Effects of Electrolyte Concentration on the *In Vitro Release* of Paracetamol Tablets

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INTRODUCTION

- Paracetamol (acetaminophen) is a fundamental component of the WHO analgesic ladder and one of the most widely used analgesics and antipyretics globally, particularly in sub-Saharan Africa (Masheta et al., 2022).
- The formulation factors and composition of dissolution media, especially electrolytes, influence the rate and extent of its dissolution and bioavailability (Jambhekar and Breen, 2013).
- Electrolytes can dehydrate polymers and encourage drug release by competing for water of hydration. Kosmotropic salts strengthen the hydrogen-bonded structure of water, causing a "salting-out" effect that encourages dissolution and disintegration. Conversely, chaotropic salts destabilise the hydrogen-bonded water structure, leading to a "salting-in" effect that reduces dissolution (Takano et al., 2020).
- The behaviour of KCl and NaCl is context-dependent because they are intermediate within the Hofmeister series.

AIM

- To determine the influence of different electrolyte concentrations on the in vitro release of Paracetamol tablets.

OBJECTIVES

The objectives are to:

- randomly sample five (5) common brands of Paracetamol in the Kumasi Metropolis.
- assess the packaging and physico-mechanical properties of the tablets.
- determine the *in vitro* release of Paracetamol in phosphate buffer pH 6.8.
- determine the influence of varying concentrations of electrolytes (NaCl and KCl) on the *in vitro* release profile of Paracetamol.
- compare the release profile of Paracetamol in different electrolyte solutions

METHODOLOGY

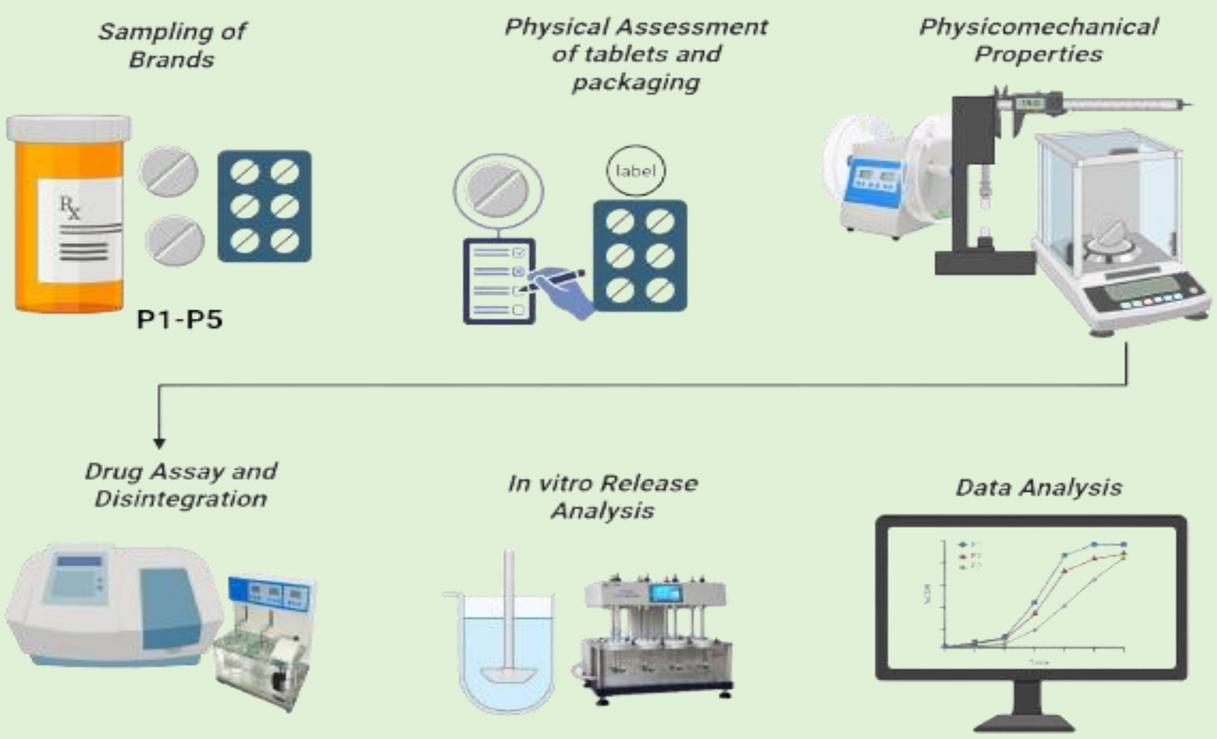

Fig 1: Illustration of methodology

RESULTS AND DISCUSSION

- All tested brands complied with the required specifications for packaging integrity, organoleptic properties and labelling.
- They all passed the uniformity of weight, hardness, disintegration and assay tests
- Non of the brands was friable

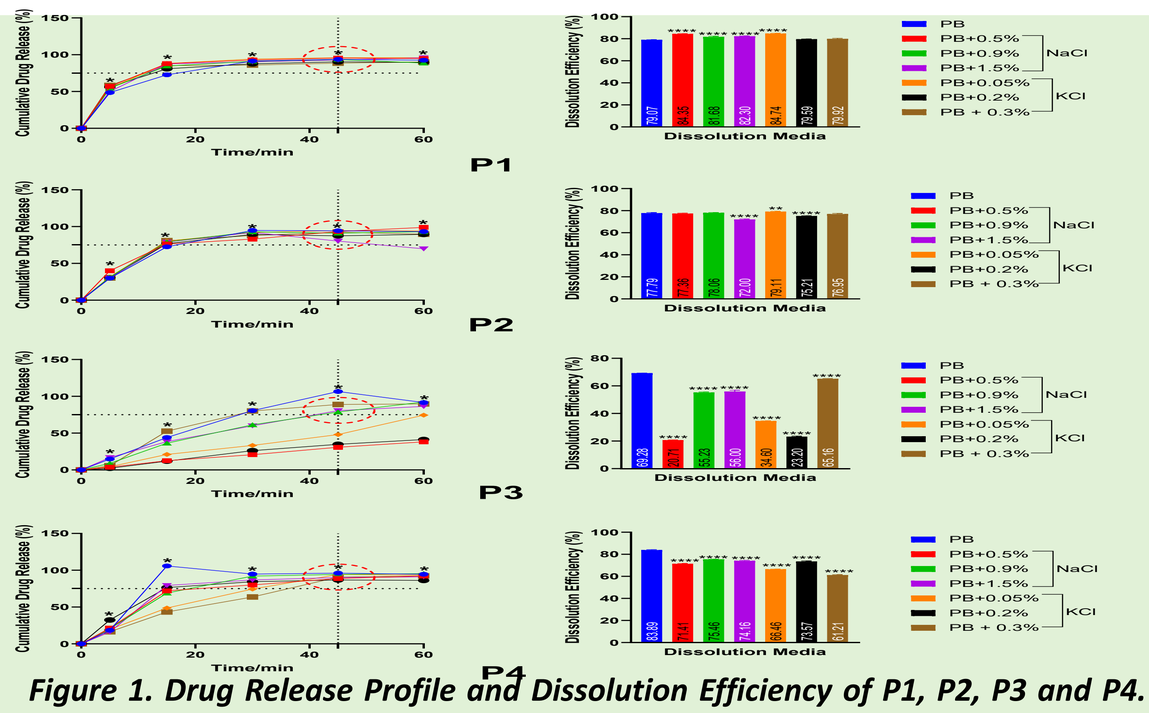

Figure 1. Drug Release Profile and Dissolution Efficiency of P1, P2, P3 and P4. **p < 0.01, ****p<0.0001 significant difference using one-way ANOVA

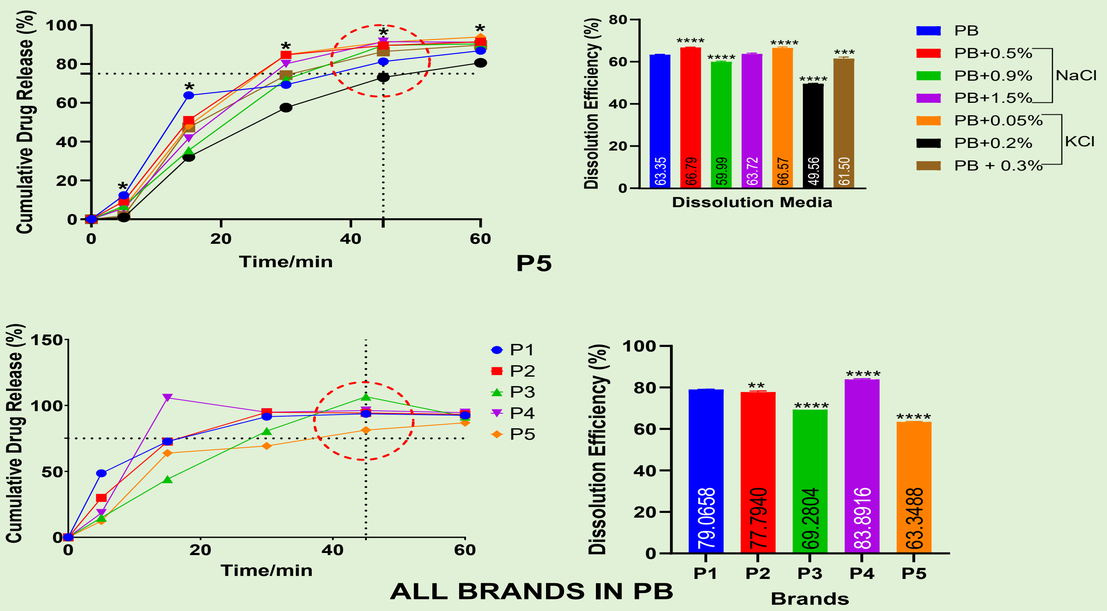

Figure 3. Drug Release Profile and Dissolution Efficiency of P5 and All Brand in PB (Phosphate buffer)p < 0.01, ****p<0.0001 significant difference using one-way ANOVA**

CONCLUSION

- All tested pharmaceutical tablets met the required quality standards for packaging, appearance, weight, durability, disintegration, hardness, drug content and release
- NaCl and KCl displayed varying kosmotropic and chaotropic effects depending on concentration, brand, and dissolution medium, significantly influencing drug release profiles

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