



Experimental evaluation of an Ayurvedic drug on dissolution of Urinary Catheter and Stents encrustation .

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ABSTRACT

*Encrustation, a crust or hard coating on the surface of urinary stent, is developed due to the formation of biofilm further leads to blockage of Urinary catheters and increases renal pressure and ultimately damage renal parenchyma tissues. **Material & Methods-** 40 albino rats procured from Central animal house of and kept at Centre of Experimental Medicine and Surgery Department of Banaras Hindu University, Varanasi. They were grouped into control, preventive and treatment. All Albino rats were intervened with the implantation of Urinary catheters bead in the urinary bladder following Suprapubic cystostomy under intraperitoneally injected pentobarbitone sodium in a dose of 30-60 mg /kg body weight. **Drug schedules-**One Ayurvedic drug(taking equal quantity of Bryophyllum pinnatum and Crataeva nurvala quath extract) was given in a dose of 35 mg/100 gm body weight to Preventive group(7 days before and 30 days after implantation) and 30 days to Treatment group. Study period was of two months and Urine out, Urine pH , Plasma electrolytes and Urinary electrolytes were evaluated in a period of 15 days interval and also plain x-ray abdomen done in all the group. **Discussion & Result** -statistical p-value shows significant in increasing Urine output & Serum Potassium in both Preventive and Treatment group where as Urine pH was remarkably decreased to normal 5.5 to 6.5. Serum Calcium, Serum Sodium& Urinary sodium were also shown remarkably decreased .p value was also shown highly significant in both the group in comparison to control group in reducing the catheter encrustation. Serum Uric acid and Serum phosphorus were within their normal limit in the entire group.*

Key words-Encrustation,Stent,catheter,quath extract.

Introduction- According to the statistics of National Kidney Foundation, kidney and urologic diseases affect at least 5% of the population and cause over 260,000 deaths. Prostate cancer is the most common cancer, Benign Prostatic Hyperplasia is about 10 % ,Bladder cancer is also about 50,000 people affected in each year. Kidney cancer occurs in 30,000 patients per year, Urolithiasis is also prevalent i.e., about 1-15% and after surgical operative measures frequent recurrence seen that is about 50 to 55 % 1.5 lakh people per year are affected with urologicaTrauma .The people who are suffered with above they are compelled for surgical operative measures. . As a result of these surgical operation, it is mandatory on part of the Urologists to place Urinary Stents or Catheters on routine and regular basis for facilitating urinary drainage, for irrigation of medicaments, to expel accumulations, to prevent post operative obstruction, edemas & also facilitating passage of stone fragments and to prevent further stricture and facilitating ureteral healing.

When biomaterials placed in the urinary system it activates platelet growth factor leading to immunological reaction and also aggravates to the inflammatory markers ultimately to development of an ulcer on urothelium. Microbacteria also entered through intralurethral routes and secreted of an extracellular poly saccharide matrix. That helps for the development of a biofilm. Embedded bacteria are difficult to cure as antibiotics have little role to penetrate over biofilm. Biochemical and optical analyses of stent encrustations by Robert et al revealed that these encrustations consist mainly of calcium oxalate, calcium phosphate and ammonium magnesium phosphate. According to one study the stent encrustation rate increased from 9.2% at <6 wks, through 47.5% at 6-12 wks to 76.3% at >12 weeks. Up to a 30% rate of luminal blockage has been documented with indwelling times of up to 3 months. Blockage of the stents causes reflux of urine and lead to increased renal and pelvic pressure and damages the renal parenchymal tissue.



Aims of the Research- Urinary Stents and catheters offer a simple and effective drainage method for the urinary tract. Long term use of Urinary stents and catheters are very frequent for therapeutic purpose of many urinary diseases and now considered a standard and indispensable urologic tool. Management of encrustation represents a continuum from therapeutic nuisance to major urologic intervention and finally it requires removal of stents and catheters and the purpose for which it was placed become defeated.

As per the literature of the Ayurvedic Text that a good number of drugs have been mentioned for the treatment of Asmari (Urolithiasis). Varuna (*Crataeva nurvala*) and Pashanbhed (*Bryophyllum pinnatum*) are among them and are being practiced by the concerned physician as well as surgeon since long. This drug reduces metabolic diseases like Stone disease and the encrustation as both stone and encrustation have same chemical constituents.

Materials and Methods-

1. Experimental Animal.

40 number's of Albino rats of either sex weighing between 150 -200 grams were procured from the Central animal house of the Institute of Medical sciences, BHU, Varanasi. They were kept in experimental animal room of the Centre of Experimental Medicine & Surgery of Institute of Medical sciences, BHU and the rats were housed in polyacrylic cages (38 cm × 23 cm × 10 cm) with not more than 3 animals per cage and maintained under standard laboratory conditions with natural dark and light cycle. They were allowed free access to standard dry diet and tap water ad libitum. The study was conducted after getting approval from the Ethical committee of the Institute of Medical sciences, Banaras Hindu University, Varanasi.

Group I – (Control group) were subjected to implant equally with the beads of urinary stents & catheters in the urinary bladder by performing suprapubic cystostomy & they were kept for control study and allowed only distilled water for two months.

Group II – (Preventive group) were studied for preventive aspect by providing a dose of 35 mg drug extract /100 gm of the body weight 7 days before & 1 month after the implantation of beads of urinary stent and catheter and then they were evaluated for the study of the dissolution of encrustation.

Group III- (Treatment group) were studied for drug efficacy by providing a dose of 35 mg drug extract /100 gm of the body weight for I month after the implantation of urinary stent and catheter bead in the urinary bladder.

In the above experimental study group following items have been evaluated i.e., 1. Urine pH , 2. Urine Output, 3. Urinary electrolytes 4. Plasma electrolytes, 5. Physical analysis of the encrustation and 6. Histopathological study of the Kidney & liver.

Drug preparation (SOP of the Drug)-

50 kg crude drug i.e., 30 kg whole plant of parnabeej (*Bryophyllum pinnatum*) and 20 kg Bark of Varuna (*Crataeva nurvala*) were procured from the whole seller of Herbs of the Varanasi. Physical Characteristics & proper identification and taxonomy study were carried out by the Botany Dept, Faculty of Science, BHU, Varanasi. Then the drug was dried under shade and cut in to small pieces in a separate sheet. Quath of the above drug has been prepared separately as per the reference mentioned in the Bhaishajya Ratnavali text & Yoga ratnakar .i.e., Small pieces of the drug were kept in a aluminium vessel and then add 16 parts water ,boil it till it remains to 1/4th part . Then it was filtered .Filtered product were kept in the drier for 72-80 hrs .After proper dried it was weighed and found that a total amount of 2400 gram extraction were yield(600 gm each).

- Drug-35mg/100 gm body weight.
- A solution was made taking 3.500gm /100 ml of distilled water.
- Anaesthetic drug for experimental animal - Nembutol (Pentobarbitone sodium)-30-60 mg/IP/kg body weight.

Drug Administration –The drug was given orally by oesophageal intubation method with the help of a fine rubber catheter connected with measured glass syringe.

Collection of Different Sample-

1-Urine-Urine was used to collect the urine in a metabolic cage. It has two separate outlets one for urine and other one for feces. The outlet for urine was connected to the bottle containing liquid paraffin to check the excess evaporation of urine.

2.pH measurement-pH of the 24 hrs urine was recorded by pH paper & pH meter .

3.Preservation of urine-The collected amount of urine was kept into a clean glass bottle with intact cork.The decomposition of urine and precipitation of Electrolytes were avoided by adding dilute Hcl 100 ml per litre of urine.

4.Collection of Blood Sample-collection of blood sample was done by puncturing the optic artery through capillary tube.After collection,the blood samples were allowed to coagulate and the serum was separated by centrifuging the sample and separated serum collected and preserved for further estimation.

Operative procedure-

Aim-Development of encrustation/stone on the surface of bead of catheter/stent implanted inside the bladder of the animal following suprapubic cystotomy procedure.

Apparatus-Beads of Catheters measured 2*2*2 mm weight 7mg / 2mm of 5fr Stent Wt 4mg, Mosquito forceps, Needle holder, Round body needle chromic Catgut 4-0, Scissor, Skin Retractor & Sterilised Cotton & Gauze .

Chemicals-Savlon, Spirit, Betadine,

Anaesthesia-Intraperitoneal injection of Nembutol Sodium in the dose of 30 mg /kg body weight.

Procedure-

The rats were anaesthetized by injecting Nembutol sodium solution in above dose intraperitoneally .After taking proper antiseptic measure a vertical incision measuring less than one cm was made over the suprapubic region in the midline and few mm above the root of penis. Firstly the skin was incised and was held in position by mosquito forceps on either side and abdomen was opened and following the suprapubic

Groups	URINE OUTPUT Mean \pm SD				
	Day 0	Day 15	Day30	Day45	Day60
Control	8.425 \pm 0.478	8.02 \pm 0.45	7.52 \pm 0.411	7.07 \pm 0.53	6.72 \pm 0.63
Treatment	8.525 \pm 0.585	9.87 \pm 0.579	11.15 \pm 0.77	12.2 \pm 0.92	13.5 \pm 1.29
Preventive	8.875 \pm 0.457	11.27 \pm 0.47	12.70 \pm 0.62	13.82 \pm 0.58	15.57 \pm 0.43
Between Group Comparison	F=0.858 P>0.05 NS	F=41.91 P<0.001,HS	F=73.02 P<0.001,HS	F=99.84 P<0.001,HS	F=113.82 P<0.001,HS

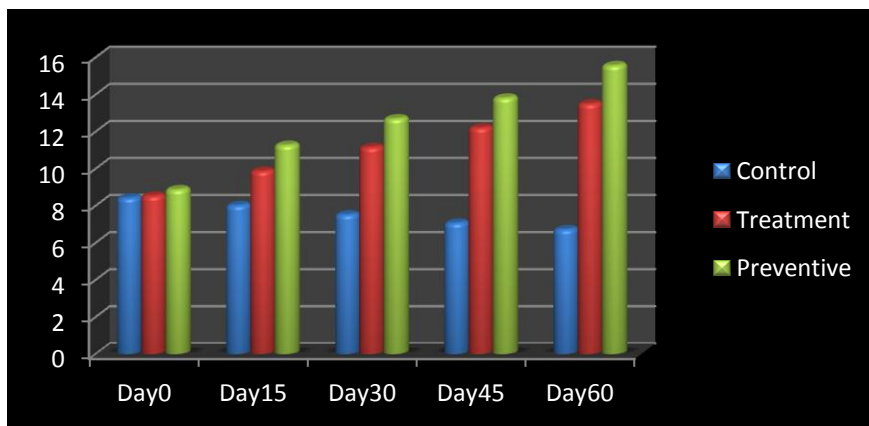
cystostomy procedure bladder was opened and then implantation of catheter and stent bead was implanted. After that by 4-0 chromic catgut bladder and abdomen was closed.

The total experiment was carried out for a period of 2 months. The growth of the stone was observed periodically taking the help of X-ray and to observe the alteration in urinary output, urinary pH, Serum and Urinary electrolytes samples were collected in each 15 days interval.

Observation- During the period of the study two rats found dead due to some unidentified cause. All other albino rats were remain active till the end of the study. In each every 15 days interval Urine pH, Urine out, Serum and Urine electrolytes were evaluated as per the protocol. Two rats were also sacrificed in the interval of 15 days and X-ray abdomen also done to know the growth of the stone/encrustation. In this experimental study following observation have been experienced.

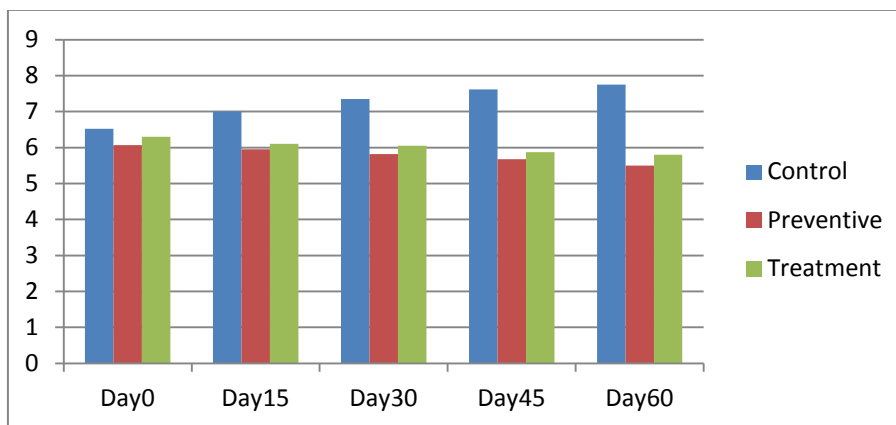
Table No.1 & Graph No.1 Urine Output

One way ANOVAs Test					
Post Hoc Test.Bonferroni's test Significant pairs	-	I,II I,III	I,II I,III	I,II I,III	I,II I,III



Effect of trial drug on Urine Output- In Day 0 the urine out put was 8 ml / 24 hrs in control group and gradually decreases to 6 ml in day 60 .In Treatment and Preventive group the urine out put was 8.5 and 8.8 ml/24 hrs respectively and gradually increased to 13.5ml/24 hrs and 15.5ml/24 hrs respectively in day 60 days. Intergroup comparison ,One way Anova test suggest in day 0' p is non significant where as in day 15,day 30,day 45 and in day 60 p is highly significant in Post Hoc test & Bonferroni's test in day 0' no significant seen in group control and treatment group where as it is highly significant in between control and preventive and between control and treatment group.

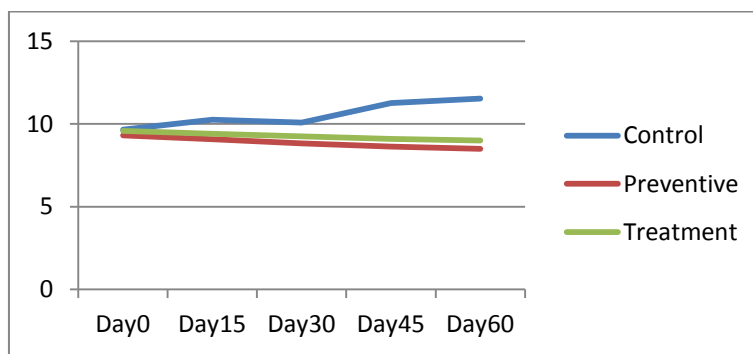
Graph No.2 Urine pH



Effect of trial drug on Urine pH-

In Day 0 the urine pH was 6.5 in control group and gradually increases to 7.7 in day 60 .In Treatment and Preventive group the urine pH was 6. and 6.3 and gradually decreased to 5.5 and 5.8 respectively. Intergroup comparison ,One way Anova test suggest in day 0' p is non significant where as in day 15,day 30,day 45 and in day 60 p is highly significant.Post Hoc test .Bonferroni's test in day 0' no significant seen in group control and treatment group where as it is highly significant in between control and preventive and between control and treatment group

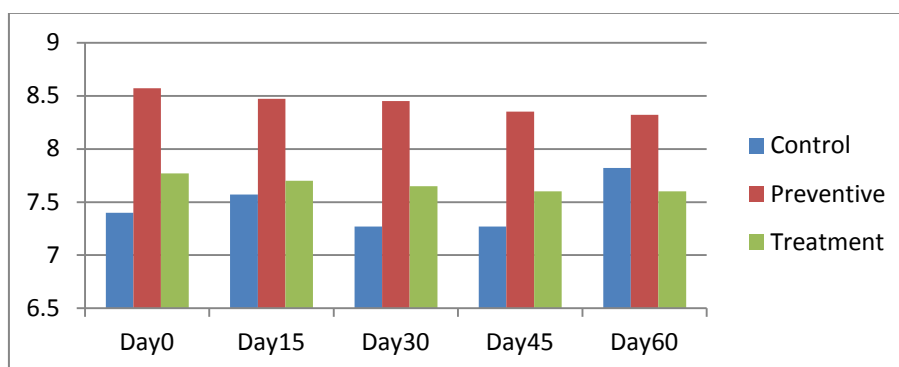
Graph No.3.Serum Calcium



Effect of Trial Drug on Serum Calcium

In Day 0' the Serum Calcium level in Control it was 9.6mg/100 ml of blood .In day 60 it was increased to 11.5 mg/100 ml of blood .In Preventive and Treatment group in Day 0' it was 9.3 and 9.5 mg/100 ml respectively but the value gradually decreased to 8.5 and 9.5 respectively in day 60 .Between group comparison One way ANOVA test shows non significant in day 0'and in day 15,bunferroni's test significant pairs shows non significant in day 0 and day 15 ,but in day 30,day 45 and in day 60 Control and preventive and control and treatment group suggest value is highly significant.

Graph no.4 Serum Phosphorus



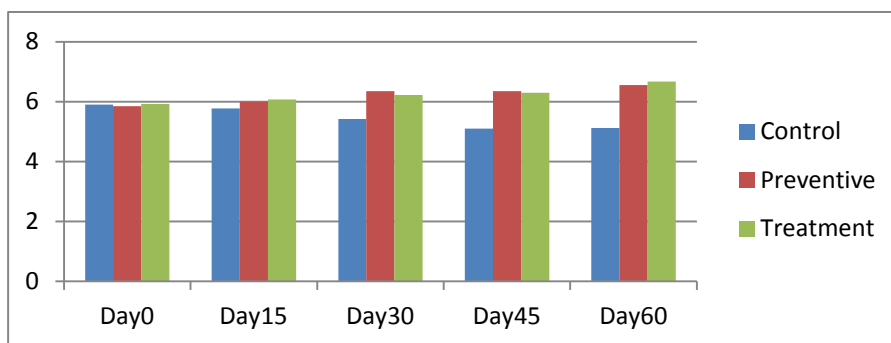
Groups	Serum Potassium Mean ±SD				
	Day 0	Day 15	Day 30	Day 45	Day 60
Control	5.900±0.258	5.77±0.298	5.42±0.35	5.1±0.496	5.125±0.492
Preventive	5.850±0.435	6±0.355	6.35±0.264	6.35±0.264	6.55±0.351
Treatment	5.92±0.150	6.07±0.095	6.22±0.05	6.3±0.081	6.675±0.206
Between Group Comparison One way Anova Test	F=0.063 P=0.94 NS	F=1.3 P=0.319,NS	F=15.5 P=0.001,HS	F=18.588 P=0.000,HS	F=21.790 P=0.000,HS

Effect of the drug on Serum Phosphorus

In Day 0 the Serum Phosphorus level in Control it was 7.4 mg/100 ml of blood. In day 60 it was increased to 7.8 mg/100 ml of blood. In Preventive and Treatment group in Day 0 it was 8.5 and 7.7 mg/100 ml respectively but the value gradually decreased to 8.3 and 7.6 respectively in day 60. Between group comparison One way ANOVA test & in Post hoc test shows non significant.

Table no.2.& Graph No.5 Serum Potassium

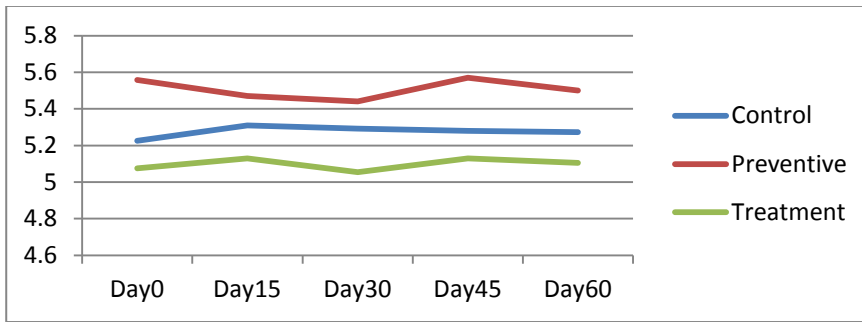
Post Hoc Test.Bonferroni's test Significant pairs	-	- I,III	I,II I,III	I,II I,III	I,II I,III
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Effect of the Drug on Serum Potassium

In Day 0' the Serum Potassium level in Control it was 5.9mg/100 ml of blood .In day 60 it was decreased to 5.1 mg/100 ml of blood .In Preventive and Treatment group in Day 0' it was 5.8 and 5.9 mg/100 ml respectively but the value gradually increased to 6.5 and 6.9 respectively in day 60 .Between group comparison One way ANOVA test shows non significant in day 0' Post hoc test and bonferroni's test significant pairs shows non significant in day 0 ,but in day 15 ,day 30,day 45 and in day 60 Control and preventive and control and treatment group suggest p value is highly significant.

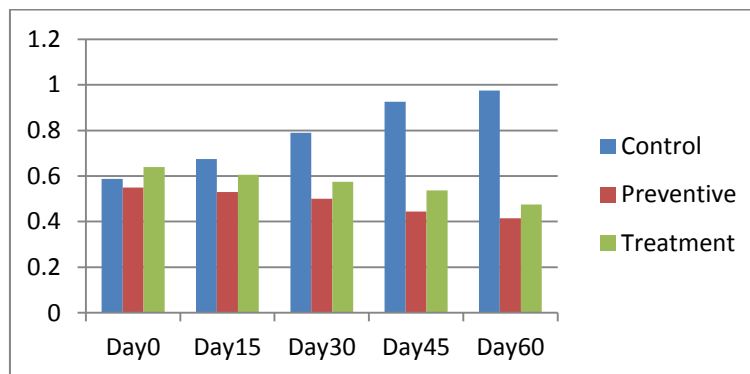
Table no.3& Graph No.6 Serum Uric Acid



Effect of trial drug on Serum Uric Acid

In Day 0 the Serum uric acid level in Control it was 5.2 mg/100 ml of blood .In day 60 it was increased to 5.27 mg/100 ml of blood .In Preventive and Treatment group in Day 0 it was 5.5 and 5.07 mg/100 ml respectively but the value gradually same as 5.5 and 5.1 respectively in day 60 .Between group comparison One way ANOVA test & in Post hoc test shows non significant.

Graph No.7 Serum Creatinine



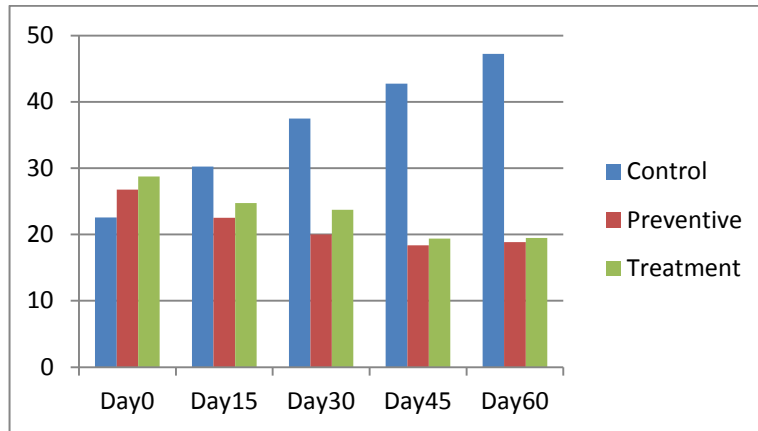
Effect of the drug on Serum Creatinine

In Day 0 the Serum Creatinine level in Control it was 0.5mg/100 ml of blood .In day 60 it was increased to 0.9 mg/100 ml of blood .In Preventive and Treatment group in Day 0 it was 0.5 and 0.6 mg/100 ml respectively but the value gradually decreased to 0.41 and 0.47 respectively in day 60 .Between group comparison One way ANOVA test shows non significant in day 0 & in day 15, Post hoc test and bonferroni's test significant pairs shows non significant in day 0 & in day 15 ,but in day 30, day 45 and in day 60 Control and preventive and control and treatment group suggest p value is highly significant.

Groups	Stent bead encrustation Mean ±SD		
	Day 0	Day 30	Day 60
Control	4.50±0.070	255±7.07	315±21.21
Preventive	4.55±0.495	10.5±0.707	15.15±2.121
Treatment	5.55±0.212	14±1.414	16.5±.707
Between Group Comparison One way ANOVA Test	F=2.171 P=0.261 NS	F=224.5 p=0.000,S	F=392.975 P=0.000,HS

Post Hoc Test.	-	I,II	I,II
Bonferroni's test		I,III	I,III
Significant pairs			

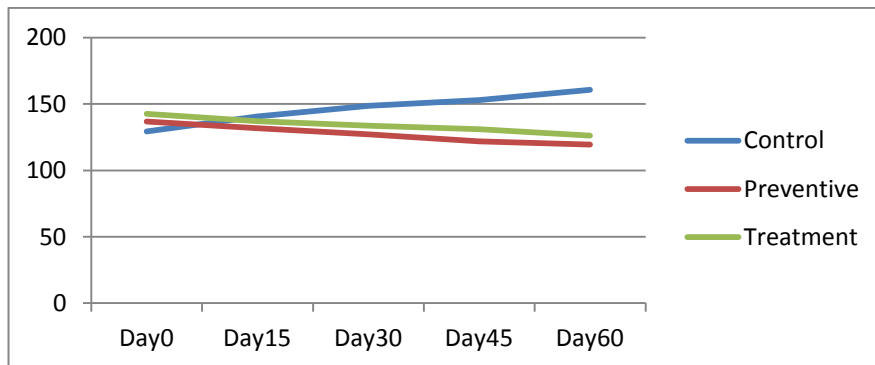
Graph No.8.Serum Blood urea



Effect of the drug on Blood urea

In Day 0 the Serum Creatinine level in Control it was 22.5mg/100 ml of blood .In day 60 it was increased to 47.2 mg/100 ml of blood .In Preventive and Treatment group in Day 0 it was 26.7 and 28.7 mg/100 ml respectively but the value gradually decreased to 18.8 and 19.5 respectively in day 60 .Between group comparison One way ANOVA test shows significant in day 0 & in day 15, day 30 ,day 45 and in day 60 . Post hoc test and bonferroni's test significant pairs shows significant in day 0, in day 15 , in day 30, day 45 and in day 60 Control and preventive and control and treatment group suggest p value is highly significant.

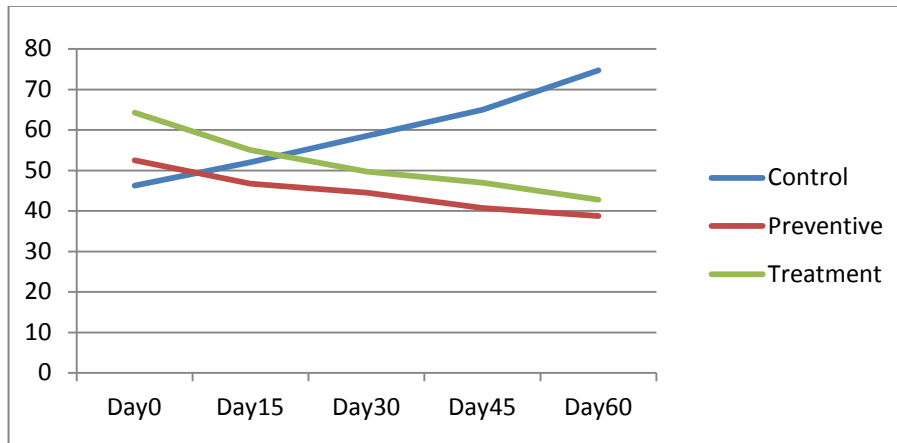
Graph No.9 .Serum Sodium



Effect of the drug on Serum Sodium

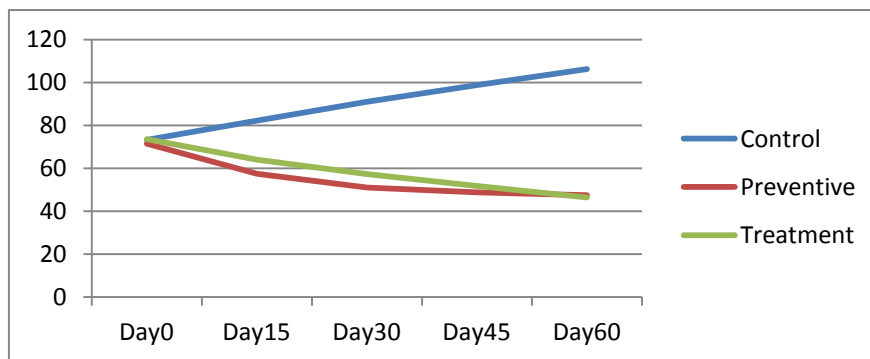
In Day 0 the Serum sodium level in Control it was 129.2meq/100 ml of blood .In day 60 it was increased to 160.5 meq/100 ml of blood .In Preventive and Treatment group in Day 0 it was 136.7 and 142.5 meq/100 ml respectively but the value gradually decreased to 119.5 and 126.25 respectively in day 60 .Between group comparison One way ANOVA test shows significant in day 0 & in day 15, day 30 ,day 45 and in day 60 . Post hoc test and bonferroni's test significant pairs shows significant in day 0, in day 15 , in day 30, day 45 and in day 60 Control and preventive and control and treatment group suggest p value is highly significant.

Graph No.10. Serum AST



Graph

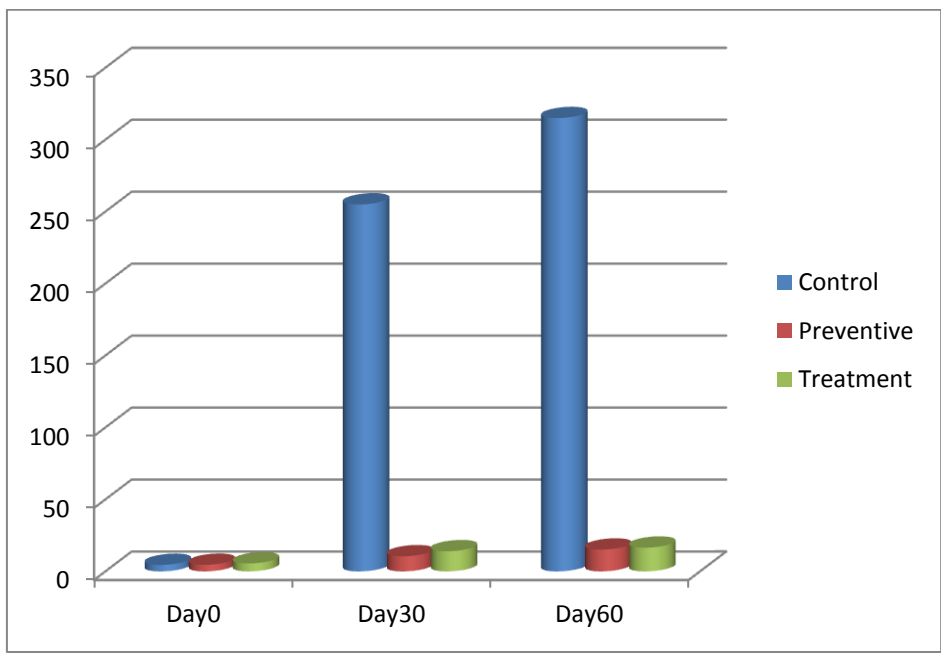
No.11.Serum ALKP



Effect of the drug on Serum ALKP

In Day 0 the Serum sodium level in Control it was 46.2mg/100 ml of blood .In day 60 it was increased to 74.75 mg/100 ml of blood .In Preventive and Treatment group in Day 0 it was 52.5 and 64.25 meq/100 ml respectively but the value gradually decreased to 38.7 and 42.75 respectively in day 60 .Between group comparison One way ANOVA test shows significant in day 0 it was non significant & in day 15,day 30 ,day 45 and in day 60 it was significant . Post hoc test and bonferroni's test significant pairs shows non significant in day 0 where as in day 15 , in day 30,day 45 and in day 60 between the group Control and preventive and control and treatment suggest p value is highly significant.**Table No.4.& Graph No.12. Stent bead encrustation**

Groups	Catheter bead encrustation Mean ±SD		
	Day 0	Day 30	Day 60
Control	7.450±0.070	244.5±20.5	360.±14
Preventive	7.55±0.07	10.5±0.707	14.75±0.35
Treatment	7.55±0.212	12±0.1	18±1.41
Between Group Comparison One way ANOVA Test	F=0.364 P=0.722 NS	F=258.467 p=0.000,S	F=1168 P=0.000,HS
Post Hoc Test. Bonferroni's test Significant pairs	-	I,II I,III	I,II I,III

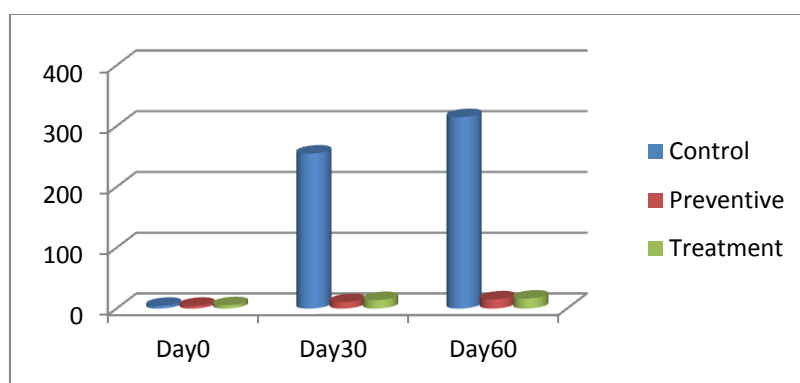


Effect of the drug on Stent bead encrustation

In Day 0 the Serum sodium level in Control it was 46.2mg/100 ml of blood .In day 60 it was increased to 74.7.5 mg/100 ml of blood .In Preventive and Treatment group in Day 0 it was 52.5 and 64.25 meq/100 ml respectively but the value gradually decreased to 38.7 and 42.75 respectively in day 60 .Between group comparison One way ANOVA test shows significant in day 0 it was non significant & in day 15,day 30 ,day 45 and in day 60 it was significant . Post hoc test and bonferroni's test significant pairs shows non significant in day 0 where as in day 15 , in day 30,day

45 and in day 60 between the group Control and preventive and control and treatment suggest p value is highly significant.

Table No.5.Graph No.12. Catheter bead encrustation



Effect of the drug on Catheter bead encrustation

In Day 0 the Serum sodium level in Control it was 46.2mg/100 ml of blood .In day 60 it was increased to 74.7.5 mg/100 ml of blood .In Preventive and Treatment group in Day 0 it was 52.5 and 64.25 meq/100 ml respectively but the value gradually decreased to 38.7 and 42.75 respectively in day 60 .Between group comparison One way ANOVA test shows significant in day 0 it was non significant & in day 15,day 30 ,day 45 and in day 60 it was significant . Post hoc test and bonferroni's test significant pairs shows non significant in day 0 where as in day 15 , in day 30,day 45 and in day 60 between the group Control and preventive and control and treatment suggest p value is highly significant.

4. Discussion and Result-

1. Antimicrobial effect-Drug contains Phenolic compounds, phenolate, quinolone, Flavanoids; 5 methyl 4,5,7 trihydroxyl flavones, 4,3,5,7 tetrahydroxy 5 methyl 5 propenamine anthocyanidines and so drug acts as an antiseptic,antifungal,bactericidal. Drug also shows potent inhibition on staphylococcus,aureas,Pseudomonas aeruginosa,klebsiella and candid albicans.Drug also inhibit cyclooxygenase,lipo-oxygenase pathwaythere by act as an anti-inflammatory activity.(Ref.No.1-10)

2. Simultaneously drug also contains bryophyllol , bryophyllin B, bryophyllin A, bryotoxin . bufadienolide orthoacetate and bersaldegenin 1,3, 5-orthoacetate may act as a cytotoxic action.Due to the presence of Citric,tartaric acids ,it acts as an cleaning effect on encrustation.(Ref.No.1-10& 41-48)

3. It also reduces enzymurea, urease or urea amidohydralase.By this drug no degradation of metabolic waste product to hydroxyl ion as the pH of theurine remain to neutral after drug therapy is seen.So no alkalisation,no crystallization and no encrustation.As drug reduces the Ca^{2+} concentration so it can decreased encrustation.(Ref.No.1-10,38-40)

4. Diureetic effect -Drug is also containing Saponins, Flavonoids , Glucosilicates.It also increase peak flow rate of urine as drug possess α -adrenergic receptor agonist and 5- α -reductase antagonistic activity , blocks the conversion of testosterone to dihydro-testosterone, the major hormone in prostatic cells.(Ref.No.38-40,&41-48)

5. Crataeva nurvala decoction-Proves to increase force of contraction& also decrease volume of residual urine. (Ref.No.41-48&38-40)
6. Anti urolithiatic activity-The main component of crataeva nurvala is Lupeol.Lupeol proves to have good action on urolithiasis in a dose of 30mg/kg/body weight.It is a potent antiurolitho lytic activity,normaizes pH and Specific gravity. (Ref.No.27-33,1-10)
7. Lupeol is proved to reduce oxalate level, reduced liver glycolate oxidase activity ((Ref.No.27-33,1-10)
8. As the Crataeva nurvala drug possess Oxalate oxidase ,it will help to degrade to oxalate.It catalyzes the oxygen dependant oxidation of oxalate to CO with concomittant formation of H₂O₂. Reduce crystallization((Ref.No.27-33,1-10)
- 9 . It also reduce oxalate, phosphate, calcium of the plasma and urine .
10. Antiinflammatory actitivity - Inhibit the release, synthesis and production of cytokines prostaglandins, histamine and polypeptide kinins and also decrease inflammation and complement activity as drug is enriched with Cadabicine& Catechin which acts as Cyclooxygenase inhibitor.(Ref.No.14-20)
- 11.Fattyacids (*B.Pinnatum*)-The drug also acts as immunosuppressive effect invivo . RossiBergmann et al showed the aqueous extract of leaves cause significant inhibition of cell-mediated and humoral immune responses in mice. (Ref.No.11-13)
- Saturated fatty acids present in herb plays an important role on lymphocyte proliferation, which explain its immunosuppressive effect in vivo(Ref.No.11-13)
- 12.Tannins(astringent property)-As this drug is enriched with tannin ,it hasten the healing of wounds and inflamed mucous membranes. (Southeastern Nigeria use herb in treating wounds and burns) (Ref.No.21-23)
- 13.Ethanolic extract of root bark of C. nurvala (150 and 300 mg/kg) showed wound healing and collagenation potential in-vivo. (Ref.No.21-23)
- 14.Moreover, supportive in-vitro studies suggest an increase level of antioxidant enzymes on granuloma tissue which further support the wound healing potential .
- 15.Flavonoids, the potent water-soluble antioxidants and free radical scavengers, which prevent oxidative cell damage(Ref.No.21-23)
- 16.Calcium (abundant) macro element present in the plant. Extracellular calcium concentrations are necessary for blood coagulation and for the integrity, intracellular cement substances. (Ref.No.21-23)
- 17.High saponin content justifies the use of the extracts to stop bleeding and in treating wounds. Saponin has the property of precipitating and coagulating red blood cells.(ref.No.41-48)
- 18.Experimentally the drug increases urinary out put, acts as diuretic without causing electrolyte imbalance.(Ref.38-40)
- 19.Experimental and clinical study shows that trial drug reduces pH due to presence of citric acid and iso citric acid and many other acids and maintains pH between 5&6.
- 20.Citric acid prevents calcium to combine with oxalate or phosphate in urine. Thus it prevents deposition of calcium oxalate and phosphate and reduce the chances of formation of stone. (Ref.No.41-48)
- 21.Drug possess antibacterial activity, prevent recurrence and formation of encrustation(Ref.No.1-10)
- 22.It reduces Sr calcium,Sr Sodium,Sr creatinine,Sr Urea and increases Sr potassium and Sr phosphrus and sr Uric acid are within normal (Ref.No.38-40,27-33)
- 23.It relieves symptoms like pain,hematuria,burning micturition,urgency,intermittency etc. (Ref.No.27-33)
- 24.Increased urinary potassium causes a transient reduction in urinary calcium and less conducive to the crystallization of stone-forming salts (calcium oxalate, calcium phosphate and uric acid). Increased citrate in the urine, by complexing with calcium, decreases calcium ion activity and thus the saturation of calcium oxalate. Citrate inhibits the spontaneous nucleation of calcium oxalate and calcium phosphate .(Ref.No.41-48,38-40,27-33)
- 25.Drug reduces prostate sonographically and reduces remarkably the LUTS . Saponin has the property of precipitating and coagulating red blood cells. flavonoids from these plants provide anti-inflammatory activity Ref.No38-40)

5. Conclusion

1. Experimentally the drug increases urinary output, acts as diuretic without causing electrolyte imbalance.
2. Experimental and clinical study shows that trial drug reduces pH and maintain to neutral.
Drug possess antibacterial activity, prevent recurrence and formation of encrustation.
It reduces Serum calcium, Serum sodium, Serum creatinine, Blood urea and increases serum potassium and maintain serum phosphorus and serum uric acid within normal. It relieves symptoms like pain, hematuria, burning micturition, urgency intermittency etc.
Physical study shows remarkable results in reducing encrustation in catheter and stents.
Increased urinary potassium causes a transient reduction in urinary calcium and less conducive to the crystallization of stone forming salts (calcium oxalate, calcium phosphate and uric acid) Increased citrate in urine by complexing with calcium, decreases ion activity and thus the saturation, and thus saturation of calcium oxalate. citrate inhibits the spontaneous nucleation of calcium oxalate and calcium phosphate.
Drug reduces prostate hypertrophy sonographically and reduces remarkably the lower urinary tract obstructive symptoms.

6. Acknowledgement- I express gratitude and indebtedness to my supervisor, Professor and Head Department of Shalyatantra for his kind blessing, excellent & constant guidance make my thesis work to complete within scheduled time.

I express my profound sense of gratitude and regard to my Co-Supervisor, Professor Uday Shankar Dwivedi Head, Department of urology and Medical Superintendent of Sir Sunderlal Hospital, IMS, BHU, Varanasi For his complaisant help in the various phases of the study.

I express my profound sense of gratitude and regard to Dr S.P. Mishra, Department of Biochemistry, IMS, BHU.

I am also extending my gratitude to the Centre of experimental medicine and surgery department, Department of Pharmaceutics, IMS, BHU, Varanasi.

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