

Viral Defence Response of Key Ingredient of PHYTOCEE® : *Emblica officinalis* (Amla)

OBJECTIVE

To investigate the viral defence response of *Emblica officinalis* using bioinformatics tools.

MATERIALS AND METHODS

The PubMed search was performed to obtain pharmacology network modulated by *Emblica officinalis*. The protein targets modulated were used as a source list to arrive functional enrichment and significant Gene Ontology (GO) terms for biological process were identified using the STRING software tool. Network maps were constructed for the GO term (defense response to virus).

RESULTS

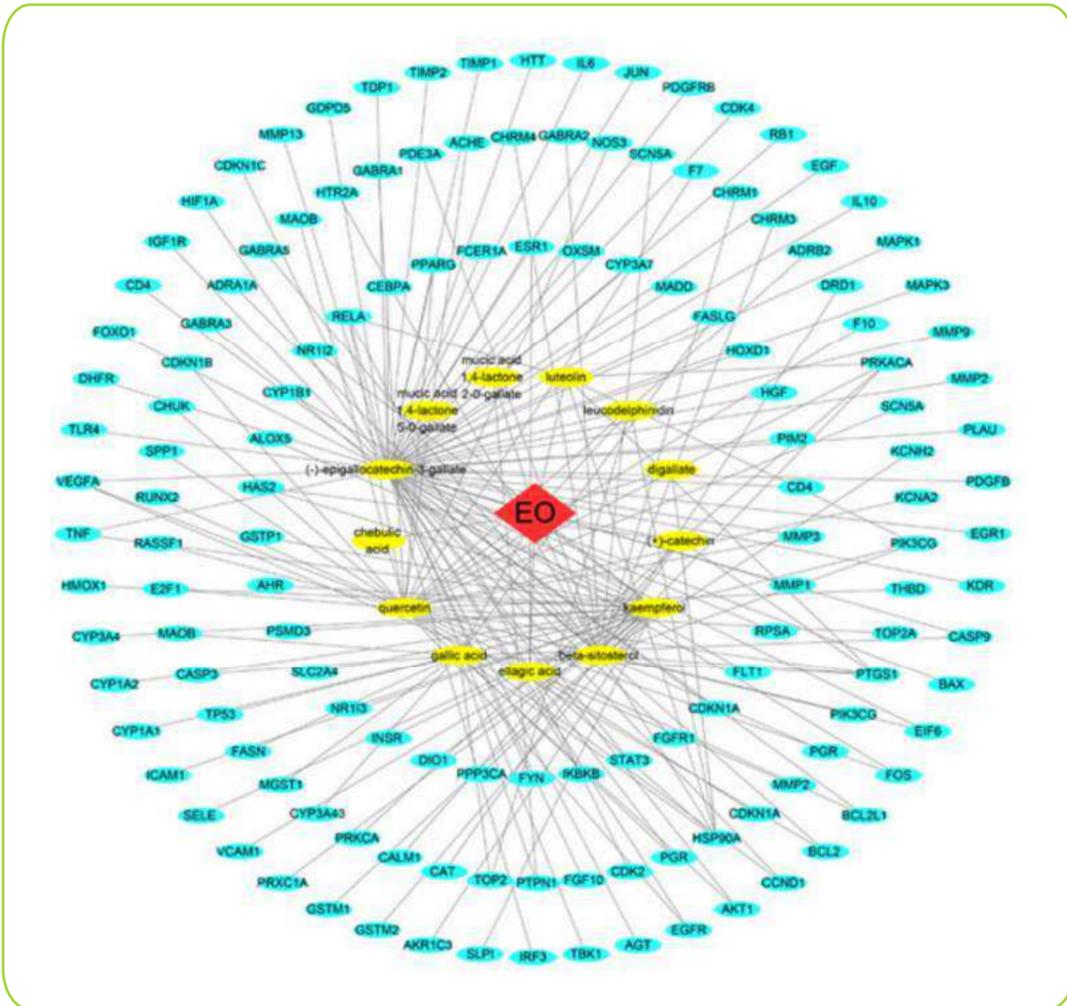


Figure 1 : The pharmacology networks of *Emblica officinalis* (red diamonds) which connect compounds (yellow ellipses) and target genes (blue ellipses)

Table 1. Functional enrichment in the network

Biological Process (Gene Ontology)				
GO-term	description	count in network	strength	▲ false discovery rate
GO:0098586	Cellular response to virus	87 of 87	2.35	9.52e-187
GO:0051607	Defense response to virus	47 of 252	1.63	7.35e-60
GO:0098542	Defense response to other organism	63 of 989	1.16	6.89e-58
GO:0006952	Defense response	67 of 1394	1.04	2.88e-55
GO:0002376	Immune system process	74 of 2121	0.9	2.22e-54
GO:0006955	Immune response	65 of 1321	1.05	1.32e-53
GO:0045087	Innate immune response	56 of 754	1.23	3.62e-53
GO:0071345	Cellular response to cytokine stimulus	52 of 711	1.22	4.10e-48
GO:0034097	Response to cytokine	53 of 804	1.17	4.67e-47
GO:0006950	Response to stress	76 of 3358	0.71	2.69e-43
GO:0019221	Cytokine-mediated signaling pathway	41 of 369	1.4	5.29e-43
GO:0060337	Type I interferon signaling pathway	25 of 42	2.13	3.23e-40
GO:0071310	Cellular response to organic substance	63 of 2019	0.85	1.06e-39
GO:0010033	Response to organic substance	68 of 2692	0.76	1.05e-38
GO:0070887	Cellular response to chemical stimulus	65 of 2609	0.75	1.11e-35
GO:0050776	Regulation of immune response	45 of 844	1.08	1.02e-34
GO:1990051	Activation of protein kinase C activity	2 of 5	2.22	0.0076
GO:0002250	Adaptive immune response	21 of 359	1.39	1.32e-21
GO:0048856	Anatomical structure development	25 of 5117	0.31	0.0046
GO:0048513	Animal organ development	24 of 3246	0.49	5.55e-06
GO:0140374	Antiviral innate immune response	7 of 22	2.13	6.14e-11
GO:0006915	Apoptotic process	9 of 1041	0.56	0.0370
GO:0042113	B cell activation	21 of 189	1.67	6.76e-27
GO:0002312	B cell activation involved in immune response	3 of 55	1.36	0.0204
GO:0030183	B cell differentiation	19 of 129	1.79	3.51e-26
GO:0042100	B cell proliferation	17 of 53	2.13	3.81e-28
GO:0023035	CD40 signaling pathway	2 of 10	1.92	0.0206

The red arrows indicate very significant terms modulated by *Emblica officinalis*

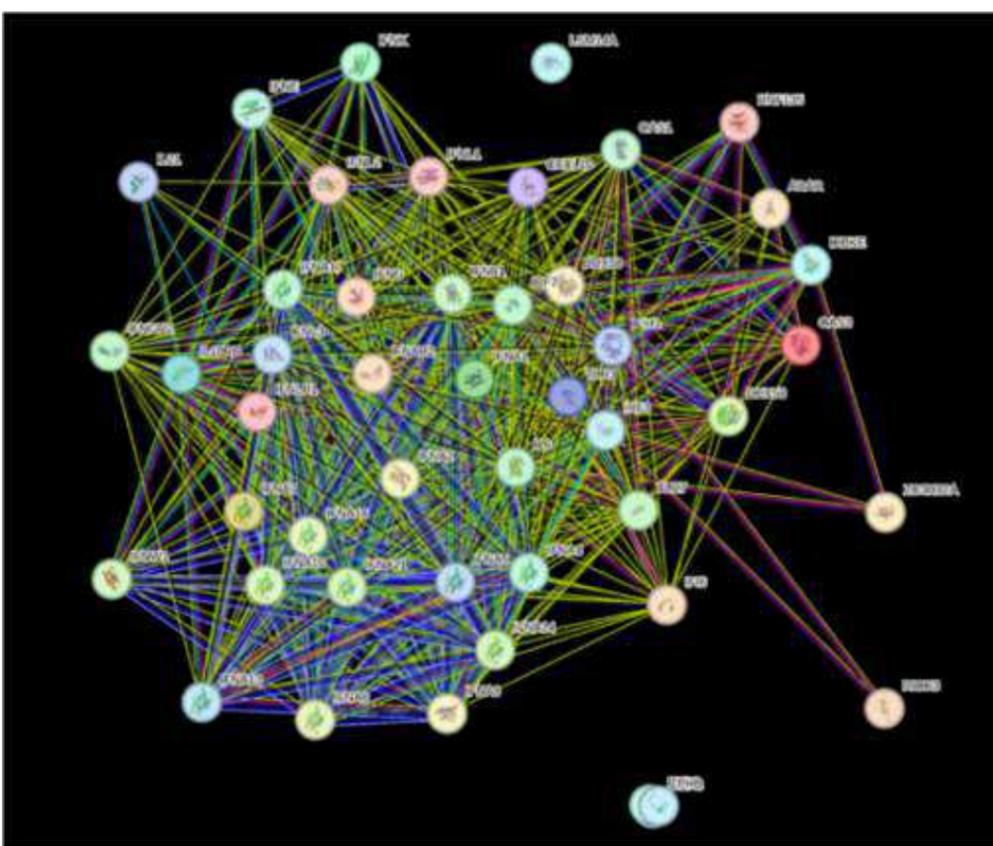


Figure 2 : Cellular network involved in "defense response to virus"

CONCLUSIONS

The bioinformatics study clearly confirmed the enrichment pathways modulated by *Emblica officinalis* influenced innate defense of an organism to viral challenges.

OUTCOME

Hence, the key ingredient of PHYTOCEE® namely *Emblica officinalis* has a strong potential to defend a host against viral challenges by modulating the host immune system.

Reference: Wang W, Liu T, Yang L et al. Study on the multi-targets mechanism of triphala on cardio-cerebral vascular diseases based on network pharmacology. Biomed Pharmacother. 2019 Aug;116:108994