UNWANTED TOXINS IN CHICKEN NUGGETS: DETECTION AND ANALYSIS OF HARMFUL COMPOUNDS

Presented by
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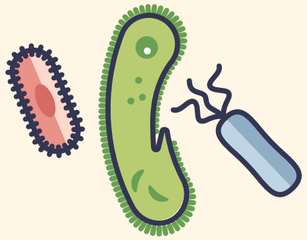
INTRODUCTION:

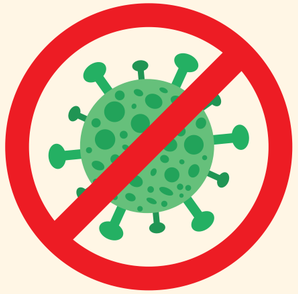
Chicken nuggets are one of the most popular fast-food items consumed worldwide, loved especially by children and young adults for their taste, convenience, and affordability. However, behind their crispy outer layer and soft meat, nuggets may carry hidden risks. During processing, deep frying, and storage, harmful substances such as acrylamide, excess sodium, preservatives, and artificial dyes can be formed or added. These compounds are not visible to the eye but can enter our bodies when we eat them.

Research has shown that regular consumption of nuggets with such toxins may lead to serious health problems like obesity, high blood pressure, heart disease, and even cancer. Despite their widespread popularity, there is very little consumer awareness about these harmful compounds. This project aims to detect and compare unwanted toxins in fast-food, packaged, and homemade chicken nuggets, to highlight the risks and promote safer food practices.

STATEMENT OF PROBLEM:



Chicken nuggets are a popular fast-food item enjoyed by children and adults for their taste and convenience, but many fast-food and packaged nuggets contain hidden toxins and additives such as excess sodium, preservatives, acrylamide, and artificial dyes. These substances, formed during processing, frying, or storage, can pose serious health risks if consumed regularly, including heart disease, obesity, and cancer. Most consumers are unaware of these risks, so this project asks: Do fast-food and packaged chicken nuggets contain more harmful compounds than homemade nuggets, and how significant are the differences?



HYPOTHESIS:

Fast-food and packaged chicken nuggets will contain higher levels of sodium, preservatives, rancid oil residues, and artificial dyes compared to homemade chicken nuggets. Is it true ?

MATERIALS:

- Store-bought packaged chicken nuggets
- Fast-food chain chicken nuggets
- Homemade chicken nuggets

Chemicals:

- Silver nitrate ($AgNO_3$),
- Potassium Chromate (K2 CrO4)
- Potassium iodine
- Sodium Thio sulphate
- Chromatography paper
- Ethanol
- Distilled water
- Beakers
- Pipettes
- test tubes

PROCEDURE:

1. Crush the three nugget samples to form broth, transfer into separate test tubes, add distilled water, and mix well.

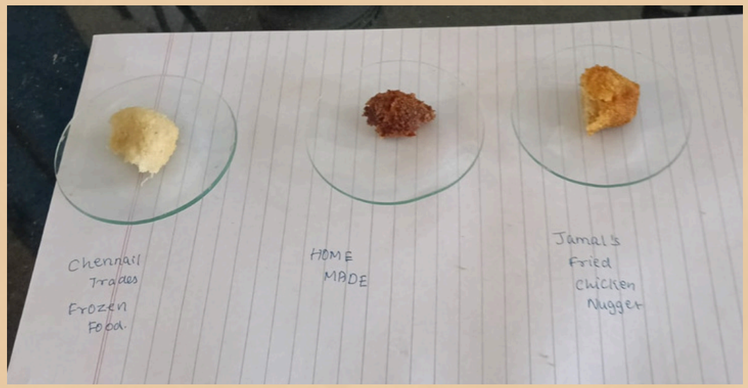
2. Take a small portion of each mixture, add potassium chromate, then slowly add silver nitrate until a reddish-brown colour appears to indicate sodium level.

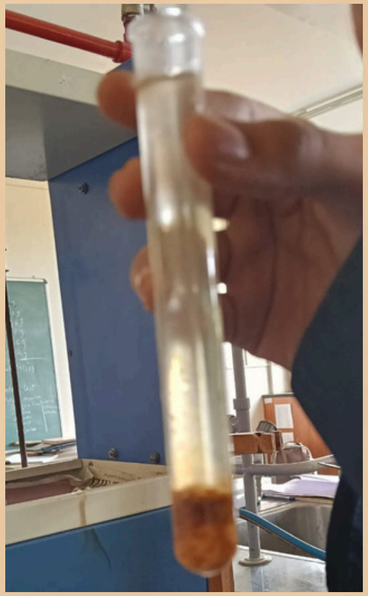
3. Place a drop of the broth on folded chromatography paper using a pipette.

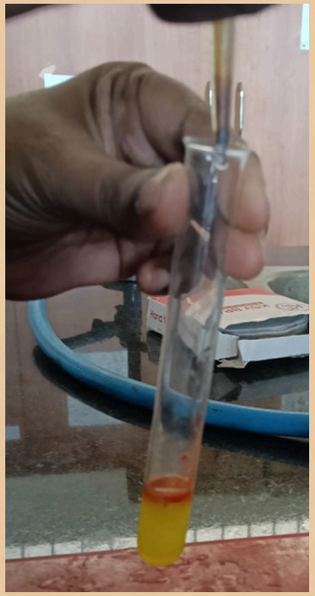
4. Dip the paper into a solvent (ethanol + distilled water) and observe different colour bands to identify artificial dyes.

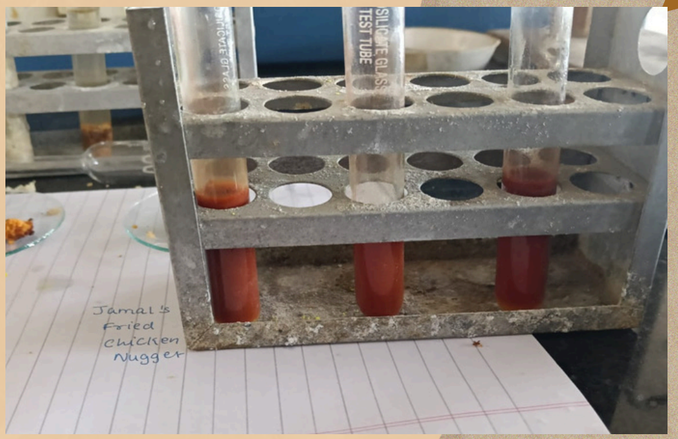
5. Pour the broth into clean test tubes, add potassium iodide, then slowly add sodium thiosulfate until a blue colour appears as the endpoint for rancidity.

PHOTOS:

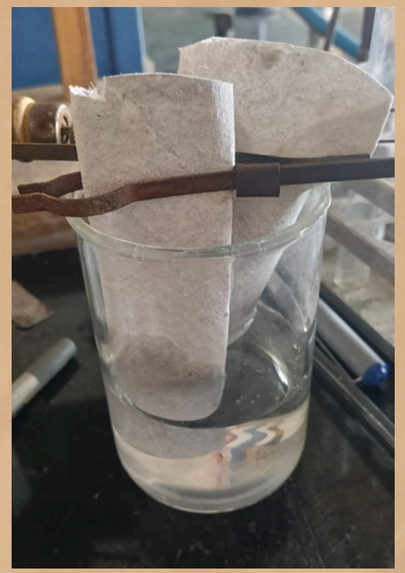




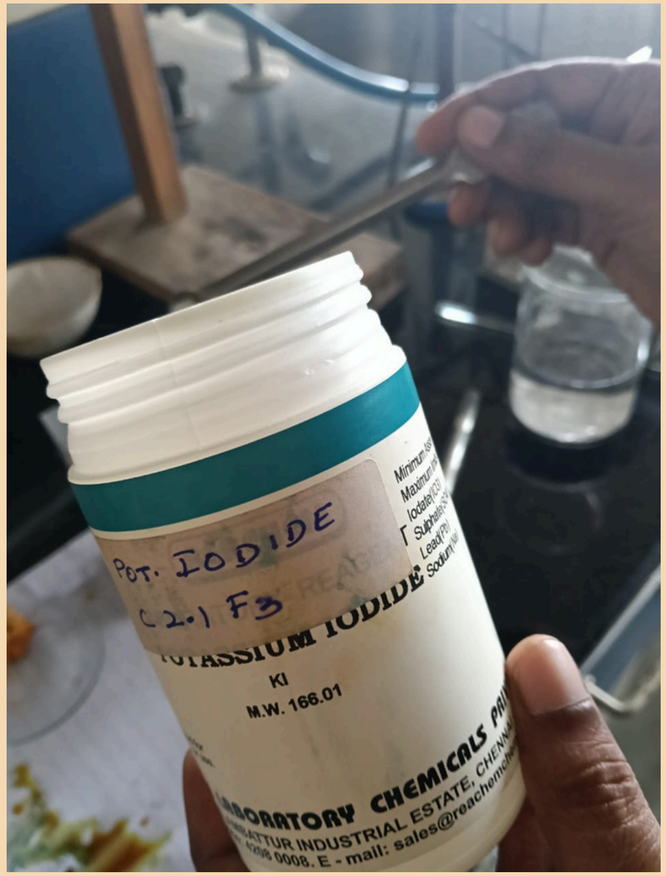




1.Sodium Test



2.Food Dye Test



3.Oil Rancity Test

OBSERVATIONS & INFERENCES:

NUGGET TYPE	SODIUM (ml)	OIL RANCITY	FOOD DYES
PACKED FROZEN CHICKEN NUGGET	▯ Turned into reddish brown quickly of adding 5ml AgNO3	▯ Needed more sodium thiosulfate to reach blue endpoint. - oil is sightly rancid	▯ No artificial dye present
FAST FOOD CHICKEN NUGGET	▯ Reddish brown formed quickly of adding 2ml of AgNO3	▯ Needed a lot of sodium thiosulfate- oil more rancid	▯ Slight yellow/orange coloration in water after soaking
HOME-MADE CHICKEN NUGGET	▯ Reddish brown formed slowly of adding 3ml AgNO3	▯ Needed very little sodium thiosulfate - oil was fresh	▯ No colour leaching into water; colour remains natural. No artificial food dyes detected

RESULT:

From the experiment, it was found that frozen chicken nuggets had the highest sodium content, while homemade nuggets had the lowest. The fast-food nuggets showed signs of rancid or reused oil, but the homemade nuggets were prepared in fresh oil.

In the food dye test, artificial coloring was present only in fast-food nuggets, and not in the frozen or homemade samples. These results show that homemade chicken nuggets are cleaner and healthier compared to frozen and fast-food nuggets.

CONCLUSION:

This study helped us understand how the quality of food can change based on how it is made and where it comes from. The tests showed that frozen and fast-food nuggets often contain extra sodium, added colors, and oil that is not always fresh. On the other hand, homemade nuggets are prepared with fewer additives, fresh ingredients, and cleaner oil, which makes them a better choice for health. So, choosing homemade food gives us more control over what we eat and helps avoid unnecessary chemicals and unhealthy fats. This experiment shows the importance of being aware of the ingredients used in packaged and restaurant foods and encourages us to prefer fresh, home prepared meals whenever possible.

FUTURE ENHANCEMENT:

In the future, this experiment can be improved by testing more brands and a larger number of samples to get even more accurate results. We can also test other nutrients such as fat content, protein quality, and moisture level to understand the nutritional differences more clearly. Additionally, using digital instruments like spectrophotometers or pH meters could give more precise readings. This study can also be extended to compare other fast-food items to help people make healthier food choices.

ACKNOWLEDGEMENT:

I am over helmed in all humbleness and gratefulness to acknowledge my depth to all those who have helped me to put these ideas, well above the level of simplicity and into something concrete. First of All, I would like to thank the Almighty for whose blessings without which this project wouldn't have been possible. I would like to express my special thanks of gratitude to my guide teacher Mrs Survath Jabeen as well as our principal who gave me the golden opportunity and guided me throughout the project to do this wonderful project on the topic of "Unwanted Toxins in Chicken Nuggets: Detection and analysis of harmful compounds.", which also helped me in doing a lot of research and I came to know about so many new things. I am thankful to them.

Any attempt at any level can't be satisfactorily completed without the support and guidance of My Parents. I would like to thank my parents who helped me a lot in gathering different information, collecting data and guiding me from time to time in making this project, despite their busy schedules, they gave me different ideas in making this project unique. THANKS AGAIN TO ALL WHO HAVE HELPED ME

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