

ABSTRACT

Inflammation is the body's rapid reaction to infections, noxious stimuli such as chemicals, or physical injuries causing damage to its tissues and cells. Previous studies have shown that Green and Black tea have beneficial effects against a variety of diseases such as cancer, obesity, diabetes, cardiovascular disease, and neurodegenerative diseases. The present study evaluated and compared the anti-inflammatory effects of aqueous extracts of green tea and black tea leaves (*Camellia sinensis*) against the denaturation of protein *in vitro*.

Here we performed molecular docking with FABP4 and known drugs Ibuprofen, and Diclofenac compared with Quercetin. The binding site was considered as the default from the x-ray crystallographic data. Both known drugs Ibuprofen and diclofenac including our selected Quercetin successfully occupied the conformational space within the binding site region and exhibited a positive pharmacophoric interaction with numerous H-bonds, pi, and Vanderwaal interactions. The binding energy for FABP4_Ibuprofen: -6.3 kcal/mol, FABP4_Diclofenac: -7.1 kcal/mol, and FABP4_Quercetin: -7.7 kcal/mol. During the phytochemical essays, the high content of steroid, flavonoid, and alkaloid have given satisfactory results. The membrane stabilization analysis revealed a concentration-dependent protection of protein denaturation by both the tea extracts. Assays such as hydrogen peroxide acid, as well as nitrate oxide assays, exhibited anti-inflammatory activity of the compounds under study. MTT analysis demonstrated no significant inhibition of normal cell line models, indicating safety for cells. Also on comparative analysis green tea was found to be more active than black tea, plausibly due to the higher flavonoid contents of green tea.

BACKGROUND

Green tea and black tea originate from the same plant species of *Camellia*.

It's ultimately the variety of tea plant and how the tea leaves are processed that defines how green tea becomes “green” and black tea becomes “black”. not all green tea taste the same, even though it all comes from the same plant variety. Green tea contains polyphenols, which include flavanols, flavandiols, flavonoids, and phenolic acids; these compounds may account for up to 30% of the dry weight. Most of the green tea polyphenols (GTPs) are flavonols, commonly known as catechins.

AIM

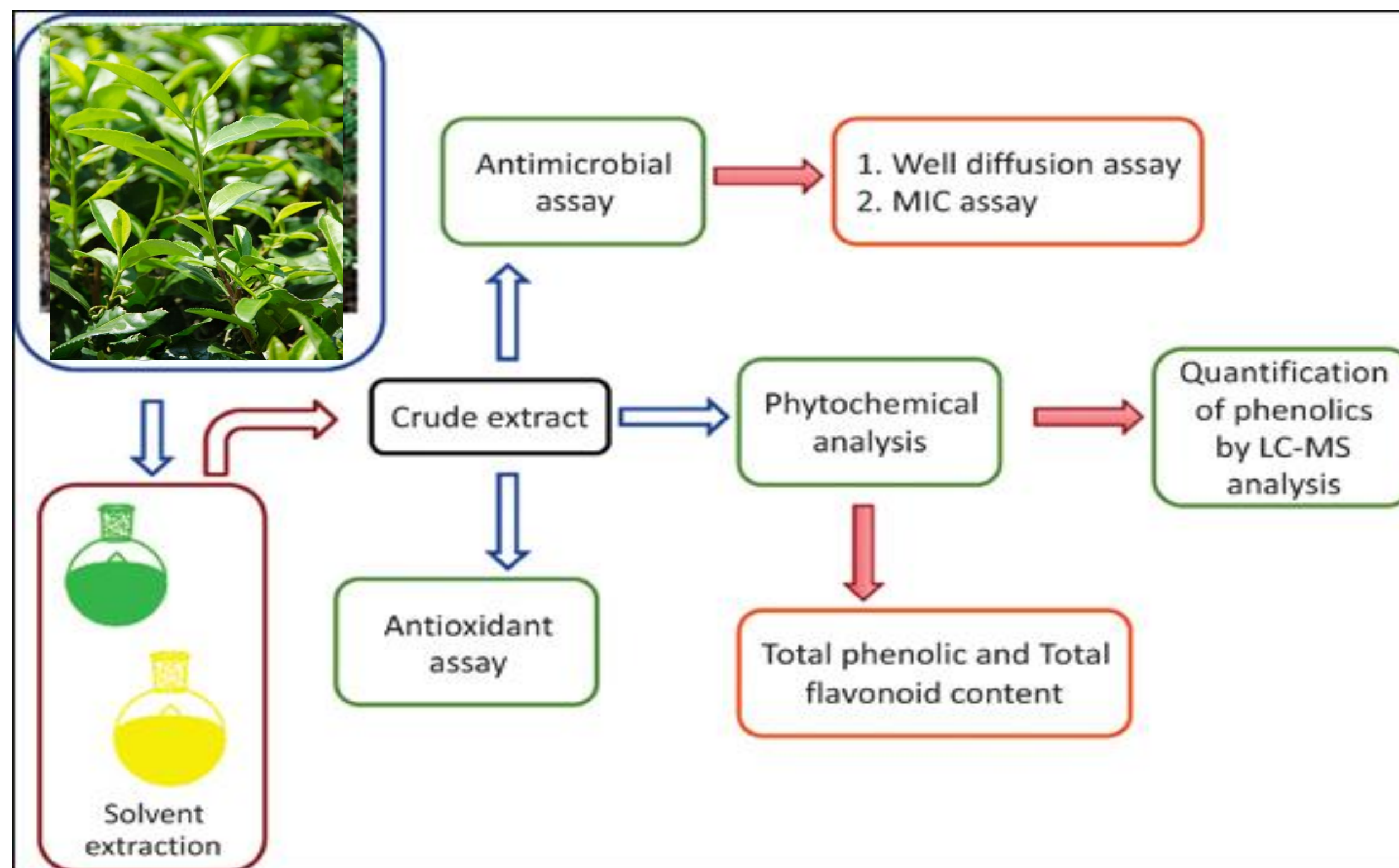
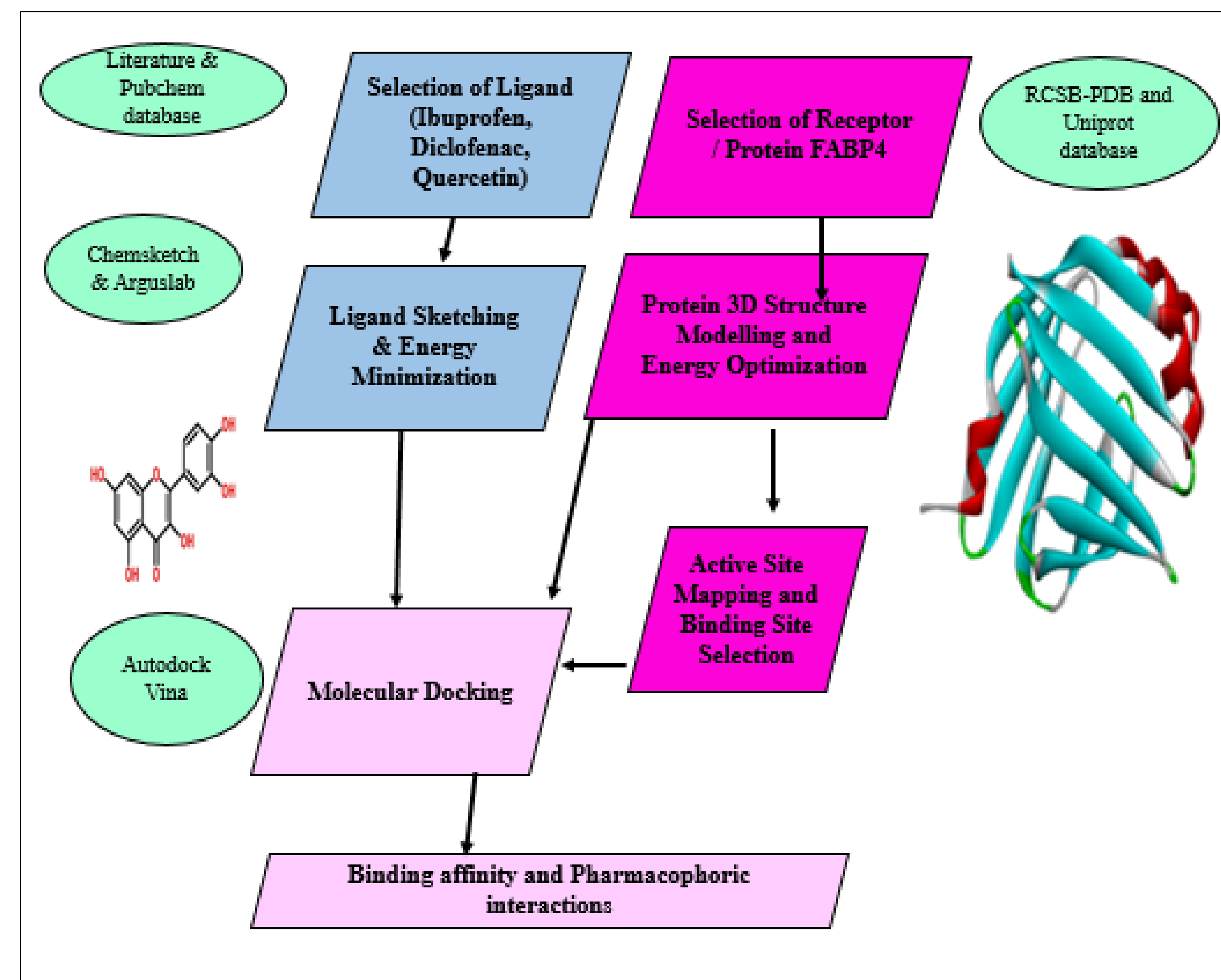
The present research aims to study the anti-inflammatory potential of Green tea, Black Tea using different in-silico and in-vitro approaches. To achieve the study aim, following objectives were adopted

1. Screening of phytometabolites in Green Tea/Black Tea for target specific receptor-ligand interaction using bioinformatics tools
2. Qualitative and Quantitative evaluation of phytometabolites present in Green Tea/Black Tea
3. Study of anti-inflammatory activity using *in-vitro* approaches

REFERENCES

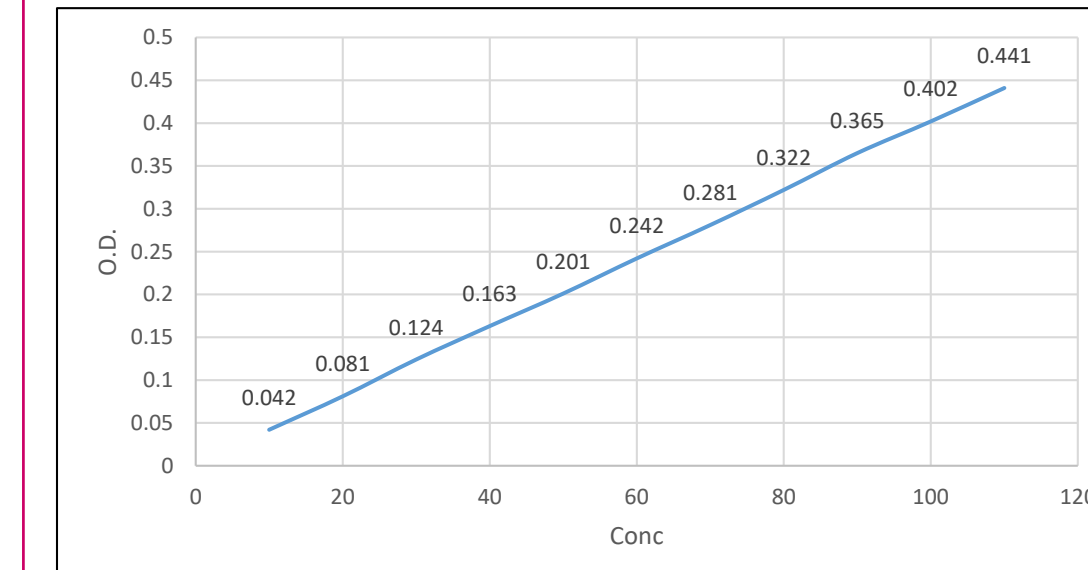
- Andrea, M., Susanna, B., Francesca, N., Enrico, M., & Alessandra, V. (2021). The emerging role of type 2 inflammation in asthma. *Expert Review of Clinical Immunology*, 17(1), 63–71. <https://doi.org/10.1080/1744666X.2020.1860755>
- Andres, S., Pevny, S., Ziegenhagen, R., Bakhiya, N., Schäfer, B., Hirsch-Ernst, K. I., & Lampen, A. (2018). Safety Aspects of the Use of Quercetin as a Dietary Supplement. *Molecular Nutrition & Food Research*, 62(1). <https://doi.org/10.1002/MNFR.201700447>

METHODOLOGY

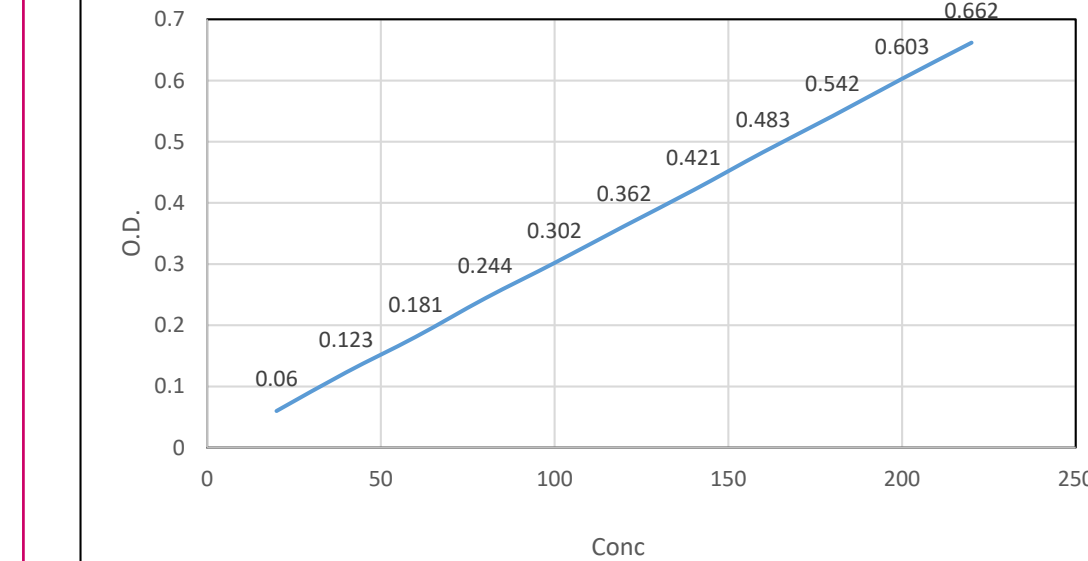


RESULTS & DISCUSSION

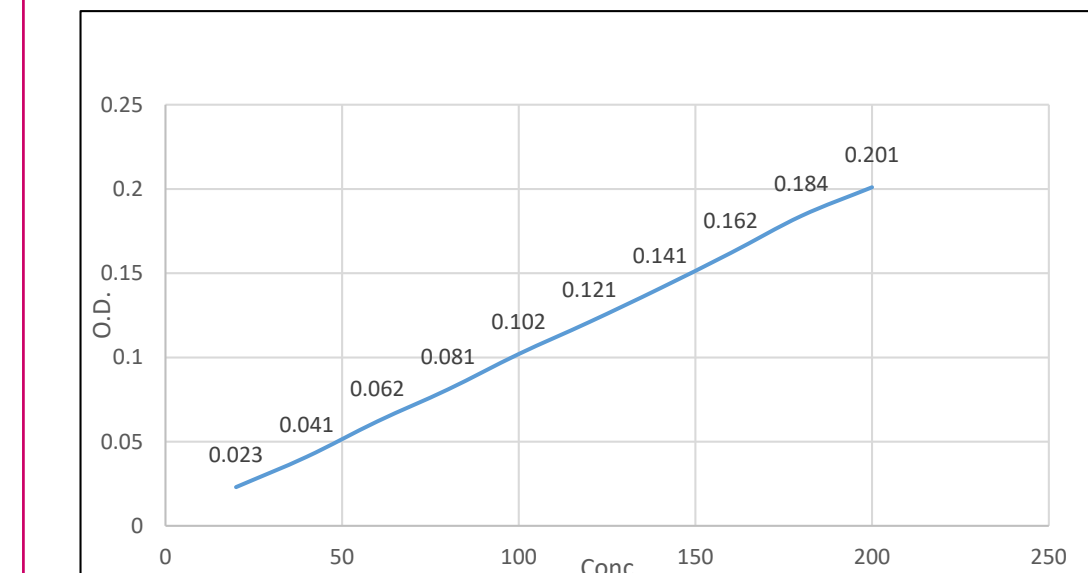
Total Alkaloid



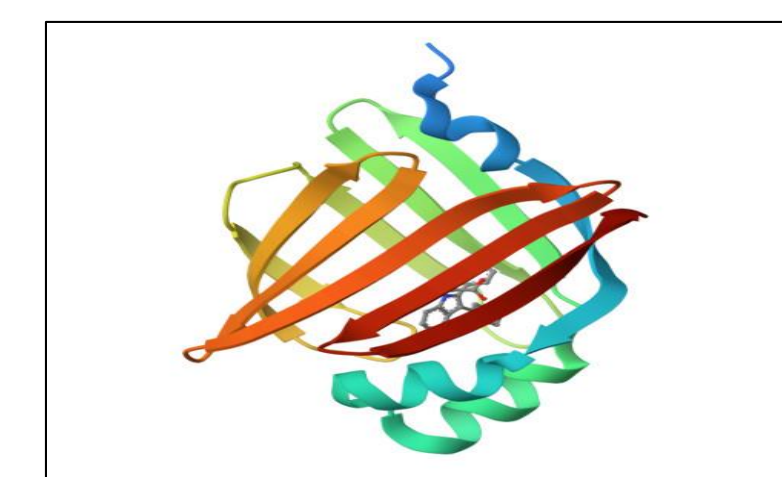
Total Flavonoid



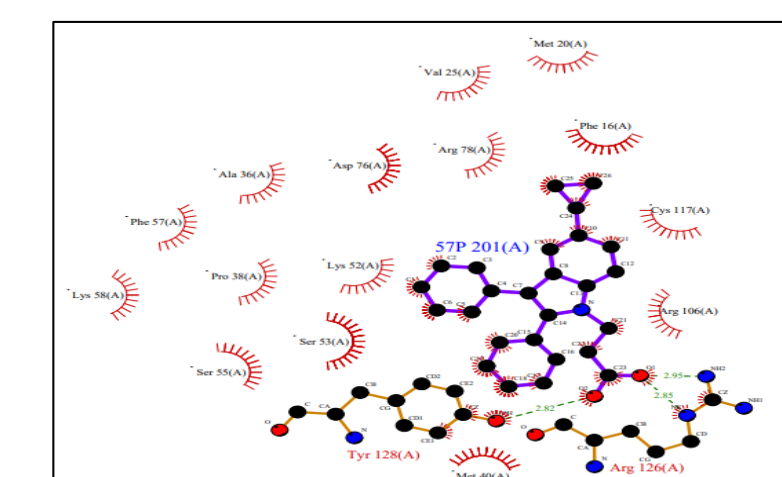
Total Protein



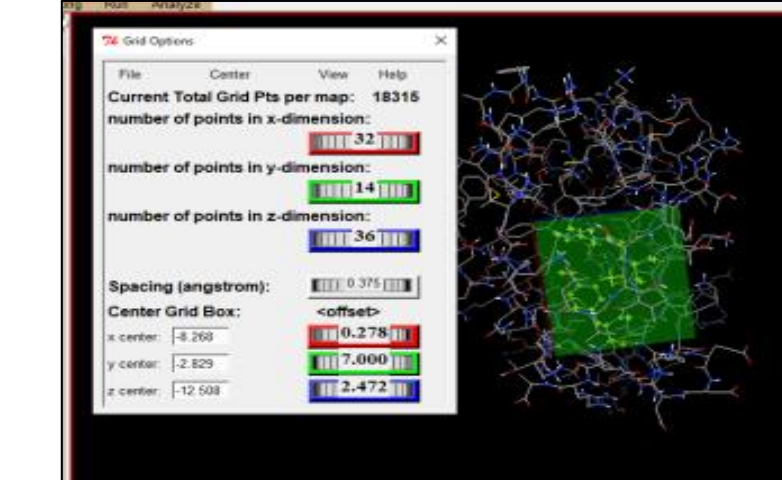
Molecular Docking



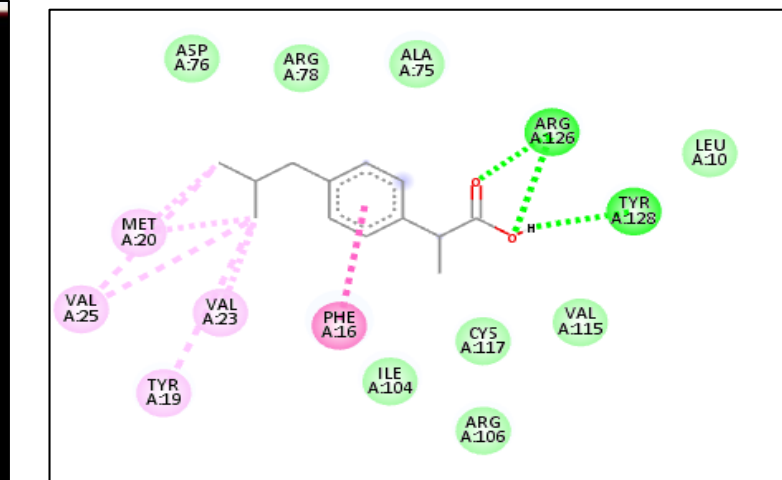
Protein 3 D Structure



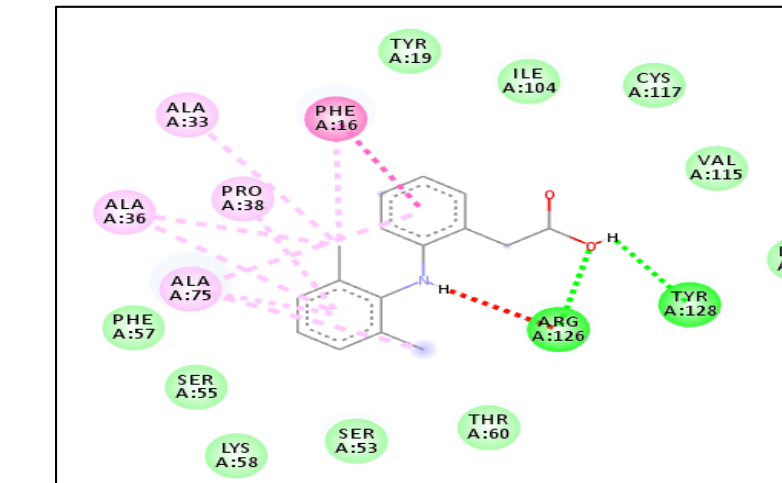
Default binding site region



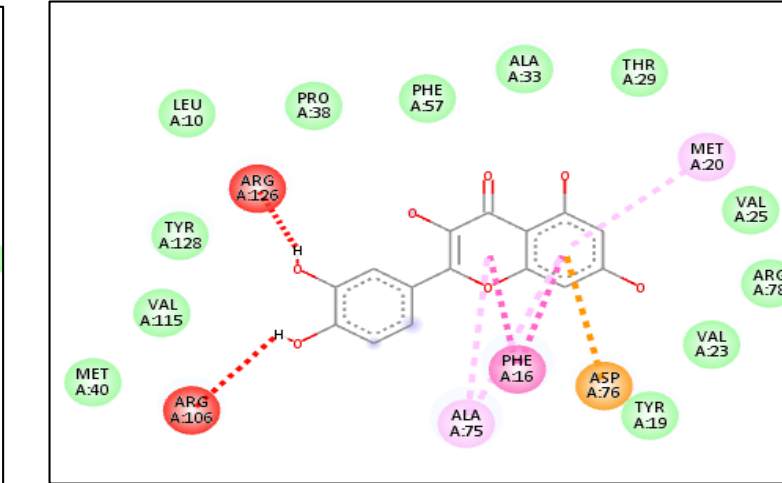
Selected binding site region



FABP4+Ibuprofen interaction



FABP4+Diclofenac interaction



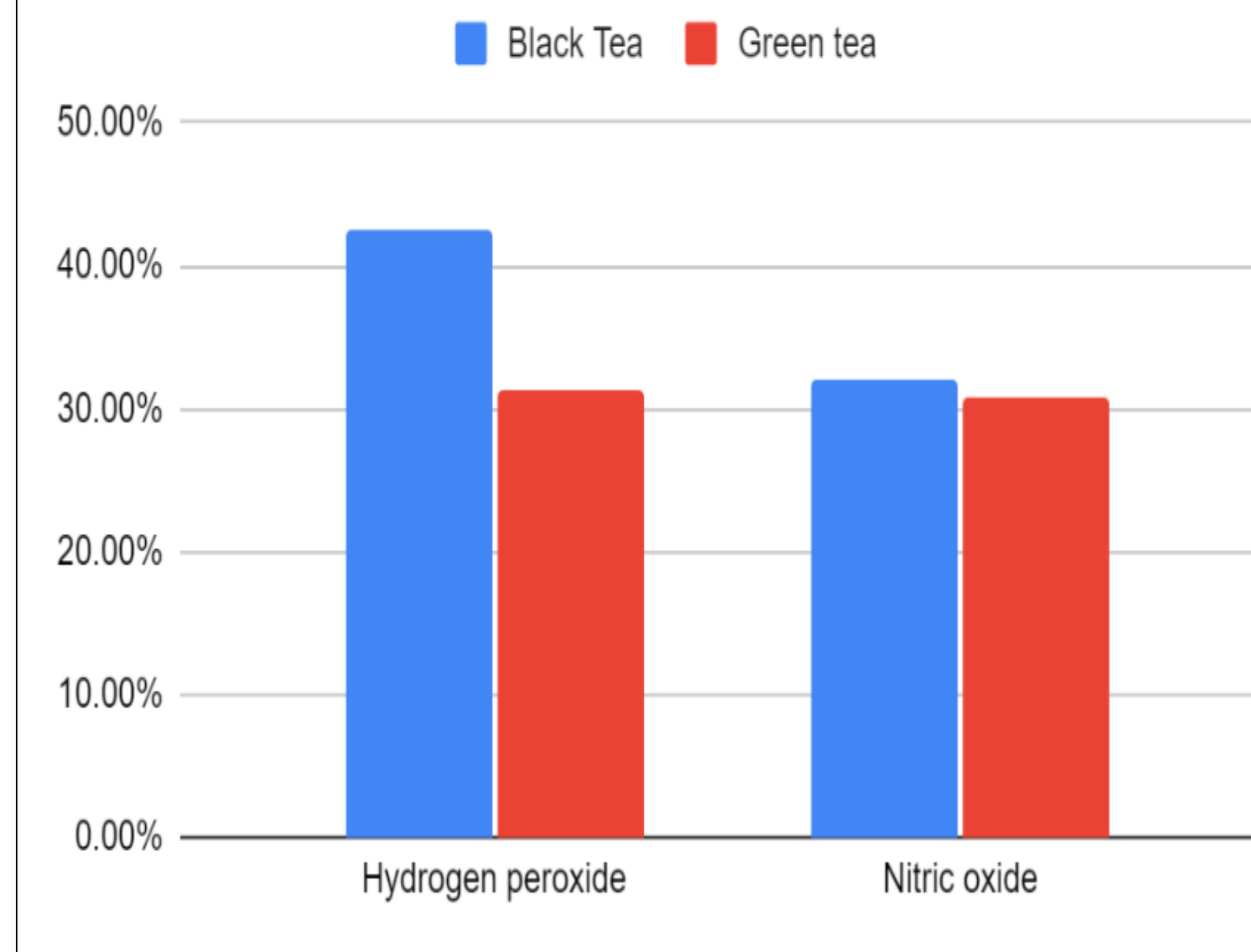
FABP4+Quercetin interaction

Table : Docking interaction

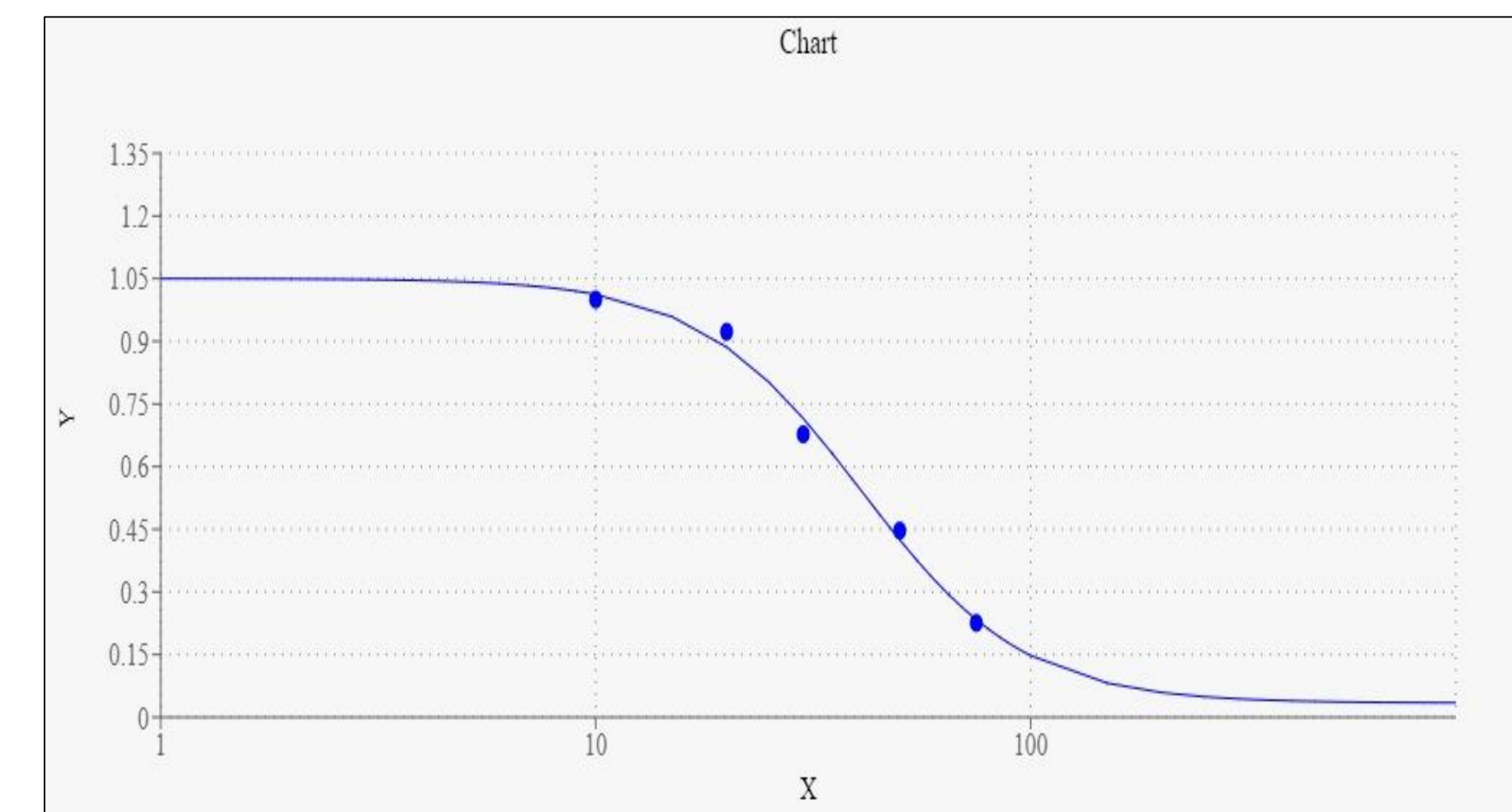
Receptor	Ligand	H-Bonds	Pi-interaction	Vanderwaal interaction	Binding Affinity (kcal/mol)
FABP4	Ibuprofen	ARG 126, TYR 128	TYR 19, MET 20, VAL 23, VAL 25	LEU 10, ALA 75, ASP 76, ARG 78, ILE 104, ARG 106, VAL 115, CYS 117.	-6.3
FABP4	Diclofenac	ARG 126, TYR 128	PHE 16, ALA 33, ALA 36, PRO 38, ALA 75	LEU 10, TYR 19, SER 53, SER 55, PHE 57, LYS 58, THR 60, ILE 104, VAL 115, CYS 117	-7.1
FABP4	Quercetin	ARG 106, ARG 126 (Un-favourable h-bonds)	PHE 16, MET 20, ALA 75, ASP 76	LEU 10, TYR 19, VAL 23, VAL 25, THR 29, ALA 33, PRO 38, MET 40, PHE 57, ARG 78, VAL 115, TYR 128	-7.7

Scavenging activity

Scavenging activity of Black Tea and Green Tea



MTT assay cell viability vs % survival graph



CONCLUSION

❖ Anti-inflammatory properties of Green and Black Tea were studied using phytochemical tests, also certain estimation results were obtained by MTT assay along with H₂O₂ assay and NO₂ assay satisfactory and positive results were obtained. Thus green tea and black tea can be beneficial for consumption as it can help to reduce inflammation on daily basis.