

Libyan International Medical University

**The Disparity in Urine Output in Both Genders While Administering Lasix**

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**Abstract**

**Introduction**: Lasix is a common potent loop diuretic that had been used in the treating edematous states and increases the urine output; which is a relevant marker of renal function.

**Materials and methods:** This study was done in double blind randomized control style, sample pool included 12 Subjects (6 females and 6 males), furosemide (Lasix) was administrated under clinically stable conditions for 6 hours; to measure their urine output, statistical analysis done by SPSS 26.0 using the two-sample t-test.

**Results:** the analytic result shows that (p-value<0.05) p-value = 0.142, which is not significant; thus, we accept the null hypothesis. The furosemide has higher urine output in men rather than women despite the small sample size and assuming the subjects are in healthy status.

**Conclusion:** in the current study, it is clear that furosemide affects the urine output which is a method of treating patients with severely oedematous conditions, and their wild consumption can lead to adverse effects in both genders.

**Keywords:** urine output, Lasix, Furosemide, two sample t-test.

**Introduction**

Furosemide with a brand name (Lasix), is a potent loop diuretic that inhibits the cotransport of Na+, K+, 2Cl- in the luminal membrane in the Thick ascending limb of the loop of Henle. Besides that, Furosemide has considered to be the most common drug of loop diuretics that act in the same region.1 Lasix is available in dosage strengths of 20, 40, and 80 mg as white tablets for oral consumption. Furosemide is a crystalline powder that is white to off-white in color and has no odor; It is insoluble in water and dilute acids, sparingly soluble in alcohol, and soluble in dilute alkali solutions.2 Historically, evidence has been scarce about pharmacokinetics and the possibility of gender differences of furosemide in the relationships between dose and efficacy or dose and adverse drug reactions.3-5 Considering that furosemide is particularly useful in clinical settings where a drug with a higher diuretic potential is required; including such edema caused by a variety of clinical conditions, such as congestive heart failure exacerbation, liver failure, renal failure, which included the nephrotic syndrome, and high blood pressure.6 therefore, the use of Lasix has been related to a significant rise in urine output, this process is known as diuresis where kidneys produce higher amounts of urine. Urine output is used to guide fluid resuscitation in critically ill patients as well as to diagnose acute renal injury,7 for that reason, measuring urine output is a way to evaluate Renal function without checking blood values, Kidneys that are not functioning will be incapable of concentrating urine and will yield a low specific gravity.8 Normal Urine output should be between 0.5-1.5 mL/kg/hour. and patients should urinate at least once every 6 hours.9

The purpose of the present study was to test if there is a significant difference in Lasix pharmacological action regarding urine output between adult males and females.

**Hypothesis**

There is difference between adult male and female in urine output after Lasix consumption.

**Materials and Methods**

The present study style is a double-blind randomized control. Sample pool included 12 patients, categorized into 6 females and 6 males, with their informed consent; the subjects were randomly assigned to notice the changes in urinary output after administrating Lasix 40mg over 6 hours. The data were collected and stored in a Microsoft Excel 2016 spreadsheet. At the end of data collection, the data were exported to SPSS 26.0 (Statistical Package for the Social Sciences), for statistical analysis, Supposedly the patients are healthy, and have a normal weight.

**Summary Table:**

The urine output of the 12 patients was measured using the urine output equation, which takes into account the amount of urine in milliliters, the time to produce the urine in hours, and the patients' weight in kilograms.

Urine Output= $\frac{Amount of urine/Number of hours}{weight of the patient in Kg}$

In this study, the data include two different variables, one quantitative and one qualitative (two categories), a two-sample t-test would serve the research requirements. As the study met the assumptions of this test are as the following10: Normality: The quantitative variable is normally distributed in each group. And Homogeneity of variance (equality of variances): Variances in the two groups are roughly equal. The output of the analysis is the sample means, standard deviations for each of the two groups, the 95% confidence interval for the difference in means, and the p-value.

**Table 1** Furosemide pharmacological effect (urine output) among the participants during the 6 hours of administration.

|  |  |  |
| --- | --- | --- |
| **Gender** | **Subjects** | **Urine Output (ml)** |
| **1 hr** | **2hrs** | **3hrs** | **4hrs** | **5hrs** | **6hrs** |
| **Female** | **1** | 50.4 | 100.8 | 151.2 | 201.6 | 252 | 302.4 |
| **2** | 64.8 | 129.6 | 194.4 | 259.2 | 324 | 388.8 |
| **3** | 72 | 144 | 216 | 288 | 360 | 432 |
| **4** | 36 | 72 | 108 | 144 | 180 | 216 |
| **5** | 57.6 | 115.2 | 172.8 | 230.4 | 288 | 345.6 |
| **6** | 86.4 | 172.8 | 259.2 | 345.6 | 432 | 518.4 |
| **Male** | **7** | 72 | 144 | 216 | 288 | 360 | 432 |
| **8** | 64.8 | 129.6 | 194.4 | 259.2 | 324 | 388.8 |
| **9** | 100.8 | 201.6 | 302.4 | 403.2 | 504 | 604.8 |
| **10** | 86.4 | 172.8 | 259.2 | 345.6 | 432 | 518.4 |
| **11** | 50.4 | 100.8 | 151.2 | 201.6 | 252 | 302.4 |
| **12** | 93.6 | 187.2 | 280.8 | 374.4 | 468 | 561.6 |

**Result and discussion:**

Consider table 2-1, which demonstrates the following information that came when the data were entered; t = -1.593, mean difference = -100.80000, P-value = 0.142, and confidence intervals are -241.75595 and 40.15595. Since the (p-value = 0.142) means that the p-value is greater than alpha = 0.05, indicates that the deviation from the null hypothesis is not statistically significant, and hence the null hypothesis states that (there is a difference between adult males and females in urine output after furosemide consumption) is not rejected based on the 5% threshold. therefore, the acceptance of the null hypothesis (P = 0.142) means there is insufficient evidence to reject; in light of; this study is done on a small sample size of the 12 subjects, and may increase the margin of error; in other words, it can render the study meaningless.

The result of this analysis in comparing urine output after administrating furosemide for six hours, the p-value for each hour is the same, confirming that there is a difference between female and male urine output following furosemide administration.

The results indicate that furosemide has a different effect on both men and women. Females had previously been excluded from being participants in clinical trials when studying the efficacy of new medicine. both males and females were grouped as one gender, hence there was no investigation of sex differences. however, it is well known that women have more adverse effects from a variety of medications, including furosemide, it is not always obvious if these adverse effects are related to gender differences in pharmacokinetics or drug pharmacodynamics, as in the present study. The treatment response may differ between males and females due to a lack of knowledge of the subjects, regardless of gender-related differences.3-5

|  |
| --- |
| **Independent Samples Test** |
|  | **Levene's Test for Equality of Variances** | **t-test for Equality of Means** |
| **F** | **Sig.** | **t** | **df** | **Sig. (2-tailed)** | **Mean Difference** | **Std. Error Difference** | **95% Confidence Interval of the Difference** |
| **Lower** | **Upper** |
| **6 hours** | **Equal variances assumed** | .208 | .658 | -1.593 | 10 | .142 | -100.80000 | 63.26174 | -241.75595 | 40.15595 |
| **Equal variances not assumed** |  |  | -1.593 | 9.932 | .142 | -100.80000 | 63.26174 | -241.88737 | 40.28737 |

**Table 2-1** Demonstrating the probability value over six hours using Two independent samples t-test.

**Table 2-2** summary of the group statistics in this study over the 12 subjects.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Group** | **Number of subjects** | **Mean** | **Std. Deviation** | **t-value** | **P-value (Sig.[2-tailed])** | **Mean difference** | **95% CI of the difference** |
| **Lower** | **Upper** |
| **Urine output** | **Female** | 6 | 367.2000 | 104.93244 | -1.593 | .142 | -100.80000 | -241.75595 | 40.15595 |
| **Male** | 6 | 468.0000 | 114.02400 |

As Furosemide is commonly included in clinical practice, in the particular reason for the circumstance regarding the dosage of furosemide the diversity of predicting how much furosemide will be absorbed in a given patient is difficult. This actively demonstrates that determining the appropriate oral dose may require testing a large range of doses in a single patient. To put it more simply, Loop diuretics, in other words, cause the discharge of urine with a salt level similar to 0.5 normal saline. Clinicians can use this information to anticipate the quantity of sodium expelled based on simple urine volume measurements.11,12

The mean among both genders in Table2-2, shows that the males have a higher urine output than females after administrating furosemide; be that as it may, the concentration of a diuretic in the final urine does not represent it at the site of action, the urinary concentration has not shown to be a meaningful metric. To put it more simply, the more diuretic that reaches its site of action, the higher the response, resulting in a constant diuretic concentration in the final urine. The diuretic excretion rate is a better reflection of the amount of diuretic that interacts with the Na-K-2Cl transporter.13,14 At this stage of understanding, several questions about the present study remain unanswered, owing to the small sample size population, the gender-based conditions of the subjects, and no accurate previous studies support this hypothesis.

**Conclusion and future directions**

In summary, furosemide is a potent loop diuretic that acts on thick ascending limp along with its action in increasing the urine volume, therefore, urine output is considered to be a measurement and a diagnostic tool in determining the kidneys status of the patient. Hence, the results of the present study demonstrate the (p-value is greater than 0.05), despite the small size number of the subjects, and their health life. Thus, the results approved that males’ urine output is higher than females’ urine output. No Current studies were clarifying the usage of furosemide in relation to gender differences in their action regarding urine output.

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