

## SUPPLEMENTARY MATERIAL

### Development of stable emulsified formulations of *Terminalia arjuna* for topical application: Evaluation of antioxidant activity of final product and molecular docking study

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#### Abstract:

**Objective:** The aim of this work was to develop stable emulsified formulations containing *Terminalia arjuna* (*T. arjuna*) extract and to assess antioxidant potential of the final product with *in silico* molecular screening. **Methods:** *T. arjuna* emulsified formulations were prepared by application of ternary phase diagram design and were evaluated for phytochemical screening, solubility studies, *ex vivo* permeation study, DPPH free radical scavenging assay, anti-tyrosinase activity, skin irritation, stability studies, molecular docking study and pharmacophore modeling. **Results:** Phytochemical screening resulted the presence of secondary metabolites. The result of the solubility study exhibited that olive oil, tween 80 and PEG 400 could be the most appropriate combination for preparation of the emulsified system. The *ex vivo* study showed adequate release from its emulsified formulation. Globule size determination and Zeta potential analysis indicate stability of emulsified system. The result of DPPH free radical scavenging activity and anti-tyrosinase activity of the final product were satisfactory. Skin irritation test on albino rats resulted no allergic dermal effects. All the prepared formulations were found to be stable upon storage for 3 months. Molecular docking resulted antioxidant potential via tyrosinase inhibitory mechanism mainly by hydrogen bonding interaction with His60B, Glu158B, His208B, Asn205B, Met215B, His42B and Asn57B whereas ionic interactions by Arg209B and Val218B of tyrosinase. Pharmacophore modeling describe the similarity features with standard. **Conclusions:** The results suggest that developed emulsified formulations with *T. arjuna* extract for topical application demonstrate interesting attributes to be explored as potential pharmaceutical products.

**Keywords:** *T. arjuna*, Phase diagram, Topical, Antioxidant activity, Docking

## **Content**

**Table S1.** List of selected phytoconstituents of *T. arjuna*

**Figure S1.** Zeta potential of emulsified formulation batch F1

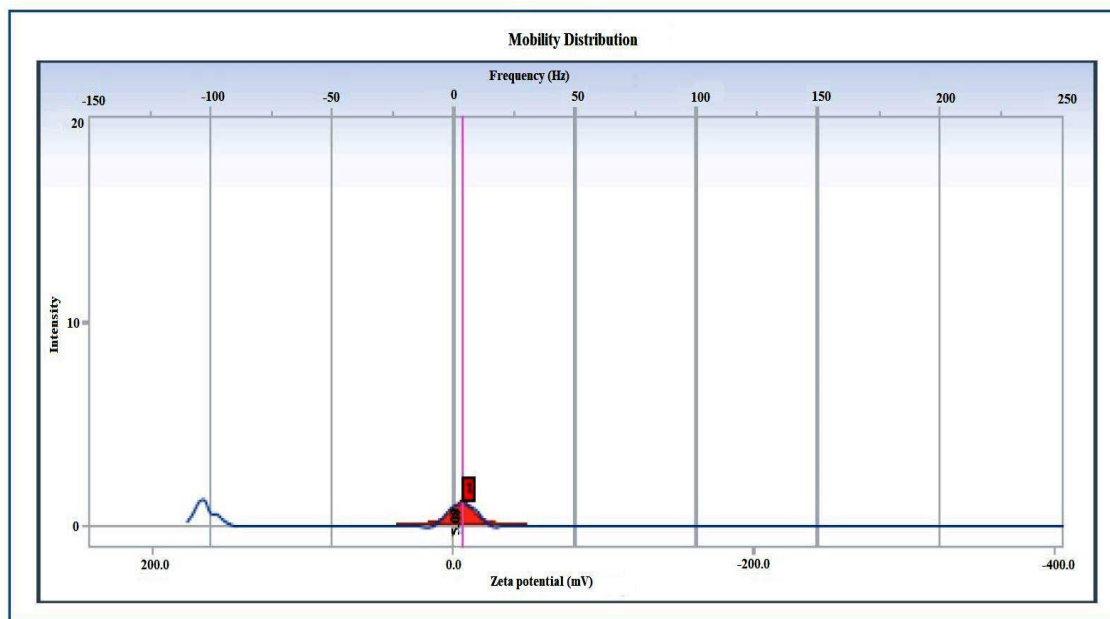
**Figure S2.** Zeta potential of emulsified formulation batch F2

**Figure S3.** Zeta potential of emulsified formulation batch F3

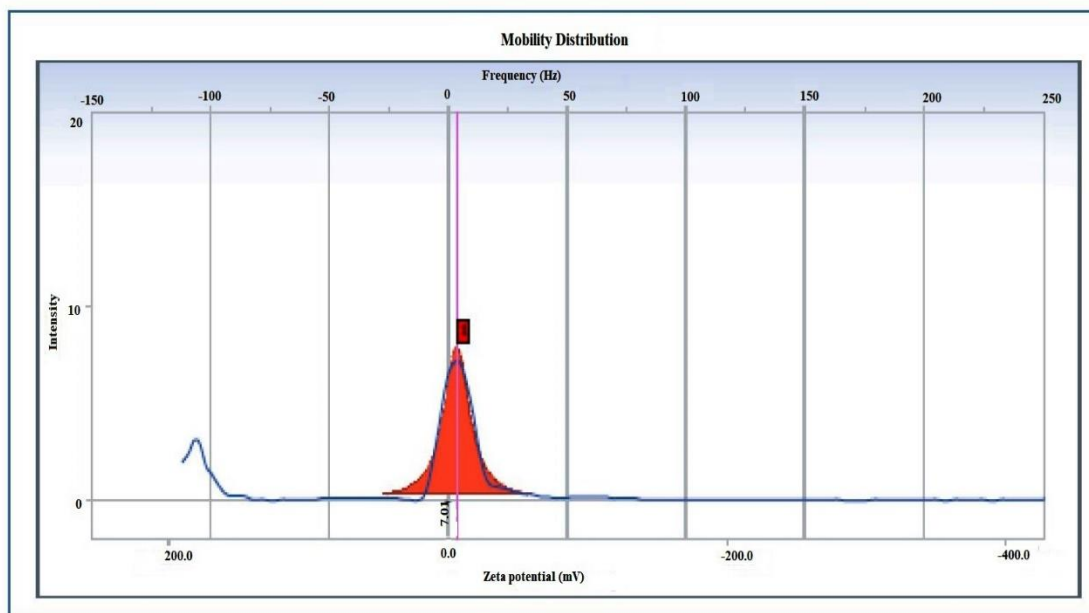
**Figure S4.** Zeta potential of emulsified formulation batch F4

**Table S1.** List of selected phytoconstituents of *T. arjuna*

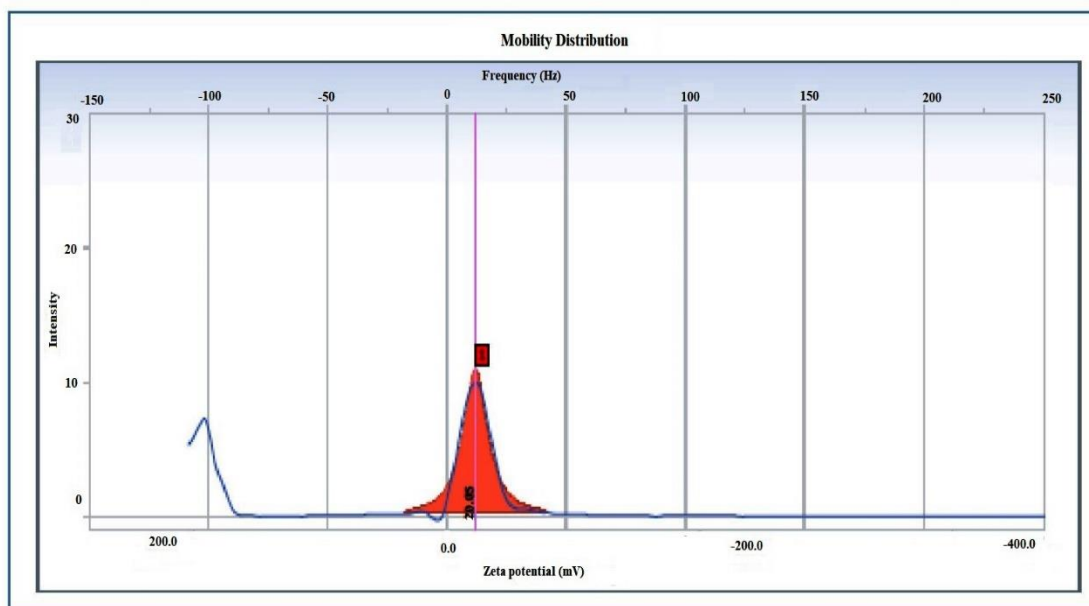
<b>Name of plant</b>	<b>Chemical type</b>	<b>Chemical constituents</b>
<i>Terminalia arjuna</i>	Triterpenoids	Arjunin Arjunic acid Arjungenin Arjunolic acid Terminic acid Terminoltin
	Ursane triterpenoids	Quadranoside VIII
	Glycosides	Arjunetin Arjunolone Arjunolitin Arjunaphthanoloside Arjunglucoside I and II Termiarjunoside I and II
	Flavonoids and phenolics	Arjunone Luteolin Baicalein Ethyl gallate Gallic acid Kaempferol Oligomeric proanthocyanidins Pelargonidin Quercetin ellagic acid (-)-epicatechin
	Tannins	Pyrocatechols Punicallin Castalagin Casuariin Casuarinin Punicalagin Terchebulin Terflavin C
	Other compounds	$\beta$ -Sitosterol



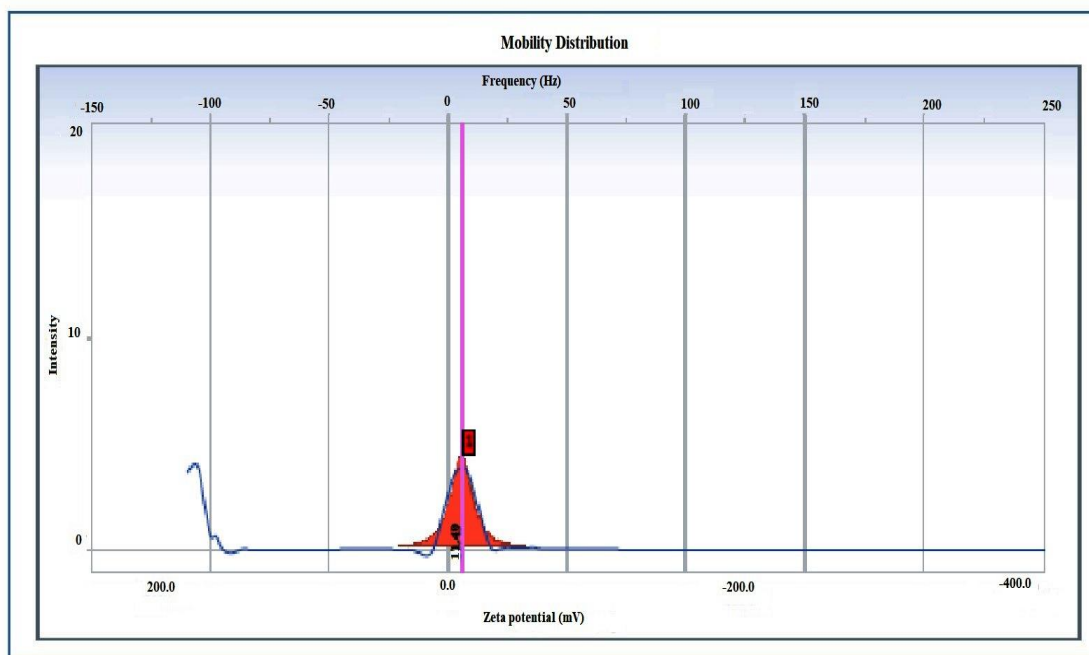
**Figure S1.** Zeta potential of emulsified formulation batch F1



**Figure S2.** Zeta potential of emulsified formulation batch F2



**Figure S3.** Zeta potential of emulsified formulation batch F3



**Figure S4.** Zeta potential of emulsified formulation batch F4