Supplementary file

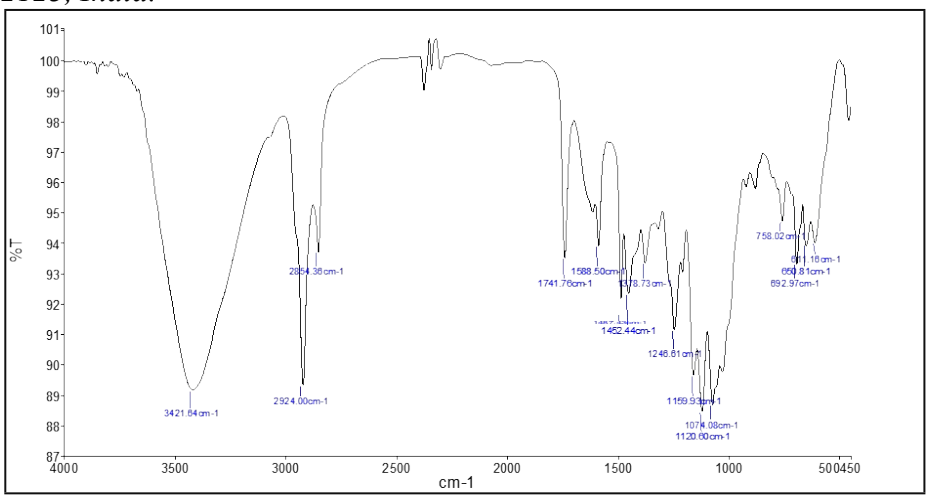
Nano-pelargonidin modulates p53/PARP/HSP 90/XRCC1 signaling axis to combat cypermethrin-induced genotoxicity and metabolic dysfunction in fish: a molecular docking predicted *in vivo* approach

[a]Priyanka Sow, [a]Sudatta Dey, [a,b]Rishita Dey, [a]Asmita Samadder*, [b]Sisir Nandi, [c]Debojyoti Tarafdar, [a]Anisur Rahman Khuda-Bukhsh

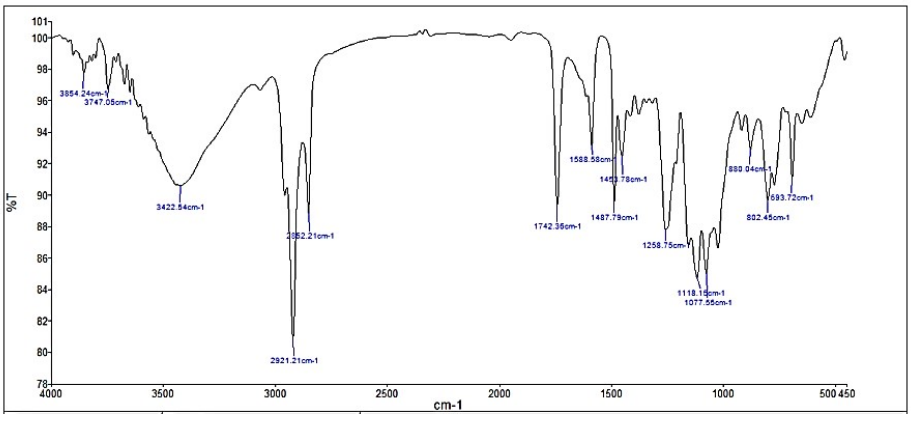
[a]*Cytogenetics and Molecular Biology Laboratory, Department of Zoology, University of Kalyani, Kalyani, Nadia, West Bengal-741235, India.*

[b]*Department of Pharmaceutical Chemistry, Global Institute of Pharmaceutical Education and Research (GIPER) (Affiliated to Uttarakhand Technical University). Kashipur-244713, India.*

[c]*Department of Chemistry, Chanchal College, (Affiliated to University of Gour Banga), Malda-732123, India.*

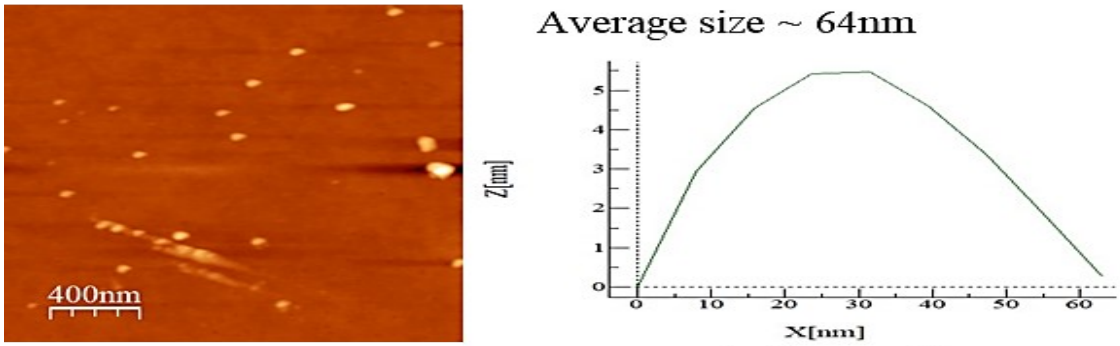


(a)

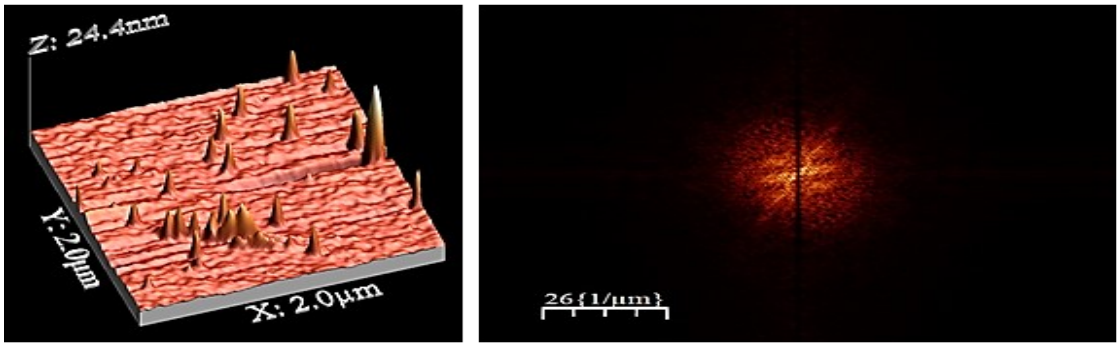


(b)

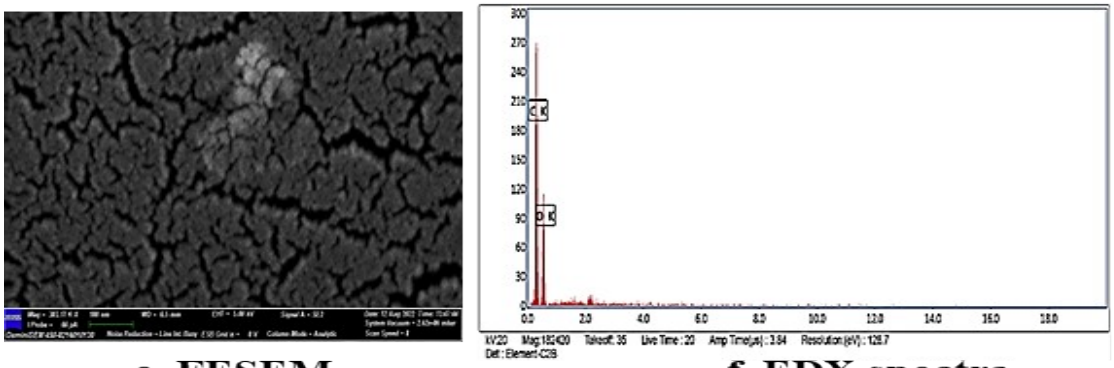
Figure 1: FTIR of cypermethrin (a) and cypermethrin (b) after 7 days on passing O_2.



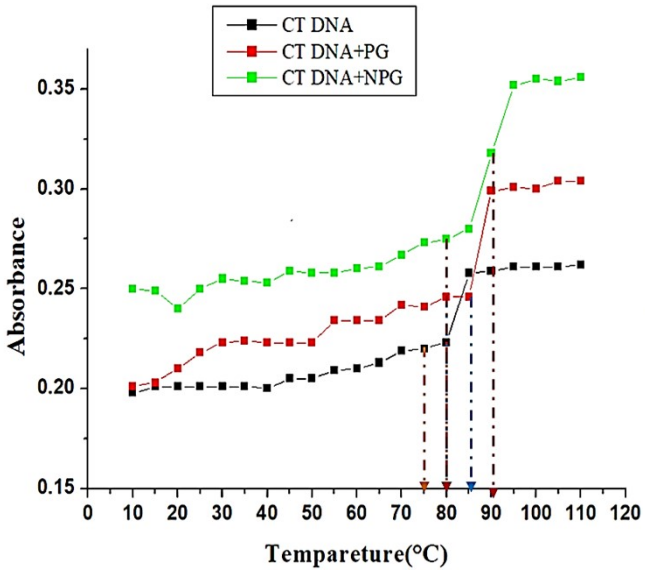
a. 2D view b. Size profile



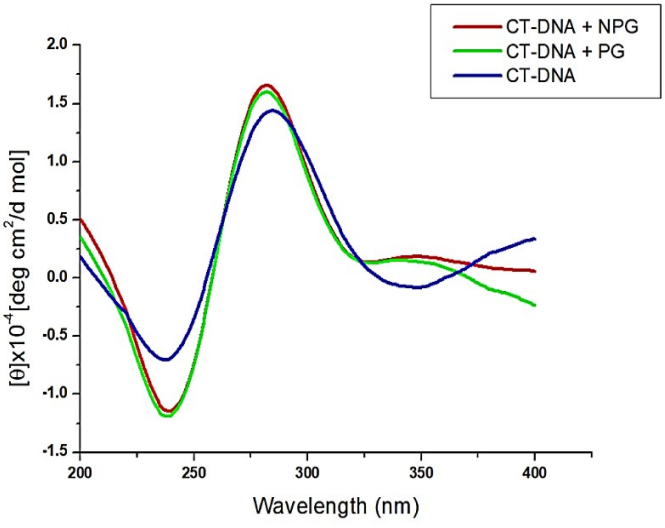
c. 3D view d. FFT



e. FESEM f. EDX spectra



(g)



(h)

Figure 2. (a-d) AFM study of NPG: (a) 2D view of NPG, (b) size profile of NPG, (c) 3D view of AFM image of NPG, (d) FFT analysis; (e) FESEM image of NPG, (F) EDAX spectra of NPG, (g) Tm curve of CT-DNA in presence of PG and NPG; (h) CD spectroscopic analysis of CT-DNA binding affinity with PG and NPG respectively.

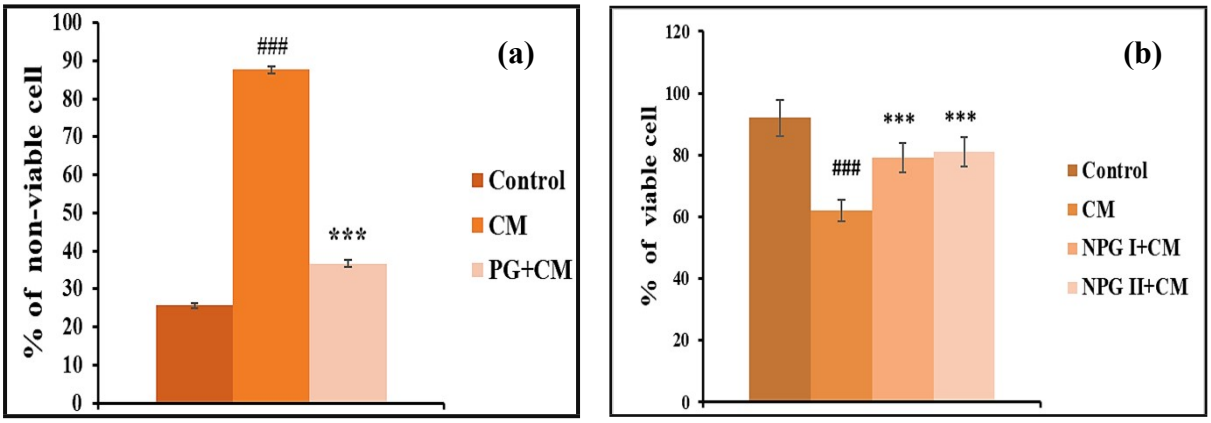


Figure 3: Graphical representation for % of cell-cytotoxicity (a) and cell viability (b) in hepatic tissue from experimental groups of tilapia. ###p<0.001 vs control , ***p< 0.001 vs CM.

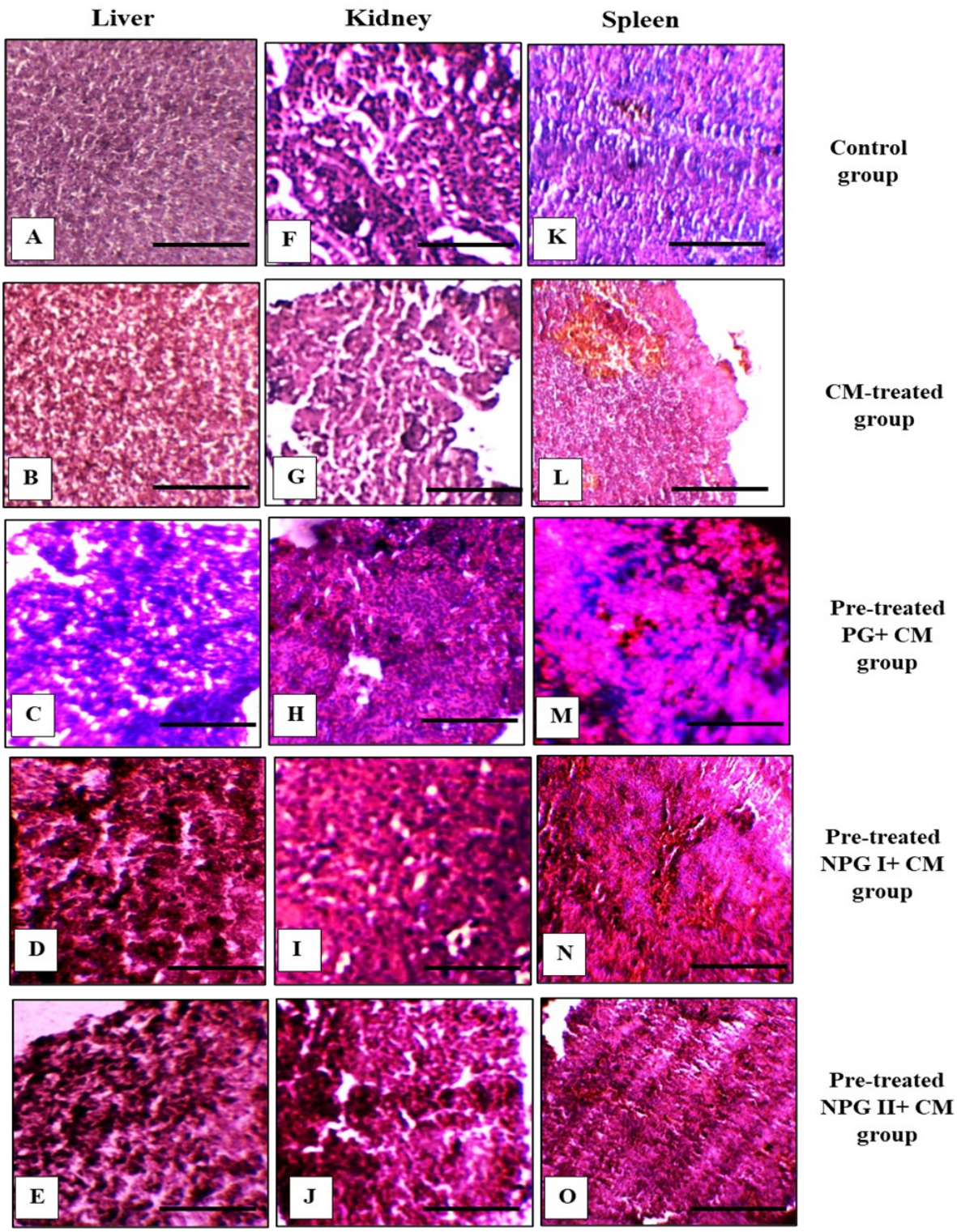


Figure 4: Histopathological changes were analysed in different tissue such as liver (A-E), kidney (F-J) and spleen (K-O) obtained from experimental groups including control set. Scale of image was 4.5 nm.

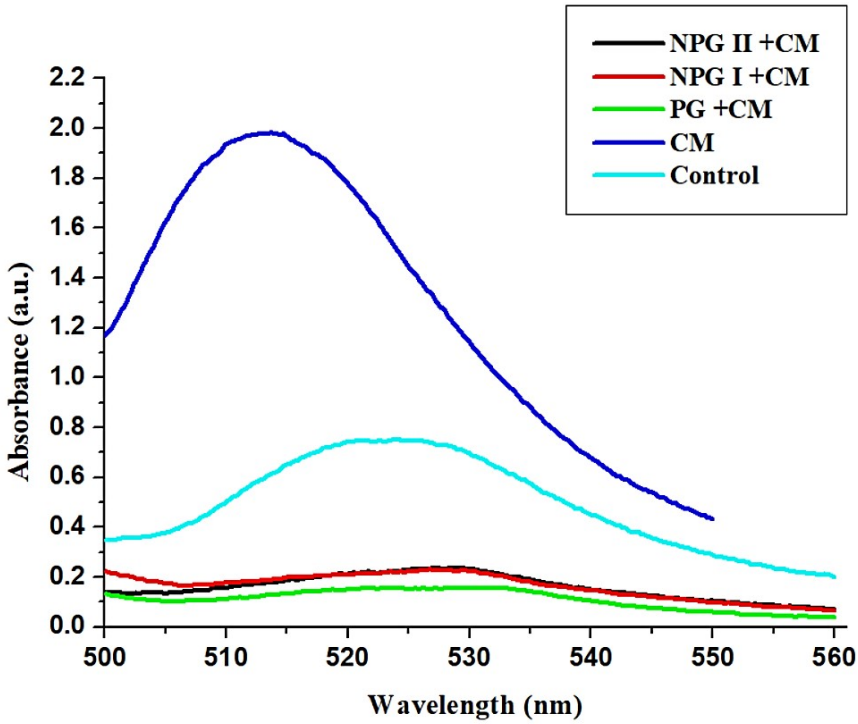


Figure 5: Assessment of ROS generation in different experimental groups by using DCFDA-H_2 dye.

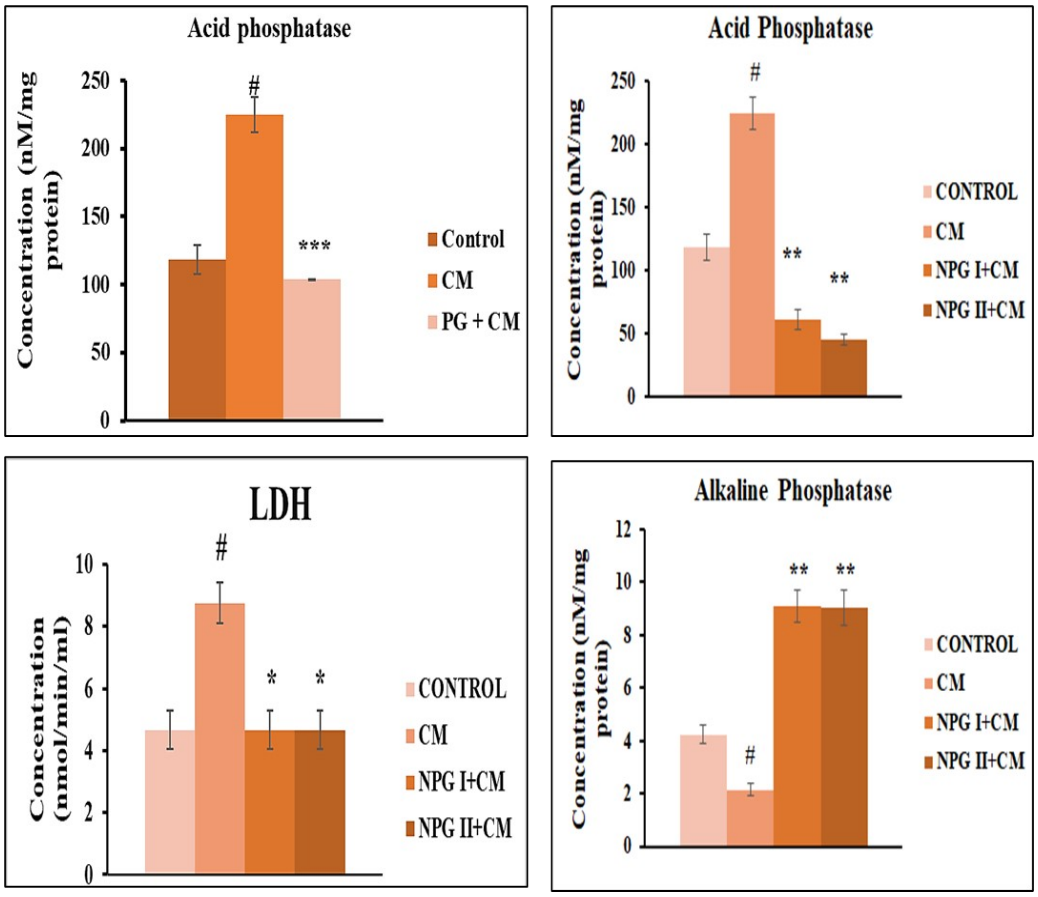


Figure 6: Analysis of hepatic enzymes profiles of all experimental groups of tilapia fish. #p< 0.05 vs. Control, ***p<0.001 vs. CM ,**p<0.01 vs. CM, *p<0.05 vs. CM.

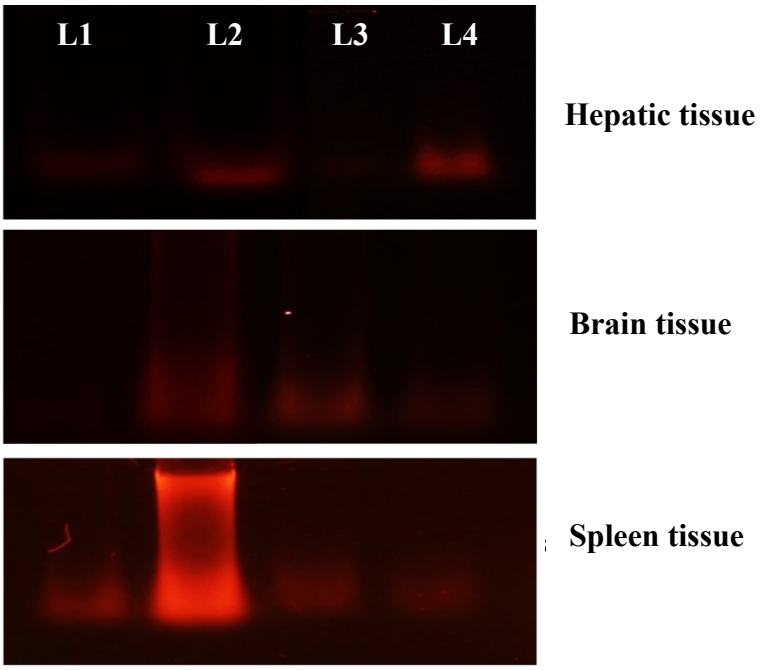


Figure 7. Analysis of DNA fragmentation in hepatic, spleen and brain tissues of different experimental groups of tilapia fish. Ln 1: Control, Ln 2: CM-treated group, Ln 3: NPG I+CM treated group, Ln 4: NPG II+CM treated group.

Experimental groups	**Micronucleus in blood (Mean±S.E)**
Control	11±0.577
CM	56.333±0.667$^{###}$
NPG I+CM	12.33±1.45***
NPG II+CM	10±1.15***

Table 1: Data for Micronucleus Formation Determined in the Experimental Group of Tilapia Fish. ###p <0.001 vs. Control, ***p <0.001 vs. CM

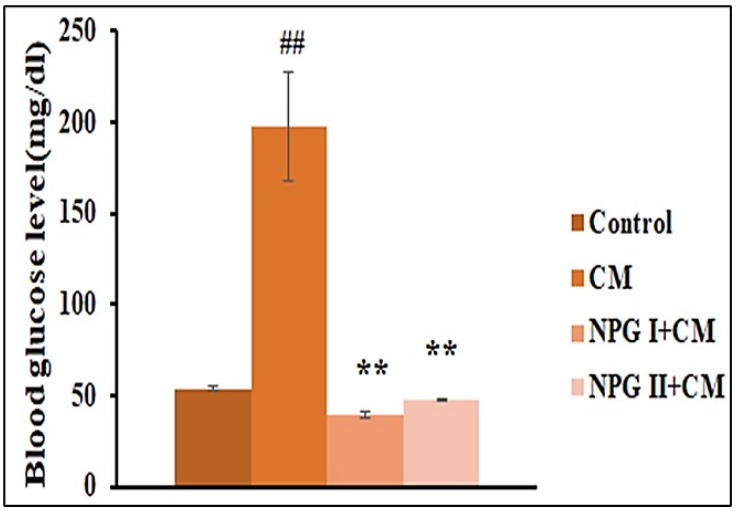


Figure 8: Analysis of blood glucose level from blood serum of all experimental groups of tilapia fish. ##p <0.01 vs. Control, **p <0.01 vs. CM.

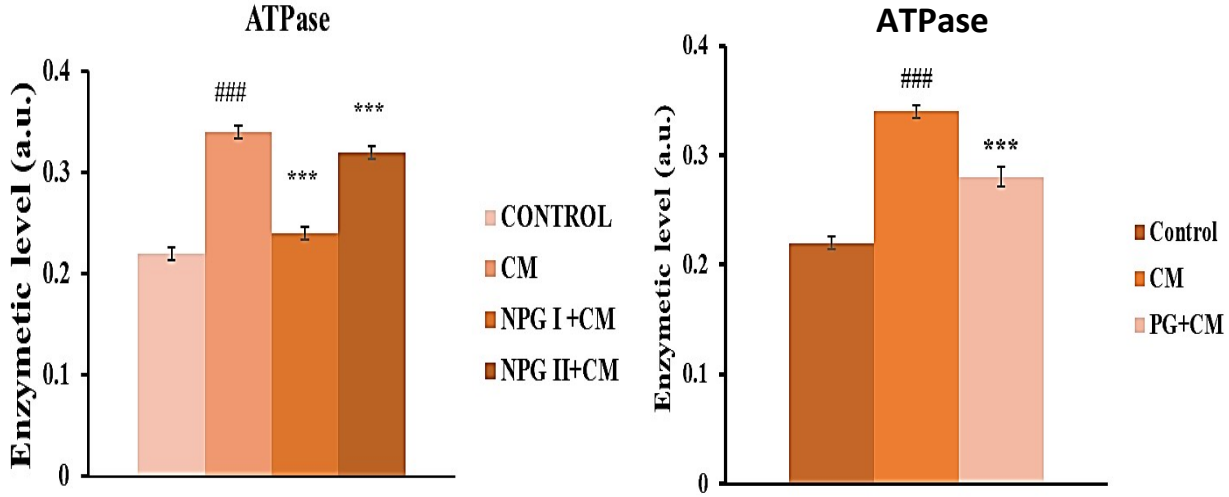


Figure 9: Analysis of ATPase level in all experimental groups of tilapia fish. ###p <0.001 vs. Control, ***p <0.001 vs. CM.

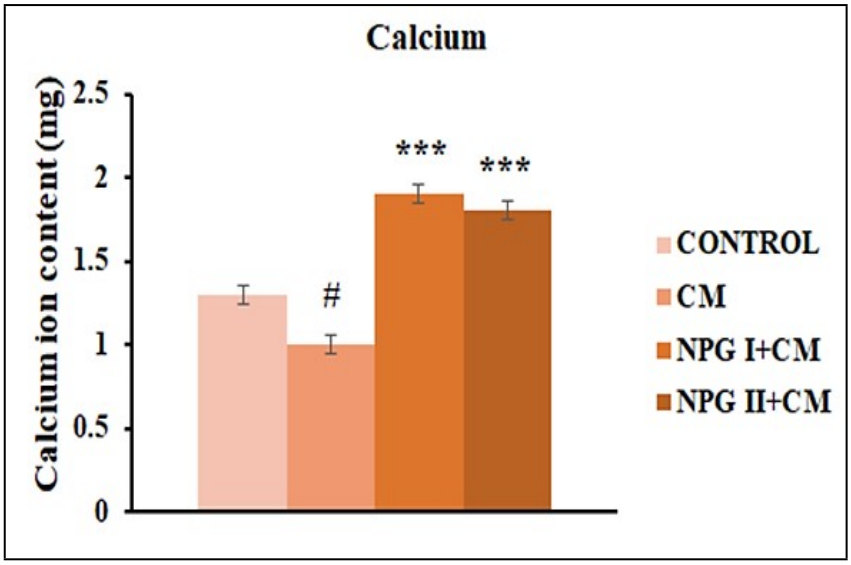


Figure 10: Analysis of intra-cellular calcium level in all experimental groups of tilapia fish. #p <0.05 vs. Control, ***p <0.001 vs. CM.