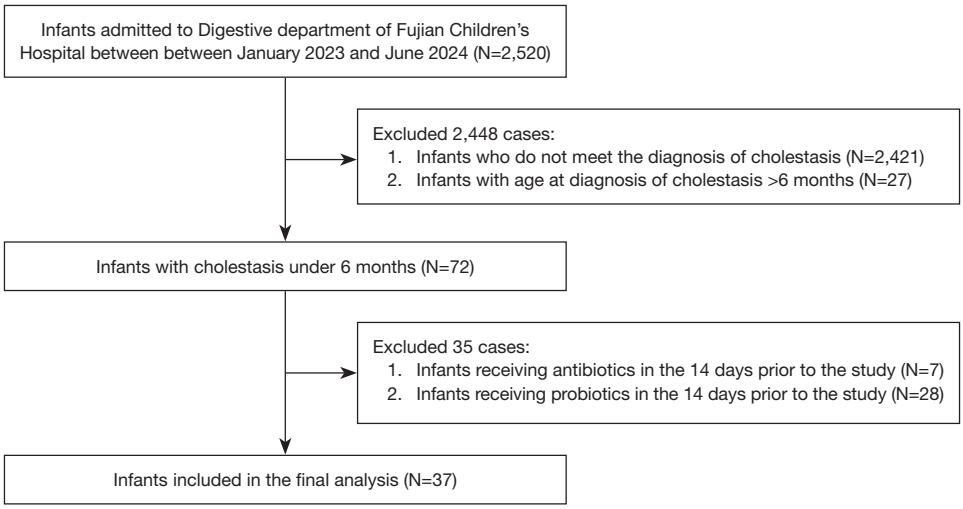

Figure S1 The screening process of the Cho group.

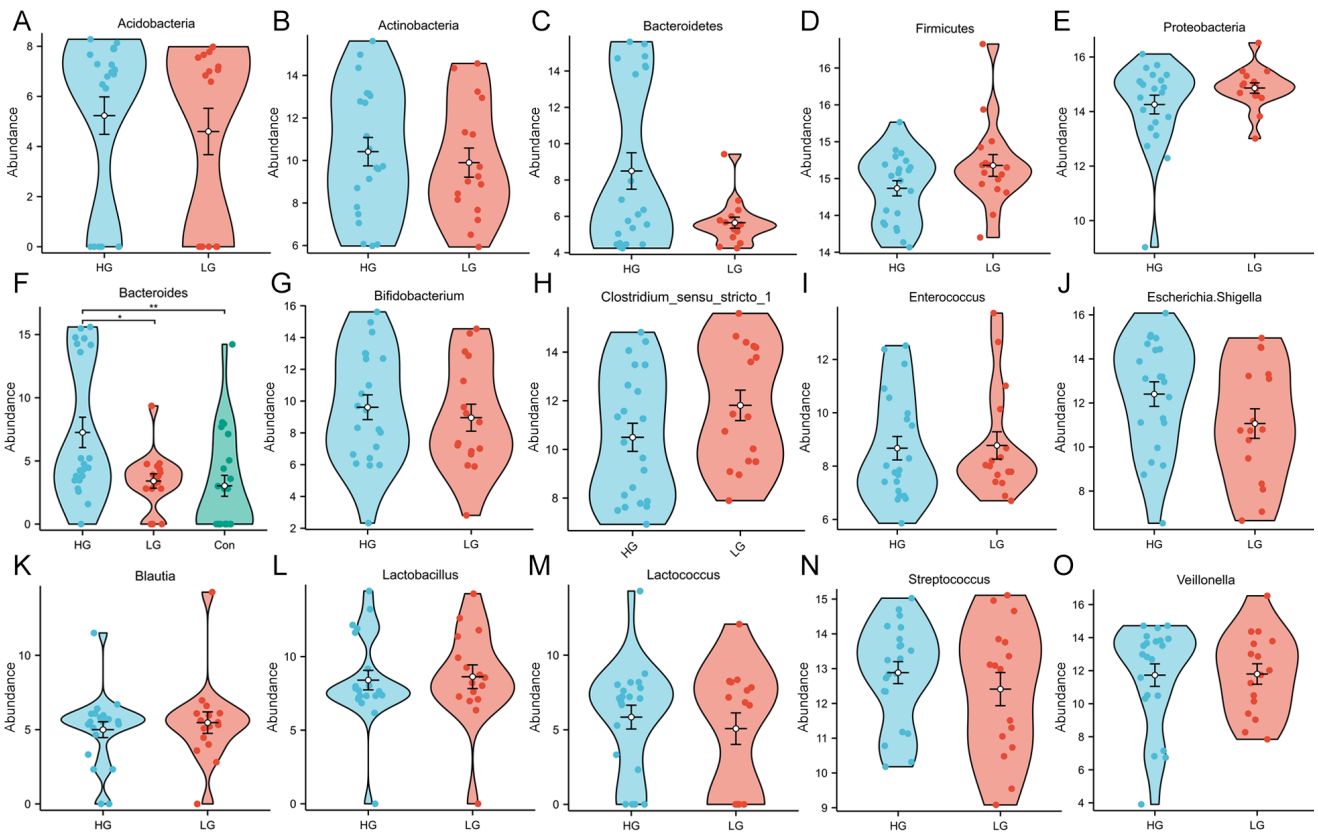

Figure S2 Comparison of abundance of gut microbiota in HG and LG groups at phylum level and genus level. Mann-Whitney *U* test was used to compare the abundances of gut microbiota between the HG and LG groups, *, P<0.05, **, P<0.01, and the Y axis represented relative abundance (log_2). (A-E) The volin plots of comparison of abundance of Acidobacteria, Actinobacteria, Bacteroidetes, Firmicutes and Proteobacteria in HG and LG groups at phylum level. (F-O) The volin plots of comparison of abundance of Bacteroides, Bifidobacterium, Clostridium_sensu_stricto_1, Enterococcus, Escherichia.Shigella, Blautia, Lactobacillus, Lactococcus, Streptococcus and Veillonella in HG and LG groups at genus level.

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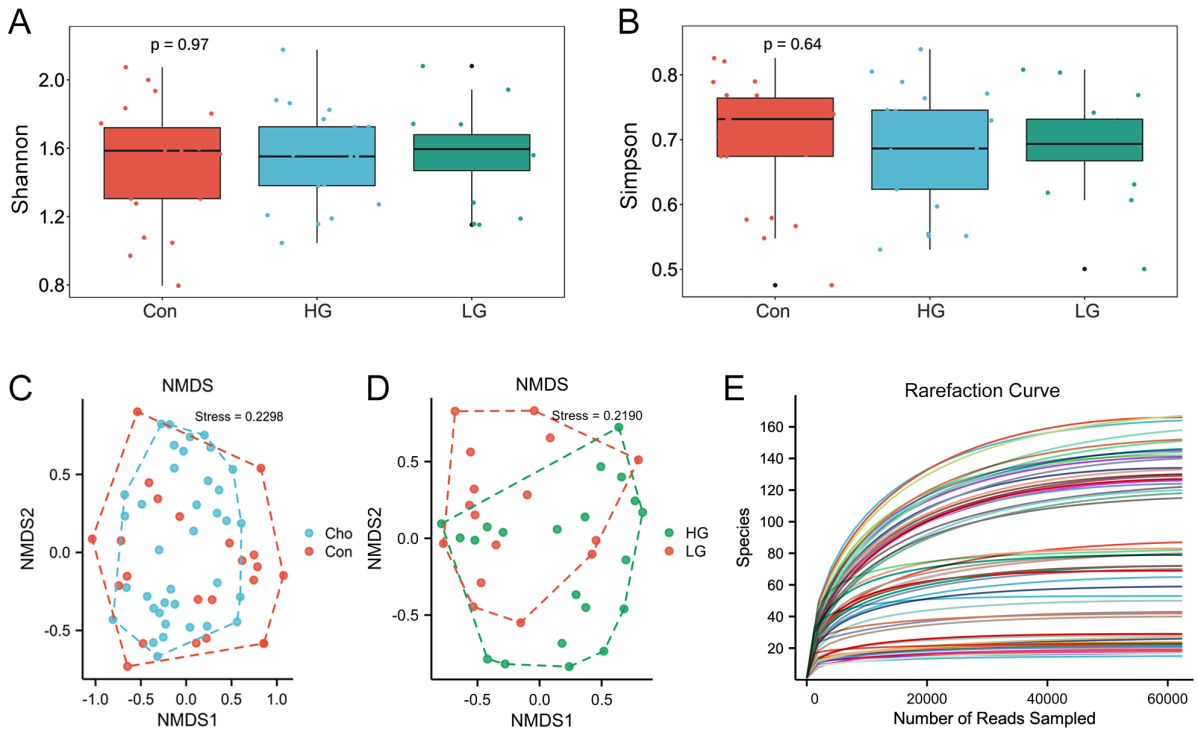

Figure S3 Diversity analysis of the microbial composition and rarefaction curves display. (A,B) Alpha diversity of the gut microbiota in the Con, HG and LG groups expressed by the Shannon and Simpson indices, the x-axis represents different groups, while the y-axis represents the Shannon and Simpson indices, the Wilcoxon test was performed for pairwise comparisons. (C,D) Beta diversity of the gut microbiota in the Cho and Con groups (C) and in the HG and LG groups (D) expressed according to NMDS based on Bray-Curtis distance, the P value was tested with ANOSIM (P=0.01 and P=0.14, respectively); each point corresponds to a sample shaped and colored by diagnosis. (E) The rarefaction curves of all samples, different colored curves represent different samples.

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Table S1 Metabolic pathway enrichment analysis of gut microbiota

Group	Pathway	L1	L2	L3
HG	ko00195	Metabolism	Energy metabolism	Photosynthesis
HG	ko00363	Metabolism	Xenobiotics biodegradation and metabolism	Bisphenol degradation
HG	ko00523	Metabolism	Metabolism of terpenoids and polyketides	Polyketide sugar unit biosynthesis
HG	ko00622	Metabolism	Xenobiotics biodegradation and metabolism	Xylene degradation
HG	ko00903	Metabolism	Metabolism of terpenoids and polyketides	Limonene and pinene degradation
HG	ko03015	Genetic information processing	Translation	mRNA surveillance pathway
LG	ko00020	Metabolism	Carbohydrate metabolism	Citrate cycle (TCA cycle)
LG	ko00130	Metabolism	Metabolism of cofactors and vitamins	Ubiquinone and other terpenoid-quinone biosynthesis
LG	ko00253	Metabolism	Metabolism of terpenoids and polyketides	Tetracycline biosynthesis
LG	ko00540	Metabolism	Glycan biosynthesis and metabolism	Lipopolysaccharide biosynthesis
LG	ko00591	Metabolism	Lipid metabolism	Linoleic acid metabolism
LG	ko00623	Metabolism	Xenobiotics biodegradation and metabolism	Toluene degradation
LG	ko00642	Metabolism	Xenobiotics biodegradation and metabolism	Ethylbenzene degradation
LG	ko00790	Metabolism	Metabolism of cofactors and vitamins	Folate biosynthesis
LG	ko00830	Metabolism	Metabolism of cofactors and vitamins	Retinol metabolism
LG	ko00960	Metabolism	Biosynthesis of other secondary metabolites	Tropane, piperidine and pyridine alkaloid biosynthesis
LG	ko00980	Metabolism	Xenobiotics biodegradation and metabolism	Metabolism of xenobiotics by cytochrome P450
Con	ko00052	Metabolism	Carbohydrate metabolism	Galactose metabolism
Con	ko00030	Metabolism	Carbohydrate metabolism	Pentose phosphate pathway
Con	ko00500	Metabolism	Carbohydrate metabolism	Starch and sucrose metabolism
Con	ko03020	Genetic Information Processing	Transcription	RNA polymerase
Con	ko00710	Metabolism	Energy metabolism	Carbon fixation in photosynthetic organisms
Con	ko00250	Metabolism	Amino acid metabolism	Alanine, aspartate and glutamate metabolism
Con	ko00983	Metabolism	Xenobiotics biodegradation and metabolism	Drug metabolism - other enzymes

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Table S2 The list of blood and urine metabolites

Metabolites	Metabolites	Metabolites
Alanine	C3DC/C4	3-Methylglutaconylglycine-2
Aspartate	C4/C2	3-Methylglutarate-2
Glutamate	C4/C3	2-Propyl-3-oxopentanoate-2
Methionine	C4-0H/C2	Glycylalanine-2
Phenylalanine	C4-0H/C3	Isobutyrylglycine-2
Tyrosine	C5/C2	2-Deoxy-4-hydroxyglutarate
Leucine	C5/C3	Butyrylglycine-1
Tryptophan	C5-0H/C3	Glutaconate-2
Valine	C5-0H/C8	Succinylacetone-0X-2(1)
Arginine	C5DC/C3	Decanoate-1
Citrulline	C5DC/C8	2-Propyl-5-hydroxypentanoate-2
Glycine	C5DC/C16	Isovalerylglycine-1
Ornithine	C6/C3	Butyrylglycine-2
Glutamine	C8/C3	Malic acid-3
Histidine	C8/C10	Adipate-2
Serine	C10/C3	Isovalerylglycine-2
Threonine	C12/C3	2-Hexenedioate-2
Proline	C14/C3	5-Oxoproline-2
Arginine/Ornithine	C14:1/C8:1	3-Methyladipic acid
Citrulline/Arginine	C14:1/C16	Sulfoacetone-2
Ornithine/Citrulline	C16/C2	2-Propyl-3-hydroxyglutarate-2
Methionine/Phenylalanine	C16/C3	7-Hydroxyoctanoate-2
Leucine/Phenylalanine	C18/C3	5-Hydroxy-methyl-2-furoic acid-1
Phenylalanine/Tyrosine	C14-0H/C3	Methacrylylglycine-2
Glycine/Phenylalanine	C16-0H/C3	3-Methylcrotonylglycine-1
Tyrosine/Phenylalanine	C18-0H/C3	Methylcrotonylglycine-1
Glutamate/Citrulline	(C16+C18:1)/C2	3-Methylcrotonylglycine-2
Histidine/Phenylalanine	C0/(C16+C18)	2-Hydroxyglutaric acid-3
Threonine/Phenylalanine	Lactate-2	3-Hydroxyglutaric acid-3
Tryptophan/Phenylalanine	2-Hydroxyisobutyrate-2	Phenyllactate-2
Citrulline/Phenylalanine	Hexanoate-1	Heptanedioate-2
Glutamate/Phenylalanine	Glycerate-2	3-Hydroxy-3-methylglutarate-3
Free Carnitine	Oxalate-2	3-Hydroxyphenylacetic acid-2
Acetylcarnitine	2-Hydroxybutyrate-2	2-Oxoglutarate-0X-2(1)
Propionylcarnitine	Glycolate-2	4-Hydroxybenzoate-2
Butyryl Carnitine	3-Hydroxypropionate-2	4-Hydroxyphenylacetic acid
Butyrylcarnitine	Pyruvic acid-OX-2	2-Oxoglutarate-0X-2(2)
3-Hydroxybutyrylcarnitine	Pentanoate-1	Hexanoylglycine-1
Succinyl Carnitine	3-Hydroxybutyrate-2	Phenylpyruvate-0X-2
Isovalerylcarnitine	3-Hydroxyisobutyrate-2	N-Acetylaspartate-2
3-Methylcrotonylcarnitine	2-Hydroxyisovalerate-2	2-Hydroxyadipic acid-3
3-Hydroxyisovalerylcarnitine	2-Methyl-3-hydroxybutyrate-1-2	Octenedioic acid-2
Glutarylcarnitine	Malonate-2	3-Hydroxyadipic acid-3
Caproylcarnitine	3-Hydroxy-isovaleric acid-2	Azelaate-2
Hexanoylcarnitine	2-Keto-isovaleric acid-OX-2	2-Oxohexanedioate-0X-3
3-HydroxyCaproylcarnitine	Methylmalonic acid - 2	Itaconate-3
Crotonylcarnitine	Ethylhydroxypropionic acid-2	Hydroxyphenylacetic acid-3
Octanoylcarnitine	Urea-2	Vanillic acid-2
Octenoylcarnitine	4-Hydroxybutyrate-2	4-Hydroxymandelic acid-2
Octadienoylcarnitine	2-Hydroxyisocaproate-2	Nonanedioate-2
Octanedioylcarnitine	3-Hydroxypentanoate-2	Hippurate-2
Decanoylcarnitine	Acetoacetate	Homogentisic acid-4
Decenoylcarnitine	2-Hydroxy-3-methylpentanoate	Gentisic acid-4
Decadienylcarnitine	Salicylate	Alkapton-3
Keto-dicarboxylyl carnitine	Acetoacetate-OX-2	Hippurate-1
Dodecanoylcarnitine	Octanoate-1	Methylgentisic acid-4(1)
Dodecadienoylcarnitine	2-Keto-3-methylpentanoate-OX-2	3-(3-Hydroxyphenyl)-3-hydroxypropionate-3
Dodecadienoylcarnitine	2-Methyl-3-hydroxypentanoate-2(1)	Methylgentisic acid-4(2)
3-Hydroxydodecanoylcarnitine	Glycerate-3	3-Hydroxyoctadecenoic acid-3
Dodecanoylcarnitine	Phosphate-3	3-Hydroxyazelate-3
Myristoylcarnitine	2-Methyl-3-hydroxypentanoate-2(2)	Vanillylmandelic acid-3
Myristoleoylcarnitine	Ethylmalonate-2	Sebacic acid-2
Myristadienoylcarnitine	2-Ketoisocaproate-OX-2	10-Heptadecenoic acid-2
3-Hydroxymyristoylcarnitine	Acetylglycine-1	4-Hydroxyphenyllactate-2
Myristoyldiacylcarnitine	Phenylacetic acid-2	4-Hydroxyphenylpyruvate-0X-2
Palmitoylcarnitine	Maleate-2	2-Hydroxyhippurate-3
Myristoyldiacylcarnitine	Succinate-2	Indole-3-acetate-2
Palmitadienoylcarnitine	Methylsuccinate-2	Octadecandioylglycine-2
3-Hydroxypalmitoylcarnitine	Uracil-2	Palmitic acid-1
3-Hydroxypalmitoleoylcarnitine	Fumarate-2	2-Hydroxysebacic acid-3
Palmitoyldiacylcarnitine	Alanylglycine-1	3-Hydroxysebacic acid-3
Stearoylcarnitine	Glycylglycine-2	2-Hydroxyhippurate-2
Octadecenooylcarnitine	Mevalonolactone-2	Dodecanedioic acid-2
Octadecanoylcarnitine	Mevalonolactone-1	N-Acetyltyrosine-3
3-Hydroxyoctadecanoylcarnitine	Isobutyrylglycine-1	Uric acid-4
3-Hydroxyoctadecenooylcarnitine	2-Propyl-3-hydroxypentanoate-2	3,6-Epoxydodecanedioic acid-2
Octadecanoyldiacylcarnitine	Methylfumaric acid-2	3-Hydroxydodecanedioic acid-3
C3/C2	Glutarate-2	3,6-Epoxytetradecanedioic acid-2

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