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BUKO WATER OF IMMATURE COCONUT IS A UNIVERSAL URINARY STONE SOLVENT

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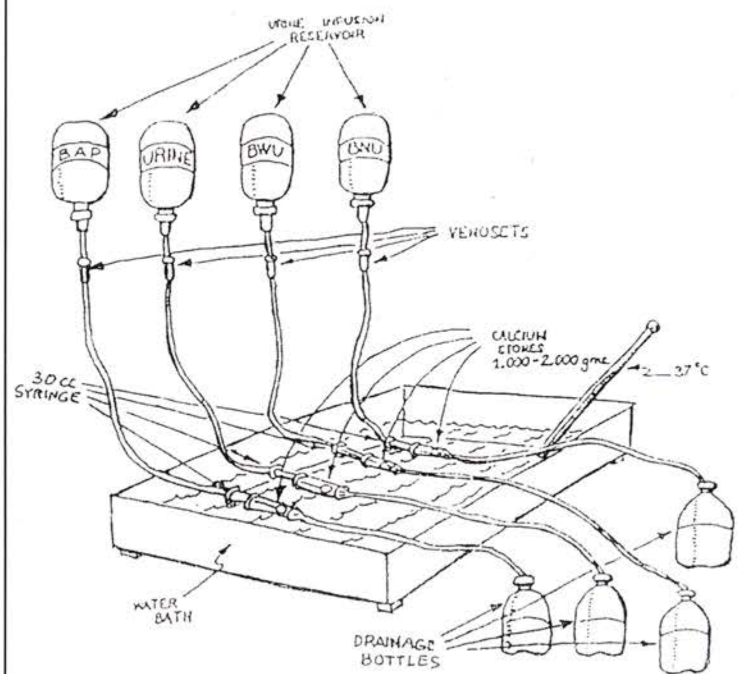
Introduction

Chemotherapy of urinary stones is very important in all the different aspects of calculi disease management from the most conservative medical litholysis to the most radical stone removal. The stone solvent (s) dissolves the residual stone fragments embedded in the urinary tract epithelium during open surgery and endoscopy stone manipulation with extractors and lithotripsy. The advent of ESWL stone therapy has revolutionized management of urinary stones as simpler problem. However, recurrence of stones remains high. The embedded stone fragments in the epithelium is difficult to remove becoming the nidus of subsequent stone formation. The role of adjuvant chemotherapy as well as prophylaxis becomes necessary and of unquestionable use in poor surgical risk patients.

Fig. 1. Modified Flowby Dissolution Apparatus



BWU - Buko Water Urine
BNU - Buko Nectar Urine
BAP - Buko Nectar Powder - Urine

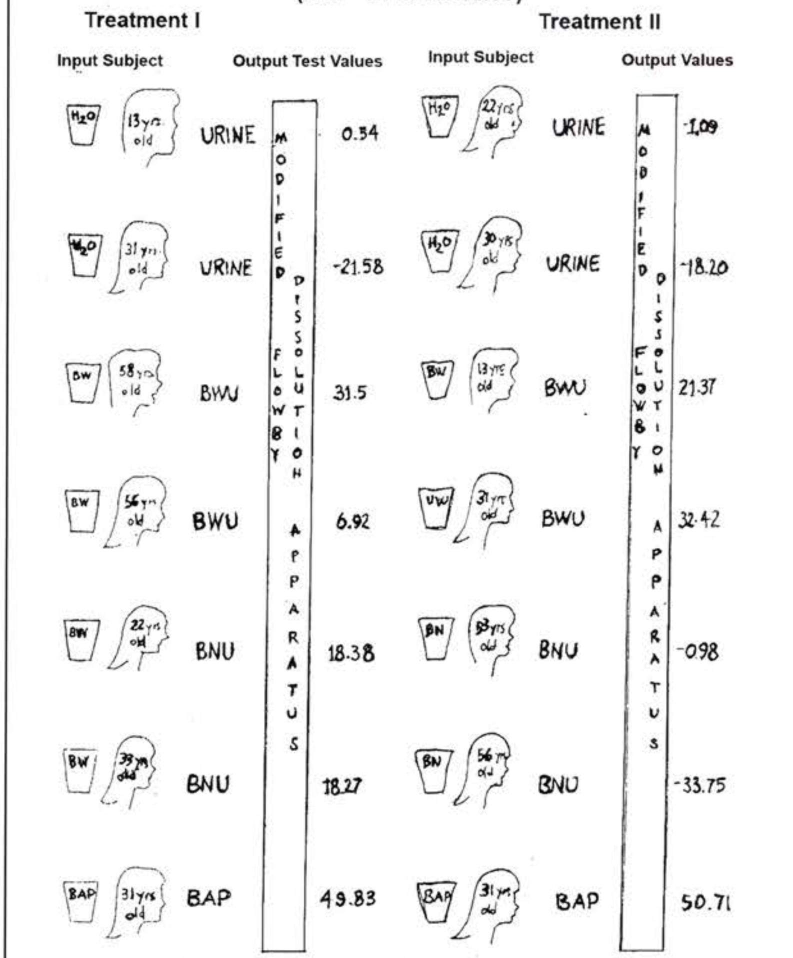
Methods and Materials

The term "Bukolysis" was coined to indicate the process by which BUKO (Young Coconut) WATER (BW) is utilized directly to irrigate and dissolve urinary stones. The effectivity of the BW Therapy particularly in Urinary Tract Diseases had been acclaimed from time and memorial in herbal and folklore medicine. Macalalag, et. al, have proven BW and "Its derivative" Buko Nectar Concentrate (BNC) and Buko Nectar Concentrate Powder in Ampule (BAP) dissolve all kinds of urinary stone by direct chemolysis.

The effectivity of stone dissolution of untreated urine and the urine of Buko water Therapy subjects on renal stones is tested by Modified Flowby Dissolution Apparatus (Figure 1). Calcium content of pre and post irrigants was determined by Atomic Absorption Spectrophotometry, for calcium stone dissolution (+) or calcium deposition (-). The irrigated stones were also analyzed before and after the irrigation for changes of individual percentage composition by Merckognost 11003.

Six subjects, four females and two males, had with age ranging from 13-58 years. Subject underwent two treatments serving as cross over study to obviate internal differences among the group and to obtain a total of 14 trials (Figure 2). After the first 8-day treatment, an acclimatization of period was done for two days, then continued to the second 8-day treatment. Hence, within one solvent set-up, there were 4 subjects involved.

Fig. 2. Oral Buko Water Therapy (BW - TT Schedules)



Oral Buko Water Therapy (BW-TTT)

Fresh Buko Water (BW) from six to ten month old immature coconut and previously prepared Buko Water concentrate derivatives namely Buko Nectar Concentrate (BNC and BNC Powder in Ampule (BAP) were used in the oral Buko Water Therapy. Dosages were given twice daily, after breakfast and supper in the following amount & BW - 250 cc; BNC - 30 cc and BAP - 20 cc of one reconstituted ampule.

Urinary Stone Solvents

After Oral Buko Water Therapy (BW-TTT), one liter of urine was collected late in the afternoon until the morning of the following day. The urine collected labelled as Untreated Urine (O-U), Buko Water Urine (BW-U), Buko Nectar Concentrate Urine (BNC-U) and BNC Powder in Ampule Urine (BAP-U) were packed in ice to prevent deterioration. A 10 ml samples were used determine the initial calcium excreted.

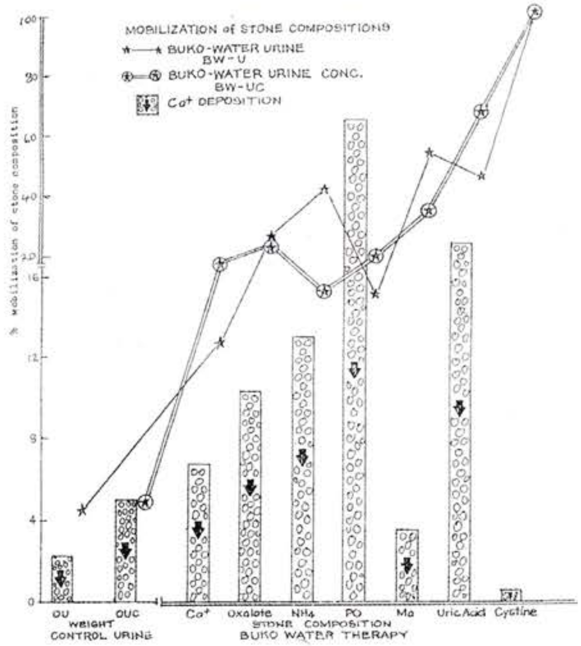
The stone (s) were irrigated with one liter of the different urine solution for a period of 8 days using the Modified Flowby Dissolution Apparatus (Figure 1). From the different urine washings, another 10 ml sample was obtained for final calcium atomic absorption spectophotometry determination. Instead of daily calcium measurements, calcium levels were determined during the 1st, 2nd, 3rd, 7th and 8th day for the first treatment and 1st, 3rd, 6th, 7th, and 8th day for the second treatment. The weight and volume measurements of the stone were monitored throughout the duration of the test.

Stone weight measurements showed no trend of actual decrease in weight. The erratic fluctuation demonstrated increase and decrease of stone weight possibly caused by differences in urine solution penetration and the actual up take of liquid in the spaces within the stone.

Study Classifications and Lables

Five digits were used in classifying and identifying the type of stone (s), the subject, the treatment, and the period of urine collection. The first number represents the type of stone used. Two (2) represents a Bladder stone while one (1) represents a kidney stone. The following two numbers together with the first serve to identify the subjects while the fourth number signifies the phase of treatment. Zero being the first treatment and two stands for the second treatment. The last digits represents the day of sample collection. Therefore, 1.2103 means that it is a kidney stone used for subject 1.21 and aliquot samples were obtained during the third day of the first phase of treatment.

Fig. 3. Bladder Stone Chemotriptic with Normal (OU) & Buko Water Urine (BW-U) Stone Changes in % Weight and Compositions (#141 and #142)



Results and Discussion

The experimental procedure of the Buko Water Litholysis or Chemotriptic Dissolution of urinary calculi utilized urine from the Oral Buko Water Therapy (BWTTT) namely: BW-U, BNC-U, BAP_U and untreated urine (O-U). It was assumed that the active component of the Buko Water (Buko water Stone Enzyme Factor-BWSt-F) was unaltered during ingestion, digestion, absorption and excretion.

For dissolution of the stone (s), final calcium levels of the imigant urine should be greater than the initiai calcium levels ($Ca_f > Ca_I$). A positive difference corresponded to stone disolution while a negative value corresponded to the loss of calcium by the irrigant deposited to the stone (s). Standard deviation was used on the wide range of values to arrive at values for comparison.

Chemical analysis of urinary stone, pre and post irrigation, reflected the change in stone composition (Figure 3). The urinary stone measurement of its size volume and weight also collaborate the stone changes.

Untreated Urine (O-U)

The final (O-U) calcium levels were uniformly less than the initial urine calcium levels ($Ca_f < Ca_I$). The resulting negative difference was correlated with calcium deposition with values ranging from -0.54 to 21.58 ppm Ca and -10.35 ppm Ca average (Table 1). Urinary stone became a nucleus hastening precipitation of calcium from the urine irrigant. The extent of calcium deposition was linearly correlated with the initial calcium level. Fairly saturated levels of initial urine calcium had greater deposits (Figure 4).

Ahmed 13 summarized a series of age related studies which indicated continuous decline in renal blood flow and glomerular filtration rate after the third decade of life. Although the number of subjects was limited, results supported its relationship. Out of the four subjects, two were above 30 years old, subject 2.61 and 2.62, while the other two were 13 years old (subject

Fig. 4. Calcium Deposited into Stone Untreated-Normal Urine –(OU)

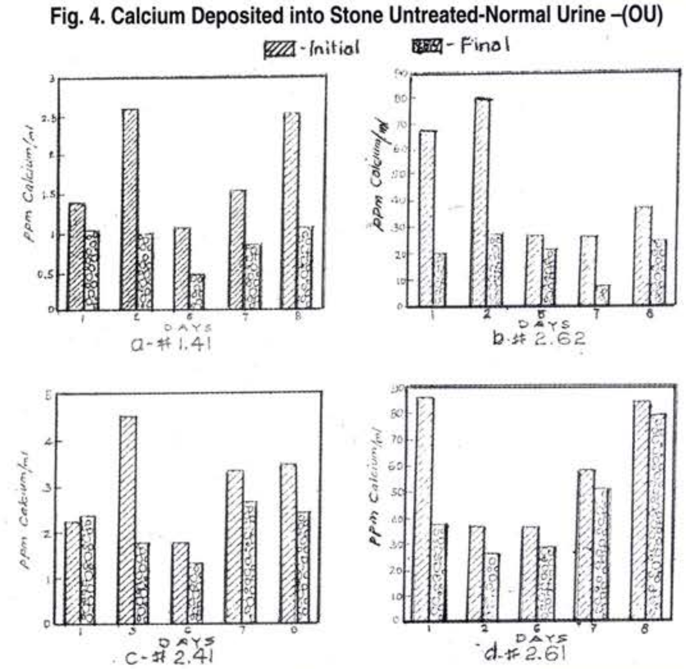


Table 1: Calcium Deposit to Urinary Stone by Untreated Urine (O-U) (Expressed in ppm ca/ml)

Subject Ca_d				
RCa_i	1.06 - 2.57	25.90 - 79.75	1.74 – 4.50	36.25 – 85.35
RCa_f	0.80 - 1.05	7.29 - 26.25	1.30 – 2.63	26.25 – 78.19
RCa_d	0.35 - 4.62	5.00 – 53.00	0.12 – 4.81	7.00 – 48.04
RCA_d	-	(10.35 – 25.35)		

t/- Ca_d = initial calcium dissolved/ deposited
RCa_i - initial calcium
RCa_f - final calcium range
RCa_d - calcium range dissolved/ deposited
t/-RCa_d - computed calcium dissolved/ deposited

1.41) and 22 years (subject 2.41). Their urine clacium levels were 25.9 - 85.35 and 1.06 - 4.5 ppm Ca respectively (Figure 4).

Consequently, a value of 10.35 to 25.35 ppm Ca was established as the range of deposition for the U-O procedure.

Table 2: Calcium Deposit to Urinary Stone by Untreated Urine (O-U) (Expressed in ppm ca/ml)

Stone Ca				
RCa_i	1.37 - 3.96	18.08 – 68.95	1.11 – 0.22	72.03 – 130.62
RCa_f	2.02 – 38.0	52.18 – 140.6	0.11 – 0.26	40.84 – 72.90
RCa	3.05 – 50.23	26.11 – 71.68	0.10 – 0.14	14.56 – 89.78
RCa	-	18.32 – 18.39		

t/- Ca = calcium dissolved/ deposited
RCa_i - initial calcium range
RCa_f - final calcium range
RCa_d - calcium range dissolved/ deposited
t/-RCa - computed calcium dissolved/ deposited

However, urine calcium levels at different ages was not a variable in the experiment, consequently, this was intentionally disregarded.

Statistical analysis using the T-test was used on the values of deposited calcium shown as Table l with results leading to the acceptance of the values of 90% confidence level. 14 Daily fluctuations in urine calcium levels and the quantity of calcium precipitation are graphically shown in Figure 4.

A trend of calcium deposition, inspite of erratic calcium levels, to the stones in a decreasing % with time (56% first day down to the 6% on the 8th day).

The actual stone analysis also confirmed the increased calcium content of the stone, not to mention the simultaneous deposition of the other stone constituents.

Buko Water Urine (BW-U)

BW-U resulted in a positive dissolution, meaning that the final BW-U Calcium was greater than the initial ($Ca_f > Ca_i$). The gain in the calcium level of the final BWU is the amount of the calcium dissolved by the BW urine from the irrigated kidney stone.

Two subjects (2.31 and 1.41) had relatively low values (Figure 5) and upon review, subject 1.210 was under diuretic medication. It may be possible that the diuretic inactivated or diluted the active component of the Buko Water dissolving components. These are mere speculation and can only be qualified and quantified in further experimentations.

Deviation by Subject 1.412, value 21.58 was due to his inability to drink the prescribed treatment of 2 glasses of Buko Water a day. Instead, he drank only one glass explaining the lowered values of his final BW-U calcium.

Fig. 5. BW Urine Stone Dissolution Calcium ppm/ml

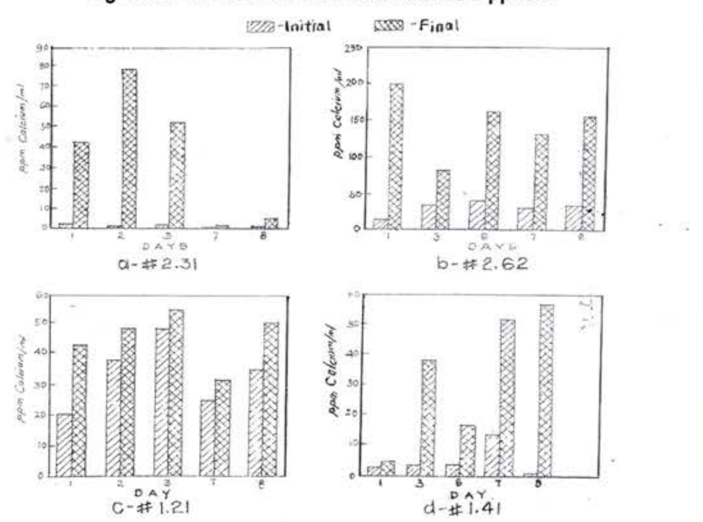
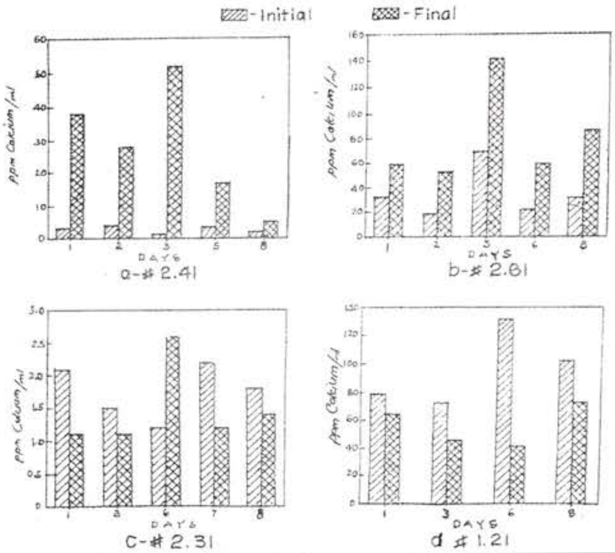


Fig. 6. BNC Urine Stone Dissolution Calcium ppm/ml



Statistical analysis excluded the value derived from subject 1,210 which is 6.92 ppm Ca (Table 2), The values tested for significance were 21.37, 31.5 and 32.42 with the rejection of 21.37 at 90% confidence level using the Q-test. The confidence values were 26.12 to 37.8 ppm Ca.

The initial calcium range of subjects 2.310, 1.210, 1.412, and 2,622 are 0.5 - 1.9 1; 20.23 - 47,45; 1. 13 - 13.7; 29.5 - 40.75 respectively (Table 2). Dissolution can be as low as twice the initial calcium level (Day 7 of 2.3107 in Figure 5 or as high as 18 times (day 1 of 2,6221 in Figure 5). Diversity of dissolved BW-U calcium level (Figure 5) may be due to the differences of stone composition and solubility. Uric acid stone(s) are harder to dissolve compared to the other types of stones such as calcium oxalate and calcium phosphates.

The chemical stone analysis of the experimented stones confirmed also the calcium dissolution but also for the other stone components in variable degrees Figure 3.

Buko Nectar Concentrate Urine (BNC-U)

Subject 2.4100 and 2.6100 had positive 18.38 ppm Ca stone dissolution while 2,3100 and 1.2100 had -0.098 and -33.785 ppm Ca respectively (Table 2). Subject 1.2100 is an essential hypertension case taking diuretic uricosuric (Metoprolol Hydrochlorothiside) and subject 2.3100 is a gout patient taking probenicide and alloropuminol). As stated previously, diuretic and uricosuric medications seem to depress the effectivity of Buko Water Urine. Thus, values from these subjects were excluded from further tests of significance.

The values tested for significance were accepted at 90% confidence level using the Q-test. Fluctuations observed in daily calcium level (Figure 6) which

Fig. 7.1 BAP-Urine Stone Dissolution Ca+ Dissolution of Stones Initial & Final Calcium Levels (BAP-U)

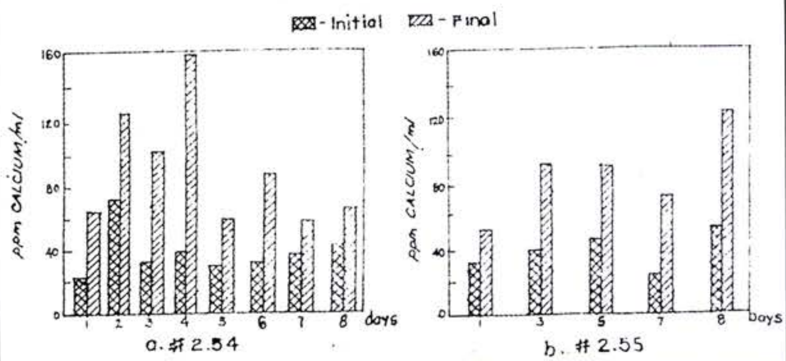


Fig. 7.2 Buko Nectar Powder (BAP) Lithotriptic % Calcium Mobilization of Calculi

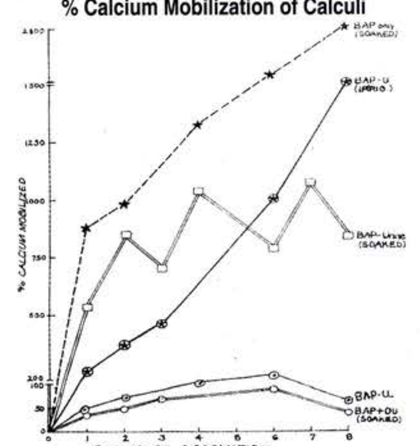
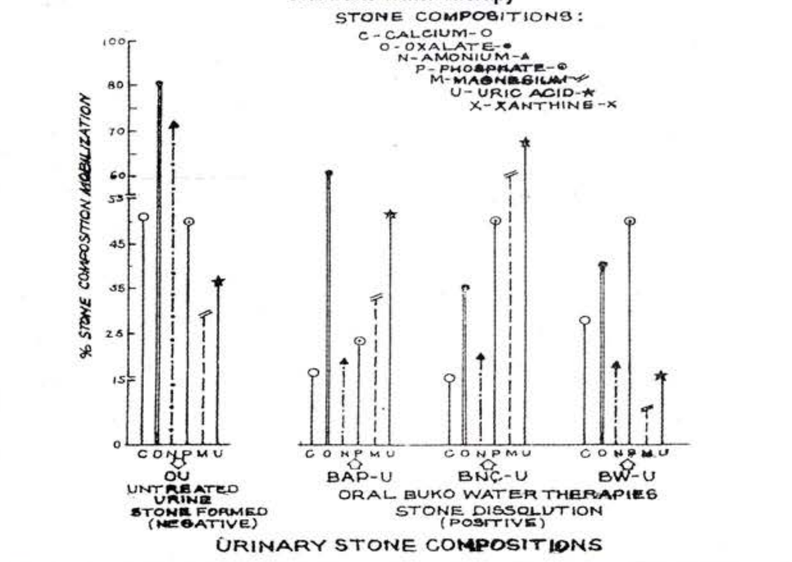


Fig. 8. Mobilization of Urinary Stone Composition Chemotriptic of Oral Buko Water Therapy



may be attributed to food calcium intake, stone composition and mediations. The BNC-U of subject 2.410 and 2.610 had resulting calcium dissolution of 3,05 - 50.213 and 26.11 to 71.68 with an average of 54.23 ppm Ca daily dissolution of the stone.

Buko Nectar Coccentrate Ampule Powder Urine (BAP U)

The same calcium mobilization from the stone is accomplished by the BAP-U subject No. 2.5400 and 2.5500 with an average of 50.75 and 50.13 respectively and 88.73 - 75. 10 pp Ca/n-d range. Figure 7. 1. The continuous irrigation, as well as, the soak dissolution procedures yielded similar calcium dissolution (Fig. 7.2) and ail components of the irrigated stones (Fig. 8).

Buko Therapy Urine

Comparison of BW-U and BAP-U

The untreated urine (OU) initiated calcium deposit to the stone irrigated R10-35 average with a range of 0.12 to 53.00 ppm Ca). Buko Water Oral Therapy hastened the dissolution of all types of urinary stones with BAP-U demonstrating the highest 165.8 with a wide range of 33.09 to 608.65 ppm Ca (Figure 8). Daily variations of urine calcium (Figure 9) expressed in percentage of calcium mobilized in the different trials is equivalent to the stone calcium dissolution show mark fluctuations as seen in Figure l0.

The results from the BW-U and BNC-U were tested for significant difference using T-Test, The paired differences of dissolved calcium levels for BW-U and BNCU were significantly different.

The lowered dissolution of BNC-U was probably due to freeze concentration. Freezing was utilized for is the least harsh among the preservation techniques. It is hypothesized that the active component of the Buko Water solvent is an enzyme, a protein. Generally, protein at low temperature is not denature but only exhibit reduced activity. Whitaker observed that some simple systems are susceptible to permanent damage after freezing and thawing if they are purified from an initially

Fig. 9. % Calcium Mobilization of Urinary Stones by Oral Buko Water Therapy Buko Water (BW-U), Buko Nectar (BNC-U), Buko Water Powder (BAP-U), Untreated (OU)

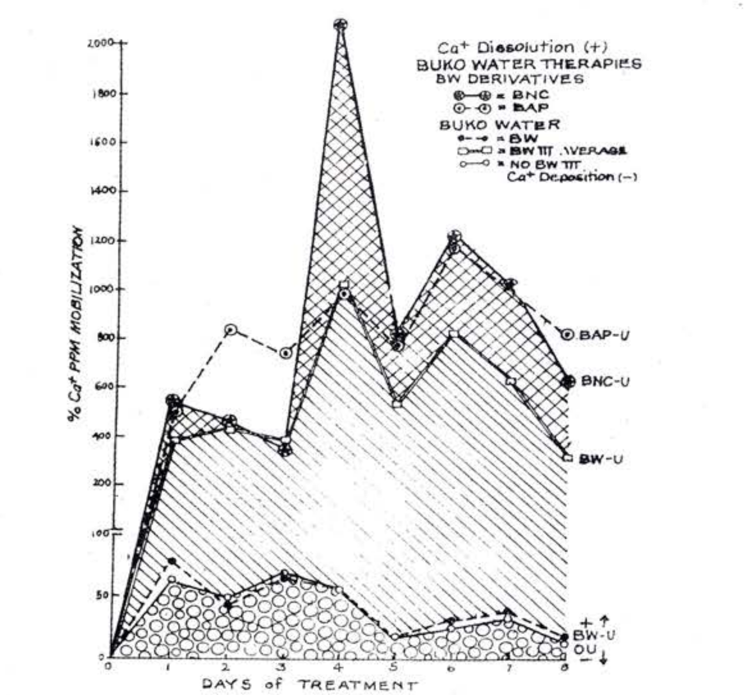


Fig. 10. Overall Ca+ Mobilization of Urinary Stone(s)

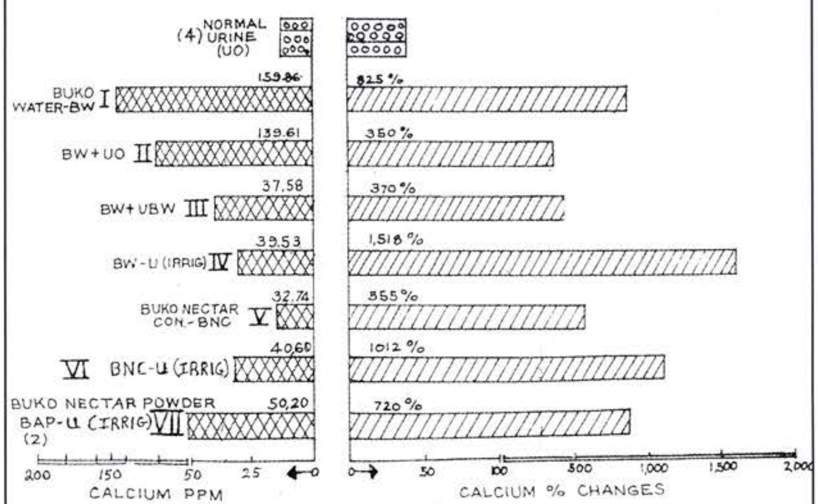
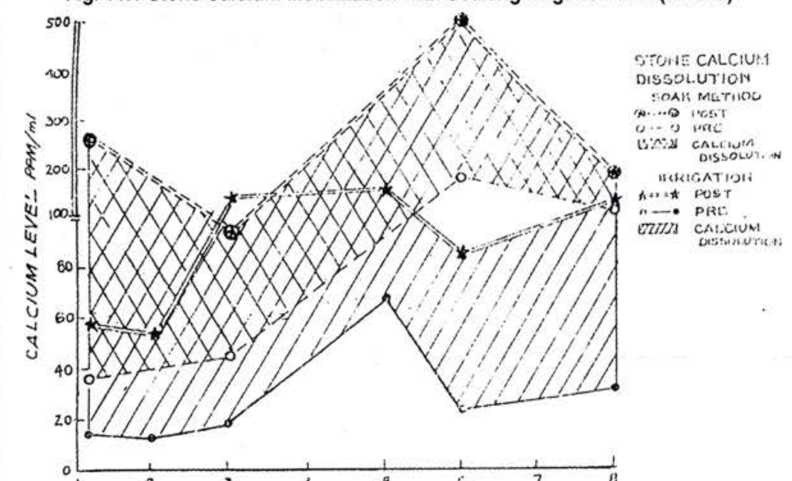


Fig. 11.1 Stone Calcium Mobilization with Soaking Irrigation with (BNC-U)



A pinkish color in a sample may be due to non-enzymatic browning or Maillard reaction occurring in the presence of sugars and proteins. Coconut water contains 2.56% sugar and 0.55 protein content but figures are higher in BNC.

Consequences of freezing were the changes in the organoleptic properties. BNC was described as turbid, having a strong coconut water aroma, sweet with subacid flavor. Solute to solvent ratio may initiate these changes.

Deteriorations mentioned above may cause the decreased effectivity of BNC as a urinary stone solvent (Fig. 11.1 - Fig. 11.2) while in the case of BAP which is highly concentrate form (one ampule to one Buko) there was si0ficant difference between BW-U with a Value of 31.96 ppm Ca and for BNC-U with 18.32 ppm Ca and BAP-U 50.2 ppm Ca Figure 12 and Table 3.

Advantages of BNC was its prolonged storage at temperature of 0°C retarding most dilute system. Coconut water contains 4.71% total solids in approximately 250 ml of liquid is typical example. Denaturation may occur when pH is decreased because of increased solute to solvent ratio. The changes in pH affect the dissolution of substance found in coconut water which eventually lead to denaturation.

Oxidation of its lipid component in the presence of oxygen may cause deterioration, although, peroxide tests were negative. The oxidative enzyme in BNCU may have reduced activity because, of freezing conditions.

Fig. 11.2 (BNC) Buko Nectar Concentrate Calcium Mobilization in Percent (%)

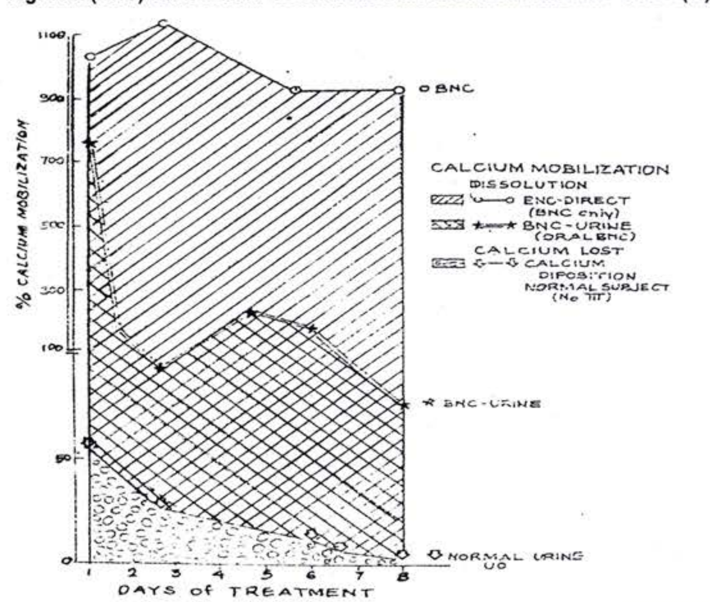
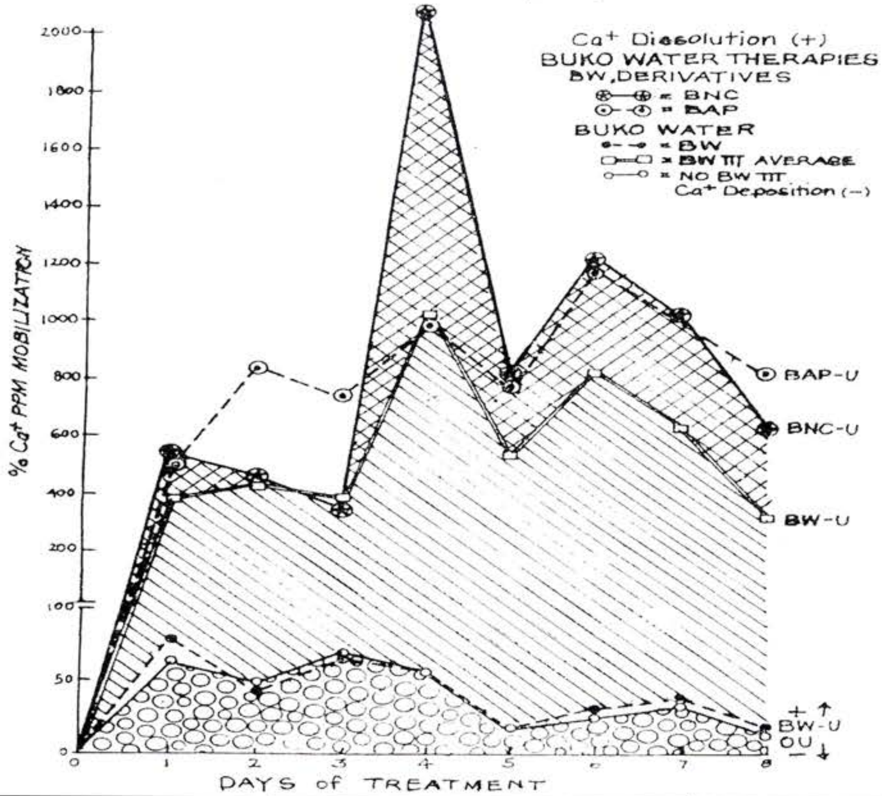


Fig. 12 % Calcium Mobilization With Soaking of Irrigation with BNC Urine (BNC-U) And Concentrate (BNC-U)



deteriorative reactions. Its considerable decreased storage requireents (30 ml) was, another advantage over BW(250 ml). The BAP or Buko Nectar Concentrate powder has all the advantage of BNC plus is sterile in nature which is being used safely with "Bukolysis - urinary stone therapy".

Summary and Conclusion

"Bukolysis" is a urological procedure utilizing young coconut (Buko) water to dissolve urinary stones by direct irrigation. The assumption that buko water stone factor (s) [BW-ST(s)] remains unaltered when ingested, unaffected by digestion, absorption and excretion is the principle behind Oral Buko Water Therapy or Buko Water Lithotriptics. Buko Water (BW) as well as the Buko Water derivatives: Buko Nectar Concentrate (BNC) and Buko Nectar Concentrate Powder in Ampule (BAP) show urinary stone(s) dissolving capacities. Dissolving capacity of the Oral Buko Water Therapy were determined by ingestion of BW, BNC and BAP and urine collection thereafter. The different urine coflected were narned BW-U, BNC-U and BAP-U respectively. These were used to irrigate urinary stone(s) in the Modified Flow by Dissolution Apparatus. Mobilized calcium determined by Atomic Absorption Spectrophotometry was interpreted as stone dissolution.

Untreated urine (OU) showed deposition of 25.35 - 10.35 ppm Ca while BW-U, BNC-U and BAP-U initiated dissolution of the stone(s) in different degrees. IN as much as the patients urinary calcium was variably affected by so many factors, the percentage urinary calcium was used to effectively compare the results.

The Bukolysis or direct chemolytic effect of the Buko Water has the same levels as the lithrotriptic effect of the Buko Water Therapy using the BW derivatives (Figures 11 and 12). This could be due to the dosage which computedly the BW derivative are nothing more but concentrates of the fresh Buko Water which were preserved, packed and stored.

Some dissolving effects where observed with the synonymous administration of diuretics anduricosuric and uricocemic drugs. The results are not conclusive due to limited subjects as a consequence of the restricted budget.

Studies similar if not related to these observations will further produce more conclusive results.

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