Formulation of Low Salt Roasted Nuts.

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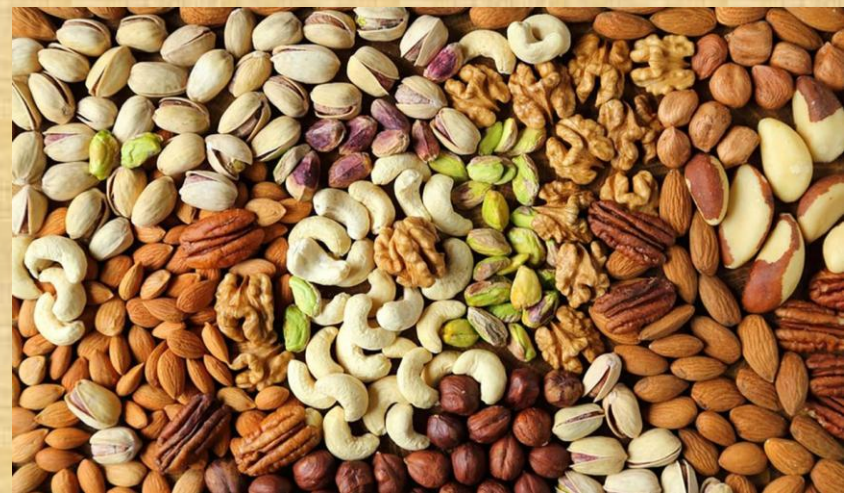


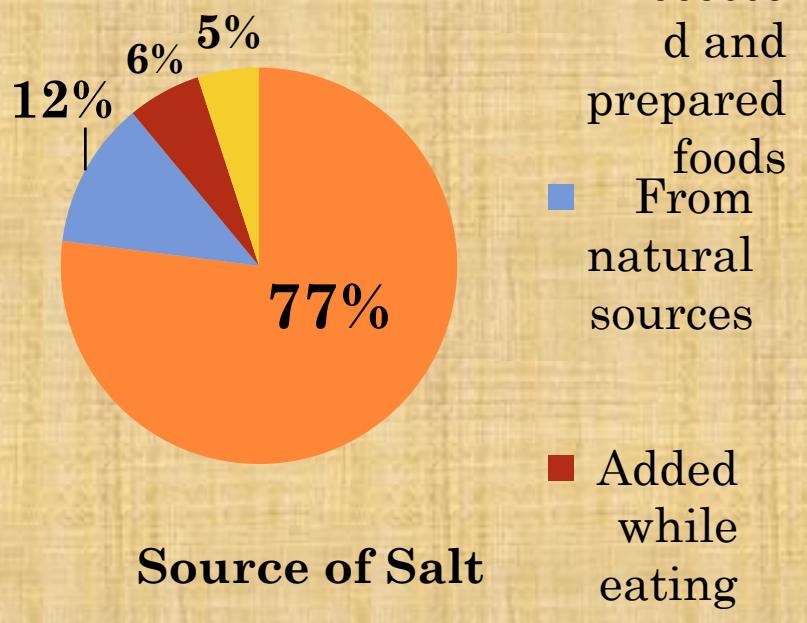
OUTLINE

- Salt and its sources.
- Why sodium intake is too high?
- Health consequences of excess sodium intake
- Strategies to reduce sodium intake
- Case study “Nuts “almonds” .

SALT

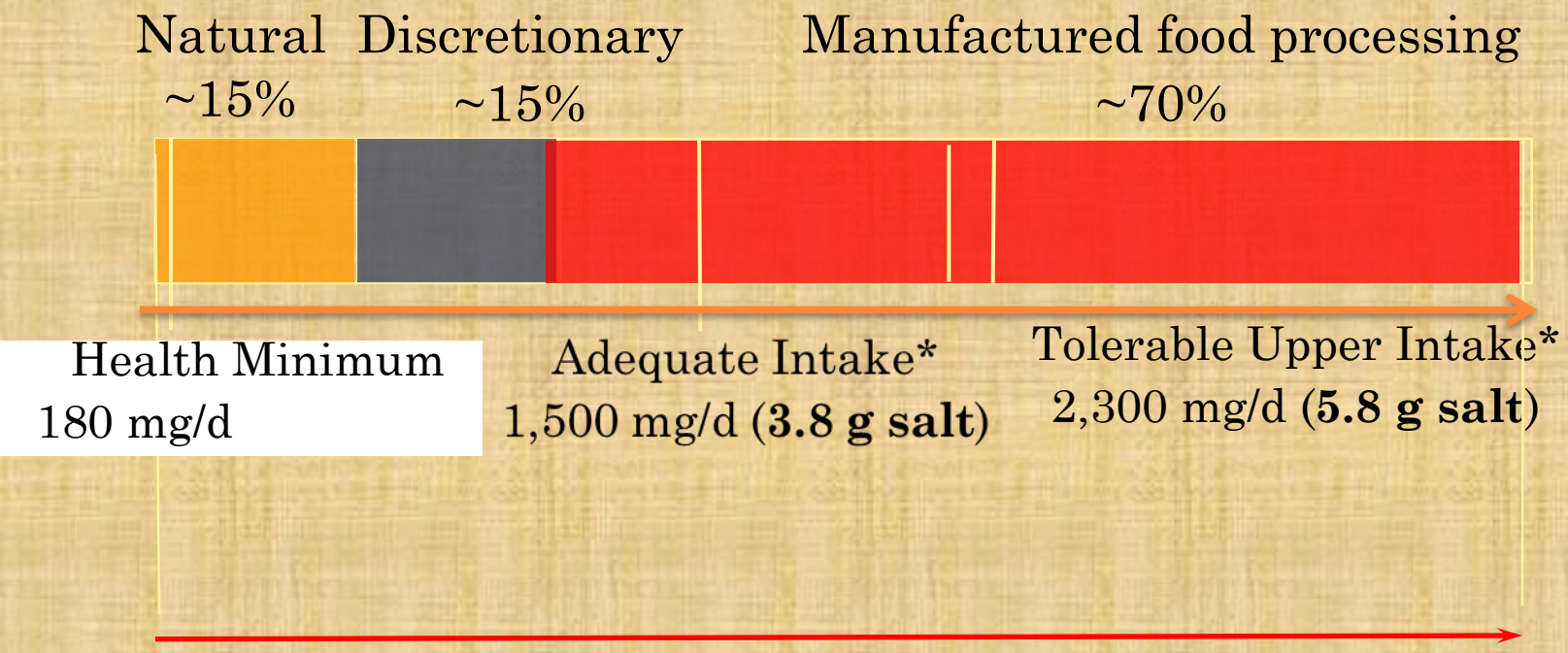
- **Sodium chloride (NaCl)** is the chemical of dietary salt is about **40% sodium** and **60% chloride** .“1”
- **Sources :**
  - Most of our sodium intake is from salt added to foods
  - The majority from restaurant and processed foods
  - Is very low naturally (fruits, vegetables, grains, etc). “2”

Rasheed et al., (2016).



Source of Salt

Sodium (salt) in our Diet:



"3" Titze et al ., (2014).

Why is our sodium intake so high?

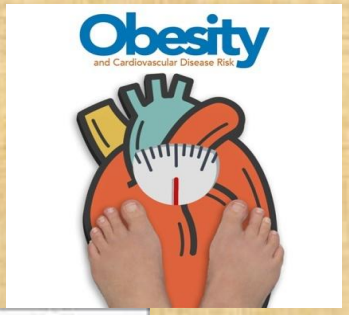
Less home-cooked meals

- Busy lifestyle!
- Want convenience.
- Prepared food is always **available.**

LIFESTYLE RISK FACTORS FOR HIGH BLOOD PRESSURE

- ✓ Obesity
- ✓ High alcohol intake
- ✓ Inactivity
- ✓ Smoking
- ✓ Inadequate vegetable and fruit intake
- ✓ Inadequate milk product intake
- ✓ High dietary sodium intake .

"4" Luzardo et al .,(2015).



How is sodium a health risk?

- ✓ **Increases blood pressure which increases risk for:**
  - ❑ **Stroke**
  - ❑ **Cardiovascular disease**
  - ❑ **Kidney disease**
  - ❑ **Dementia (brain)**

"4" Luzardo et al .,(2015).

WHY IS SALT SO WIDELY USED IN FOOD?

SODIUM'S FUNCTION IN FOOD

- Preservatives
- Stabilizer
- Modify flavor
- Binds ingredients
- Enhances color

- Inhibits growth of food-borne pathogens

Protocol to set up strategies to reduce sodium intake.

Key messages

- 23 countries have 80% of the burden of chronic disease in low-income and middle-income regions of the world
- In these countries, 13·8 million deaths could be averted over 10 years from 2006 to 2015 (8·5 million by a salt-reduction strategy and 5·5 million by implementation of four elements of the WHO Framework Convention on Tobacco Control)

- The cost of implementing these two interventions would be less than US$0·40 per person per year in low-income and lower middle-income countries, and US$0·50–1·00 per person per year in upper middle-income countries (as of 2005)

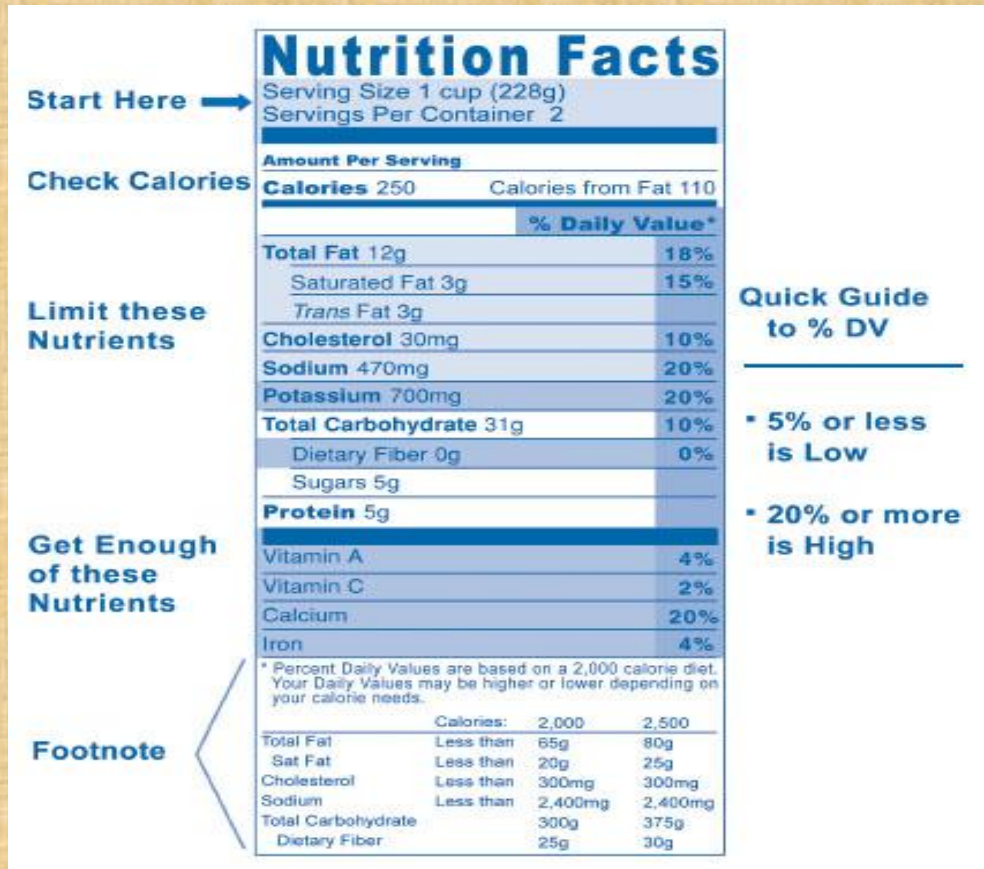
Vital Signs: MMWR 2011; 60(4):1-3–8 Heidenreich PA, et al. Forecasting the future of cardiovascular disease in the United States: a policy statement from the American Heart Association. Circulation 2011;123;933–944.

Asaria P, et al. Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use. Lancet 2007;370:2044–53.

STRATEGIES TO REDUCE SODIUM INTAKE

1. Increase the awareness of public by education or by individual dietary counseling, improving food labeling

"5" Burnier et al ., (2015).



2. DIRECT REPLACEMENT:

potassium, calcium, and magnesium salts,

ascorbate, and sulphate ,Reduced-sodium sea salt

(increased magnesium and potassium).

"5" Burnier et al ., (2015).

3. IMPROVE THE PERFORMANCE OF TASTE BUDS BY USING SALT ENHANCERS

- **Lysine, arginine, ornithyl-3-alanine, trehalose**
- **Umami substitutes (fermentation products, monosodium glutamate, etc)**
- **salt enhancers (alapyridain, alkyldienamides, high ribonucleotide yeast extract, and dehydrated protolyzed milk or cereal proteins) which increase the perception of salt in the finished products. Salt enhancers can achieve up to 20% of salt reduction**
- **Challenges: Cost, altered flavor profile.**

"5" Burnier et al ., (2015).

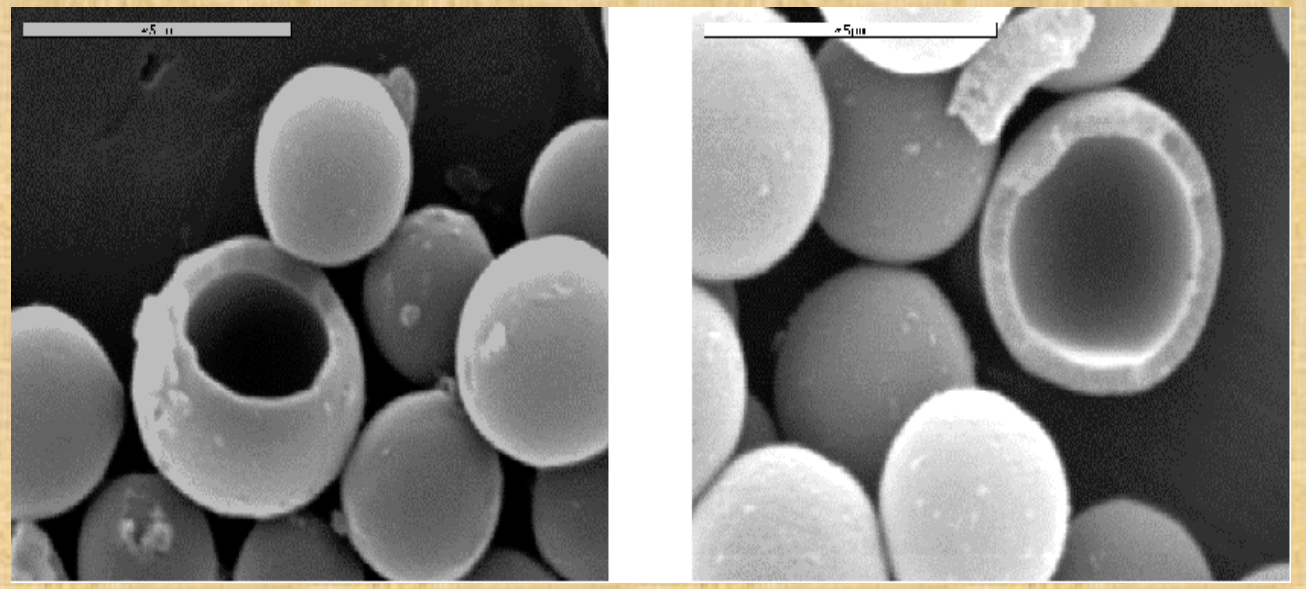
4. Enhance the taste bioavailability of salt by

modifying its physical status (i.e. lowering particle size by means of micronization/encapsulation).

"5" Burnier et al ., (2015).

NEW TECHNOLOGIES IN DEVELOPMENT?

- **Microcapsules: potassium chloride and agent to reduce bitterness. "6"** Khor et al .,(2017).
- **Hollow microspheres of sodium chloride**



- **Impart a similar taste experience for a lower absolute quantity of salt "7"** Brunchi et al ., (2014).

Case study

Nuts(Almonds)

THE SCOPE OF THE STUDY

- Check the effectiveness of reducing the salt (NACL)

from roasted nuts and their acceptance by customers.

EXPERIMENTAL DESIGN

1.preliminary assessment of salt content in nuts in tulkarm city.

2. We adopted approach to reduce salt by size reduction.

3. We took the salt and treated it thermally (burning), to get rid of any inorganic material.

4. Then we milled salt to reduce its size and become able to stick it in the nuts.

5. We then took photos by microscope before and after milling, to note the change in salt volume

❖ 1.To know concentration of **AGNO3**

3.372g AgNO3	dissolved	200 ml D.W
1 g K2CrO4	dissolved	20 ml D.W
1.168 Pure salt	dissolved	200 ml D.W

Nuts

Grinding

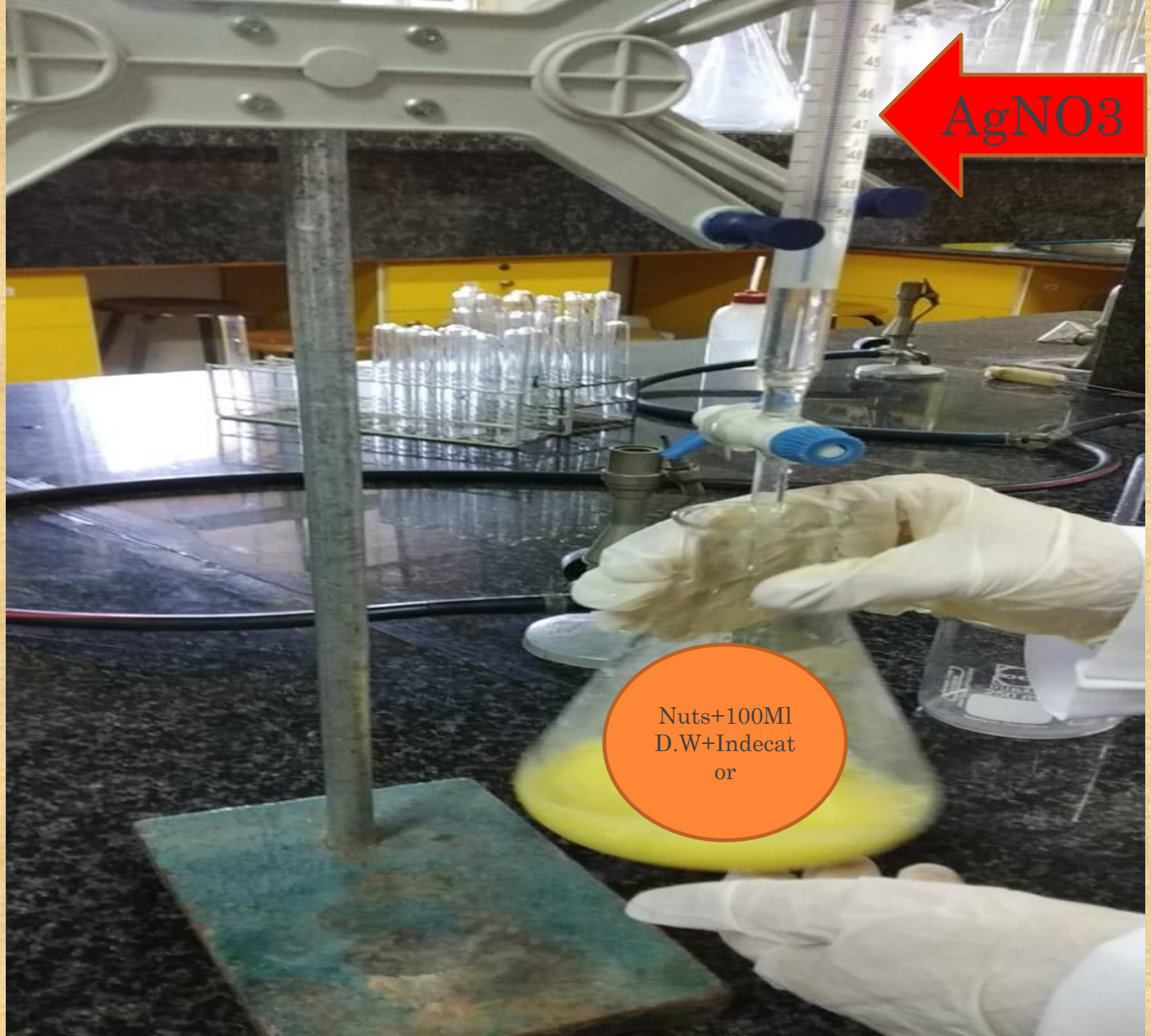
weight 5g

Add 100 ml D.W

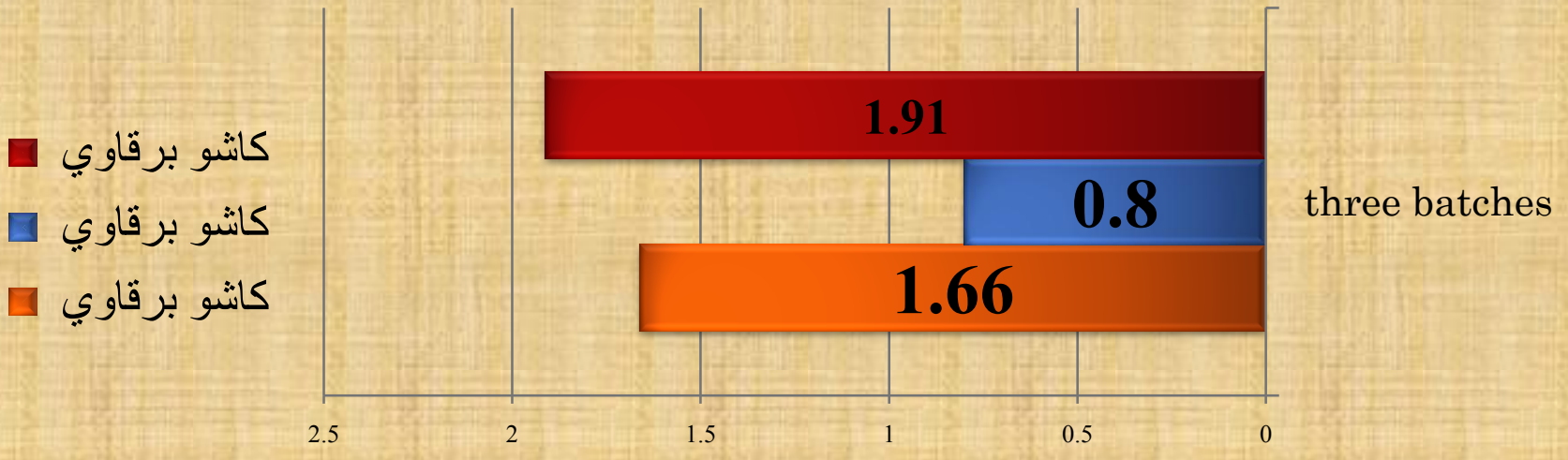
Heat at 80 C for 1 hr(Water Path).

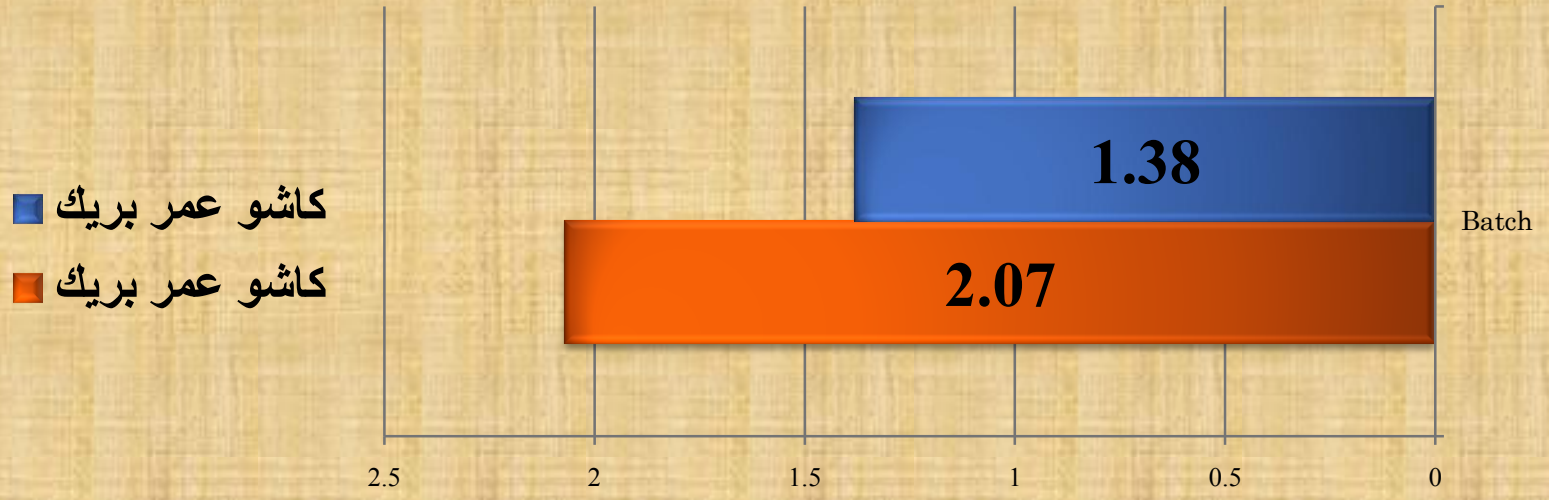
Add indicator(K_2CrO_4)

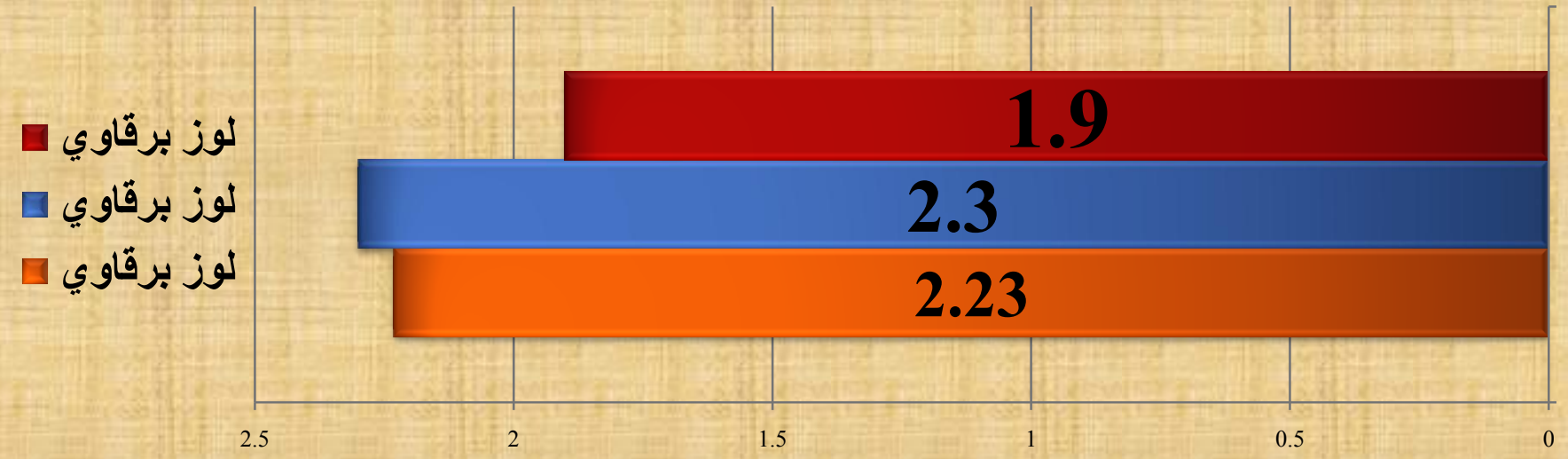
Titrate

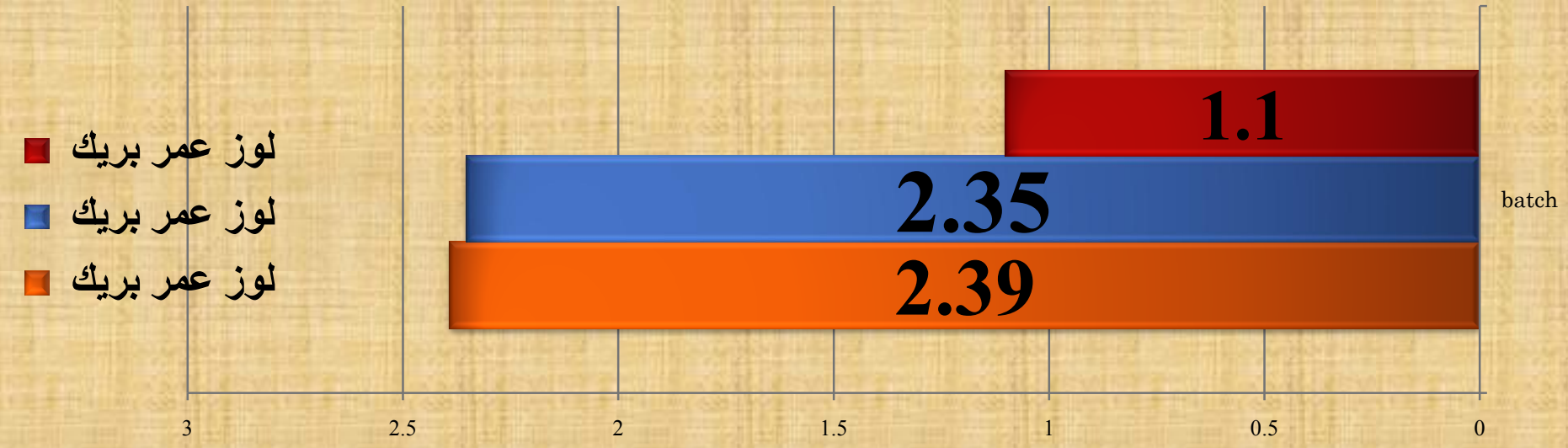

AgNO3
Nuts+100Ml D.W+Indecator

❑Evaluation results for salt content in nuts in Tulkarem city :-





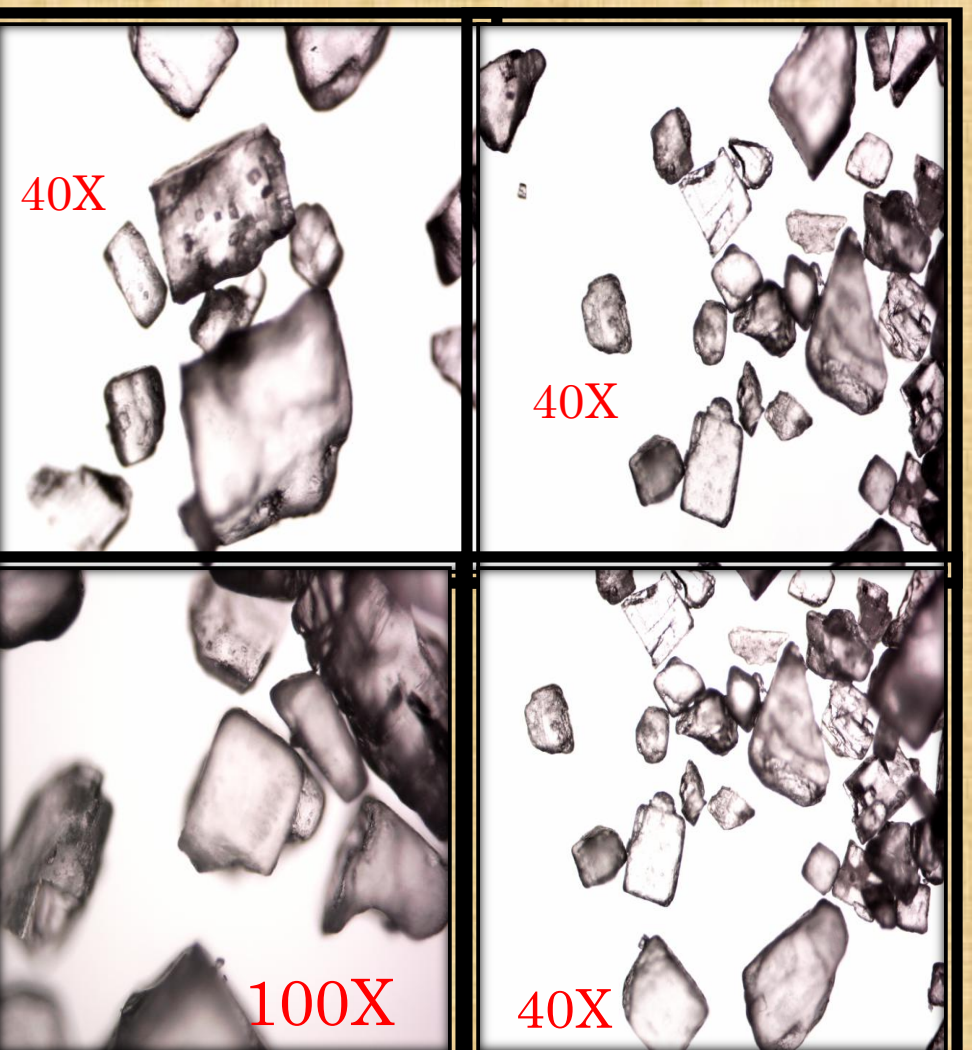




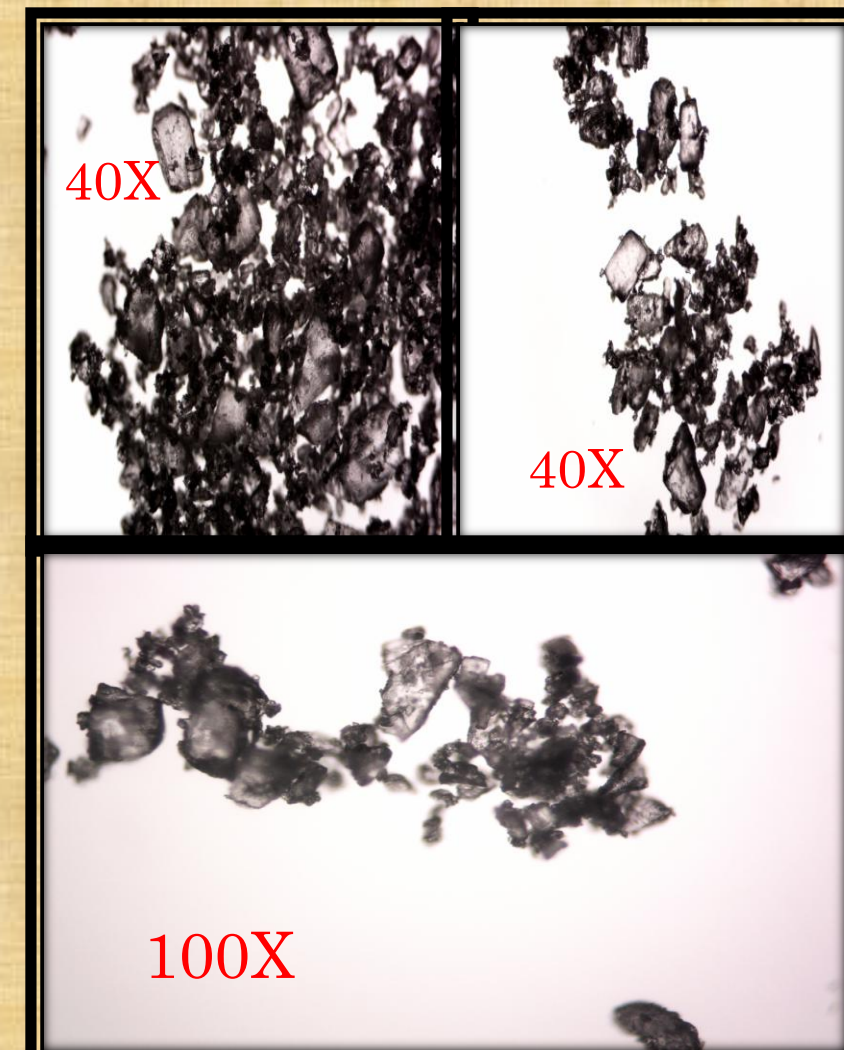
Then we took the Average of almonds =2.44%

- **Images taken to the salt by microscope before and after Milling:**

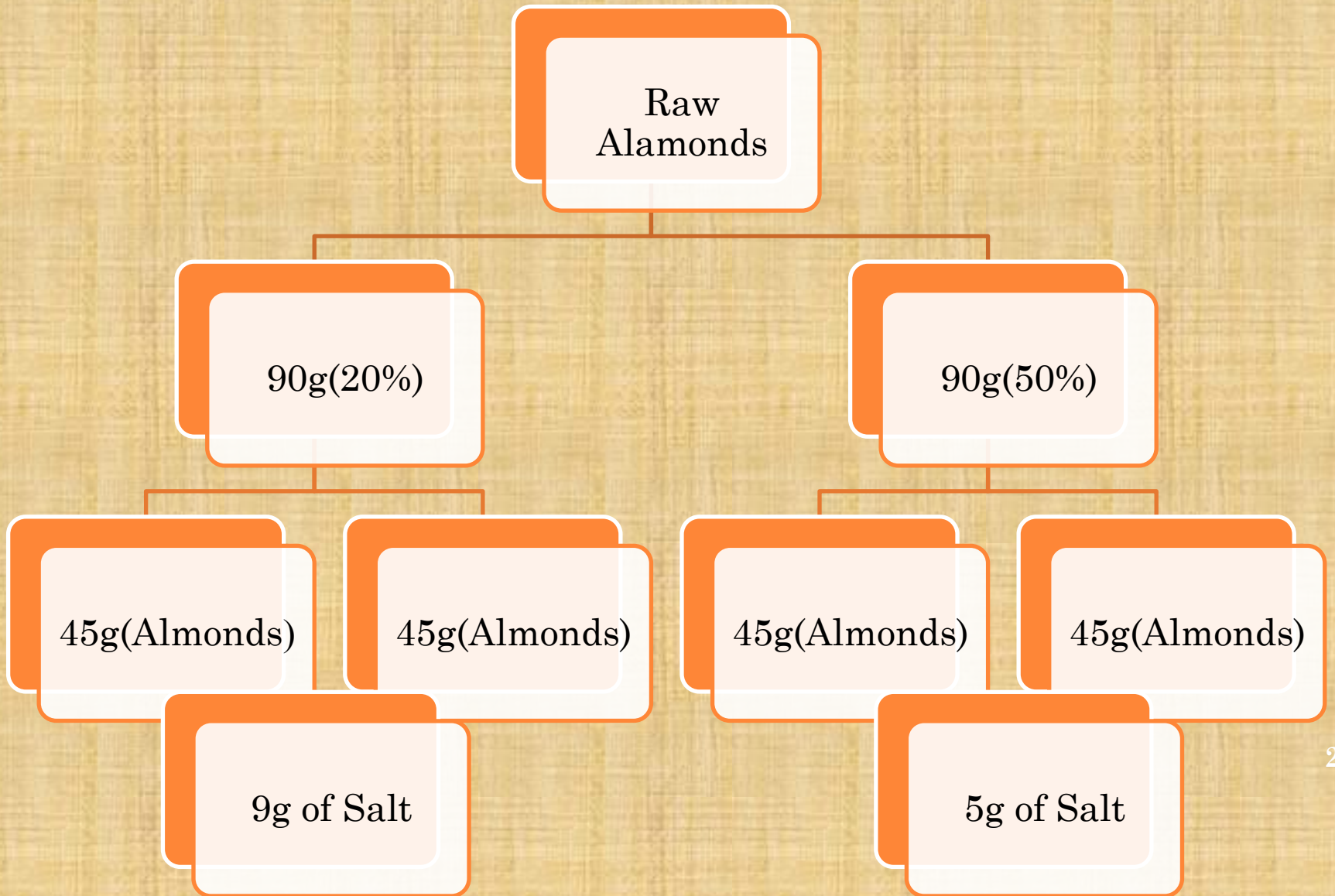
Before milling:



After Milling:



Preparation for Roasting:



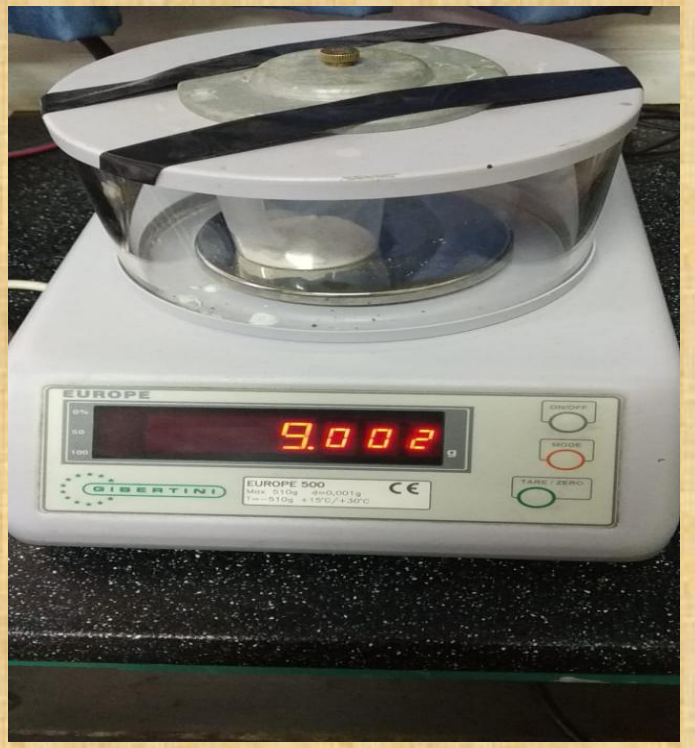
Roasting:

It was roasted at 200 ° C

5 g of salt to reduce the proportion of 50%

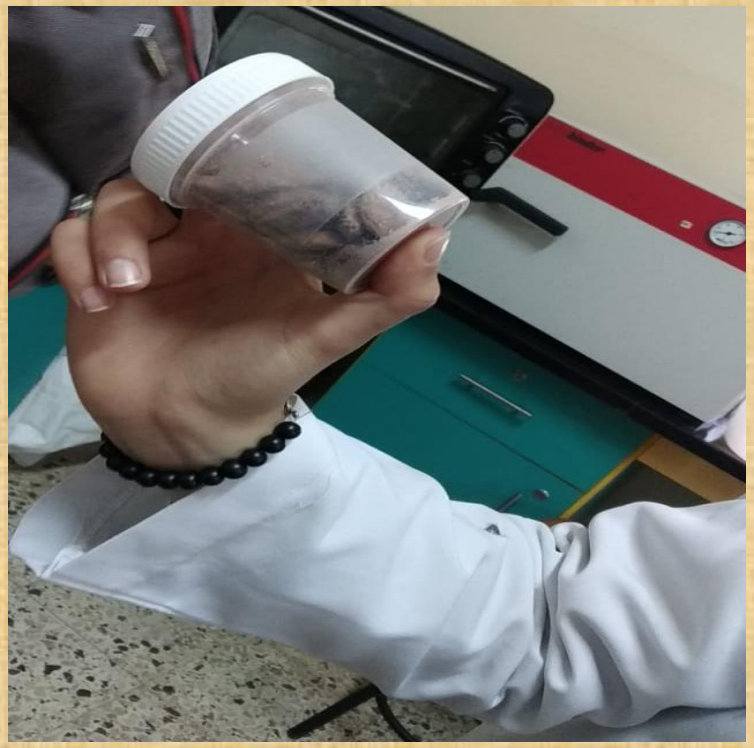
9 g of salt to reduce the proportion of 20%

Almonds and salt were put together in a cup



CON…

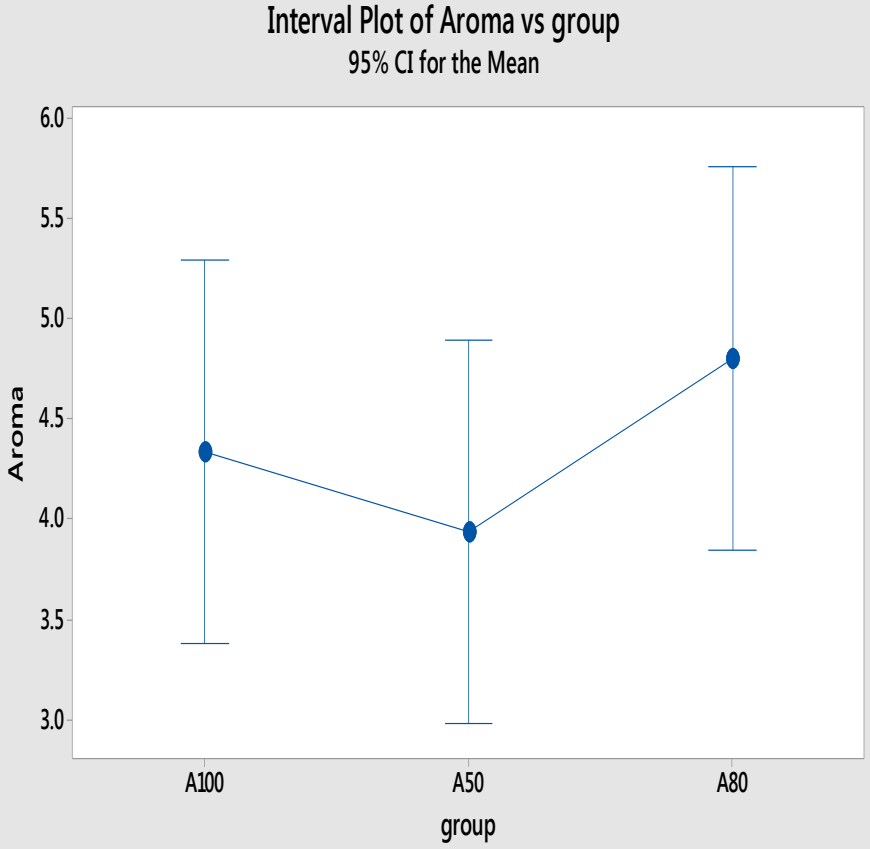
The cup was then shaking until the salt molecules are bonded to the almonds.



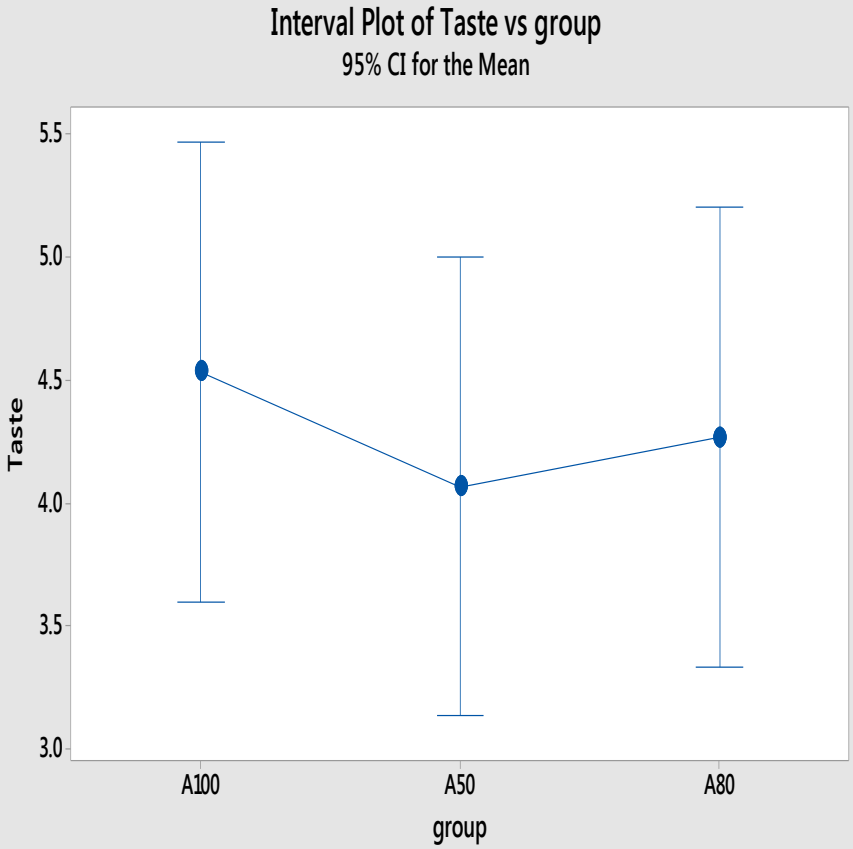
CON…

Sensory analysis

RESULTS

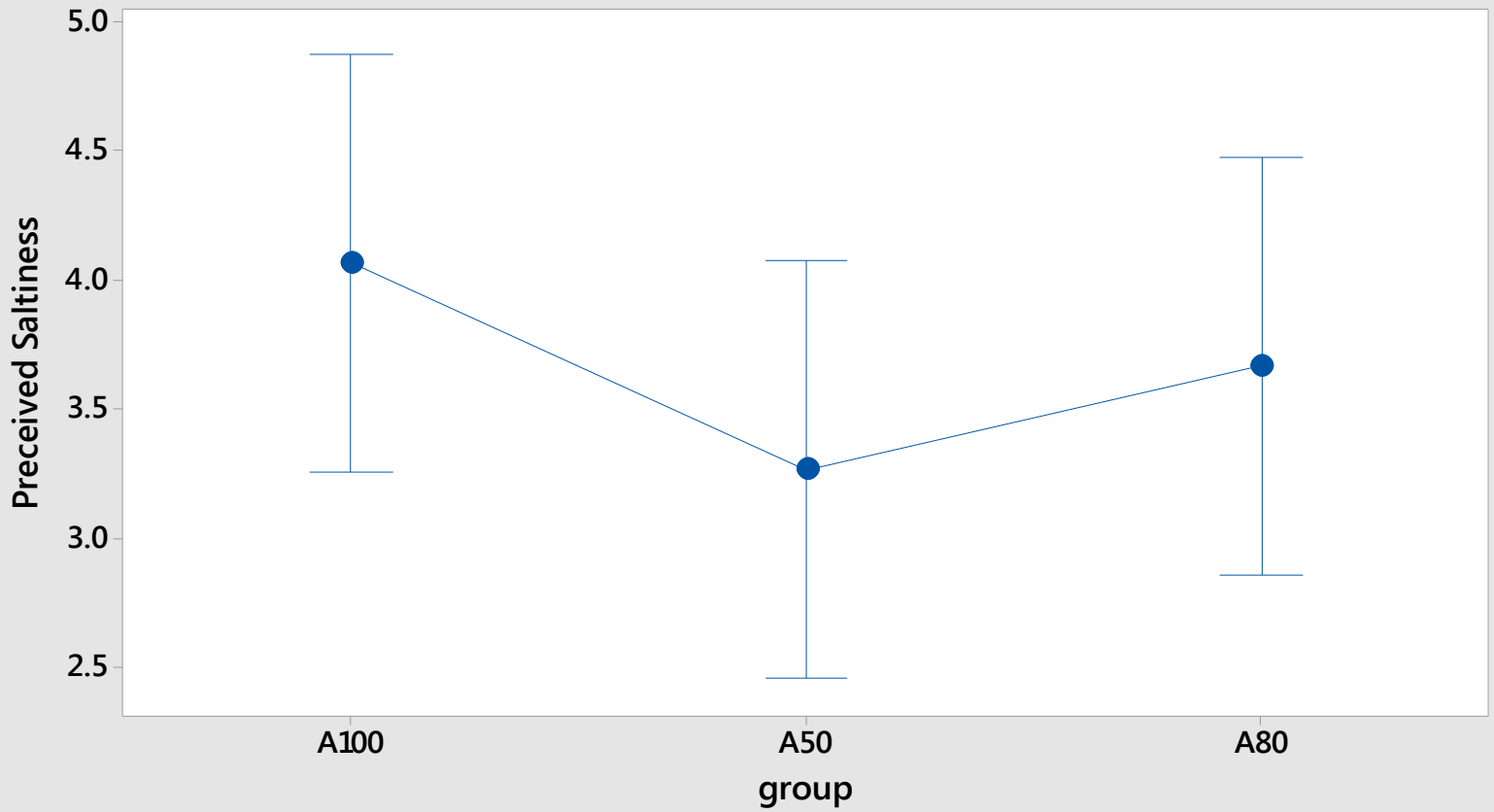


The pooled standard deviation is used to calculate the intervals.



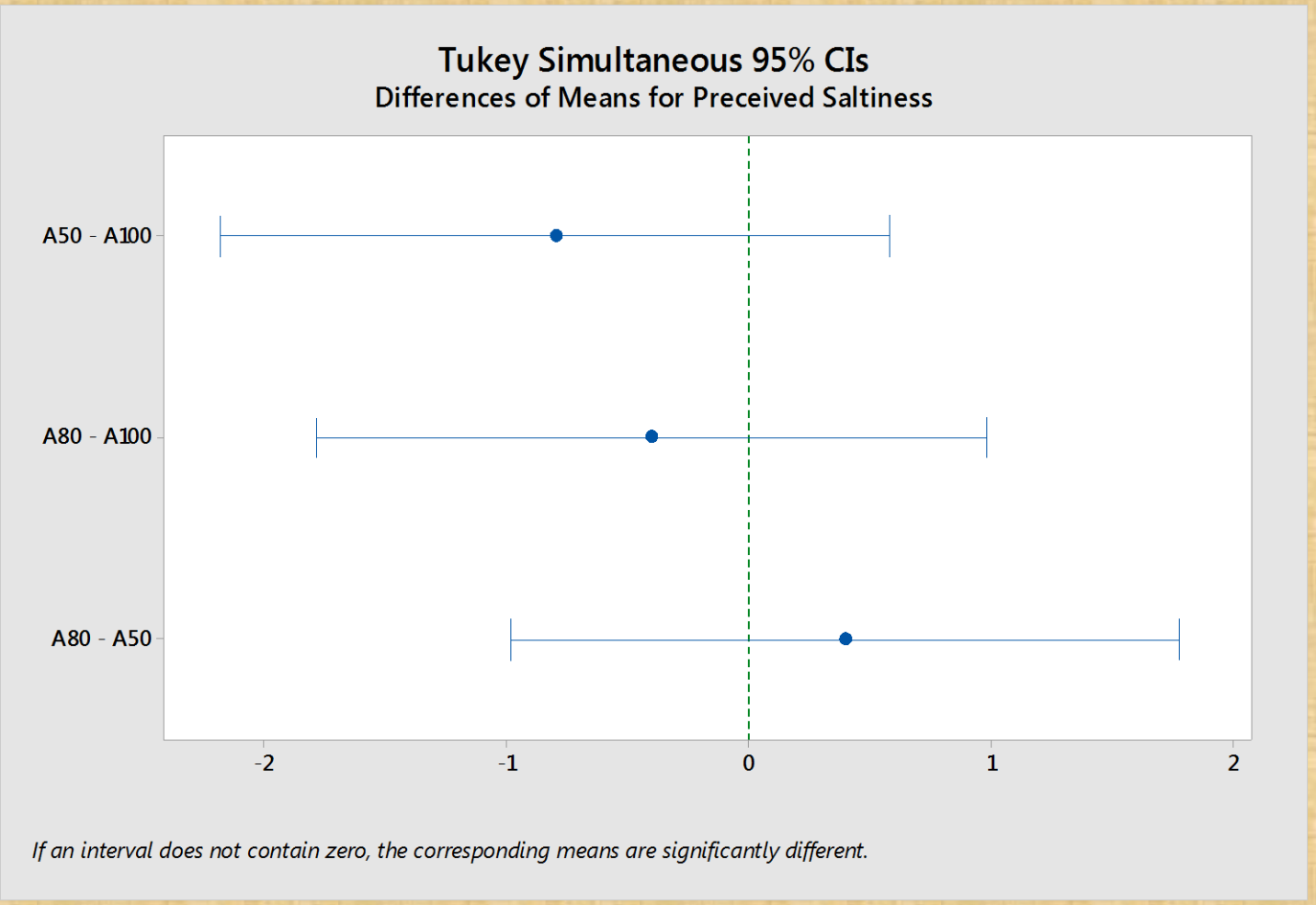
The pooled standard deviation is used to calculate the intervals.

RESULTS



The pooled standard deviation is used to calculate the intervals.

P-value=0.378



If an interval does not contain zero, the corresponding means are significantly different.

Null hypothesis	All means are equal
Alternative hypothesis	Not all means are equal
Significance level	$\alpha = 0.05$

Equal variances were assumed for the analysis.

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
group	2	4.800	2.400	1.00	0.378
Error	42	101.200	2.410		
Total	44	106.000			

References

- “2” :Rasheed, S., Siddique, A. K., Sharmin, T., Hasan, A. M. R., Hanifi, S. M. A., Iqbal, M., & Bhuiya, A. (2016). Salt intake and health risk in climate change vulnerable coastal Bangladesh: what role do beliefs and practices play?. *PloS one*, *11*(4), e0152783.
- “3” :Titze, J., Dahlmann, A., Lerchl, K., Kopp, C., Rakova, N., Schröder, A., & Luft, F. C. (2014). Spooky sodium balance. Kidney international, 85(4), 759-767.
- “4” :Luzardo, L., Noboa, O., & Boggia, J. (2015). Mechanisms of salt-sensitive hypertension. Current hypertension reviews, 11(1), 14-21.
- “5” :Burnier, M., Wuerzner, G. P., & Bochud, M. (2015). Salt, blood pressure and cardiovascular risk: what is the most adequate preventive strategy? A Swiss perspective. Frontiers in physiology, 6, 227.

"6" :Khor, C. M., Ng, W. K., Kanaujia, P., Chan, K. P., & Dong, Y. (2017). Hot-melt extrusion microencapsulation of quercetin for taste-masking. Journal of microencapsulation, 34(1), 29-37.

"7" : Brunchi, C. E., Morariu, S., & Bercea, M. (2014). Intrinsic viscosity and conformational parameters of xanthan in aqueous solutions: salt addition effect. *Colloids and Surfaces B: Biointerfaces*, *122*, 512-519.