**Table S1: Correlation analysis between Amino Acid Concentrations and MRI parameters, inflammation and oxidative stress biomarkers, biochemical parameters & anthropometrics.** *Pearson's correlation coefficient for normally distributed variables and Spearman's rank correlation for non-normally distributed variables. Note: \*normally distributed variable. Correlation coefficient values are given. Yellow color indicates a statistically significant result of correlation analysis. \* P ≤ 0.05, \*\* P ≤ 0.01, \*\*\* P ≤ 0.001.*

|  |  |
| --- | --- |
|  | **MRI parameters** |
| **Amino Acids (AAs)** | cT1 Whole Mean (ms) | Whole LIF | Fat ROI pooled mean (%) | iron ROI pooled median (mg/g) |
| **Essential AAs** | 0.28  | 0.29  | 0.38  | 0.27  |
| **Nonessential AAs** | 0.16  | 0.10  | 0.13  | 0.11  |
| **GSG index ( glutamate / (serine + glycine))** | 0.20 | 0.27 | 0.32 | 0.16 |
| **BCAAs (Valine + Leucine + Isoleucine)** | 0.21 | 0.23 | 0.38 | 0.28 |
| **AAAs (Tyrosine + Phenylalanine)** | 0.25 | 0.25 | 0.44 \*\* | 0.32 |
| **L-Alanine\*** | 0.25 | 0.23 | 0.16 | 0.02 |
| **beta-Alanine\*** | -4.56e-03 | 0.08 | 0.10 | 0.23 |
| **Sarcosine** | 0.11 | 0.18 | 0.07 | -0.06 |
| **Cystine** | 0.02 | 0.05 | -0.03 | -0.18 |
| **L-Serine** | -0.11 | -0.15 | -0.05 | 0.12 |
| **O-Phosphoethanolamine** | 0.07 | 0.12 | -0.04 | -0.33 |
| **Taurine** | 0.10 | 0.16 | -0.02 | -0.11 |
| **L-Asparagine** | 0.14 | 0.07 | 0.09 | 0.10 |
| **Hydroxy-L-Proline** | 0.08 | 0.03 | 0.14 | 0.22 |
| **Glycine** | -0.13 | -0.16 | -0.27 | -0.12 |
| **L-Glutamine\*** | -8.56e-03 | -0.06 | 0.02 | 0.13 |
| **Ethanolamine\*** | 9.20e-03 | -8.10e-03 | 0.03 | 0.19 |
| **L-Aspartic acid** | 0.24 | 0.27 | 0.25 | 0.13 |
| **L-Citruline** | -0.04 | -0.08 | -0.09 | 0.02 |
| **L-Threonine** | 0.27 | 0.25 | 0.10 | -0.05 |
| **L-Glutamic acid** | 0.28 | 0.35 | 0.35 | 0.16 |
| **L-Histidine\*** | -0.05 | 0.01 | 0.02 | -8.34e-04 |
| **1-Me-L-Histdine** | 0.12 | 0.14 | 0.12 | 0.08 |
| **3-Me-L-Histdine** | 0.06 | 0.05 | 0.16 | 0.26 |
| **gamma-Amino-butyric acid GABA** | 0.02 | 0.02 | -0.05 | -0.11 |
| **D,L-beta-Aminoisobutyric acid** | -0.17 | -0.18 | -0.29 | -2.49e-03 |
| **D,L-alpha-Amino-n-butyric acid** | -0.03 | -0.04 | 0.08 | 0.09 |
| **L-alpha-Aminoadipic acid** | 0.06 | 0.10 | 0.29 | 0.17 |
| **L-Proline** | 0.15 | 0.13 | 0.19 | 0.12 |
| **L-Arginine\*** | -3.45e-03 | 0.03 | -0.01 | -0.16 |
| **L-Orthithine** | 0.10 | 0.04 | 0.12 | 0.26 |
| **L-Lysine** | 0.28 | 0.23 | 0.24 | 0.33 |
| **L-Valine** | 0.23 | 0.27 | 0.37 | 0.24 |
| **L-Methionine\*** | 0.12 | 0.09 | 0.22 | 0.11 |
| **L-Tyrosine** | 0.26 | 0.24 | 0.44 \*\* | 0.32 |
| **L-Isoleucine** | 0.17 | 0.16 | 0.42 \* | 0.33 |
| **L-Leucine** | 0.14 | 0.14 | 0.33 | 0.28 |
| **L-Phenylalanine** | 0.23 | 0.25 | 0.38 | 0.27 |
| **L-Tryptophan** | 0.12 | 0.10 | 0.25 | 0.27 |

|  |  |
| --- | --- |
|  | **Inflammation and oxidative stress biomarkers** |
| **Amino Acids (AAs)** | EGF (pg/mL) | Glut (U/L) | HGB (g/mL) | IL-1a (pg/mL) | IL-1b (pg/mL) | IL-2 (pg/mL) | IL-4 (pg/mL) | IL-6 (pg/mL) | IL-8 (pg/mL) | IL-10 (pg/mL) | IFN (pg/mL) |
| **Essential AAs** | 0.04  | 0.29  | 0.32  | 0.10  | -7.71e-04  | -0.09  | 0.04  | 0.22  | 0.12  | 0.03  | -0.02  |
| **Nonessential AAs** | 0.05  | 0.24  | 0.11  | 0.10  | -0.05  | 0.04  | -6.42e-03  | -0.02  | 0.20  | 0.10  | 4.36e-03  |
| **GSG index ( glutamate / (serine + glycine))** | -0.21  | 0.03  | 0.13  | 0.02  | -0.02  | -0.09  | 0.09  | 0.08  | 0.07  | -0.05  | -0.24  |
| **BCAAs (Valine + Leucine + Isoleucine)** | -0.05  | 0.35  | 0.33  | 0.07  | -0.02  | -0.13  | 0.05  | 0.24  | 0.09  | 0.05  | 0.01  |
| **AAAs (Tyrosine + Phenylalanine)** | 0.15  | 0.19  | 0.22  | 0.08  | 0.14  | -0.03  | 0.19  | 0.19  | 0.16  | 0.16  | -0.06  |
| **L-Alanine\*** | 5.76e-03  | 0.07  | -0.06  | 0.10  | 0.16  | 6.80e-05  | 0.09  | -0.08  | 0.06  | 0.19  | 0.18  |
| **beta-Alanine\*** | -0.19  | 0.14  | 0.14  | 0.02  | 8.12e-03  | -0.21  | -0.08  | 0.12  | -0.04  | 0.05  | 0.03  |
| **Sarcosine** | -0.15  | 0.06  | 0.14  | 1.86e-04  | -0.17  | -0.13  | 0.03  | 0.28  | 0.11  | 0.10  | -0.12  |
| **Cystine** | 0.04  | 0.14  | 0.07  | 0.07  | -0.14  | 0.09  | 0.04  | -0.05  | -0.11  | -0.19  | -0.13  |
| **L-Serine** | 0.15  | 0.06  | 0.05  | -0.02  | -0.10  | 0.04  | -0.07  | 0.06  | 0.06  | 0.17  | 0.02  |
| **O-Phosphoethanolamine** | 0.03  | -0.05  | 0.05  | -0.14  | -0.12  | -0.10  | -0.09  | -3.95e-03  | -0.16  | -0.07  | -0.07  |
| **Taurine** | -0.05  | 0.18  | 0.11  | -0.09  | -0.09  | -1.67e-03  | 0.04  | 0.10  | -0.07  | -0.19  | -0.37  |
| **L-Asparagine** | 0.28  | 0.04  | 0.03  | 0.11  | 0.11  | 0.10  | -0.08  | 0.02  | 0.12  | 0.17  | 0.09  |
| **Hydroxy-L-Proline** | 0.07  | 0.03  | 0.03  | -0.10  | -0.10  | -0.19  | -0.03  | 0.28  | -0.06  | -0.01  | 1.99e-03  |
| **Glycine** | 0.15  | 0.02  | 0.03  | 0.03  | -0.02  | 0.10  | -0.07  | -0.10  | 0.07  | 0.21  | 0.09  |
| **L-Glutamine\*** | -0.02  | 0.25  | 0.17  | 0.09  | -0.05  | 0.05  | -0.07  | -0.02  | 0.08  | -0.07  | 3.06e-03  |
| **Ethanolamine\*** | 0.15  | 0.10  | 0.41 \* | -0.12  | 0.05  | -1.86e-03  | -0.04  | 0.06  | -0.05  | 0.10  | -0.02  |
| **L-Aspartic acid** | -0.09  | 0.05  | 0.16  | -0.15  | 0.02  | -0.17  | -0.05  | 0.21  | 0.03  | 0.03  | -0.24  |
| **L-Citruline** | 0.21  | 0.09  | 0.03  | -0.15  | -0.08  | -0.09  | -0.27  | 0.15  | 0.06  | 0.04  | -0.06  |
| **L-Threonine** | 0.06  | 0.18  | 0.09  | 3.30e-03  | -0.15  | -0.09  | -0.05  | 0.07  | 0.05  | -0.18  | -0.24  |
| **L-Glutamic acid** | -0.21  | 0.03  | 0.22  | 0.03  | -0.06  | -0.10  | 0.08  | 0.16  | 0.17  | 0.05  | -0.22  |
| **L-Histidine\*** | 0.04  | 0.16  | -8.10e-03  | 0.09  | 0.06  | -0.03  | -0.06  | 0.04  | -0.08  | -0.03  | -0.03  |
| **1-Me-L-Histdine** | -6.92e-03  | 0.07  | 0.18  | 0.10  | -0.05  | -0.01  | 0.03  | 0.10  | 5.98e-03  | 0.07  | 0.04  |
| **3-Me-L-Histdine** | -0.07  | 0.13  | 0.22  | -0.01  | -0.12  | -0.15  | -0.09  | 0.20  | -0.09  | -0.11  | 0.06  |
| **gamma-Amino-butyric acid GABA** | 0.01  | -0.17  | 0.09  | -0.11  | -0.02  | -0.08  | -0.03  | 0.02  | -0.01  | -0.09  | -0.05  |
| **D,L-beta-Aminoisobutyric acid** | 0.10  | 0.11  | 0.16  | -0.14  | -0.18  | -0.19  | -0.08  | 0.11  | -0.05  | 0.07  | -0.10  |
| **D,L-alpha-Amino-n-butyric acid** | -0.05  | -0.10  | 0.13  | -0.07  | -0.09  | 0.08  | -0.12  | 0.03  | -0.05  | -0.04  | -0.04  |
| **L-alpha-Aminoadipic acid** | -0.09  | 0.21  | 0.21  | 3.37e-03  | 0.11  | -0.06  | 0.09  | 0.19  | 0.07  | -0.04  | -0.08  |
| **L-Proline** | -0.03  | 0.30  | 0.08  | 0.02  | -0.07  | -0.09  | 0.09  | 0.06  | 0.15  | 0.05  | -0.02  |
| **L-Arginine\*** | -0.20  | 0.18  | -0.11  | -7.38e-03  | -0.04  | -0.07  | -0.10  | 8.78e-03  | 0.05  | -0.12  | -0.10  |
| **L-Orthithine** | 0.35 (0.278) | -0.04  | 0.11  | 7.68e-03  | 0.05  | -0.11  | -0.01  | 0.29  | 9.38e-03  | 0.18  | 0.05  |
| **L-Lysine** | 4.14e-03  | 0.02  | 0.14  | 0.14  | 0.04  | 3.15e-03  | 0.12  | 0.21  | 0.12  | 0.13  | 0.08  |
| **L-Valine** | -0.10  | 0.36  | 0.29  | 0.03  | -0.05  | -0.16  | 0.04  | 0.22  | 0.06  | 0.03  | 0.02  |
| **L-Methionine\*** | 0.23  | 0.15  | 0.09  | 0.01  | 0.09  | -0.05  | 2.42e-03  | 0.20  | -0.09  | 0.06  | -0.11  |
| **L-Tyrosine** | 0.09  | 0.19  | 0.13  | 0.03  | 0.13  | -0.01  | 0.17  | 0.19  | 0.18  | 0.13  | -0.10  |
| **L-Isoleucine** | 0.02  | 0.19  | 0.28  | 0.03  | -2.07e-03  | -0.10  | 0.05  | 0.26  | 0.11  | 0.02  | 0.02  |
| **L-Leucine** | 0.05  | 0.29  | 0.34  | 0.12  | 0.04  | -0.04  | -8.70e-03  | 0.24  | 0.07  | 0.05  | 0.03  |
| **L-Phenylalanine** | 0.19  | 0.17  | 0.30  | 0.15  | 0.13  | -0.05  | 0.17  | 0.16  | 0.08  | 0.17  | 0.07  |
| **L-Tryptophan** | 0.18  | 0.22  | 0.28  | -0.02  | 0.06  | 0.06  | 0.14  | 0.02  | 0.07  | 0.14  | -0.05  |
| EGF: Epidermal Growth Factor levels; Mean (pg/mL), Glut: Glutathione acivity; Mean (U/L), HGB: Hemoglobin levels; (g/mL), IL-1a: Interleukin-1alevels; Mean (pg/mL), IL-1b: Interleukin-1b levels; Mean (pg/mL), IL-2: Interleukin-2 levels; Mean (pg/mL), IL-4: Interleukin-4 levels; Mean (pg/mL), IL-6: Interleukin-6 levels; Mean (pg/mL), IL-8: Interleukin-8 levels; Mean (pg/mL), IL-10: Interleukin-10 levels; Mean (pg/mL), IFN: Interferon-γ levels; Mean (pg/mL) |

|  |  |
| --- | --- |
|  | **Inflammation and oxidative stress biomarkers** |
| **Amino Acids (AAs)** | MCP (pg/mL) | SOD (U/mL) | SOD per HGB (SOD U/mL)(g HGB/mL) | TAS (mmol/L) | TNF (pg/mL) | VEGF (pg/mL) |
| **Essential AAs** | 0.15  | 0.07  | -0.05  | 0.27  | 0.16  | -0.05  |
| **Nonessential AAs** | -0.01  | 0.05  | -2.38e-04  | 0.07  | 0.22  | -0.08  |
| **GSG index ( glutamate / (serine + glycine))** | 0.08  | -0.12  | -0.15  | 0.08  | -0.16  | -0.19  |
| **BCAAs (Valine + Leucine + Isoleucine)** | 0.13  | 0.15  | 8.50e-03  | 0.29  | 0.12  | -0.04  |
| **AAAs (Tyrosine + Phenylalanine)** | 0.28  | 0.08  | 0.02  | 0.36  | 0.10  | -0.08  |
| **L-Alanine\*** | 0.16  | 0.10  | 0.19  | 0.22  | 0.08  | -0.06  |
| **beta-Alanine\*** | 0.12  | -0.07  | -0.11  | 0.19  | 9.03e-03  | -0.08  |
| **Sarcosine** | 0.08  | -0.13  | -0.16  | 0.09  | -0.04  | -0.03  |
| **Cystine** | -0.20  | -0.20  | -0.22  | -0.31  | 0.24  | -0.01  |
| **L-Serine** | -0.04  | -0.06  | -0.11  | -0.04  | 0.16  | 0.02  |
| **O-Phosphoethanolamine** | 0.15  | -0.08  | -0.08  | -0.18  | -0.04  | 0.10  |
| **Taurine** | 0.12  | -0.16  | -0.23  | -0.02  | 0.09  | -0.03  |
| **L-Asparagine** | 0.08  | -0.07  | -0.07  | 0.09  | 0.21  | 0.11  |
| **Hydroxy-L-Proline** | 8.42e-03  | 0.25  | 0.19  | 0.38  | -0.06  | 0.06  |
| **Glycine** | -0.11  | 0.08  | 0.08  | -0.06  | 0.22  | 0.06  |
| **L-Glutamine\*** | -0.10  | 0.09  | 0.02  | 0.07  | 0.11  | -0.07  |
| **Ethanolamine\*** | 0.25  | 0.23  | 0.09  | 0.43 \*\* | -0.03  | 0.02  |
| **L-Aspartic acid** | 0.24  | -0.13  | -0.18  | 0.26  | -0.09  | -0.10  |
| **L-Citruline** | -0.01  | 0.14  | 0.10  | 0.14  | -9.17e-04  | -0.02  |
| **L-Threonine** | 0.02  | -0.07  | -0.10  | -0.04  | 0.06  | 0.12  |
| **L-Glutamic acid** | 0.02  | -0.12  | -0.19  | 0.11  | -0.07  | -0.18  |
| **L-Histidine\*** | 0.08  | -0.15  | -0.10  | 0.03  | 0.07  | -0.23  |
| **1-Me-L-Histdine** | 0.04  | 0.26  | 0.17  | 0.24  | -0.01  | 0.12  |
| **3-Me-L-Histdine** | 0.13  | 0.25  | 0.14  | 0.37  | 0.10  | -0.12  |
| **gamma-Amino-butyric acid GABA** | 0.06  | -0.19  | -0.19  | 6.52e-03  | -0.07  | -0.02  |
| **D,L-beta-Aminoisobutyric acid** | -0.08  | 0.03  | -0.02  | -0.01  | 0.11  | 0.01  |
| **D,L-alpha-Amino-n-butyric acid** | 0.04  | 0.16  | 0.12  | 0.23  | -0.08  | 5.73e-03  |
| **L-alpha-Aminoadipic acid** | 0.19  | 0.07  | 0.04  | 0.21  | -0.12  | 9.54e-03  |
| **L-Proline** | -0.09  | 0.05  | 0.04  | 0.06  | 0.14  | -0.10  |
| **L-Arginine\*** | -0.06  | -0.03  | 0.03  | -0.15  | -0.06  | -0.10  |
| **L-Orthithine** | 0.26  | 0.21  | 0.16  | 0.44 \*\* | 0.15  | 0.08  |
| **L-Lysine** | 0.24  | -7.24e-03  | -0.04  | 0.26  | 0.17  | -0.05  |
| **L-Valine** | 0.17  | 0.11  | -0.02  | 0.24  | 0.12  | -0.06  |
| **L-Methionine\*** | 0.13  | 0.22  | 0.18  | 0.31  | 0.06  | -0.01  |
| **L-Tyrosine** | 0.26  | 0.09  | 0.05  | 0.35  | 0.03  | -0.05  |
| **L-Isoleucine** | 0.06  | 0.12  | 0.02  | 0.33  | -1.09e-03  | 0.02  |
| **L-Leucine** | 0.13  | 0.22  | 0.07  | 0.35  | 0.16  | -0.04  |
| **L-Phenylalanine** | 0.28  | 0.06  | -0.03  | 0.32  | 0.25  | -0.13  |
| **L-Tryptophan** | 0.21  | 0.14  | 0.01  | 0.34  | 0.07  | -0.12  |
| MCP: Monocyte Chemoattractant Protein1; Mean (pg/mL), SOD: Superoxide dismutase acivity; Mean (U/mL), SOD per HGB: Superoxide dismutase acivity per gram HGB; Mean (SOD U/mL)(g HGB/mL), TAS: Total Antioxidant Status; Mean (mmol/L), TNF: Tumour Necrosis Factor; Mean (pg/mL), VEGF: Vascular Endothelial Growth Factor; Mean (pg/mL) |
|  |

|  |  |
| --- | --- |
|  | Biochemical parameters  |
| Amino Acids (AAs) | ALT (IU/L) | AST (IU/L) | AST/ALT ratio | Total cholesterol (mg/dL) | LDL (mg/dL) | HDL (mg/dL) | Triglycerides (mg/dI) |
| Essential AAs | 0.33  | 0.23  | -0.28  | -0.11  | -0.08  | -0.23  | 0.19  |
| Nonessential AAs | 0.22  | 0.18  | -0.20  | -0.03  | -6.69e-03  | -0.04  | -0.05  |
| GSG index ( glutamate / (serine + glycine)) | 0.14  | 0.07  | -0.12  | -0.18  | -0.21  | -0.19  | 0.30  |
| BCAAs (Valine + Leucine + Isoleucine) | 0.30  | 0.13  | -0.36  | -0.05  | -0.08  | -0.23  | 0.30  |
| AAAs (Tyrosine + Phenylalanine) | 0.43 \* | 0.32  | -0.33  | -0.16  | -0.16  | -0.31  | 0.24  |
| L-Alanine\* | 0.13  | 0.14  | -0.08  | -0.03  | -0.06  | -0.16  | 0.21  |
| beta-Alanine\* | 0.08  | 7.95e-03  | -0.15  | 0.04  | 0.03  | 0.02  | -0.01  |
| Sarcosine | 0.03  | -0.01  | -0.10  | -0.10  | -0.06  | -0.01  | -0.06  |
| Cystine | 3.19e-03  | -0.01  | -0.04  | -0.13  | -0.17  | 0.15  | -0.02  |
| L-Serine | 0.09  | 0.08  | -0.08  | 0.06  | 0.11  | 0.07  | -0.21  |
| O-Phosphoethanolamine | 3.27e-03  | -0.03  | -0.06  | -0.04  | -0.10  | 0.14  | 3.26e-03  |
| Taurine | -0.06  | -0.03  | 0.13  | 0.08  | 0.07  | 0.07  | -0.09  |
| L-Asparagine | 0.15  | 0.21  | -0.02  | -0.05  | -0.05  | 0.01  | -0.10  |
| Hydroxy-L-Proline | 0.22  | 0.18  | -0.18  | 0.03  | 0.08  | -0.16  | 0.11  |
| Glycine | -3.90e-03  | -0.02  | -7.24e-03  | 0.06  | 0.08  | 0.09  | -0.19  |
| L-Glutamine\* | 0.15  | 0.09  | -0.15  | -0.06  | -0.03  | 0.10  | -0.21  |
| Ethanolamine\* | 0.25  | 0.26  | -0.12  | 0.09  | 0.12  | -0.26  | 0.15  |
| L-Aspartic acid | 0.06  | 0.13  | 0.04  | -0.05  | -0.05  | -0.23  | 0.20  |
| L-Citruline | 0.06  | 8.41e-03  | -0.04  | 0.04  | 0.02  | 0.10  | -0.03  |
| L-Threonine | 0.14  | 0.15  | -0.05  | -0.09  | -0.04  | 0.14  | -0.19  |
| L-Glutamic acid | 0.22  | 0.14  | -0.13  | -0.17  | -0.19  | -0.22  | 0.30  |
| L-Histidine\* | 3.27e-03  | -0.08  | -0.03  | -0.07  | -0.06  | -0.02  | -4.17e-03  |
| 1-Me-L-Histdine | 0.11  | 0.12  | 0.03  | 0.04  | 0.07  | -0.10  | 0.08  |
| 3-Me-L-Histdine | 0.21  | 0.25  | -0.09  | 0.17  | 0.14  | -9.33e-03  | 0.19  |
| gamma-Amino-butyric acid GABA | -0.09  | 0.02  | 0.14  | -0.02  | -0.02  | -0.09  | -0.03  |
| D,L-beta-Aminoisobutyric acid | 0.04  | -0.07  | -0.10  | 0.05  | 0.09  | -0.05  | 2.63e-03  |
| D,L-alpha-Amino-n-butyric acid | -0.04  | -0.04  | 5.81e-03  | 0.08  | 0.13  | -4.66e-03  | -0.03  |
| L-alpha-Aminoadipic acid | 0.11  | 0.06  | -0.12  | -0.02  | -0.04  | -0.19  | 0.26  |
| L-Proline | 0.21  | 0.17  | -0.21  | -0.05  | -0.04  | -0.12  | 0.08  |
| L-Arginine\* | 0.01  | 5.48e-03  | 0.02  | -0.03  | -0.01  | 0.05  | -0.08  |
| L-Orthithine | 0.25  | 0.19  | -0.14  | 0.04  | 0.08  | -0.26  | 0.15  |
| L-Lysine | 0.19  | 0.26  | -8.69e-03  | -0.01  | 0.08  | -0.22  | 0.10  |
| L-Valine | 0.23  | 0.08  | -0.30  | 5.79e-03  | -0.02  | -0.18  | 0.28  |
| L-Methionine\* | 0.32 (0.249) | 0.24  | -0.20  | -0.10  | -0.07  | -0.09  | 4.68e-03  |
| L-Tyrosine | 0.39  | 0.34  | -0.24  | -0.12  | -0.12  | -0.25  | 0.21  |
| L-Isoleucine | 0.32  | 0.20  | -0.32  | -0.11  | -0.11  | -0.28  | 0.24  |
| L-Leucine | 0.34  | 0.17  | -0.35  | -0.07  | -0.07  | -0.25  | 0.28  |
| L-Phenylalanine | 0.44 \*\* | 0.27  | -0.39  | -0.17  | -0.17  | -0.33  | 0.24  |
| L-Tryptophan | 0.42 \* | 0.30  | -0.33  | -0.19  | -0.17  | -0.26  | 0.12  |
| ALT: alanine aminotransferase (IU/L), AST: aspartate aminotransferase (IU/L), LDL: Low-density lipoprotein (LDL) cholesterol concentration (mg/dL), HDL: High-density lipoprotein (HDL) cholesterol concentration (mg/dL) |

|  |  |
| --- | --- |
|  | **Biochemical parameters** |
| **Amino Acids (AAs)** | Glucose (mg/dL) | 120 min-OGTT Glucose (mg/dL) | Insulin (μU/mL) | HOMA-IR | γ-gt (U/L) | NFS |
| **Essential AAs** | 0.12  | 0.04  | **0.42** \* | **0.47** \*\* | 0.16  | -0.02  |
| **Nonessential AAs** | 0.12  | 0.18  | 0.18  | 0.22  | -0.03  | -0.20  |
| **GSG index (glutamate / (serine + glycine))** | -0.01  | 0.07  | 0.25  | 0.24  | 0.07  | -0.04  |
| **BCAAs (Valine + Leucine + Isoleucine)** | 0.20  | 0.04  | 0.48 \*\*\* | 0.52 \*\*\* | 0.15  | 0.02  |
| **AAAs (Tyrosine + Phenylalanine)** | 0.11  | 0.28  | 0.46 \*\* | 0.47 \*\* | 0.10  | -0.09  |
| **L-Alanine\*** | 0.03  | 0.20  | 0.24  | 0.23  | -0.02  | -0.25  |
| **beta-Alanine\*** | 0.14  | 0.29  | 0.01  | 0.01  | 0.03  | -0.24  |
| **Sarcosine** | 0.16  | 0.03  | -0.16  | -0.05  | 0.09  | -0.09  |
| **Cystine** | 0.11  | -0.18  | 0.26  | 0.29  | 3.40e-03  | 0.12  |
| **L-Serine** | 0.08  | 0.15  | -0.15  | -0.05  | 0.01  | 0.11  |
| **O-Phosphoethanolamine** | -0.06  | -0.06  | -0.05  | -0.12  | 0.20  | -0.04  |
| **Taurine** | -0.10  | -0.08  | -0.01  | -0.08  | -0.11  | -0.05  |
| **L-Asparagine** | 0.07  | 0.08  | -0.07  | -4.56e-03  | 0.10  | 0.07  |
| **Hydroxy-L-Proline** | -0.05  | 0.02  | 0.14  | 0.16  | 0.20  | -0.07  |
| **Glycine** | -0.03  | -0.11  | -0.15  | -0.16  | 1.91e-03  | -0.04  |
| **L-Glutamine\*** | 0.10  | 0.18  | -0.05  | 1.79e-03  | 0.02  | -0.04  |
| **Ethanolamine\*** | 0.07  | 0.14  | 0.06  | 0.09  | -0.05  | -0.04  |
| **L-Aspartic acid** | -0.06  | 0.10  | -0.04  | 4.66e-03  | -0.04  | -0.12  |
| **L-Citruline** | -0.02  | -0.21  | 0.18  | 0.12  | 0.04  | 0.02  |
| **L-Threonine** | -0.08  | -0.04  | 0.14  | 0.16  | 0.02  | -0.03  |
| **L-Glutamic acid** | 0.04  | 0.10  | 0.25  | 0.25  | 0.11  | -0.04  |
| **L-Histidine\*** | 0.02  | 0.12  | 0.05  | 0.11  | -0.16  | -0.08  |
| **1-Me-L-Histdine** | -0.33  | -0.29  | -0.02  | -0.10  | 0.18  | -0.13  |
| **3-Me-L-Histdine** | -8.95e-03  | -0.06  | 0.19  | 0.21  | 0.17  | -0.04  |
| **gamma-Amino-butyric acid GABA** | -0.02  | -0.06  | -0.19  | -0.16  | -0.06  | -0.13  |
| **D,L-beta-Aminoisobutyric acid** | 5.08e-03  | -0.01  | -0.22  | -0.19  | 0.04  | 0.03  |
| **D,L-alpha-Amino-n-butyric acid** | 0.05  | -0.19  | -0.18  | -0.12  | 0.08  | 0.07  |
| **L-alpha-Aminoadipic acid** | 0.04  | -0.06  | 0.33 | 0.33  | 0.12  | -0.08  |
| **L-Proline** | 0.09  | 0.16  | 0.44 \* | 0.43 \* | 0.01  | -0.23  |
| **L-Arginine\*** | -0.03  | -0.15  | 0.22  | 0.21  | -0.07  | -0.15  |
| **L-Orthithine** | -0.18  | 0.11  | 0.17  | 0.11  | 0.07  | -0.09  |
| **L-Lysine** | -1.07e-03  | 0.17  | -0.02  | 0.05  | 0.21  | 0.01  |
| **L-Valine** | 0.20  | 0.03  | 0.44 \*\* | 0.48 \*\* | 0.12  | 0.03  |
| **L-Methionine\*** | -0.08  | -0.03  | 0.38 \* | 0.36  | -9.54e-03  | 0.05  |
| **L-Tyrosine** | 0.09  | 0.27  | 0.40  | 0.43 \* | 0.08  | -0.02  |
| **L-Isoleucine** | 0.19  | 0.09  | 0.42 \* | 0.48 \*\* | 0.15  | -0.10  |
| **L-Leucine** | 0.16  | 0.02  | 0.45 \*\* | 0.47 \*\* | 0.16  | 0.01  |
| **L-Phenylalanine** | 0.08  | 0.20  | 0.47 \*\* | 0.44 \* | 0.15  | -0.15  |
| **L-Tryptophan** | -0.05  | 0.05  | 0.26  | 0.25  | 0.07  | -0.02  |
| 120 min-OGTT Glucose: Oral Glucose Tolerance Test after 120 min from intake (mg/dL), HOMA-IR: Homeostatic model assessment InsulinResistance, γ-gt: Gamma Glutamyl Transpeptidase (U/L), NFS: NAFLD fibrosis score  |

|  |  |
| --- | --- |
|  | **Anthropometrics** |
| **Amino Acids (AAs)** | Weight (kg) | BMI (kg/m2) | Waist circumference (cm) | Hip circumference (cm) | WHR |
| **Essential AAs** | 0.19  | -0.03  | 0.15  | 0.06  | 0.16  |
| **Nonessential AAs** | -0.12  | -0.08  | -0.11  | -0.02  | -0.11  |
| **GSG index ( glutamate / (serine + glycine))** | 0.23  | 0.12  | 0.23  | 0.04  | 0.28  |
| **BCAAs (Valine + Leucine + Isoleucine)** | 0.27  | 0.05  | 0.23  | 0.09  | 0.24  |
| **AAAs (Tyrosine + Phenylalanine)** | 0.12  | -0.08  | 0.10  | -0.02  | 0.18  |
| **L-Alanine\*** | 0.04  | -0.01  | -0.06  | -0.07  | 5.60e-03  |
| **beta-Alanine\*** | 0.02  | -0.18  | -0.11  | -0.20  | 0.11  |
| **Sarcosine** | 0.08  | -0.03  | 0.10  | -0.12  | 0.27  |
| **Cystine** | 0.07  | 0.22  | 0.32  | 0.25  | 0.12  |
| **L-Serine** | -0.13  | -0.07  | 3.31e-03  | 0.10  | -0.17  |
| **O-Phosphoethanolamine** | 3.58e-03  | 6.92e-03  | 0.12  | -0.04  | 0.20  |
| **Taurine** | 0.09  | 0.17  | 0.10  | 0.06  | 0.01  |
| **L-Asparagine** | -0.12  | -0.15  | -0.04  | -0.06  | -0.04  |
| **Hydroxy-L-Proline** | 0.16  | 0.08  | 0.12  | 0.01  | 0.16  |
| **Glycine** | -0.25  | -0.14  | -0.23  | -0.02  | -0.24  |
| **L-Glutamine\*** | -0.08  | -0.09  | -0.17  | -0.06  | -0.15  |
| **Ethanolamine\*** | 0.16  | -0.19  | -0.05  | -0.17  | 0.18  |
| **L-Aspartic acid** | 0.12  | -3.18e-03  | 0.09  | -0.09  | 0.23  |
| **L-Citruline** | 0.05  | -0.07  | -0.03  | 0.05  | -0.04  |
| **L-Threonine** | -0.06  | -0.06  | 0.04  | 0.10  | -0.07  |
| **L-Glutamic acid** | 0.18  | 0.09  | 0.26  | 0.08  | 0.27  |
| **L-Histidine\*** | -0.11  | -0.20  | -0.18  | -0.14  | -0.08  |
| **1-Me-L-Histdine** | 0.09  | -0.06  | 0.12  | -0.06  | 0.28  |
| **3-Me-L-Histdine** | 0.26  | -0.03  | 0.04  | -0.02  | 0.11  |
| **gamma-Amino-butyric acid GABA** | 0.05  | 0.03  | 0.14  | 0.06  | 0.11  |
| **D,L-beta-Aminoisobutyric acid** | 0.03  | -0.10  | -0.04  | -0.05  | 0.07  |
| **D,L-alpha-Amino-n-butyric acid** | 0.10  | -0.07  | -8.20e-03  | -0.02  | 2.37e-03  |
| **L-alpha-Aminoadipic acid** | 0.22  | -1.37e-03  | 0.12  | 0.09  | 0.09  |
| **L-Proline** | -4.89e-03  | -0.04  | 3.66e-03  | 0.03  | 0.02  |
| **L-Arginine\*** | 0.14  | 0.11  | 0.10  | 0.18  | -0.08  |
| **L-Orthithine** | -0.03  | -0.12  | -0.09  | -0.16  | 0.11  |
| **L-Lysine** | -0.03  | -0.11  | -0.03  | -0.07  | 8.49e-03  |
| **L-Valine** | 0.25  | 0.10  | 0.21  | 0.10  | 0.17  |
| **L-Methionine\*** | 0.03  | -0.21  | 9.17e-03  | -0.09  | 0.14  |
| **L-Tyrosine** | 0.05  | -0.08  | 0.05  | -0.03  | 0.11  |
| **L-Isoleucine** | 0.22  | -0.07  | 0.19  | 0.03  | 0.27  |
| **L-Leucine** | 0.27  | 2.91e-03  | 0.22  | 0.05  | 0.32 |
| **L-Phenylalanine** | 0.23  | -0.06  | 0.18  | 0.01  | 0.27  |
| **L-Tryptophan** | 0.10  | -0.18  | 0.04  | -0.06  | 0.20  |
| BMI: Body Mass Index of the participants (kg/m2), WHR: Waist to Hip ratio |