Supplementary information

S1. Methods

S1.1 Extraction and purification of polysaccharide

The jujubes were dried and crushed into a powder, and then the jujube powder was extracted with distilled water (m:v/1:20) containing 0.3% cellulase (w/v) at 55 °C for 5 h after screened by 100 mesh sieve. The mixture was centrifugated at 2862 g for 15 min and the supernant was collected and reprecipitated by 4 times volume of ethanol (95%) at 4°C overnight. The precipitate was deproteinized with Sevage reagent, dialyzed, and then lyophilized to yield the crude extract of polysaccharides from jujubes (JP).

Subsequently, JP (0.4 g) was fractionated on a DEAE-cellulose column (1.6 cm × 20 cm), eluted stepwise with phosphate-buffered saline, 0.1 M, 0.3 M and 0.5 M NaCl. 30 tubes were used to collect eluent for every eluting gradient and filled with 10 mL. Meanwhile, the eluent was detected the polysaccharides contents by phenol-sulfuric acid method at 625 nm to plot eluting curve. Finally, three fractions were obtained and named as JP-1, JP-2 and JP-3 for subsequent research.

S1.2 Homogeneity and molecular weight

The molecular weights of samples were determined by gel permeation chromatography (GPC). Chromatograms were recorded by a Waters 515 instrument equipped with a Optilab T-rex detector, and two columns (SB-804HQ, 7.8mm×30.0 cm, and Shodex OHpak SB-806HQ, 6.0 mm× 4.0cm, Tosoh Co. Ltd) connected in

series. The columns were calibrated with T-series Dextran (T-500, T-300, T-200, T-100, T-10, and T-5). The eluent used was ultrapure water (0.02% sodium azide, pH 6), and the flow rate was 1.0 mL/min. A 100 μL aliquot of sample was injected for each run. Accordingly, the weight average molecular mass (Mw), number average molecular mass (Mn), and the polymer dispersity index (PDI) of the tested samples were calculated.

S1.3 Monosaccharide composition analysis

Pre-column PMP derivatization HPLC analysis was proceeded as followed. 1 mg/mL polysaccharides aqueous solution was added an equal volume of 4 M trifluoroacetic acid for 2 h of hydrolysis at 110°C. The hydrolyte was added with 120 mL of NaOH solution (0.3 M) and 120 mL of PMP methanol solution (0.5 M) and then the mixture was incubated at 70°C for 30 min. Following cooled to room temperature, the reaction product was neutralized with 120 mL of 0.3 M HCl. This process was repeated three times, and then the aqueous layer was filtered through a 0.45 μm membrane.

The PMP derivatives (10 mL) were injected into an HPLC system (Agilent 1260, USA) equipped with a C_{18} column(250 mm × 4.6 mm, 5 μm) maintained at 30°C. The mobile phase was a 87:13 v/v mixture with acetonitrile and aqueous phosphate (0.02 mM) at an eluting rate of 1 mL/min. The wavenumber of UV detector was set at 250 nm. PMP derivative of authentic mixed standards were prepared and subjected to HPLC analysis separately in the same manner.

45

46 **S1.4 FTIR spectroscopy**

47 The polysaccharides samples was dried to a constant weight with potassium
48 bromide at 50 °C, and FTIR-100 (Shimadzu Co. Ltd, Japan) was used for recording
49 IR spectra in the region 4000–400 cm^{-1}.

STable. 1 The molecular weight and distribution of JP

	JP-1	JP-2	JP-3
Mw	1.637×10^3 Da	1.799×10^3 Da	2.047×10^3 Da
Mn	1.149×10^3 Da	0.788×10^3 Da	1.213×10^3 Da
PDI	1.425	2.283	1.687

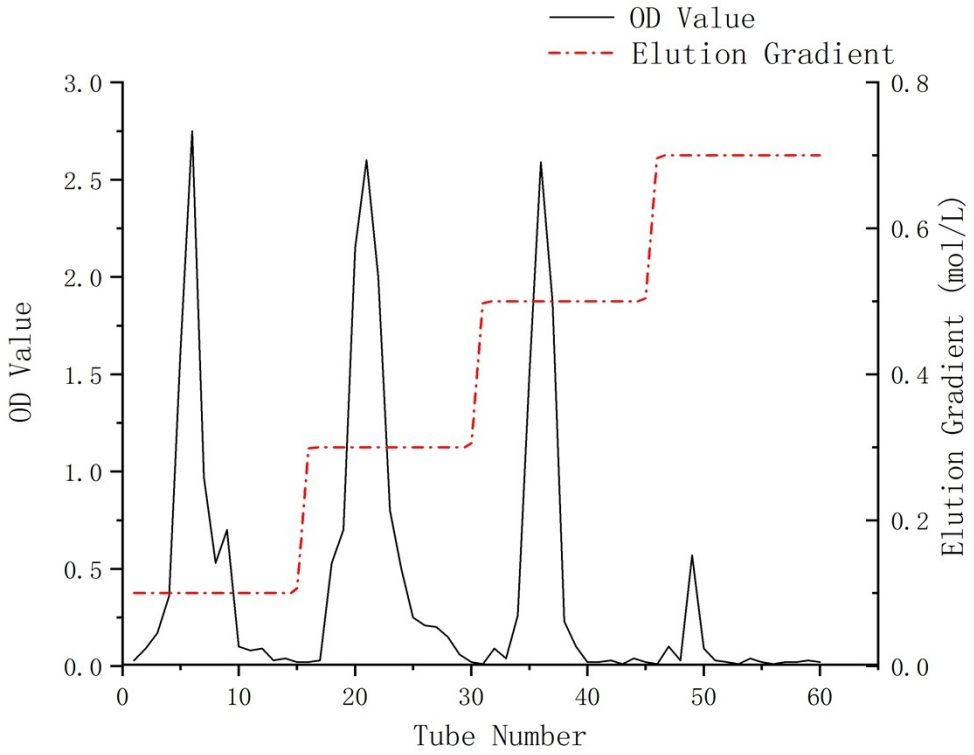
SFigure Caption

SFig. 1 DEAE-Sepharose FF column separation of the water-soluble JP. The black curve indicates the polysaccharide monitoring for the eluting fractions with the phonel-sulfate method (490 nm), the red dotted line shows the variation of the eluting gradients of NaCl during the separation process.

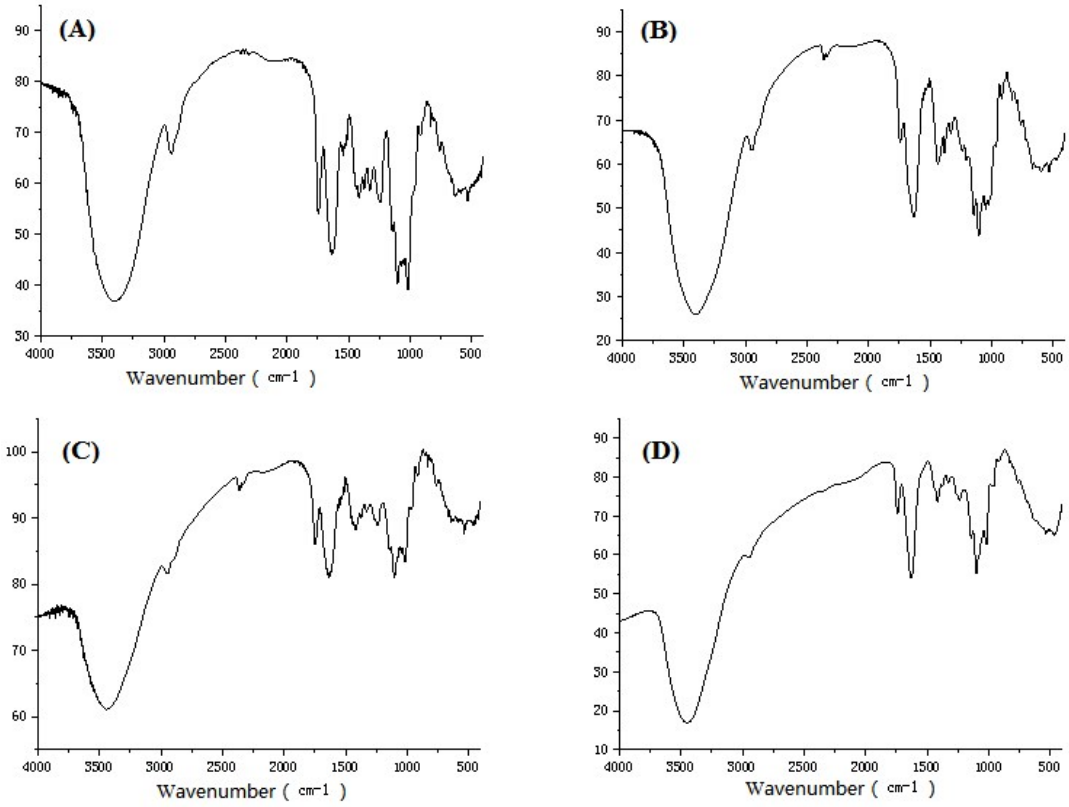
SFig. 2 FTIR spectra of JP samples. Spectrogram A, B, C and D represent the JP, JP-1, JP-2 and JP-3, respectively.

SFig. 3 Determination of component monosaccharide in polysaccharide with HPLC. Chromatography A is the six monosaccharide standard mixture; B, C, D, E represent the JP, JP-1, JP-2 and JP-3, respectively.

SFig. 1

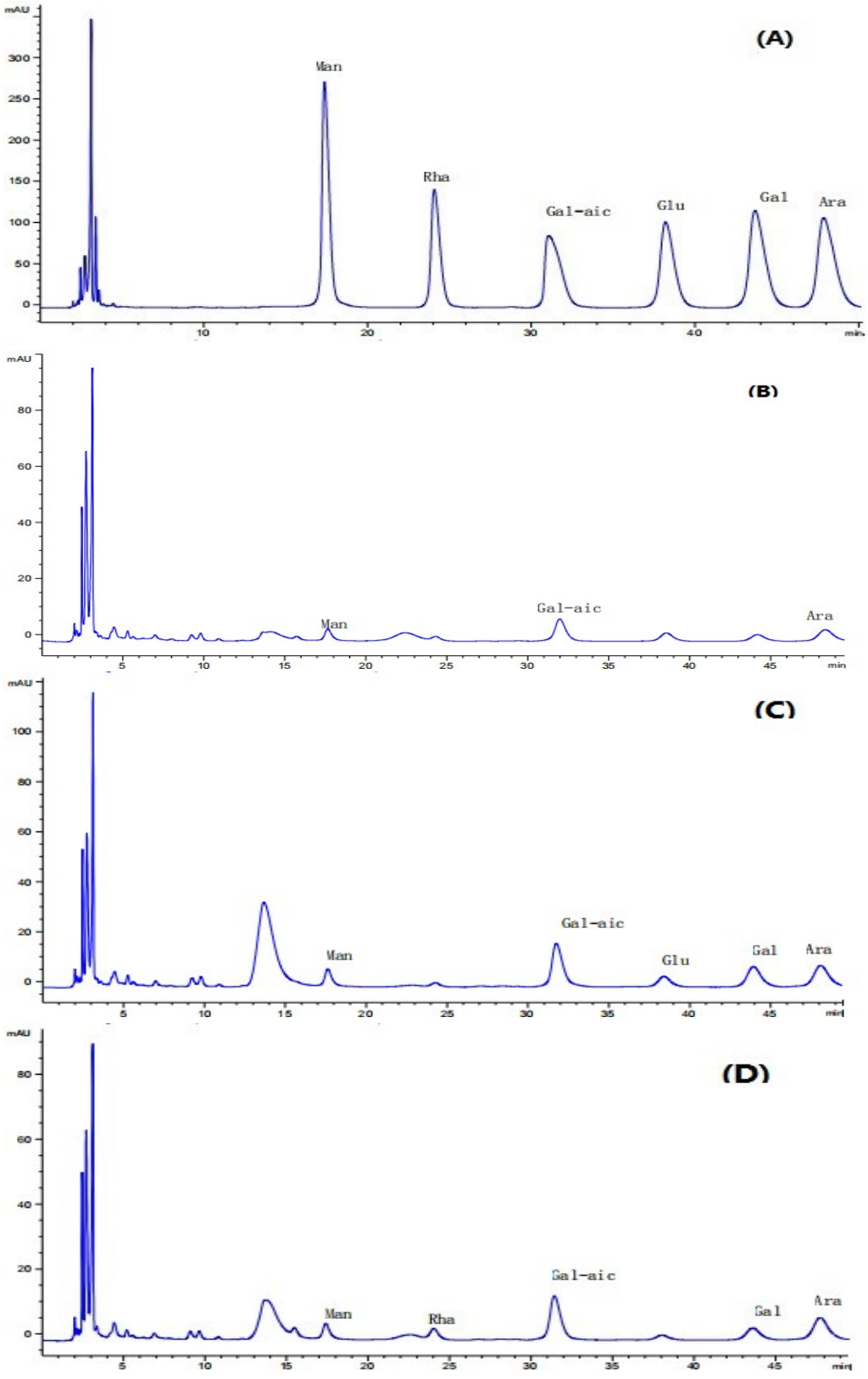

OD Value
Elution Gradient
OD Value
Elution Gradient (mol/L)
Tube Number
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.8
0.6
0.4
0.2
0.0
0
10
20
30
40
50
60

67 SFig. 2


(A)
(B)
(C)
(D)
Wavenumber (cm-1)
Wavenumber (cm-1)
Wavenumber (cm-1)
Wavenumber (cm-1)

68

SFig. 3


(A)
Man
Rha
Gal-aic
Glu
Gal
Ara
(B)
Man
Gal-aic
Ara
(C)
Man
Gal-aic
Glu
Gal
Ara
(D)
Man
Rha
Gal-aic
Gal
Ara