Antifungal ouzo nanoparticles from guar gum propionate

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Elemental analysis and degree of substitution. C, H, N percentage composition studies were carried out by combustion technique in a flow of oxygen.[1] The degree of substitution in each case was determined using the following equation:

$$DS = [(6 \times M_{C\text{-}AGU} - \%\ C) \times M_{AGU}] / [(M_E \times \%\ C) - M_{C\text{-}E}]$$

Where %C is the carbon content in the sample GGP and $M_{C\text{-}AGU}$, M_{AGU}, M_E and $M_{C\text{-}E}$ are associated to the carbon molar mass (12 g), the molar mass of an anhydro sugar unit (162 g), the mass of the propionate ester substituent (57 g) and the carbon mass of the ester part (36 g) respectively. The ratio of elemental oxygen to carbon in an anhydrosugar unit is 1.11. Theoretically that was linked with elemental weight fraction of 49.4 % O and 44.4 % C. A correction factor is utilized to nullify the observation discrepancies in oxygen percentage. The theoretical and experimental values for GG and GGP were shown in Table S1. The DS was dependent mostly upon proportionate molar incorporation of the substituent. The DS values were calculated from the equation for each GGP derivative type from the corrected values.

Table S1 Elemental analysis and degree of substitution of the biopolymers

Compound	Molar ratio of anhydrosugar unit to propionyl chloride	C,H,N analysis (wt %) Corrected			C,H,N analysis (wt %) Experimental			Degree of Substitution (DS)
		C	H	N	C	H	N	
GG	-	44.44	6.17	-	39.90	6.20	-	-
GGP_A	1:1	56.40	6.16	-	50.63	6.19	-	0.79
GGP_B	1:2	52.20	5.70	-	46.86	5.73	-	1.09
GGP_C	1:3	48.30	5.28	-	43.38	5.31	-	1.40
GGP_D	1:4	48.70	5.32	-	43.72	5.35	-	1.37

Phase diagram studies of guar gum propionate ouzo nanoparticles. GGPnp were generated by the nanoprecipitation process. Polymer concentration is the control parameter in facile nanoprecipitation techniques. The ouzo regime of GGP solution was studied from the phase out ouzo diagram by the solvent titration method.[2] For each concentration (1-9 mg mL^{-1}) of starting GGP solution, nanoparticle parameters like the Z-average size and PDI of the resulting ouzo nanoparticles were recorded. The Z-average particle size and the PDI decreased with the increasing concentration and the optimal levels (Z-avg size 329.6 nm, PDI 0.339) were attained when the GGP concentration was 5 mg mL^{-1} (Figure S1). However, above this concentration (5 mg mL^{-1}) both the Z-average particle diameter and the PDI increased significantly up to 9 mg mL^{-1} (Z-avg size 987.9 nm, PDI 0.816). This increase was assumed to be related to the viscosity of the solutions and has been observed in case of many nanoparticles from various polymers.[3]

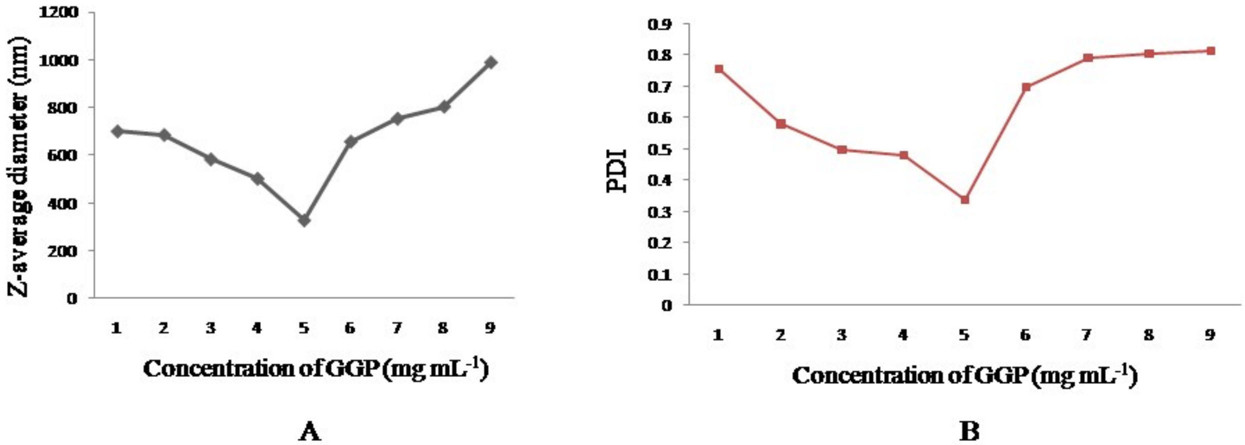
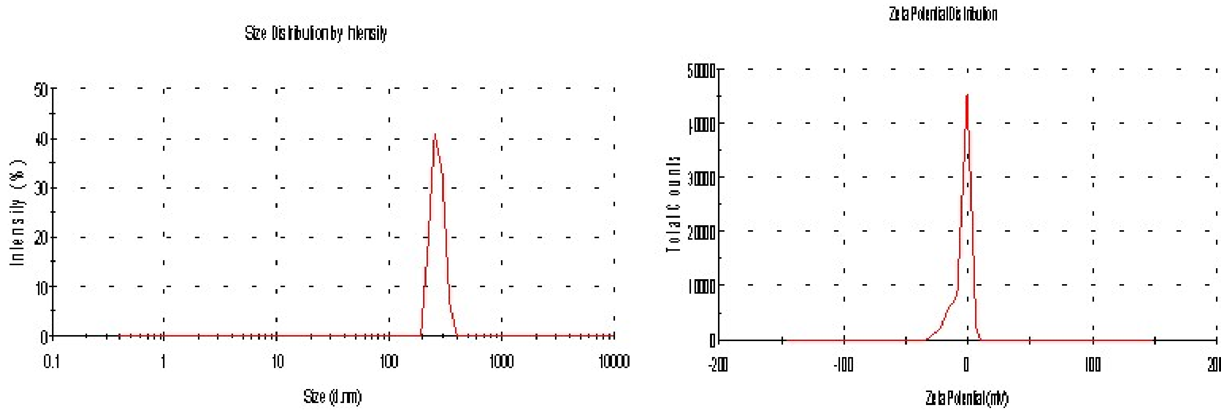


Fig. S1 The Z-average diameters (A) and PDI (B) of obtained GGP nanoparticles.

Particle size, PDI and zeta potential of guar gum propionate nanoparticles. The particle size, polydispersity index (PDI) and zeta potential of GGPnp were determined in a DLS (Zetasizer® Nano ZS, Malvern Instrument Ltd., U.K). The particle size and zeta potential distribution respectively of the ouzo nanoparticles prepared by dialysis technique is shown in Table S2 and Figure S2. The nanoparticle PDI parameters indicated stable colloidal dispersion.

Table S2 Particle size, PDI and Zeta-potential of GGP nanoparticles

Sample	Z-average particle size (nm)	PDI	ζ-potential (mV)
GGPnp	329.6	0.339	-13.36 ± 3.3



A **B**

Fig. S2 Size distribution (A) and Zeta potential distribution (B) of GGP nanoparticles.

References

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