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Zingiber Officinale antioxidant and immunomodulatory effects on human polymorphonuclear neutrophils

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INTRODUCTION & AIM

Throughout history, traced back 60 000 years ago, numerous societies have utilized medicinal plants for their different healing abilities. Nowadays researchers have also marked a profound interest on immunomodulatory effects of medicinal plants, such as *Zingiber Officinale* (*Z. officinale*).

In order to deepen our understanding of the biological properties of *Z. officinale*, we were specifically interested in studying the *in vitro* antioxidant and immunomodulatory effects of its aqueous extract (ZOAE) on polymorphonuclear neutrophils (PMNs).

METHODS

- The phytochemical composition of ZOAE was studied through the colorimetric assays.
- The assays, DPPH• radical scavenging assay, total antioxidant capacity (molybdate reduction) and nitric oxide scavenging ability were used to examine the antioxidant effects.
- The immunomodulatory effect of ZOAE was assessed through the measurement of human PMNs degranulation, monitoring the release of lysozyme, an enzyme known to be stocked in the different PMNs granules, subsequent to an extract treatment of isolated PMNs, with increasing concentrations of 250, 500, and 1500 µg/mL followed by fMLP (N formyl-methionyl-leucyl-phenylalanine) stimulation (10^{-6} M).

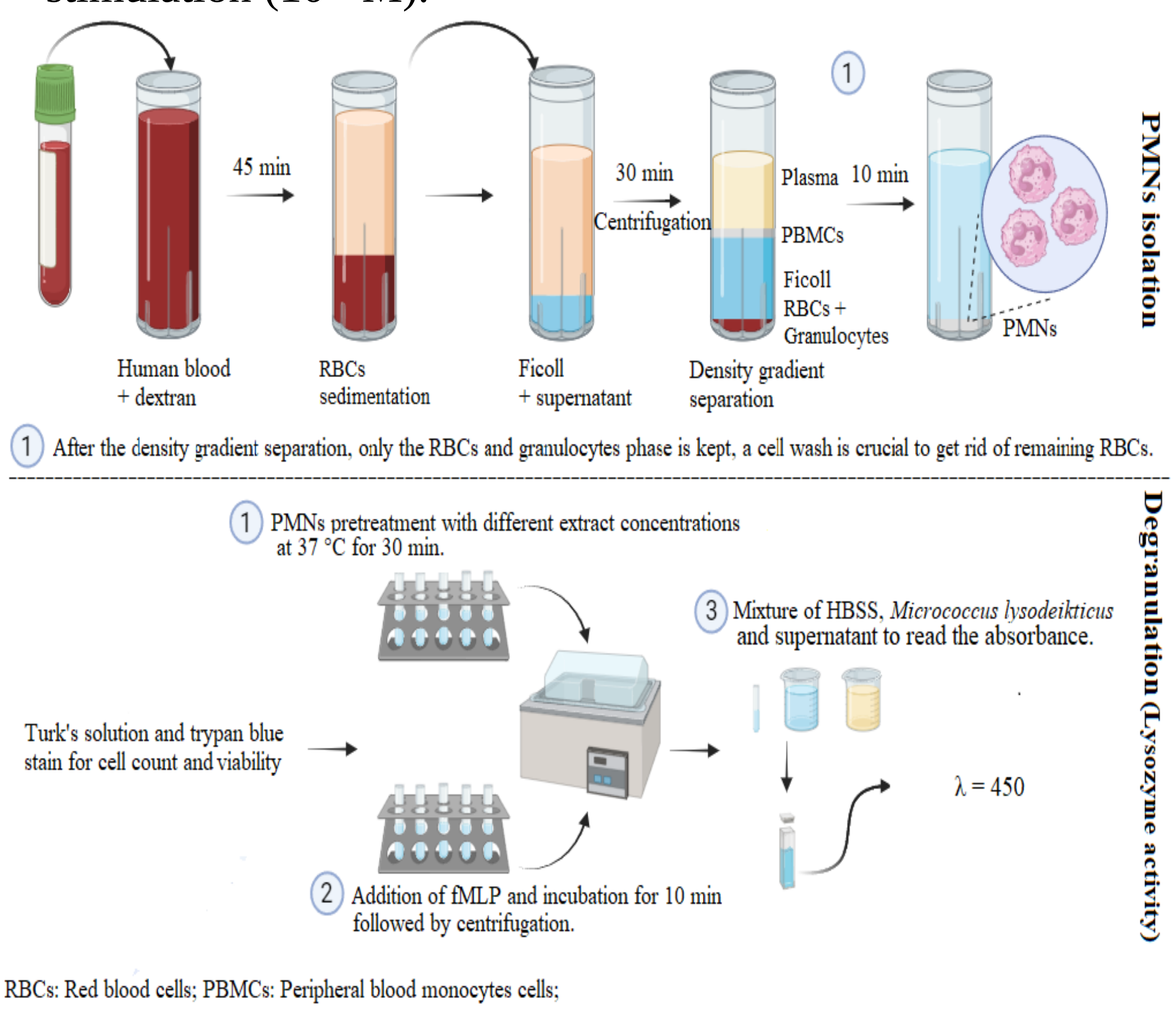

Figure 1: PMNs isolation and degranulation assay.

RESULTS & DISCUSSION

- Phytochemical screening of ZOAE revealed the presence of phenols, flavonoids, coumarins, terpenoids, saponins and alkaloids.
- This extract showed important antioxidant activities by scavenging DPPH• radical and reducing molybdate to molybdene, whereas nitric oxide radical inhibition did not show any significant activity.

Table: Antioxidant effect of ZOAE.

Antioxidant assay	Antioxidant activitiy of ZOAE
DPPH• radical scavenging	>10 mg/mL
Total antioxidant capacity	3,595 mg/mL
Nitric oxide scavenging	-

- ZOAE showed a significant dose-dependent inhibition of lysozyme activity. Indeed, at the maximal concentration of 1500 µg/mL, lysozyme release decreased to 36.39%. These results clearly indicate that the extract exerts an inhibitory effect on lysozyme activity, and therefore potentially influences PMNs degranulation.

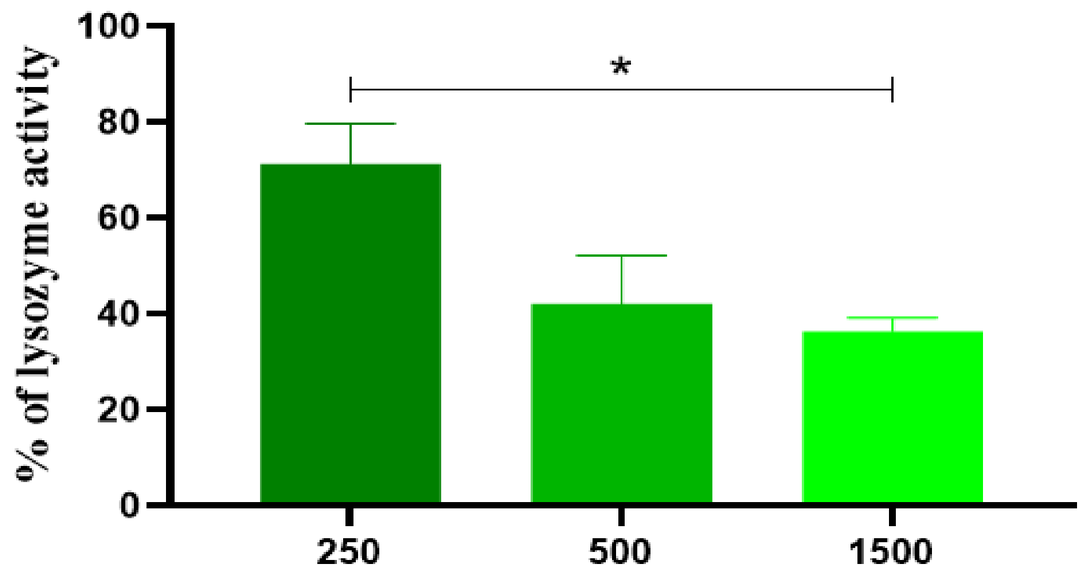

Figure 2: Dose-effect of ZOAE on lysozyme activity (µg/mL).
* ZOAE concentrations vs control, $p < 0,01$

CONCLUSION

Our study showed that ZOAE has both an *in vitro* antioxidant activity and an immunomodulatory effect on human PMNs. Further investigations are required to develop our knowledge on ZOAE, concerning its *in vivo* immunomodulatory effects on human PMNs and the signaling pathways involved in these effects.

FUTURE WORK / REFERENCES

1- Adiele, J.G., Ezeokwelume, R.C., 2022. Physiology and Agronomy of Ginger (Zingiber officinale): An Empirical review. Niger. Agric. J. 53, 357–362.
2- Iswaibah, mustafa, Chin, N.L., 2023. Antioxidant Properties of Dried Ginger (Zingiber officinale Roscoe) var. Bentong. Foods 12, 178. https://doi.org/10.3390/foods12010178.