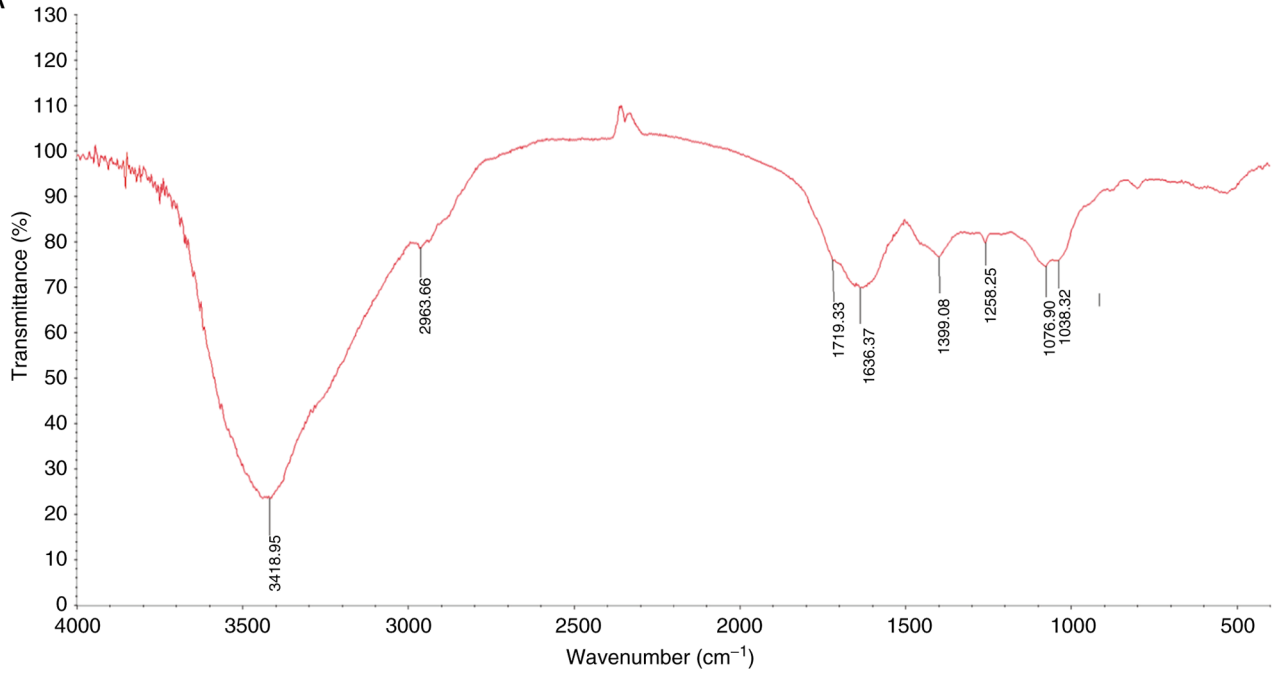
Figure S1. GLP characterization and identification. (A) GLP infrared spectrum. (B) GLP monosaccharide component identification. GLP, *Ganoderma lucidum* polysaccharides; nC, nanocoulomb.

A



B

Component	Peak area (nC*min)	Retention time (min)	Molar ratio	Content (μg/mg)
Fucose	0.436	5.192	0.009	1.920
Galactosamine	0.000	10.175	0.000	0.000
Rhamnose	0.000	10.684	0.000	0.000
Arabinose	0.223	11.867	0.006	1.173
Glucosamine	2.958	13.259	0.024	6.684
Galactose	3.380	15.417	0.118	28.113
Glucose	26.618	17.592	0.746	177.311
Xylose	0.482	20.784	0.015	2.875
Mannose	1.270	22.042	0.037	8.772
Fructose	0.000	25.125	0.000	0.000
Ribose	0.000	27.317	0.000	0.000
Galacturonic Acid	0.453	43.009	0.032	8.318
Guluronic Acid	0.000	43.7	0.000	0.000
Glucuronic Acid	0.458	45.484	0.014	3.529
Mannuronic Acid	0.000	47.892	0.000	0.000

Figure S2. Effects of GLP on the body weight gain, food intake and fat and muscle content. (A) Body weight gain. (B) Food intake. (C) Lean, (D) fat and (E) liquid mass (n≥6). $^{\#\#}$P<0.01, $^{\#\#\#}$P<0.005 vs. Sham; *P<0.05, **P<0.01, ***P<0.01 vs. OVX. GLP, *Ganoderma lucidum* polysaccharides; OVX, ovariectomy; LGLP, low-dose GLP; MGLP, medium-dose GLP; HGLP, high-dose GLP; Siv, simvastatin.

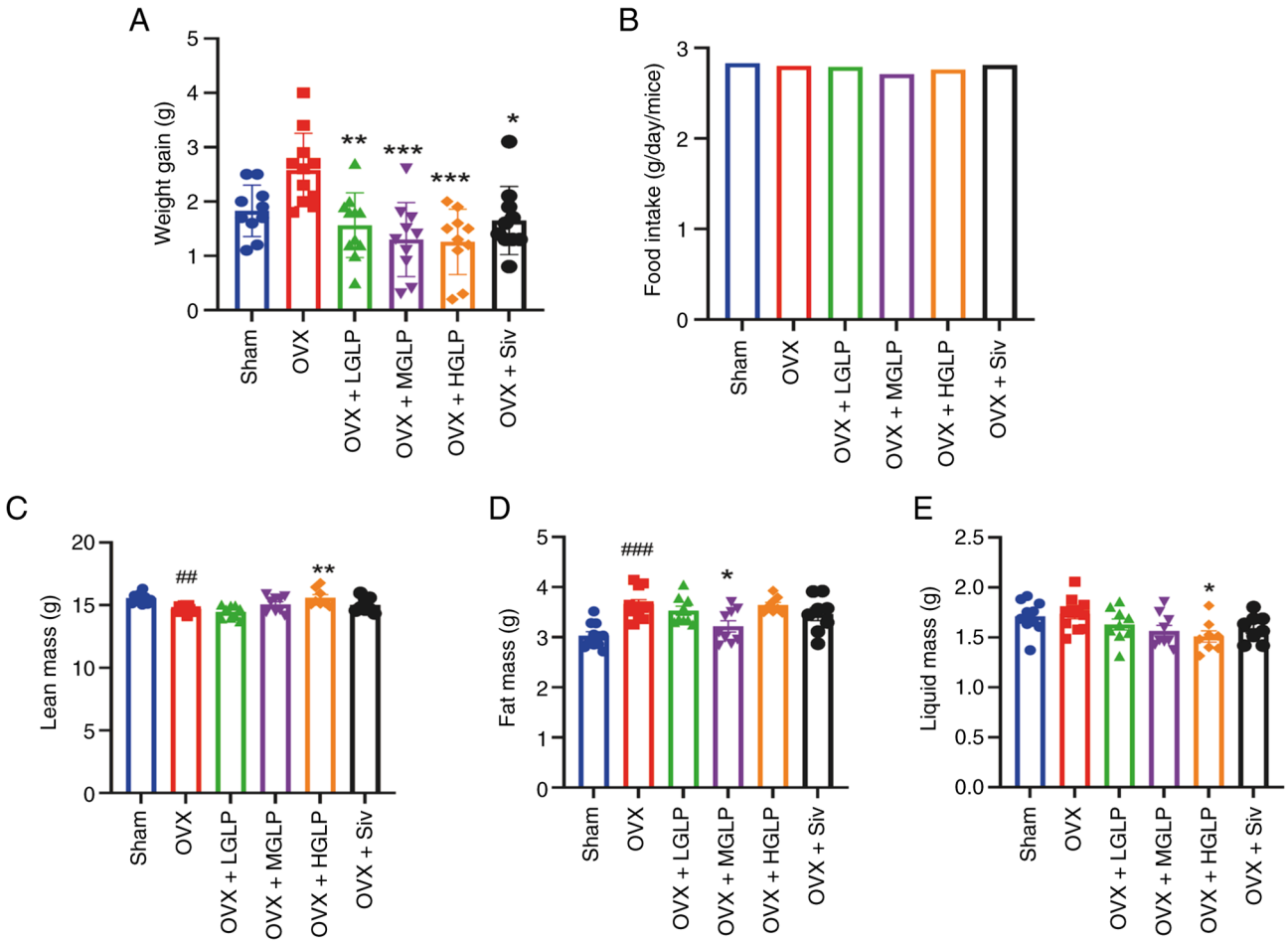


Figure S3. Effect of GLP on the expression of cholesterol synthesis-associated proteins in the hepatic tissue. (A) Protein levels detected by western blot and (B) densitometry (n≥6). $^{\#}$P<0.05 vs. Sham; *P<0.05, **P<0.01, ***P<0.01 vs. OVX. GLP, *Ganoderma lucidum* polysaccharides; OVX, ovariectomy; LGLP, low-dose GLP; MGLP, medium-dose GLP; HGLP, high-dose GLP; Siv, simvastatin; HMGCR, 3-hydroxy-3-methylglutaryl-CoA reductase; MVK, mevalonate kinase; IDI1, isopentenyl-diphosphate delta isomerase 1.

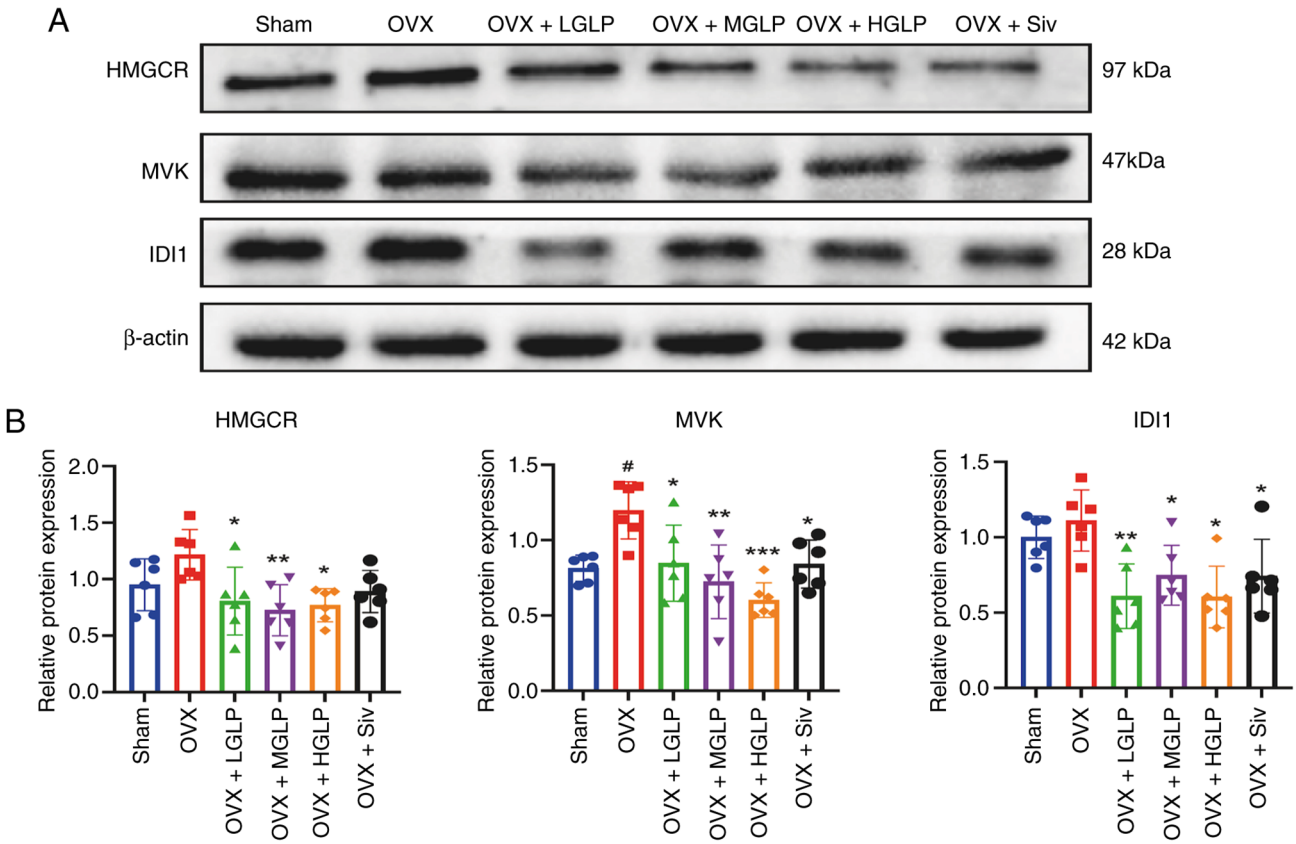


Figure S4. Effect of GLP on the expression of circadian rhythm proteins in hepatic tissue. (A) Protein expression levels of (B) CLOCK and BMAL1 in the liver (n≥6). #P<0.05 vs. Sham; *P<0.05 vs. OVX. GLP, *Ganoderma lucidum* polysaccharides; OVX, ovariectomy; LGLP, low-dose GLP; MGLP, medium-dose GLP; HGLP, high-dose GLP; Siv, simvastatin; CLOCK, clock circadian regulator; BMAL1, aryl hydrocarbon receptor nuclear translocator like 1.

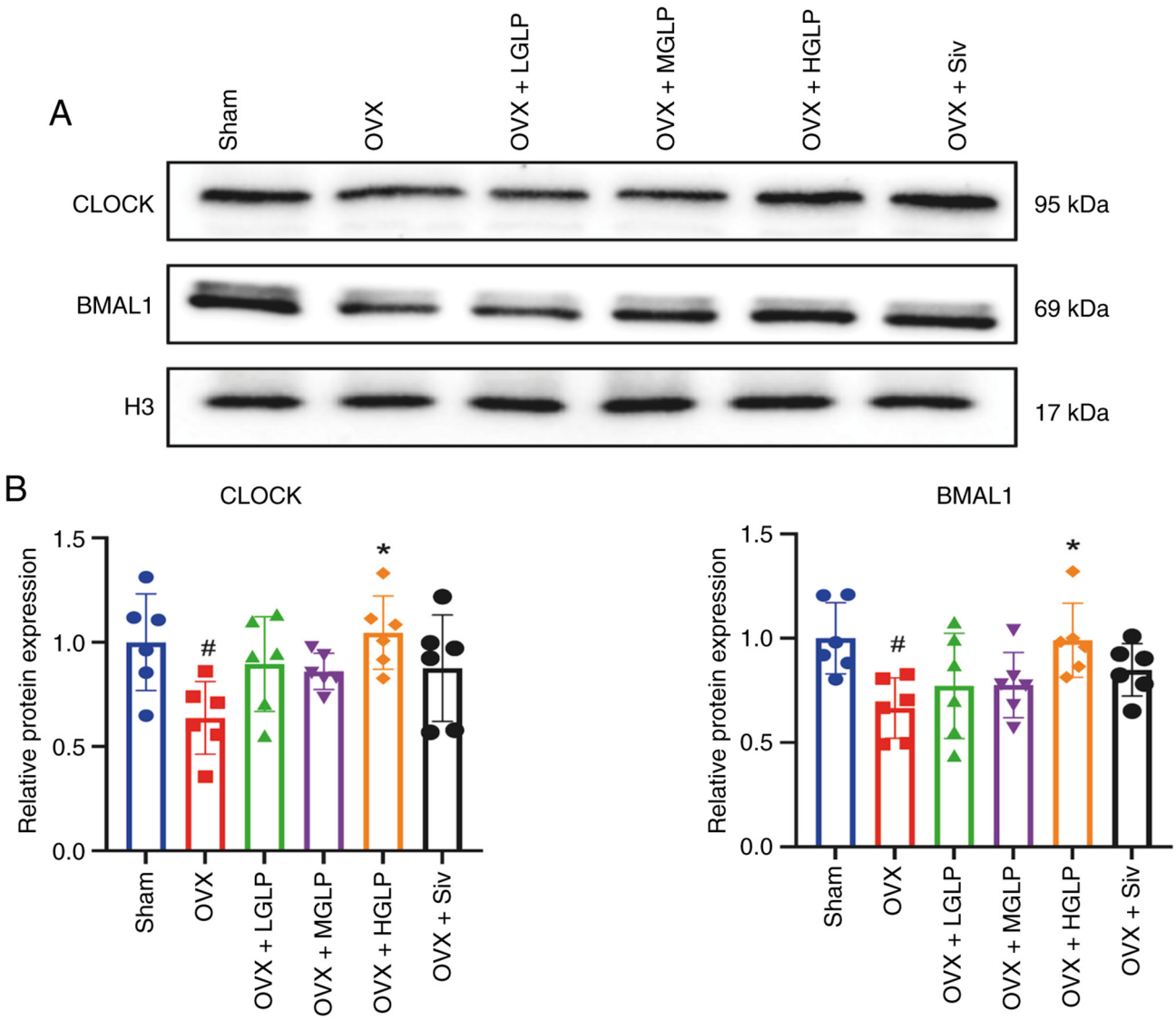


Figure S5. Effect of GLP on estrogen receptor and downstream gene expression in the liver. mRNA expression levels of *Esr1*, *Esr2*, *Crat*, *Cyp27a1*, *Fads2*, *Hnf1a*, *Acsl5*, *Acly*, *Cpt1a*, *Apoa2*, *Abcg8* and *Gpam* in the liver (n≥6). *P<0.05, **P<0.01, ***P<0.01 vs. OVX. GLP, *Ganoderma lucidum* polysaccharides; OVX, ovariectomy; LGLP, low-dose GLP; MGLP, medium-dose GLP; HGLP, high-dose GLP; Siv, simvastatin; Esr, estrogen receptor; Crat, carnitine O-acetyltransferase; Fads, fatty acid desaturase; Hnf1a, HNF1 homeobox A; Acsl5, acyl-CoA synthetase long chain family member 5; Acly, ATP citrate lyase; Cpt1a, carnitine palmitoyltransferase 1A; Apoa2, apolipoprotein A-II; Abcg8, ATP binding cassette subfamily G member 8; Cyp27a1, family 27, subfamily a, polypeptide 1; Gpam, glycerol-3-phosphate acyltransferase, mitochondrial.

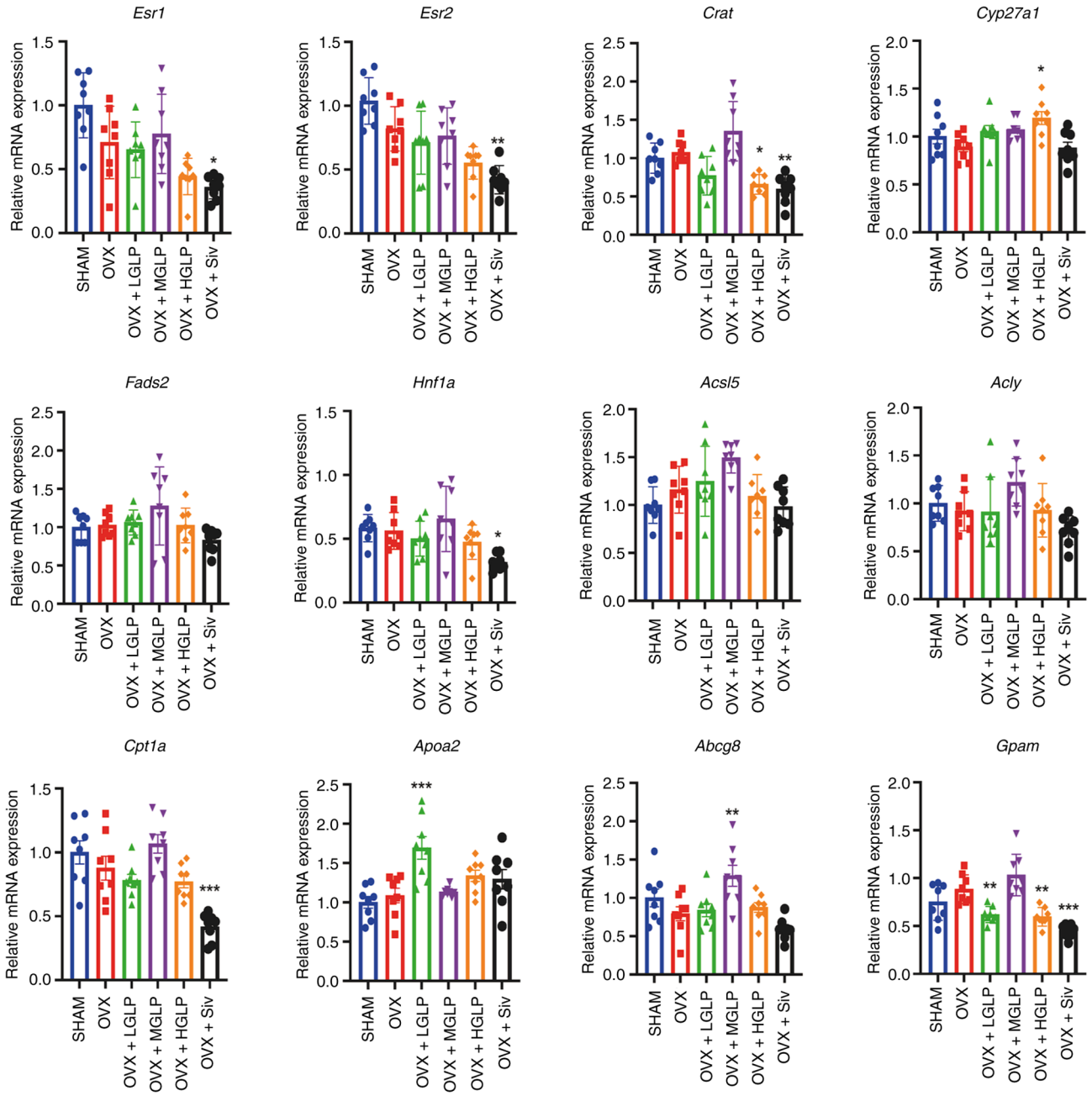


Figure S6. Effect of GLP on relative abundance of intestinal microbiota. GLP, *Ganoderma lucidum* polysaccharides; OVX, ovariectomy; LGLP, low-dose GLP; MGLP, medium-dose GLP; HGLP, high-dose GLP; Siv, simvastatin.