



SMARTPHONE-BASED DOWNSCALING PLATFORM FOR ACTIVE PHARMACEUTICAL INGREDIENTS (APIs) MONITORING IN MEDICAL DISINFECTANT FORMULATIONS

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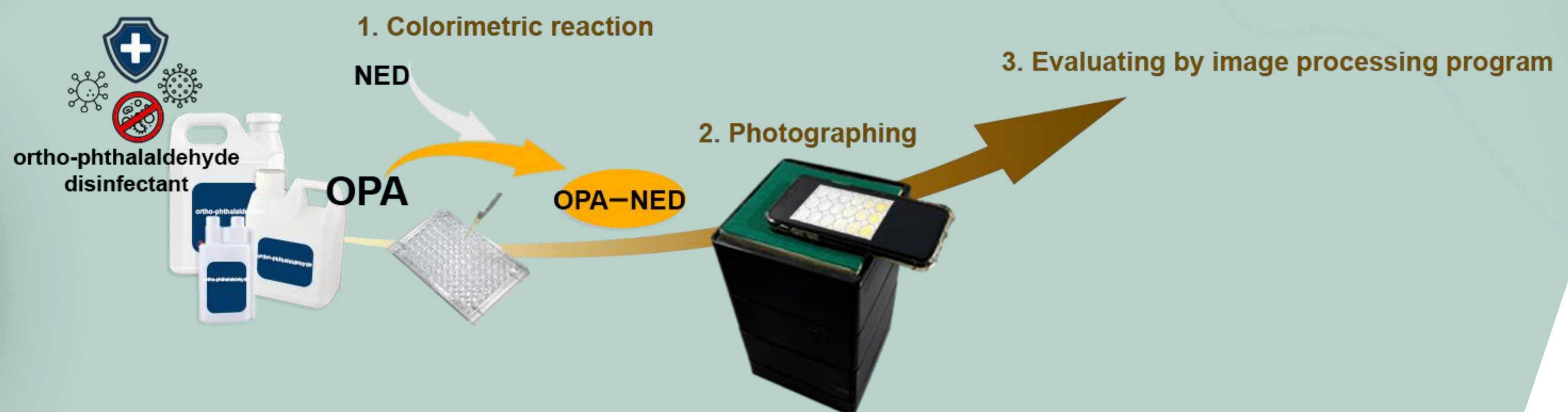


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BACKGROUND

Effective infection prevention and control (IPC) is a crucial, evidence-based strategy aimed at safeguarding both patients and healthcare workers from avoidable infections. Ensuring the proper concentration of active pharmaceutical ingredients (APIs) in medical disinfectant formulations is imperative for effective sterilization and mitigating pathogen spread. This study aims to develop smartphone-based downscaling platform for the determination of APIs in medical disinfectant formulations.

METHODS



RESULTS

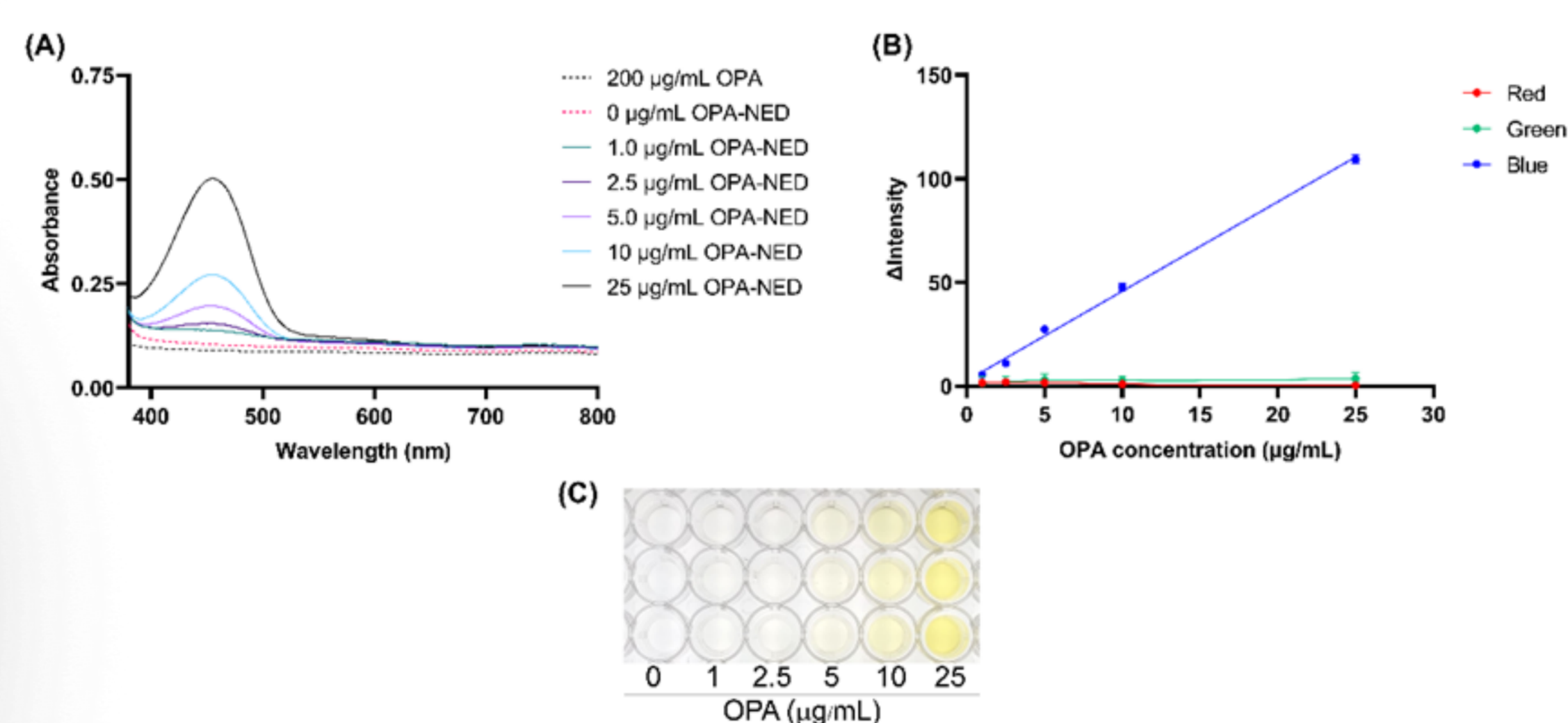


Figure 1 (A) UV-Visible spectrum of OPA (0 to 25 mg/mL) and NED (6.2 mM) color complex, (B) the relationship between the OPA concentrations (1.0 to 25 mg/mL) and Δ intensity color of red, green, and blue, and (C) color of the OPA-NED at different OPA concentrations in triplicate.

Table 1 Analytical characteristics of the proposed method in comparison to the previous methods for OPA determination

Parameters	Range ($\mu\text{g}/\text{mL}$)	LOD ($\mu\text{g}/\text{mL}$)	Incubation time (min)
Proposed method	1.0 – 25	1.15	10
Spectrophotometric method	6 – 250	4	30
DISINTEK™ OPA Test Strips	3,000, 5,500	30	0.33
McKesson OPA Test Strips	3,500, 5,500	35	1.5

Table 2 Comparison of the proposed procedure and HPLC method for the determination of OPA concentration in samples (n=3).

Samples	Proposed method	HPLC
S1	0.56±0.03	0.57±0.01
S2	0.54±0.03	0.52±0.04
S3	0.55±0.03	0.58±0.01

Investigation for optimum conditions

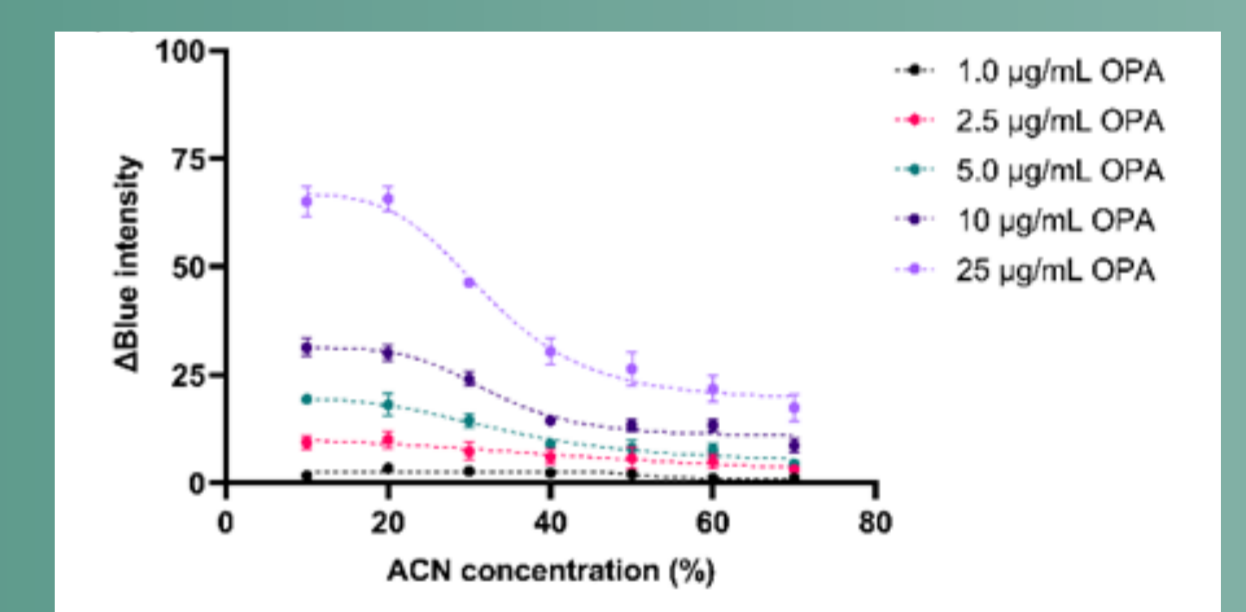


Figure 2 effects of ACN concentration on Δ blue intensity of OPA-NED product with different OPA concentrations (0.1 to 25 $\mu\text{g}/\text{mL}$)

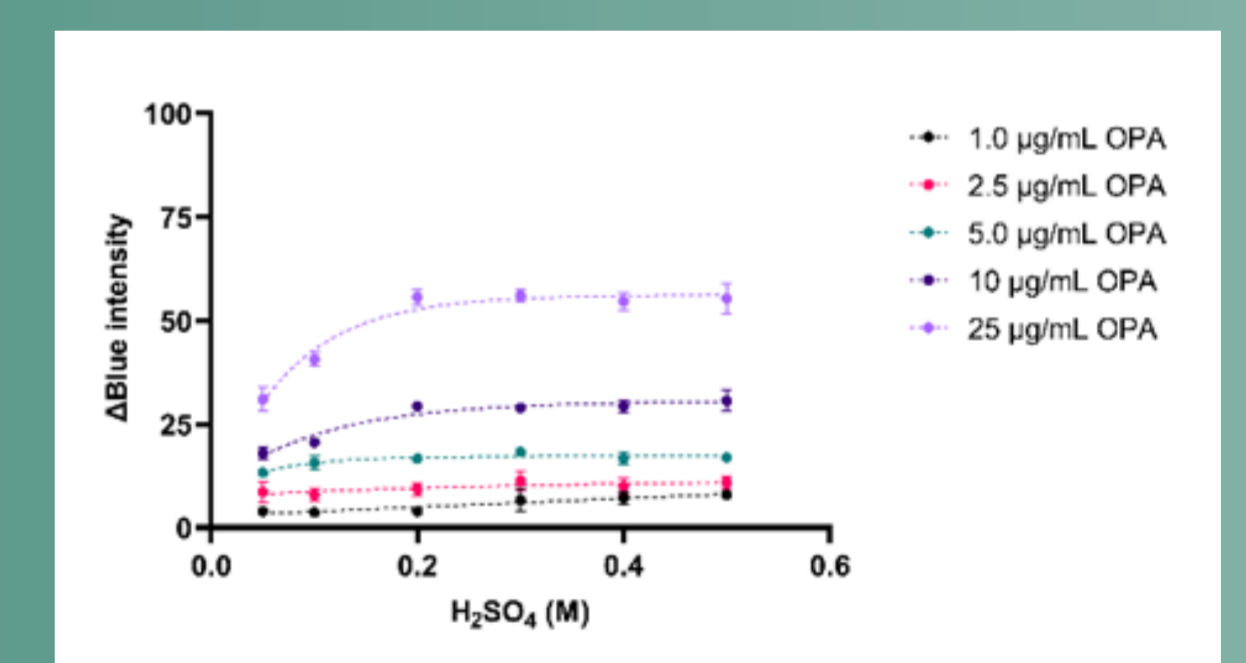


Figure 3 effects of H_2SO_4 concentration on Δ blue intensity of OPA-NED product with different OPA concentrations

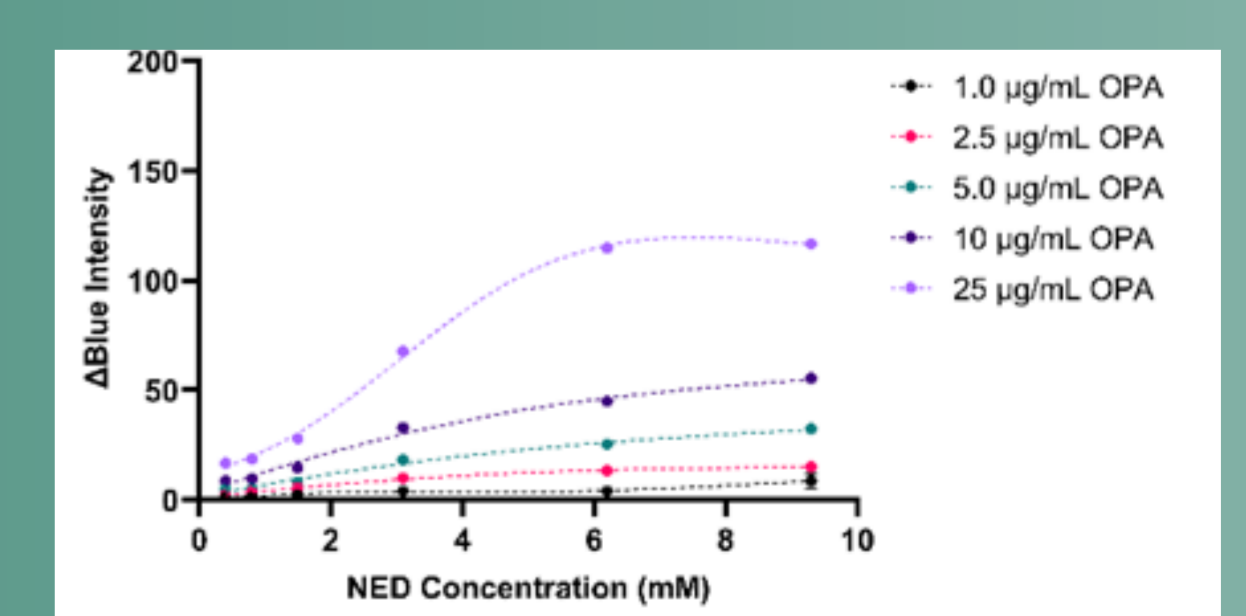


Figure 4 effects of NED concentration on Δ blue intensity with different OPA concentrations

CONCLUSION

The proposed smartphone-based method is well-suited for at-site and portable APIs in medical disinfectant formulations monitoring, particularly in resource-limited or point-of-care settings.