Does Name Brand Make a Difference in Tampon Absorbency?

Introduction:

Menstruation. The monthly annoyance that almost all women across the world, unfortunately, have to deal with. For many women, tampons are the preferred disposable menstrual product to use during their period. When going to the store to buy these tampons, many women may ask themselves if it's worthwhile to buy name brand tampons rather than generic off-brand tampons since name brand tampons cost more. All tampon brands are required by the FDA to put a label on the product box displaying the absorbency range for all size tampons; for all brands, a regular size tampon has an absorbency range of 6-9 grams of blood. So why does one brand cost more than another? In this experiment, I will be testing regular-sized Tampax Pearl as the name brand tampon against regular-sized Equate as the generic brand tampon to see if brand really has an impact on absorbency efficiency. Tampax Pearl tampons are sold for $6.97 per box of 36 regular-sized tampons, which is equivalent to $0.19 per tampon. Equate tampons, on the other hand, are sold for $4.17 per box of 40 regular-sized tampons, which is equivalent to $0.10 per tampon. The per-tampon cost for regular-sized Tampax Pearl is

almost double the per-tampon cost for regular-sized Equate, despite both brands having the same required absorbency range.

Statistical Question:

Do name brand tampons (Tampax Pearl) have a high absorbency than their competitor generic off-brand tampons (Equate)?

$$H_O : \mu_1 - \mu_2 = 0$$

$$H_a : \mu_1 - \mu_2 > 0$$

$$\alpha = 0.05$$

Where…

μ_1 = the true mean amount (in grams) of blood absorbed by one regular-sized name brand tampon (Tampax Pearl) in the span of 2 hours

μ_2 = the true mean amount (in grams) of blood absorbed by one regular-sized generic off-brand tampon (Equate) in the span of 2 hours

Sample means:

$\bar{x}_1$ = sample mean amount (in grams) of blood absorbed by a Tampax Pearl tampon

$\bar{x}_2$ = sample mean amount (in grams) of blood absorbed by an Equate tampon

Data Collection:

For my samples, I bought two boxes of 36 regular-sized Tampax Pearl tampons (72 tampons total) and two boxes of 40 regular-sized Equate tampons (80 tampons total). I then numbered each of the Tampax Pearl tampons 1 to 72 and used a random number generator to

randomly select 50 of the purchased tampons. I repeated this for the Equate tampons, numbering the tampons from 1 to 80 this time. Once I acquired both samples of 50, I then removed the packaging and applicators from all 100 tampons and weighed them on a scale individually. Each of the tampons weighed approximately 1 gram. It is important to note that the scale I had access to was not precise to decimal placements, so in reality, there may have been more variability in the weights of the tampons than measured in this experiment. Despite being approximately the same weight, the two brands of tampons had very different appearances. The Tampax Pearl tampons had a blue attachment between the string and the tampon itself, built in as an extra absorbent factor, and the string itself was thick as well. The Equate tampons did not have this, but rather just a thin, tightly twisted strand. With this in mind, I proceeded with my experiment.

To try and make this experiment as accurate as possible, I decided to make a substance that had approximately the same consistency as real blood. I researched numerous fake blood recipes and came up with the following for mine: 342 grams of Karo corn syrup, 56 grams of tap water, and 10 drops of red food coloring. This combination made one “batch” of fake blood; I ended up needing to make three batches total. Next, I took 100 five-ounce Dixie cups and flipped a coin to randomly assign a brand to each cup (“heads” represented Equate and “tails” represented Tampax Pearl). I capped at 50 cups for each brand. Random assignment was not really needed in this experiment since each cup was receiving the same exact mixture and each tampon was independent of the others; however, I did it just to be safe. Following this process, I weighed each Dixie cup (all were approximately 3 grams) and then added 10 grams of fake blood to each cup. Once everything was ready, with the help of two assistants, starting with two Tampax Pearl assigned cups and two Equate assigned cups, I placed four tampons into their

respective cups and started a timer for two hours. For each cup, I placed the tampon directly in the center of the cup, tip-down, with the string hanging over the side of the cup. My assistants and I waited five minutes before repeating this process with another four tampons, two Tampax Pearl and two Equate, starting another two-hour timer. This entire process was repeated until all 100 tampons were in their respective cups and on their own timers (25 timers were going at once; one of my assistants was a timekeeper and kept them all on his computer). Once two hours were up for the first group, all four tampons were simultaneously removed from their cups and weighed individually as quickly as possible, then promptly thrown away. The combined weight of the tampon plus blood absorbed (in grams) for each tampon was recorded in the data table. Every five minutes, as the two-hour timers went off, this process was repeated until all 100 tampons had been removed, weighed, and thrown away. Then for each recorded value for tampon weight combined with the weight of the absorbed blood, I subtracted the weight of the tampon (1 gram) to find the amount of blood absorbed by each tampon (in grams).

Data Display:

Raw Data

Combined Weight of Tampax Pearl tampon with absorbed blood	**Amount of blood absorbed by Tampax Pearl tampon**	**Combined Weight of Equate tampon with absorbed blood**	**Amount of blood absorbed by Equate tampon**
11g	10g	10g	9g
12g	11g	10g	9g
11g	10g	9g	8g
10g	9g	10g	9g

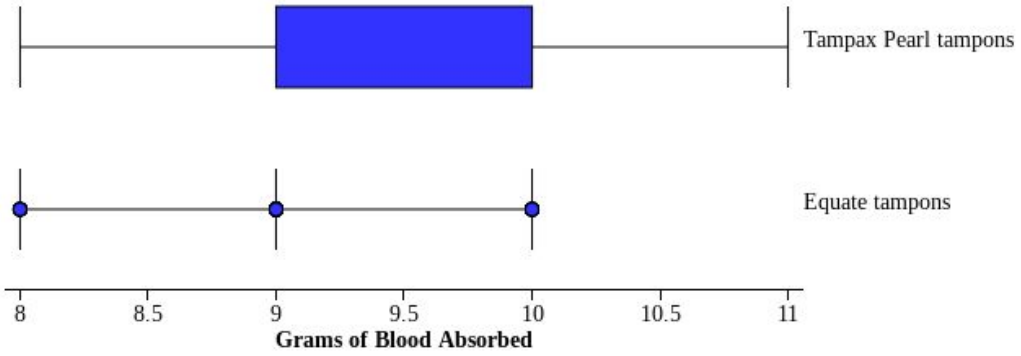
12g	11g	10g	9g
10g	9g	10g	9g
11g	10g	11g	10g
10g	11g	9g	8g
11g	10g	9g	8g
10g	9g	11g	10g
11g	10g	10g	9g
11g	10g	10g	9g
9g	8g	10g	9g
11g	10g	9g	8g
10g	9g	10g	9g
10g	9g	11g	10g
12g	11g	10g	9g
11g	10g	10g	9g
10g	9g	11g	10g
11g	10g	10g	9g
9g	8g	9g	8g
10g	9g	10g	9g
11g	10g	10g	9g
11g	10g	10g	9g
11g	10g	10g	9g
11g	10g	10g	9g
10g	9g	10g	9g
11g	10g	11g	10g
11g	10g	10g	9g

10g	9g	10g	9g
11g	10g	11g	10g
10g	9g	10g	9g
11g	10g	10g	9g
10g	9g	11g	10g
11g	10g	10g	9g
12g	11g	11g	10g
11g	10g	11g	10g
10g	9g	10g	9g
10g	9g	11g	10g
10g	9g	10g	9g
9g	8g	11g	10g
11g	10g	11g	10g
11g	10g	10g	9g
11g	10g	10g	9g
11g	10g	10g	9g
11g	10g	9g	8g
11g	10g	9g	8g
11g	10g	10g	9g
11g	10g	10g	9g
10g	9g	10g	9g

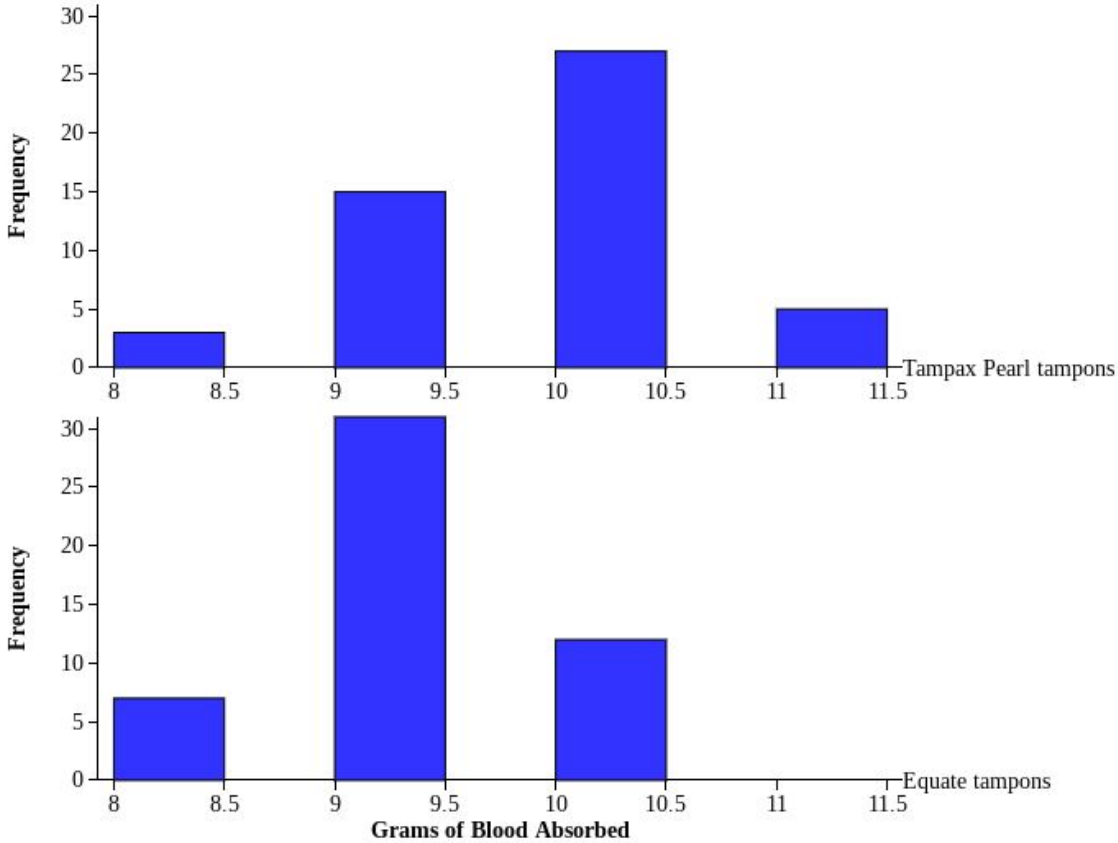
Summary Statistics

Group Name	n	mean	SD	min	Q_1	med	Q_3	max
1: Tampax Pearl tampons	50	9.68	0.741	8	9	10	10	11
2: Equate tampons	50	9.1	0.614	8	9	9	9	10

Boxplots



Histograms



Data Analysis:

The two distributions are clearly different. The distribution for Tampax Pearl absorbency has a center of $\bar{x}_1 = 9.68$ grams and a spread of 3. The distribution for Equate absorbency has a center of $\bar{x}_2 = 9.1$ grams and a spread of 2. Both of these values for Equate are noticeably smaller than the values for Tampax Pearl. There are no major outliers in either distribution. Since both distributions have sample sizes that are greater than 30, by the Central Limit Theorem we can assume that the sampling distributions are both approximately Normal. Furthermore, since there are more than 500 regular-sized tampons produced by Tampax Pearl and there are more than 500 regular-sized tampons produced by Equate, the 10% Condition is satisfied and we can assume independence. (The condition for Randomness was checked in a previous section, as well as the parameters and hypotheses were stated in a previous section.)

Use a 2 sample *t*-test

Test Statistic:

$t = (\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2) / \sqrt{(S1^2/n1) + (S2^2/n2)}$

$t = (9.68 - 9.1) - 0 / \sqrt{0.55/50 + 0.38/50}$

$t = 4.263$

P-Value:

$p = P(t > 4.263)$

$p = 0.000024$

Conclusion:

Since p = o.oooo24 < α = 0.05, we reject the null hypothesis and accept the alternative hypothesis. There is convincing evidence that the true mean amount of blood (in grams) absorbed by one Tampax Pearl tampon is greater than the true mean amount of blood (in grams) absorbed by one Equate tampon.

These results mean that the name brand tampon, Tampax Pearl, is of higher quality than its generic brand competitor, Equate, in regards to how absorbent it is. While the per-tampon cost for Tampax Pearl is almost double that of Equate, its sample mean amount of blood absorbed in the span of two hours is almost 0.6 grams more than the sample mean amount of blood absorbed in the span of two hours for Equate. Given this data, the consumer can decide whether the extra few bucks for a box of Tampax Pearls is worth it for a more absorbent tampon.

Reflection:

My goal in this experiment was to replicate the environment of a real uterus in order to test the absorbency of different brands of tampons. As a whole, I think this project went smoothly and there were very few bumps in the road. Although it was time-consuming, it was fairly simple to carry out. However, there is some room for potential errors that could be improved upon with further research in mind.

One area of the experiment that obviously could use some improvement is the developmental aspect of the uterus environment I attempted to recreate. For obvious ethical

reasons, I couldn't use real blood. While my corn syrup and water replacement was the correct consistency of blood, it lacked the cellular structure of true blood. Also, the fake blood I created sat at room temperature, which is much cooler than the blood temperature within the uterus, which can be anywhere between 94.46 and 105.26 degrees Fahrenheit. Thirdly, my model lacked the force of gravity aspect that plays a role in the menstrual cycle. Since there really wasn't a way to recreate a shedding blood lining, the tampons had to be placed in the cup with the string up. In reality, the tampon is inserted with the string down, and the force of gravity is was pulls the blood lining downward. Because of these factors, my model wasn't the most accurate recreation of a uterus.

Additionally, the scale I used for weighing the tampons lacked precision. The scale I used did not include decimal places, which made for uninteresting and repetitive data. For future research and repetitions of this experiment, I could use a more precise weighing device to see if there is more of a difference between amounts of blood absorbed than originally found in this experiment.

Furthermore, in this experiment I limited myself to only using regular sized tampons of the two brands. In an expanded experiment, I could also test other sizes of tampons using this same procedure, including light, super, super plus, and ultra tampons. I could also test other name brands of tampons to see how they compare to the generic brand Equate, as well as even Tampax.