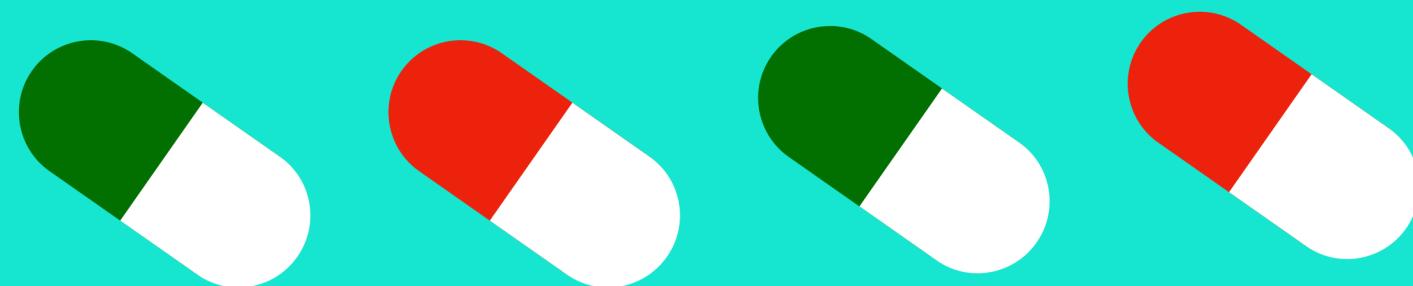


Investigation of the Acetaminophen in Different Fever and Flu Tablets



Abstract:

Acetaminophen has been used as a pain relief drug for at least about half a century. Being used so regularly, Acetaminophen can also cause great harm as much as it causes great relief.

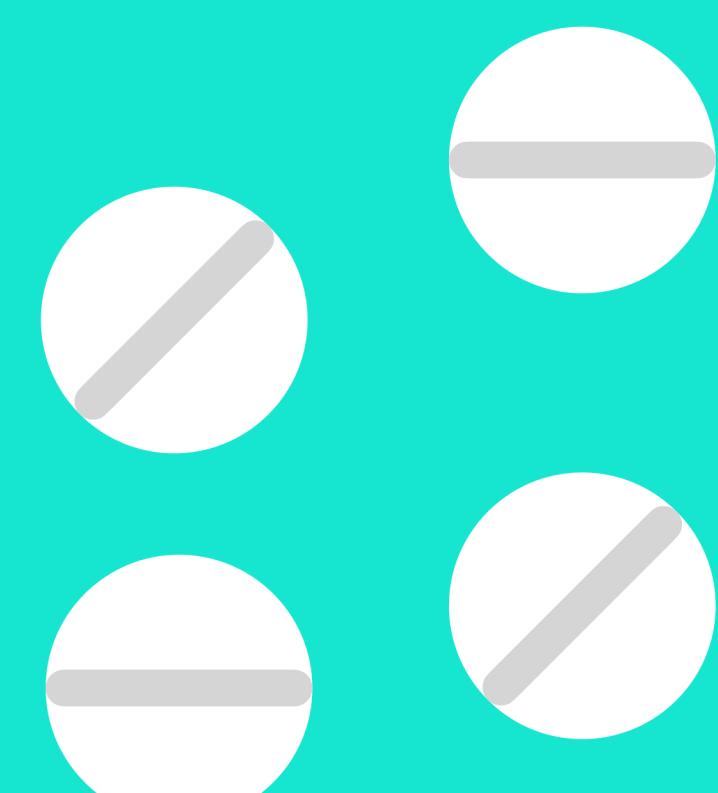
As such, our research, which aims to measure the amount of acetaminophen in 7 different tablets and ensure that they are below the recommended amount, which is 500mg. To do so, we utilised spectrometry, which uses light to detect the acetaminophen concentration. After research, there is evidence that the amount of acetaminophen in tablets are at a safe value, and that human life is not at threat. The results of this research can be used to catalogue levels of acetaminophen in tablets to present such information better. It can be used to inform the public and increase awareness on the lethality of acetaminophen.

Research Question

Is the acetaminophen level in different fever and flu tablets from different companies safe for consumption?

Hypothesis

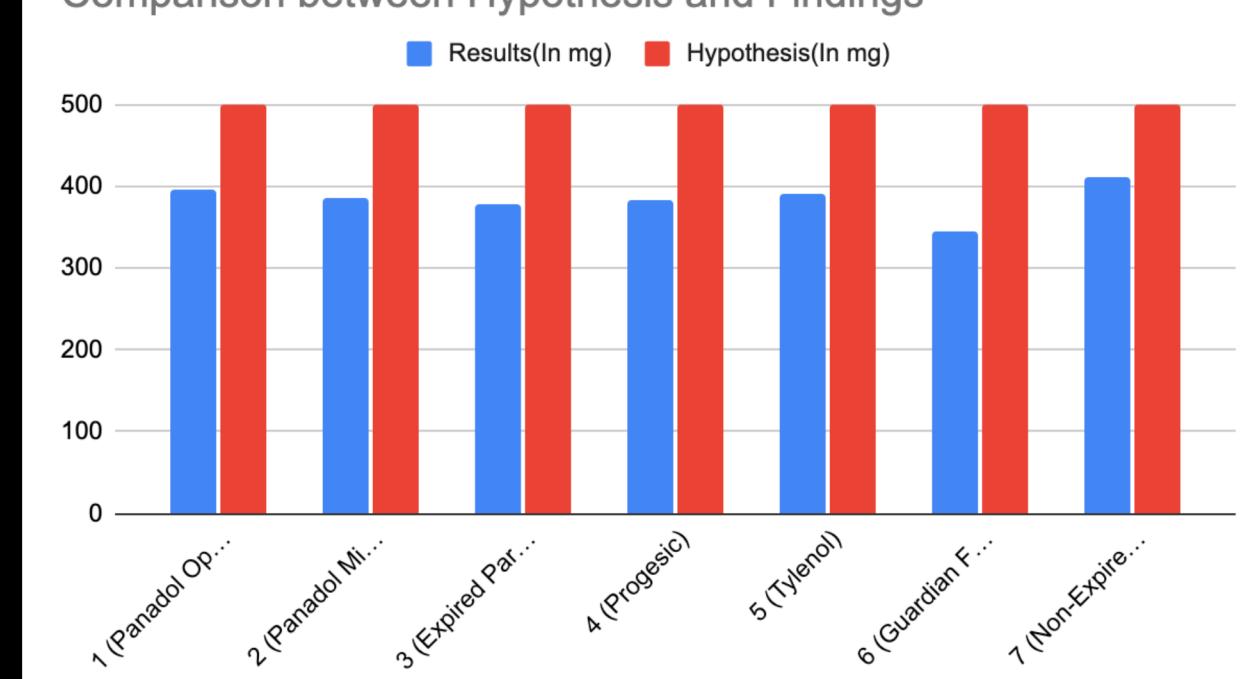
The amount of acetaminophen in the 7 different brands of tablets should have levels not exceeding 500 mg per tablet.



Results (In mg):

Sample/Reading	Reading 1	Reading 2	Reading (Average)
1 (Panadol Optizorb)	395	398	397
2 (Panadol Mini Caps)	387	386	387
3 (Expired Paracil)	379	376	378
4 (Progesic)	381	387	384
5 (Tylenol)	390	391	391
6 (Guardian Fever and Pain Relief)	346	345	346
7 (Non-Expired Paracil)	410	411	411

Comparison between Hypothesis and Findings



Methods:

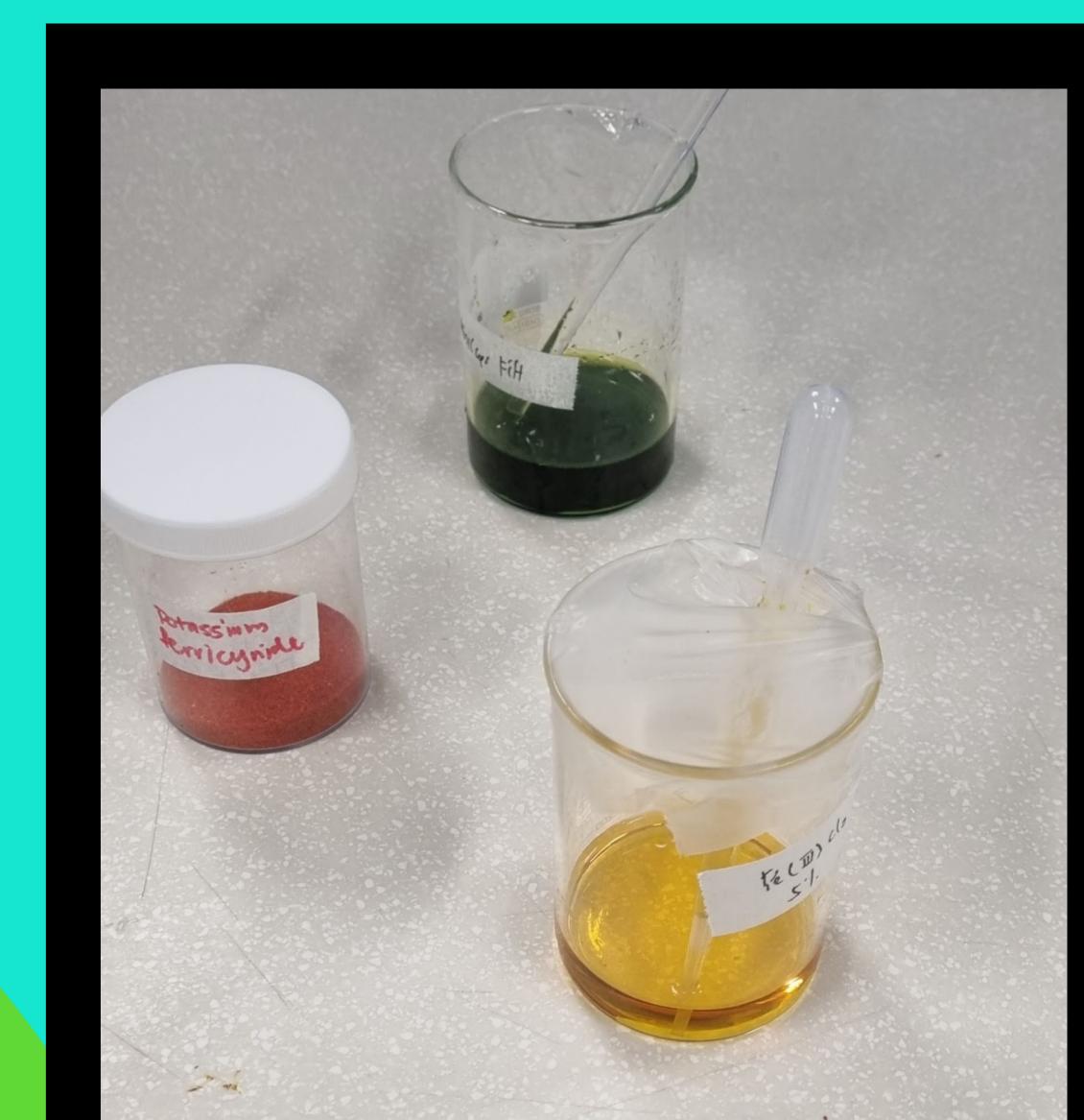
- Place a piece of filter paper on top of a Buchner funnel.
- Pour 50ml of the solution from the beaker(A) into the Buchner Funnel
- Turn on a Diaphragm Pump and wait until the Buchner Funnel drips dry.
- After the solution in the Buchner Funnel drips dry, unhook the vacuum tube
- After that, pour the solution out into a separate beaker(B).
- Then, pour 25ml from beaker(B) into a 500ml measuring cylinder
- Dilute the solution poured from beaker(B) by pouring in distilled water until it reaches the 500ml mark.
- Then, pour out 25ml into another beaker(C).
- Fill the beaker(C) with distilled water up till 250ml to dilute the solution.
- Measure 10ml of the solution in beaker(C) and pour it into another beaker(D).
- Wear eye goggles
- Add 2-3 drops of Iron Chloride Solution(III) (5%) into the beaker(D).
- Add 4g of Potassium Hexacyanoferrate(III) into the beaker(D) and mix well
- Let the mixture sit for 10 minutes
- After 10 minutes, pour 1ml Hydrochloric Acid into the beaker(D) and mix.
- Pour it into the cuvette until the cuvette is approximately $\frac{3}{4}$ full.
- Place cuvette into the spectrometer

Discussion:

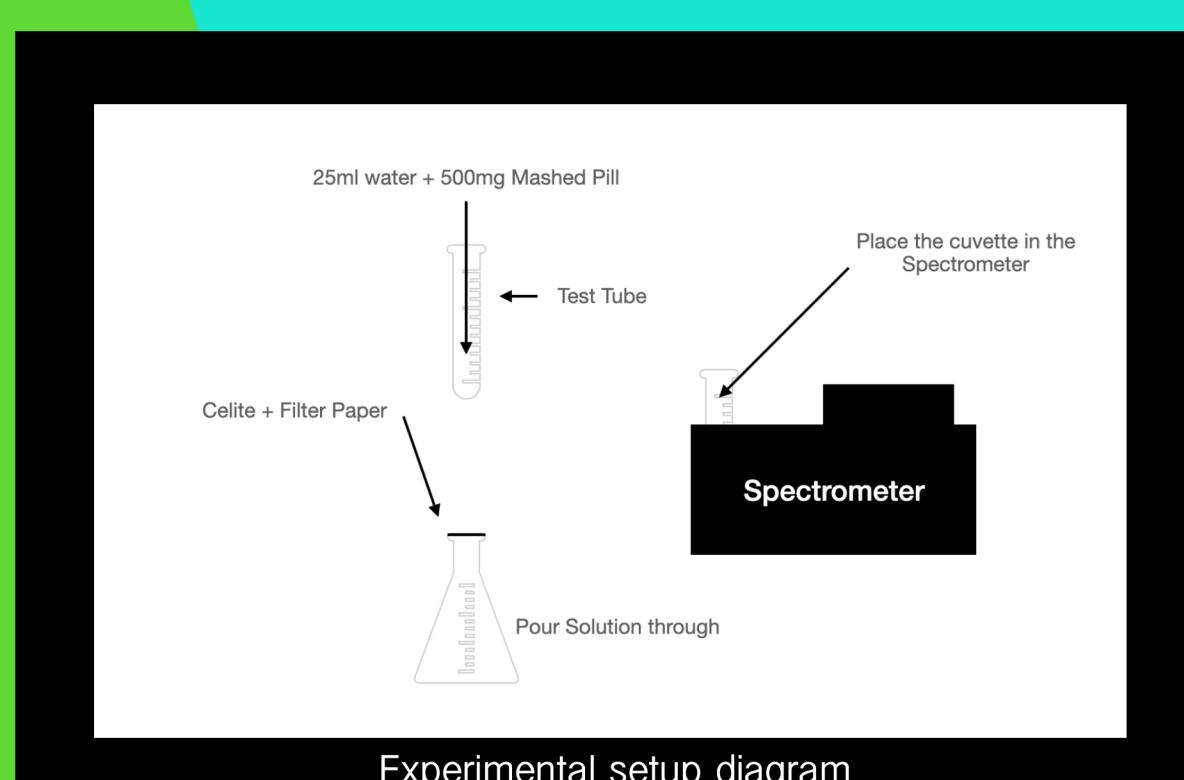
From the chart and the data collected, it is evident that our hypothesis H1 is valid. Across all the values, the amount collated is no more than 411mg per pill of 500mg. This is a safe value as the maximum value of 500mg*8 doses for 4000mg per day for an adult as a maximum. (Harvard Health Publishing, 2022).

However, this does not match with stated claims by the companies that write that each pill contains, which is 500mg of acetaminophen. Compared to our results for example, Panadol Mini Caps on their website(Medicines to Midnight), contains 500mg of acetaminophen per tablet. However, our research and findings show that Panadol Mini Caps, on average, has 387mg of acetaminophen per tablet. Such a discrepancy could be due to for example, equipment shortcomings, which will be discussed more later.

To come to this conclusion, we used Beer's Law to calculate the raw data in the form of Abs to concentration. After this, we reversed our steps of dilution to end up with the final amount calculated. Using the results, we can then compare against the expected results or against what the amount is stated on as per the ingredients list on the manufactures.



Experiments and Chemicals



Experimental setup diagram

Conclusion

To summarise, our research was to ensure that the level of acetaminophen in different flu and fever tablets are at a acceptable level. To find out, we tested the hypothesis "The amount of acetaminophen in the 7 different brands of tablets should have levels not exceeding 500 mg per tablet." and we found it to be true. Our research found that all of the pills have readings of no higher than 411mg of acetaminophen in a 500mg pill, which is below what we have expected but still renders our hypothesis true.

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