Boosting effects of Cranberry and Cinnamaldehyde for pioglitazone amelioration of liver steatosis in rat via suppression of HIF-1α/Smad/β-catenin signaling

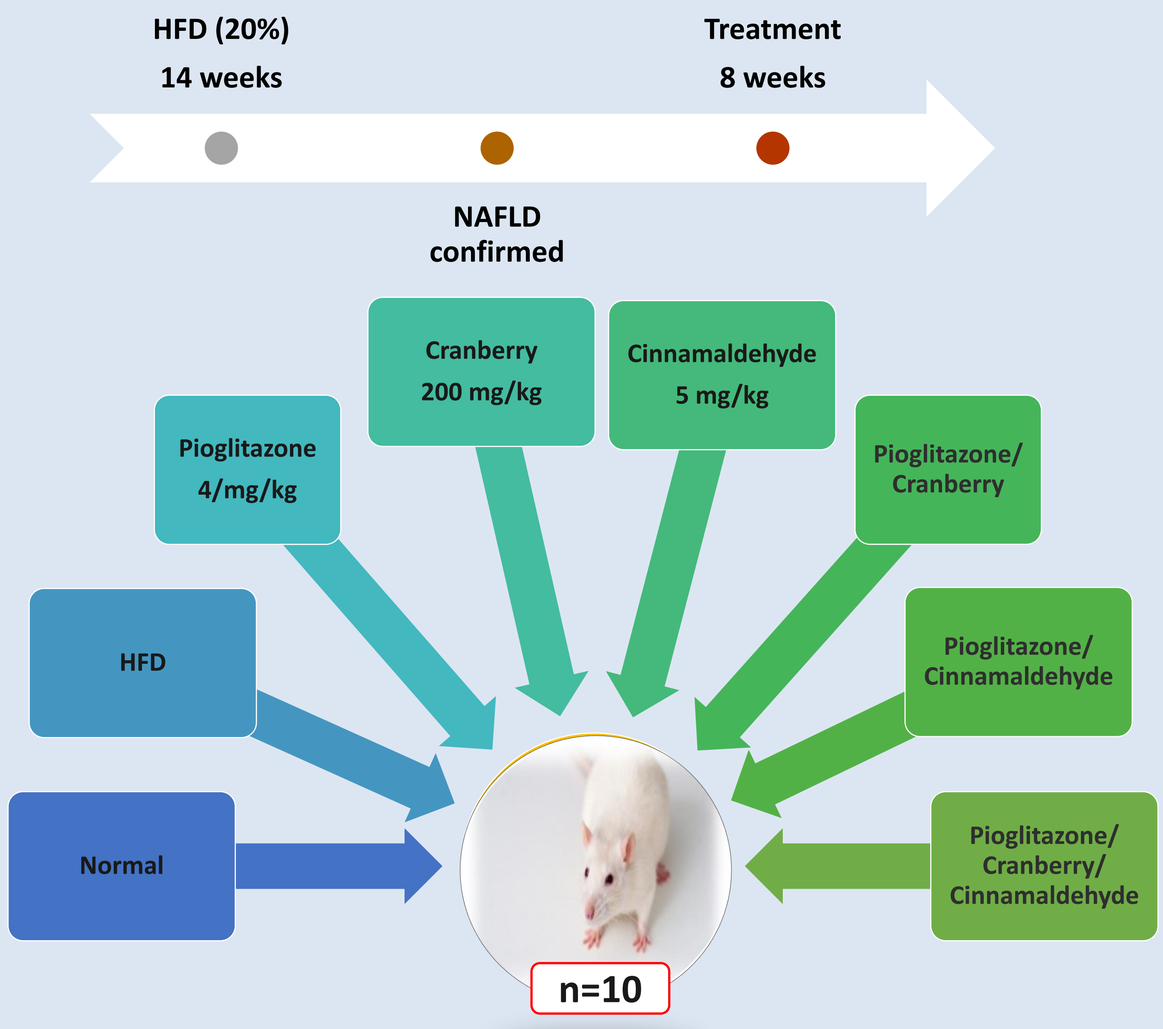
Mennatallah A. Ali*, Shimaa A. Mahmoud, Adel Alkhedaide, Mohamed M. Soliman, Tamer A. Al-Shafie, Yasser S. El-Sayed, Mustafa Shukry, Heba I. Ghamry, Samar S. Elblehi

*Department of Pharmacology &Therapeutics, Faculty of Pharmacy, Pharos University in Alexandria, Alexandria, Egypt

Introduction

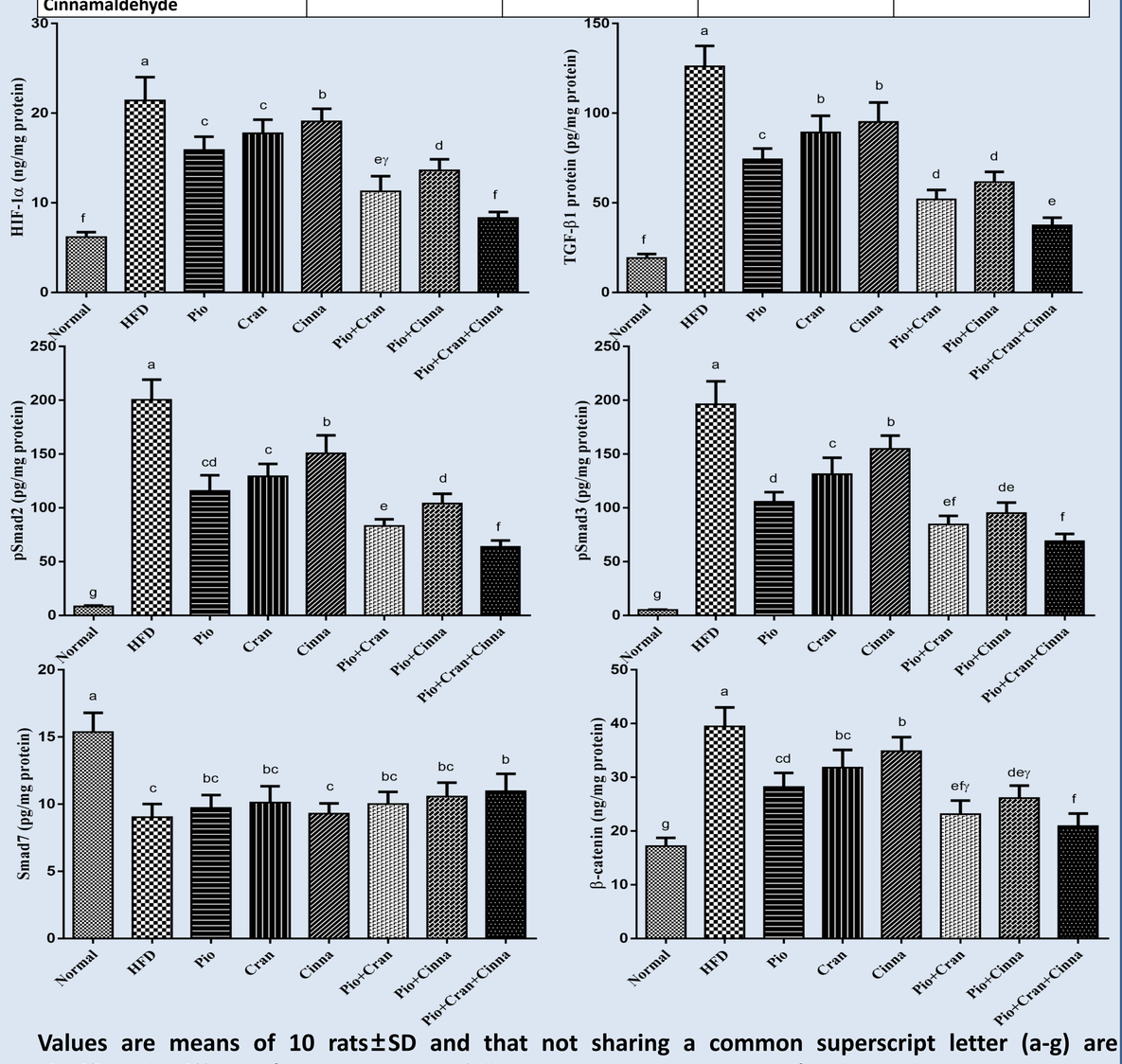
The involvement of hypoxia-inducible factor-1α (HIF-1α), transforming growth factor-β1 (TGF-β1), Smad and β-catenin signaling pathway in non-alcoholic fatty liver disease (NAFLD) is not fully elucidated. Pioglitazone improves NAFLD, whereas the underlying molecular mechanisms are not extensively clarified. In addition, cranberry and cinnamon have received increasing attention as potential therapeutic agents in metabolic disorders.

Materials and Methods

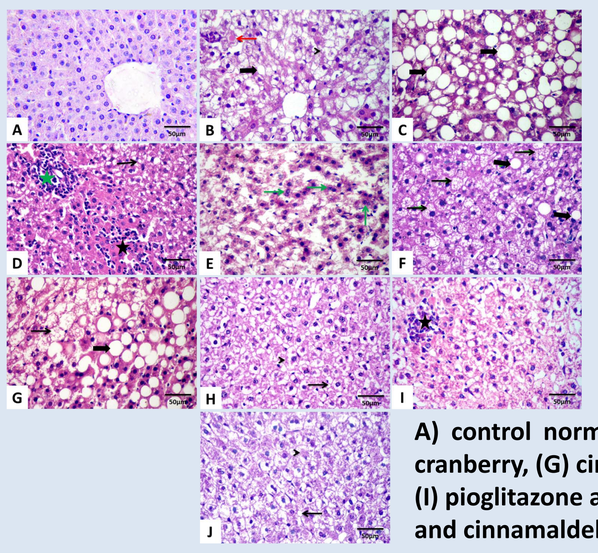


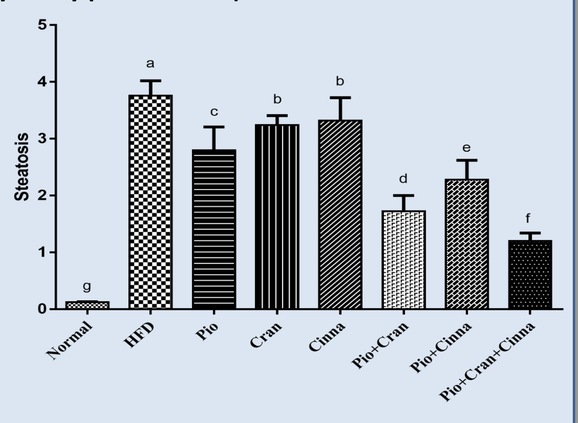
Results

Groups	Body weight (g)	Liver index (%)	ALT (U/L)	AST (U/L)
Normal control rats	195.69 ± 22.55^{d}	2.11 ± 0.18^{d}	28.69 ± 3.57^{f}	42.56 ± 5.98^{f}
Untreated NAFLD rats	339.79 ± 34.07^{ab}	3.53 ± 0.49^{a}	74.84 ± 9.50^{a}	91.73 ± 10.99^{a}
Pioglitazone	354.32 ± 39.04^{a}	2.87 ± 0.37^{bc}	50.71 ± 6.08^{c}	62.60 ± 8.31^{cd}
Cranberry	297.68 ± 22.77^{c}	2.98 ± 0.34^{b}	55.43 ± 6.37^{bc}	68.36 ± 7.08^{c}
Cinnamaldehyde	284.73 ± 30.87^{c}	2.66 ± 0.42^{bc}	62.54 ± 7.06^{b}	79.03 ± 6.18^{b}
Pioglitazone + Cranberry	323.55 ± 30.04^{ab}	2.57 ± 0.24^{bcd}	41.94 ± 3.93^{de}	41.09 ± 5.39^{f}
Pioglitazone + Cinnamaldehyde	305.51 ± 26.49^{bc}	2.46 ± 0.39^{cd}	46.94 ± 6.22^{cd}	56.83 ± 6.74^{deψ}
Pioglitazone+ Cranberry + Cinnamaldehyde	267.97 ± 28.64^{c}	2.39 ± 0.30^{cd}	37.12 ± 4.62^{ef}	36.85 ± 2.04^{f}



Values are means of 10 rats±SD and that not sharing a common superscript letter (a-g) are significantly different (one-way ANOVA followed by Tukey post hoc test) at $P < 0.05$

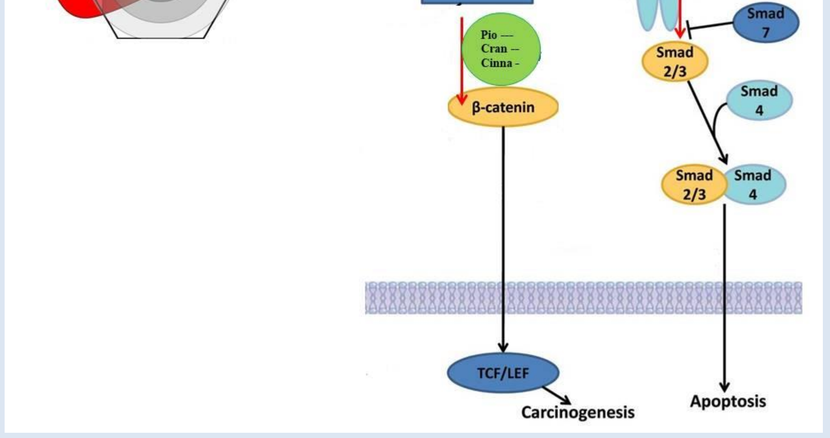




A) control normal, (B-D) untreated HFD, (E) pioglitazone, (F) cranberry, (G) cinnamaldehyde, (H) pioglitazone, and cranberry, (I) pioglitazone and cinnamaldehyde, (J) pioglitazone, cranberry and cinnamaldehyde treated HFD groups.

Conclusions

Cranberry and cinnamon are potential add-on agents in hepatic steatosis and NAFLD management.



References

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