduce the incidence of Urinary Tract Infection, which is cost effective.

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INTRODUCTION

Health is a possible gift of nature to man and he must give a return gift to nature by preserving and enhancing his health potential in line with various natural situations. Health is the most precious possession of an individual and one must take optimal care of it. The best way to maintain good health is to be on guard against any alarming, unusual changes that one may experience. This entails regular medical checkup at given interval so that one is kept free of disease and /or deformity (1). A disease or disorder is a condition that impairs the proper function of the body or of one of its parts. Every living thing, both plants and animals, can succumb to disease. Hundreds of different diseases and disorders exist. Each has its own particular set of symptoms and signs, clues that enable a physician to diagnose the problem. A symptom is something a patient can detect, such as fever, bleeding, or pain. A sign is something a doctor can detect, such as a swollen blood vessel or an enlarged internal body organ. Every disease has a cause, although the accuses of some (2). Urinary tract: The organs of the body that produce, store, and discharge urine. These organs include the kidneys, ureters, bladder, and urethra (3).

A urinary tract infection (UTI) is a bacterial infection that affects any part of the urinary tract. Symptoms include frequent feeling and or need to urinate, pain during urination, and cloudy urine (4). The urinary tract infection is defined as an infection of one or more structures in the urinary system. Most UTIs are caused by gram-negative bacteria, most commonly Escherichia coli or species of Klebsiella, Proteus, Pseudomonas, or Enterobacter, although other strains, such as Staphylococcus and Serratia, are emerging. The condition is more common in women than in men (5) A urinary tract infection (UTI) is a bacterial infection that affects any part of the urinary tract. Symptoms include frequent feeling and or need to urinate, pain during urination, and cloudy urine (6). Urinary tract infections are responsible for over a third of all hospital acquired infections. Most of these (at least 80%) follow some type of invasive procedures or instrumentation of the urinary tract, usually catheterization (7). A UTI can happen anywhere in your urinary tract. The urinary tract is made up of kidneys, ureters, bladder, and urethra. Most UTIs only involve the urethra and bladder, in the lower tract. However, UTIs can involve the ureters and kidneys, in the upper tract. Although upper tract UTIs are more rare than lower tract UTIs, they're also usually more severe (8).

A catheter associated urinary tract infection, whose development is favoured by a prolonged catheterization, inadequate catheter care, catheter care with unsterile technique Such infections include fungal and bacterial infections and are aggravated by the reduced resistance of individual patients to normal flora (9).

Problem statement: “A comparative study to evaluate the effectiveness of betadine vs normal saline for catheter care in reducing urinary tract infection among patients with indwelling catheter”

Objectives

Objectives were

- To assess the UTI among patients receiving catheter care.
- To evaluate the effectiveness of Betadine in reduction of UTI among catheterized patient.
- To evaluate the effectiveness of Normal saline in reduction of UTI among catheterized patients.
- To compare the effectiveness of betadine versus normal saline in reduction of UTI among patients with indwelling catheter.
- To find out the association between the pre test level of UTI among patients with indwelling catheter with their selected demographic variable in experimental group I.
- To find out the association between the pre test level of UTI among patients with indwelling catheter with their selected demographic variable in experimental group II.

Hypotheses

H1: There is a significant difference between the reduction of UTI among patients with indwelling catheter in Betadine Vs Normal saline group.

H2: There is a significant association between pre test level of UTI with their selected variables of experimental group I patients

H3: There is a significant association between pre test level of UTI with their selected variables of experimental group II patients

Operational Definitions

Evaluate: In this study it refers to the process used to evaluate the UTI by using UTI symptoms checklist.

Effectiveness: It refers to the changes in the UTI symptoms brought out by giving catheter care with Betadine and Normal saline and it is measured by the Urinary Tract Infection symptoms assessment questionnaire tool among patients with indwelling catheters.

Urinary tract infection: It is the colonization of the urinary tract with the microorganism along with the presence of UTI symptoms such as elevated temperature above 100°F, supra pubic tenderness, burning micturition and a positive microscopic analysis findings with presence of the pus cells, casts, bacteria and other abnormal cell.

Indwelling catheter: A catheter is defined as a drainage tube that is inserted into the bladder through the urethra, is left in place and is connected to a closed drainage system. The catheter is sometimes called a “Foley catheter” or indwelling urinary catheter.

Catheter care: Cleansing the urethral meatus, the skin surrounding the catheter insertion site and perineum for patients with retention catheter who are bed ridden.

Betadine solution: It is a topical microbial solution which is used in the patients with indwelling catheter and it contains 5% povidone iodine.

Normal saline: It is a sterile isotonic solution which contains 0.9gram sodium chloride in 100 ml of water.

Delimitations

- The period of study is limited to 4 weeks.
- The sample size is limited to 60.
- The study is limited to the age group of above 20 yrs.
- The study is limited to only one hospital.

MATERIAL AND METHODS

Research Approach: Quantitative evaluative research approach.

Research Design: Quasi experimental design.

Description of Tool

Section-A: Demographic Variable: It includes Age, Sex, Religion, Marital status, Education, Occupation, Family Monthly Income, Locality, and Dietary pattern. No score was allotted for this section and it was used for descriptive analysis.

Section-B: structured questionnaires: It includes the clinical profile of the patients such as Diagnosis, Comorbidities, Indication of catheterization, Previous experience of catheterization, Previous history of Urinary Tract Infection, Duration of catheterization, Admitted unit, and Administration of antibiotics. No score was allotted for this section and it was used for descriptive analysis.

Section-C: Self made UTI symptoms checklist

Part – I: Self made UTI symptoms checklist was used to assess the UTI. No score was allotted for this section. Only descriptive data was collected.

Part – II: The UTI symptoms checklist was designed to assess UTI during hospital stay, before and after intervention. It contains UTI symptoms such as the temperature, dysuria, pyuria, suprapubic tenderness, discomfort. It contains various features of UTI such as the urgency of urination, color of the urine, strong odour of the urine, temperature, and discomfort which was comprehensively scored as severity of UTI from (0-9). The scoring was: Yes -1 score and No - 0 Maximum score=9.

Score Interpretation

Descriptionscore

DESCRIPTION	SCORE
No UTI	0
Mild UTI	1-3
Moderate UTI	4-6
Severe UTI	7-9

Data collection

Data collection procedure: After obtaining permission from ethical committee in a selected hospital at Perambalur district. Rapport established patients with indwelling catheter. After a brief introduction about the study its purpose, and procedure, oral consent was obtained from the patients and data collection was done. Purposively assigning the samples for experimental group I and experimental group II. Pretest was done on the first day using UTI assessment checklist and Urinary Tract Infection was graded. Patients in the experimental group I received 5% Povidone iodine solution for catheter care and experimental group II received normal saline for catheter care every morning, duration of each care takes 15 to 20 minutes approximately, catheter care is done once a day for 7 consecutive days. Post test was conducted after 6 days of intervention using UTI assessment checklist and scoring system for both the groups. Same procedure followed for 4 weeks until the fulfilment of required samples.

Plan for data analysis: After the data collection, data were organized, tabulated, summarized and analyzed. The data were analyzed according to the objectives of the study by using descriptive and inferential statistics. Collected data is to analyzed by using both descriptive and inferential statistics.

Section- A: Distribution of the demographic variables of patients with indwelling catheter.

Demographic variables	Normal saline group		Betadine group	
	NO	%	NO	%
Age in years				
20-30 yrs	5	16.66	3	10
31-40yrs	7	23.33	8	26.66
41-50yrs	6	20	5	16.66
51-60yrs	4	13.33	2	6.66
61 yrs and above	8	26.66	12	40
Sex				
Male	10	33.33	8	26.66
Female	20	66.66	22	73.33
Religion				
Hindu	15	50	11	36.66
Christian	9	30	9	30
Muslim	6	20	10	33.33
Marital status				
Married	17	56.66	19	63.33
Unmarried	6	20	5	16.66
Widow	7	23.33	6	20
Education				
Illiterate	5	16.66	10	33.33
Primary education	7	23.33	5	16.66
Secondary education	10	33.33	6	20
Under graduate	5	16.66	7	23.33
Post graduate	3	10	2	6.66
Occupation				
Home maker	9	30	10	33.33
Daily wages	10	33.33	4	13.33
Government employee	1	3.33	2	6.66
Private employee	8	26.66	10	33.33
Un employee	2	6.66	4	13.33
Family monthly Income				
Rs 1000-5000	3	10	5	16.66
Rs 5001-10000	9	30	5	16.66
Rs 10001-15000	9	30	10	33.33
Rs 15001 & above	9	30	10	33.33
Location				
Urban	12	40	10	33.33
Rural	18	60	20	66.66
Dietary pattern				
Vegetarian	7	23.33	9	30
Non vegetarian	18	60	13	43.33
Ova vegetarian	4	13.33	5	16.66
Others	1	3.33	3	10

This table shows that the majority of the patients in betadine group 12(40%) were in the age group of above 61 yrs, whereas in normal saline group majority of the patients 8 (26.6%) were in the age group of above 61 years,7(23.3%) With regard to Gender, majority of the patients in betadine group 22(73.33%) were female, and in experimental group II patients with indwelling catheter 20(66.66%) were female With regard to Religion, majority of the patients in experimental group I 11 (36.6%) were belongs to Hindu religion, in experimental group II 15 (50%) also belongs to Hindu. While comparing marital status, majority of the patients in experimental group I 19(63.33%) were married, whereas in experimental group II majority of the patients 17 (56.66%) were married. According to Education, majority of the patients in betadine group 10(33.3%) had illiterate, but in normal saline group majority 10 (33.33%) were studied up to secondary education. By seeing occupational status, majority of the patients in betadine group 10 (33.33%) were unemployed In normal saline group 10 (33.33%) were daily wages. While discussing the family monthly income, majority of the patients in betadine group 10 (33.33%) were earning between Rs. 10001- 15000, But in the normal saline group 9 (30%) were earning between Rs. 10001- 15000. According to locality of the patients in betadine group the majority of people 20(66.66%) were residence in rural area In normal saline group the majority of people 18(60%) were residence in rural .While discussing the dietary pattern, majority of the patients in betadine group 13 (43.33%) were non vegetarian,. In normal saline group majority 18 (60%) were non vegetarian.

Section B: Distribution of patients according to their clinical profile with indwelling catheter

N=30
n=30

Clinical profile	Betadine group		Normal saline group	
	Frequency	Percentage	Frequency	Percentage
Diagnosis				
Cardiac	6	20	9	30
Neuro	9	30	8	26.66
Others	15	50	13	43.33
Comorbidities				
Diabetes mellitus	12	40	17	56.66
Kidney disease	7	23.33	6	20
Others	11	36.66	7	23.33
Indication of catheterization				
Urinary incontinence	8	26.66	12	40
Unconsciousness	7	23.33	6	20
Neuro muscular weakness	6	20	5	16.66
Post operative period	9	30	7	3.33
Previous experience of catheterization				
Yes	12	40	20	66.66
No	18	60	10	33.33
Previous history of UTI				
Yes	9	30	7	23.33
No	21	70	23	76.66
Duration of catheterization				
3-5 days	7	23.33	5	16.66
6-7days	10	33.33	11	36.66
8-12days	3	10	7	23.33
Above 12 days	10	33.33	7	23.33
Admitted unit				
ICU	6	20	7	23.33
Semi ICU	20	13.33	3	10
Medical ward	11	36.66	9	30
Surgical ward	9	30	11	36.66
Administration of antibiotics				
Yes	5	16.66	13	43.33
No	25	83.33	17	56.66

SECTION C : Distribution of patients according to their UTI assessment checklist

N=30
n=30

S.No	CHARACTERISTICS	BETADINE GROUP		NORMAL SALINE	
		FRE	%	FRE	%
1)	Temperature Upto 98.6 F	27	90	25	83.33
	Above 100 F	3	10	5	16.66
2)	Supra pubic tenderness Present	7	23.33	10	33.33
	Absent	23	76.66	20	66.66
3)	Pus discharge Present	5	16.66	7	23.33
	Absent	25	83.33	23	76.66
4)	Cloudy urine Present	8	26.66	7	23.33
	Absent	22	73.33	23	76.66
5)	Strong odor urine Present	5	16.66	8	26.66
	Absent	25	83.33	22	73.33

6)	Swelling around the meatus				
	Present	2	6.66	8	26.66
	Absent	23	93.33	22	73.33
7)	Dysuria				
	Present	11	36.66	10	33.33
	Absent	19	63.33	20	66.66
8)	Urgency of urination				
	Present	8	26.66	5	16.66
	Absent	22	73.33	25	83.33
9)	Discomfort at the back and abdomen				
	Present	2	6.66	5	16.66
	absent	28	93.33	25	83.33

Table 3 describes the distribution of subjects according to their clinical symptoms of UTI at post test(after 3 days of catheter care).

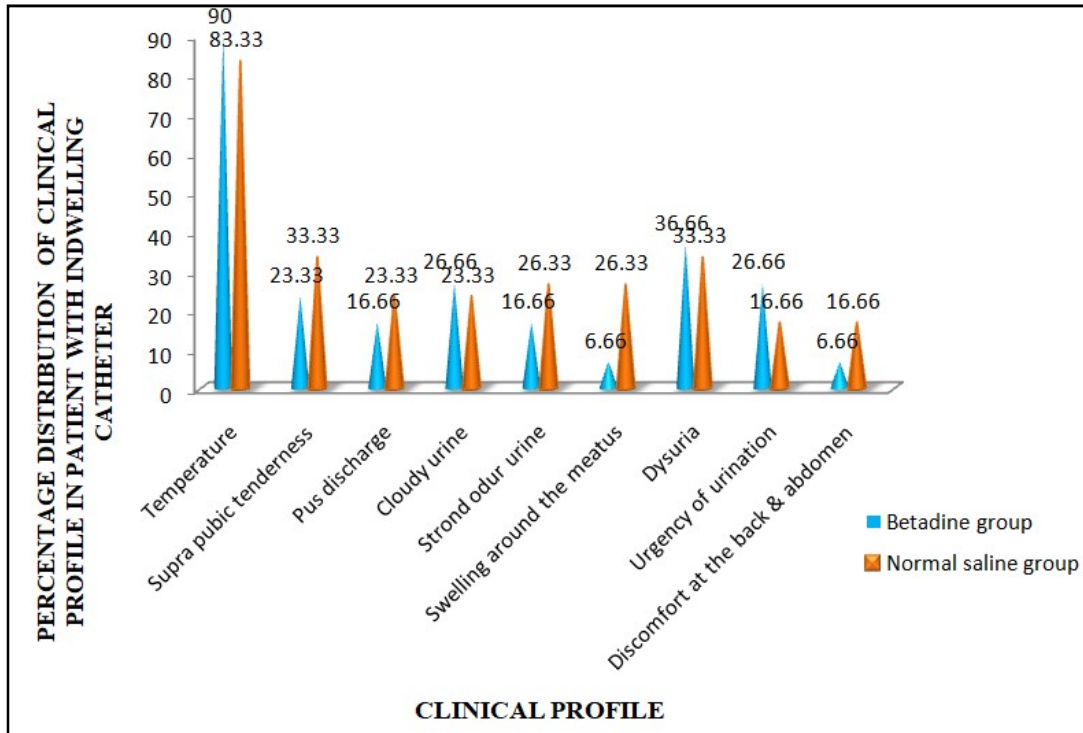


Figure 1. Diagram showing Percentage distribution of UTI among patients with indwelling catheter in experimental group I & II according to clinical profile

Section D. Pretest and post test level of catheterized patients receiving catheter care with betadine

UTI symptoms	No UTI (0)		Mild (1-3)		Moderate (4-6)		Severe (7-9)	
	No	%	No	%	No	%	No	%
Pretest	0	0	3	10	16	53.33	11	36.66
Posttest	5	16.66	20	66.66	5	16.66	0	0

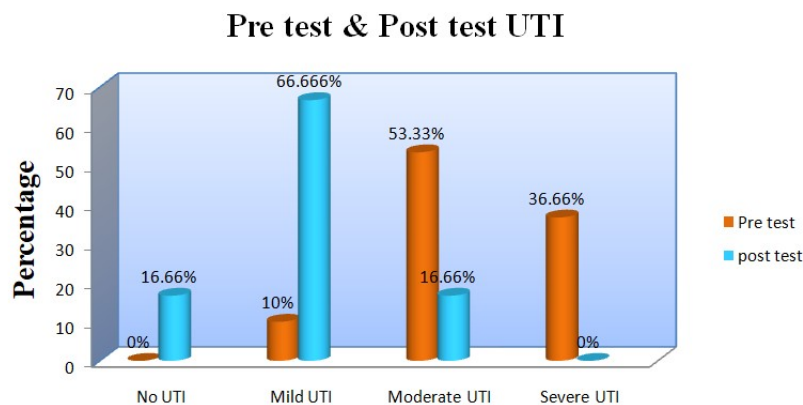


Figure 2. Diagram showing Percentage distribution of pre test&post test UTI among patients with indwelling catheter in experimental group I

Section E: Pretest and post test UTI of patients receiving catheter care with Normalsaline

UTI symptoms	No UTI (0)		Mild (1-3)		Moderate (4-6)		Severe (7-9)	
	No	%	No	%	No	%	No	%
Pretest	0	0	1	3.33	8	26.66	21	70
Posttest	10	33.33	15	50	5	16.66	0	0

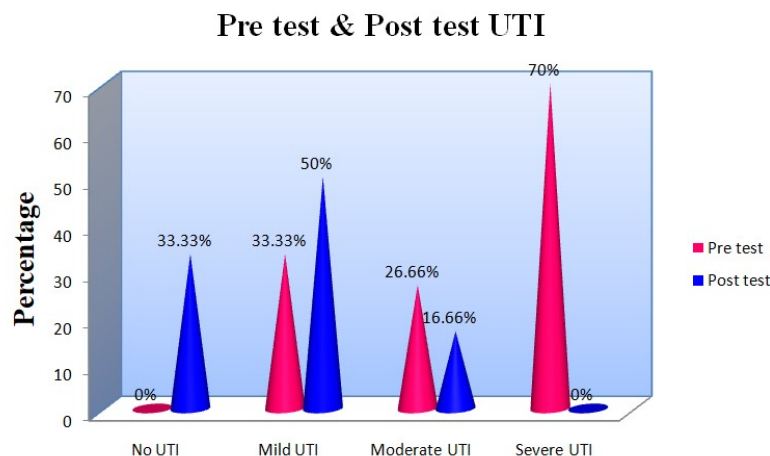


Figure 3. Cylindrical diagram showing Percentage distribution of pre test & post test UTI among patients with indwelling catheter in experimental group II

Section F. Effectiveness of betadine versus normal saline among patients with indwelling catheter in the experimental group I (Betadine)

Experimental Group-I	Mean	SD	Mean Difference	Paired “t” Value	df
Pretest	6.46	0.88	0.2691	t=21.448	29
Posttest	2.6	0.610		p=0.005 s***	

Section G.: Effectiveness of normal saline among patients with indwelling catheter in the experimental group II (Normal saline)

Experimental Group-II	Mean	SD	Mean Difference	Paired “t” Value	Df
Pretest	5.33	1.2020	0.486	t=17.22	29
Posttest	2.4	0.716		p=0.005 s***	

Table 9: Association of pre-test UTI among patients with indwelling catheters with their selected demo graphic variables in the experimental group I. (Betadine)

S. No	Demographic variables	Chi-square	Table value	DF	Level of significance
1)	Age in years 1.1) 20- 30 yrs 1.2) 31-40 yrs 1.3) 41-50 yrs 1.4) 51-60 yrs 1.5) above 61 yrs	$\chi^2=4.16$	21.03	12	NS
2)	Sex 2.1) Male 2.2) Female	$\chi^2=1.64$	7.82	3	NS
3)	Religion 3.1)Hindu 3.2)Christian 3.3)Muslim	$\chi^2=2.127$	12.59	6	NS
4)	Marital status 4.1)Married 4.2)Unmarried 4.3)Widow	$\chi^2=1.214$	12.59	6	NS
5)	Education 5.1)Illiteate 5.2)Primary education 5.3)Secondary education 5.4)Under graduate 5.5)Post graduate	$\chi^2=11.107$	21.03	12	NS
6)	Occupation 6.1) Home maker 6.2)Daily wages 6.3)Government employee 6.4)Private employee	$\chi^2=19.23$	21.03	12	NS

	6.5)Un employee				
7)	Family monthly income 7.1)Rs1000-5000 7.2)Rs5001-1000 7.3)Rs 10001-15000 7.4)above Rs15001	$\chi^2=18.55$	16.92	9	NS
8)	Location 8.1)Urban 8.2)Rural	$\chi^2=2.694$	7.82	3	NS
9)	Dietary pattern 9.1)Vegetarian 9.2)Non- vegetarian 9.3)Ova vegetarian 9.4)Others	$\chi^2=6.784$	16.92	9	NS

Section J. Association of pre test level of UTI with their selected demographic variables in the experimental group II (Normal saline)

S. No	Demographic variables	Chi-square	Table value	DF	Level of significance
1)	Age in years 1.1) 20- 30 yrs 1.2)31-40 yrs 1.3)41-50 yrs 1.4)51-60 yrs 1.5)above 61 yrs	$\chi^2=7.104$	21.03	12	NS
2)	Sex 2.1)Male 2.2)Female	$\chi^2=1.54$	7.82	3	NS
3)	Religion 3.1)Hindu 3.2)Christian 3.3)Muslim	$\chi^2=1.488$	12.59	6	NS
4)	Marital status 4.1)Married 4.2)Unmarried 4.3)Widow	$\chi^2=2.199$	12.59	6	NS
5)	Education 5.1)Illiterate 5.2)Primary education 5.3)Secondary education 5.4)Under graduate 5.5)Post graduate	$\chi^2=5.768$	21.03	12	NS
6)	Occupation 6.1) Home maker 6.2) Daily wages 6.3) Government employee 6.4) Private employee 6.5) Un employee	$\chi^2=7.1655$	21.03	12	NS
7)	Family monthly income 7.1) Rs1000-5000 7.2) Rs5001-1000 7.3) Rs 10001-15000 7.4) above Rs15001	$\chi^2=4.189$	16.92	9	NS
8)	Location 8.1)Urban 8.2)Rural	$\chi^2=14.293$	7.82	3	NS
9)	Dietary pattern 9.1)Vegetarian 9.2)Non- vegetarian 9.3)Ova vegetarian 9.4)Others	$\chi^2=1.732$	16.92	9	NS

DISCUSSION

Findings based on the objectives

The first objective of the study was to assess the Urinary Tract Infection among patients with receiving catheter care: In experimental group I, the pre test Urinary Tract Infection revealed that majority 70% had severe UTI and in the post test majority 50% had mild UTI and 3.33% of had mild UTI, and 33.33 had no UTI. In experimental group II, the pretest Urinary Tract Infection UTI revealed that majority 53.33 had moderate UTI and 36.66% had severe UTI in the post test majority 66.66% had mild UTI and 16.66% had moderate UTI and no UTI.

The second objective of the study was to evaluate the effectiveness of betadine in reduction of Urinary Tract Infection among patients within dwelling catheter. The calculated pre test mean score of urinary tract infection was 6.46 ± 0.88 and the posttest urinary tract infection mean score was 2.6 ± 0.61 calculated, t -value 21.448 was significant at $p < 0.005$.

Based on the findings the stated hypothesis H1: There is a significant difference between the reduction of urinary tract infection among patients with indwelling catheter who receive 5% betadine for catheter care was accepted.

The third objective of the study was to evaluate the effectiveness of Normal saline in reduction of UTI symptoms among patients within dwelling catheter.

The calculated pre test mean score of Urinary Tract Infection was 5.33 ± 1.205 and the posttest Urinary Tract Infection mean score was 2.4 ± 0.716 . calculated, t -value 17.22 was significant at $p < 0.005$.

Based on the findings the stated Hypothesis H1: There is a significant difference between the reduction of urinary tract infection among patients with indwelling catheter who receive normal saline for catheter care was accepted.

The fourth objective of the study was to compare the effectiveness of betadine versus normal saline in reduction of urinary tract infection among patients with indwelling catheter.

In experimental group I, the post test mean score and standard deviation was 6.46 and 0.88 . In experimental group II post test mean score and standard deviation was 2.4 and 0.716 . The calculated, t -value was 2.4265 indicating that there was a significant difference between post test level of urinary tract infection related symptoms in experimental group I and experimental group II at $p < 0.005$ level.

Based on the findings the stated Hypothesis H1: there is a significant difference between the betadine versus normal saline in reduction of urinary tract infection among Patients within dwelling catheter was accepted.

The fifth objective was to find out the association between the pre test level of urinary tract infection among patient with indwelling catheter with their selected demographic variable in experimental group I.

Findings revealed that the demographic variables such as age in years, gender, religion, marital status, education, occupation, family monthly income, location and dietary pattern had not shown statistically significant association with the pre test level of urinary tract infection symptoms.

Based on the findings the stated Hypothesis H2: There is no significant association between pre test level of urinary tract infection with their selected demographic variables and clinical profile of patients with indwelling catheter who receive 5% betadine solution application was not accepted.

The sixth objective was to find out the association between the pre test level of urinary tract infection among patient with indwelling catheter with their selected demographic variable in experimental group II.

Findings revealed that the selected demographic variables such as age in years, gender, religion, marital status, education, occupation, family monthly income, locality, and dietary pattern, had shown no significant association with the pre test level of urinary tract infection related symptoms.

Based on the findings the related Hypothesis H3: There is no significant association between pre test level of urinary tract infection with their selected demographic variables and clinical profile of patients with indwelling catheter who receive normal saline was not accepted.

Recommendations

- A comparative study can be conducted to assess the effect of betadine Vs chlorhexidine solution for catheter care in reducing the urinary tract infection.
- A study can be conducted to assess the incidence rate of nosocomial infections among patients admitted in ICU.
- A comparative study can be conducted to assess the effect of betadine Vs chlorhexidine Vs sterile water for catheter care in reducing the urinary tract infection.
- A study can be conducted to assess the prevalence rate of catheter associated urinary tract infection among patients who admitted in various settings.
- A similar kind of study can be conducted for a larger group to generate the findings.
- Along it a similar study can be conducted to assess the effect of 10% betadine with sterile water in reducing urinary tract infection.
- The same study can be conducted among different age groups.
- The study can be conducted by using other techniques of the catheter care with betadine that with conventional bladder irrigation with betadine Vs Chlorhexidine.
- This study can be done as comparative studies between male and female patients.

CONCLUSION

The study results showed that betadine solutions was more effective than normal saline in reducing the urinary tract infection. Clinically there is a significant reduction in the rate of UTI in Betadine group, but statistically there is no significant difference between the Normal saline and betadine in reduction of Urinary Tract Infection. 5% Betadine can be recommended for urinary catheter care in clinical practice which helps for evidence based practice as well as cost effective. This study findings agree with various other similar studies conducted.

REFERENCES

- 1) Health Care Ethics | Internet Encyclopedia of Philosophy. <https://iep.utm.edu/h-c-ethi/>. Accessed 1 Feb. 2017.
- 2) *Human disease*. (n.d.). Britannica Kids. <https://kids.britannica.com/students/article/human-disease/274019>
- 3) *The urinary tract & how it works—Niddk*. (n.d.). National Institute of Diabetes and Digestive and Kidney Disease. <https://www.niddk.nih.gov/health-information/urolologic-diseases/>
- 4) *The urinary tract & how it works—Niddk*. (n.d.). National Institute of Diabetes and Digestive and Kidney Diseases. <https://www.niddk.nih.gov/health-information/urolologic-diseases/>
- 5) Guentzel, M. N. (1996). *Escherichia, klebsiella, enterobacter, serratia, citrobacter, and proteus*. In S. Baron (Ed.), *Medical Microbiology* (4th ed.). University of Texas Medical Branch at Galveston. <http://www.ncbi.nlm.nih.gov/books/NBK8035/>
- 6) Kovacs, J. S. (n.d.). Urinary tract infection(Uti). WebMD. <https://www.webmd.com/women/>
- 7) Catheter-associated urinary tract infections (Cauti) | hai | cdc. (2019, October 1). https://www.cdc.gov/hai/ca_uti/uti.html
- 8) Wei Tan, C., & Chlebicki, M. P. (2016). Urinary tract infections in adults. *Singapore Medical Journal*, 57(9), 485–490. <https://doi.org/10.11622/smedj.2016153>
- 9) Werneburg, G. T. (2022). Catheter-associated urinary tract infections: Current challenges and future prospects. *Research and Reports in Urology*, 14, 109–133. <https://doi.org/10.2147/RRU.S273663>
