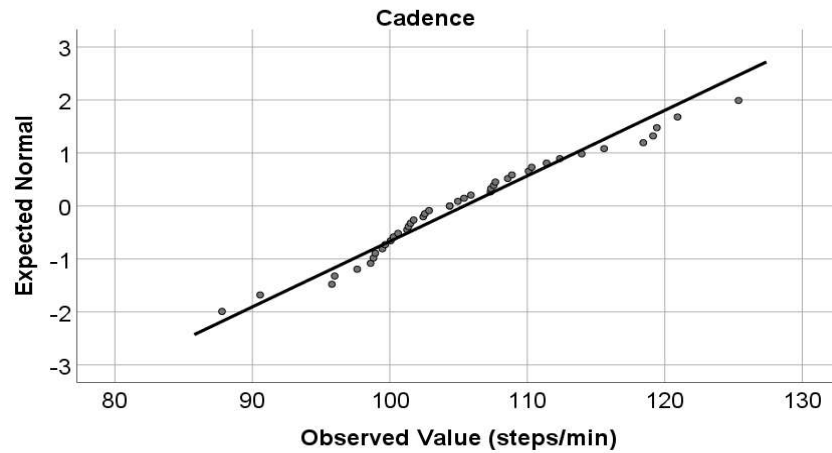
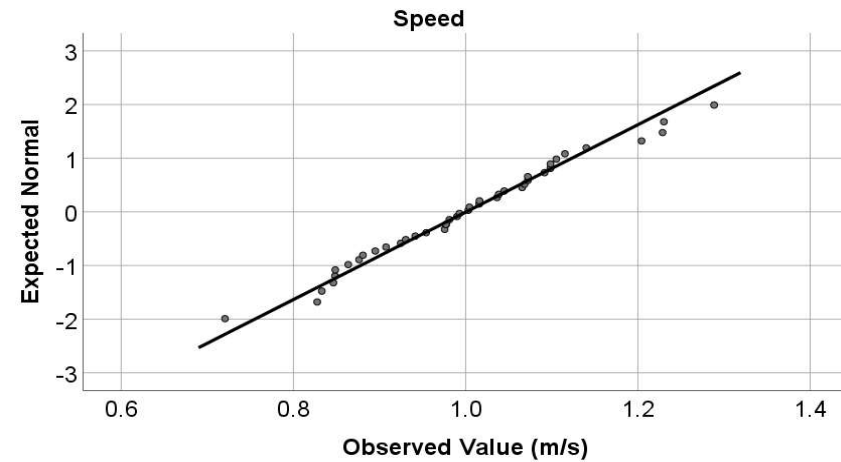


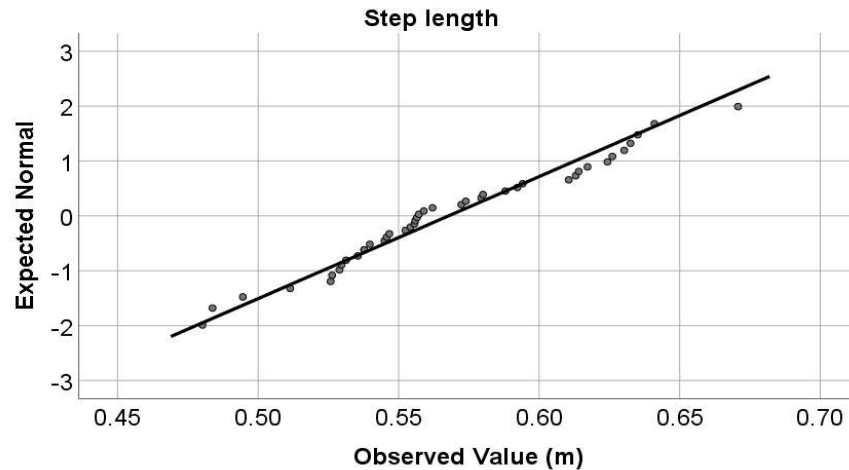
## Supplementary Material 1



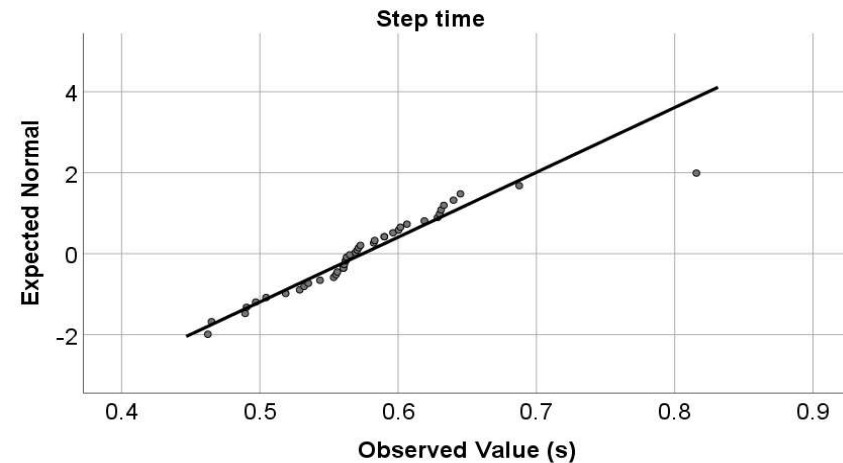
**Figure 1.** Q-Q plot for Cadence.



**Figure 2.** Q-Q plot for Speed.

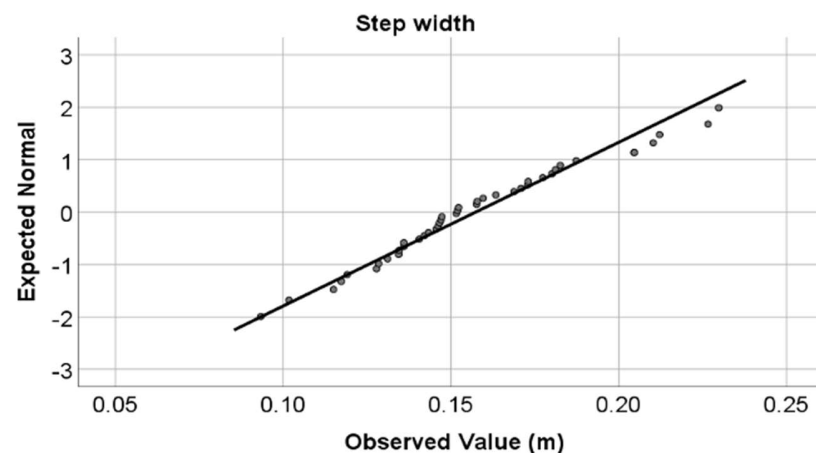


**Figure 3.** Q-Q plot for Step length.

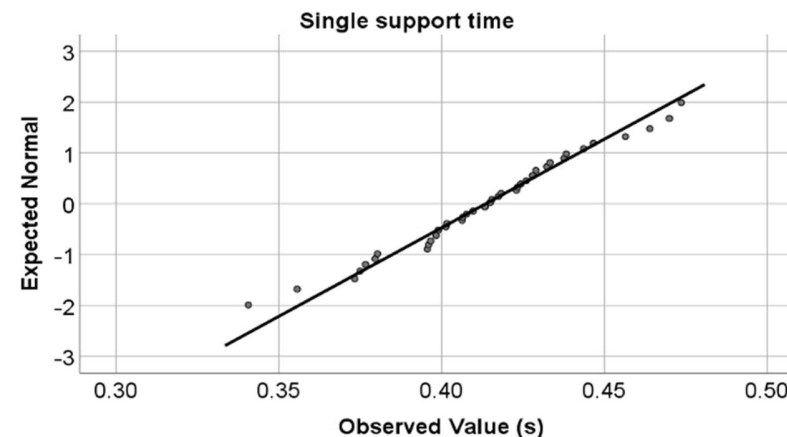


**Figure 4.** Q-Q plot for Step time.

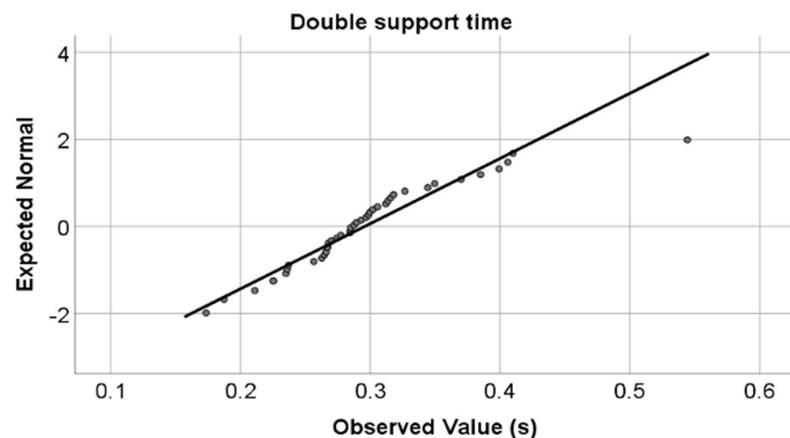
**Figures 1-4:** The Q-Q plots for cadence, speed, step length, and step time, in which the observed data points align closely with the reference line, with no substantial deviations at either tail, indicating approximately normal distribution.



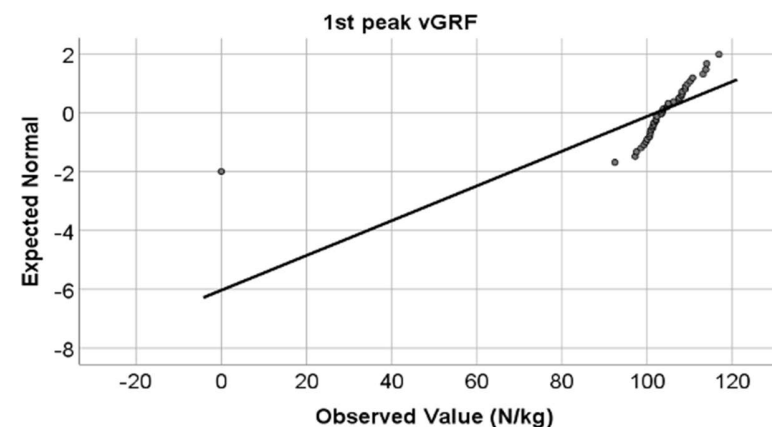
**Figure 5.** Q-Q plot for Step width.



**Figure 6.** Q-Q plot for Single support time (SST).



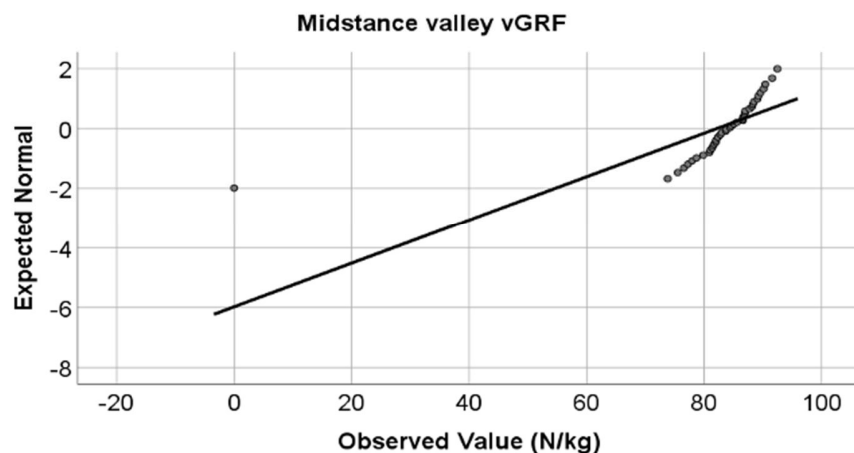
**Figure 7.** Q-Q plot for Double support time (DST).



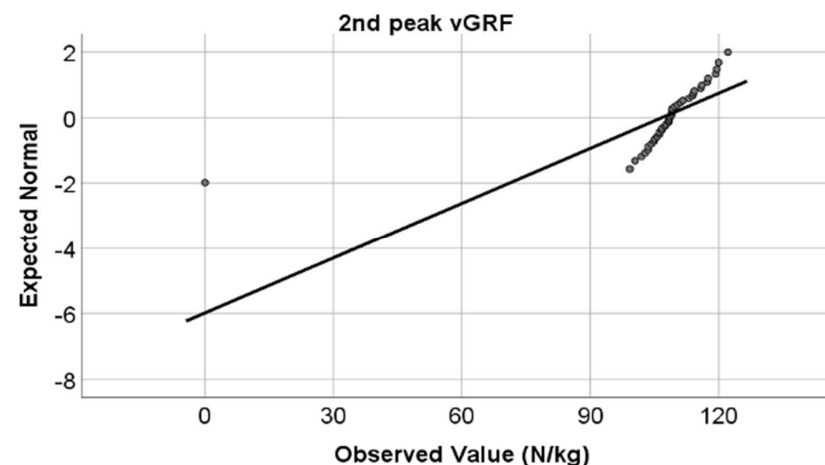
**Figure 8.** Q-Q plot for 1<sup>st</sup> peak vGRF (F1).

**Figures 5-7:** The Q-Q plots for step width, Single support time (SST), and Double support time (DST) demonstrate that the observed data points align closely with the reference line, with no substantial deviations at either tail, indicating approximately normal distribution.

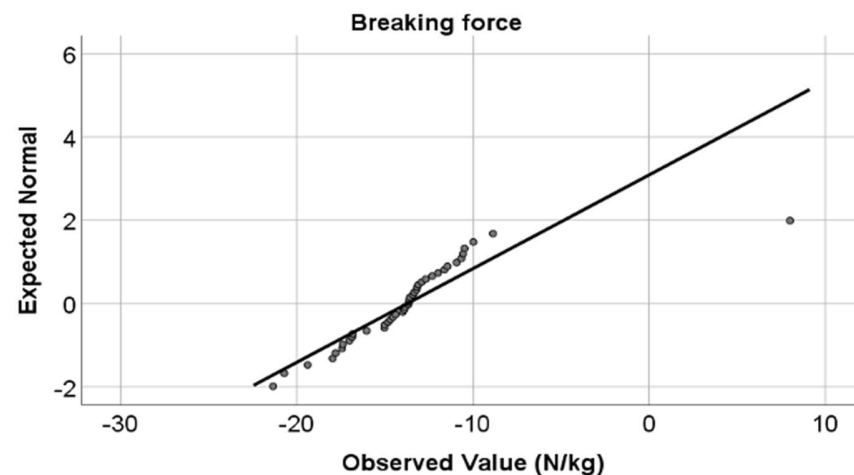
**Figure 8:** The Q-Q plot for the first peak vertical ground reaction force (vGRF) (F1), in which the observed data points deviate noticeably from the reference line, particularly at the tails, indicating not follow a normal distribution.



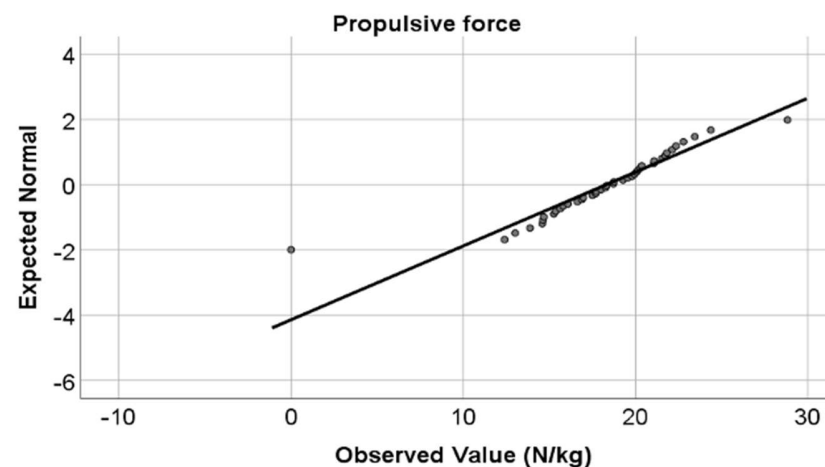
**Figure 9.** Q-Q plot for Midstance valley vGRF (F2).



**Figure 10.** Q-Q plot for 2<sup>nd</sup> peak of vGRF (F3).

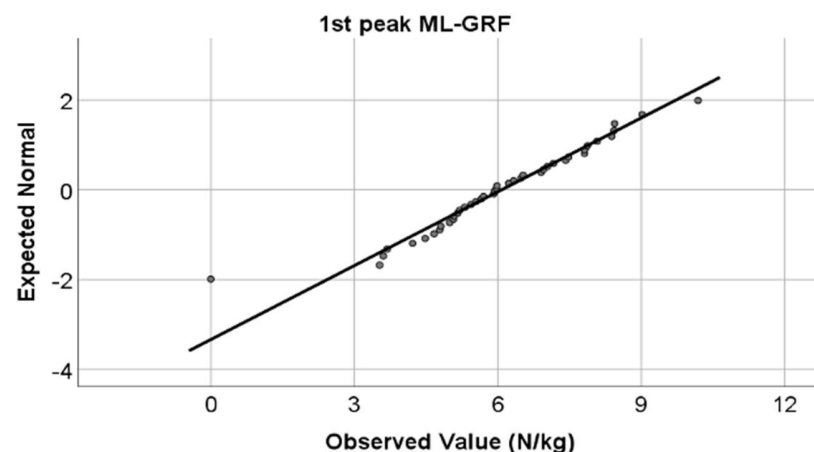


**Figure 11.** Q-Q plot for Breaking force (F4).

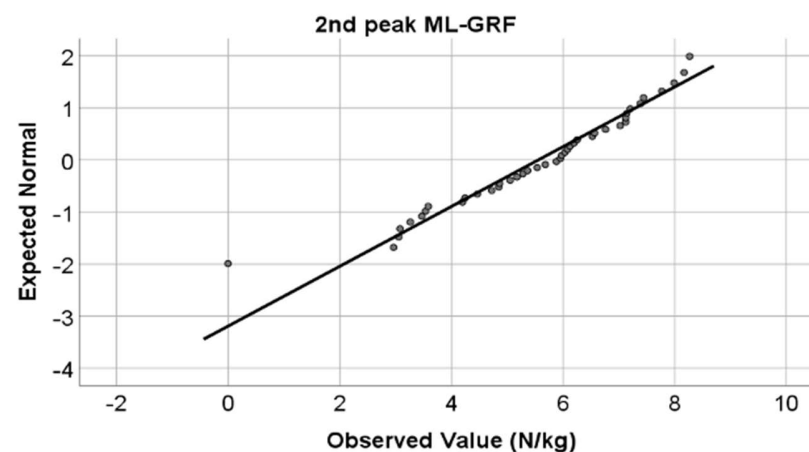


**Figure 12.** Q-Q plot for Propulsive force (F5).

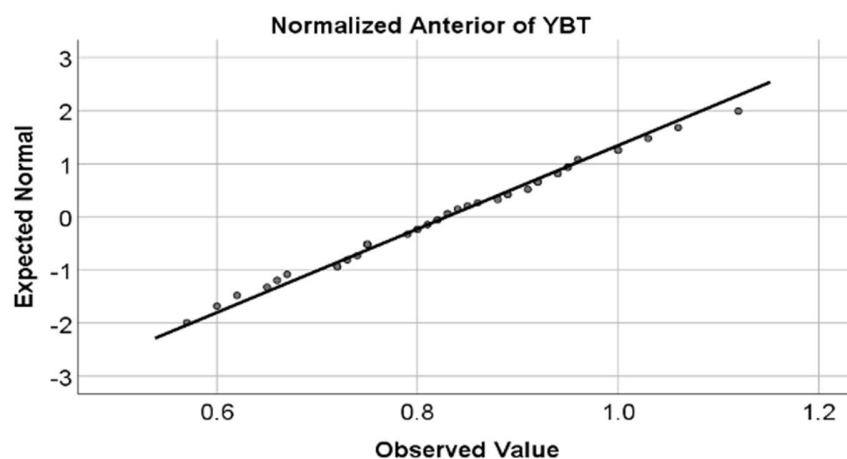
**Figures 9-12:** The Q-Q plots for Midstance valley vertical Ground Reaction Force (vGRF) (F2), 2<sup>nd</sup> peak of vGRF (F3), Breaking force (F4), and Propulsive force (F5), in which the observed data points deviate noticeably from the reference line, particularly at the tails, indicating not follow a normal distribution.



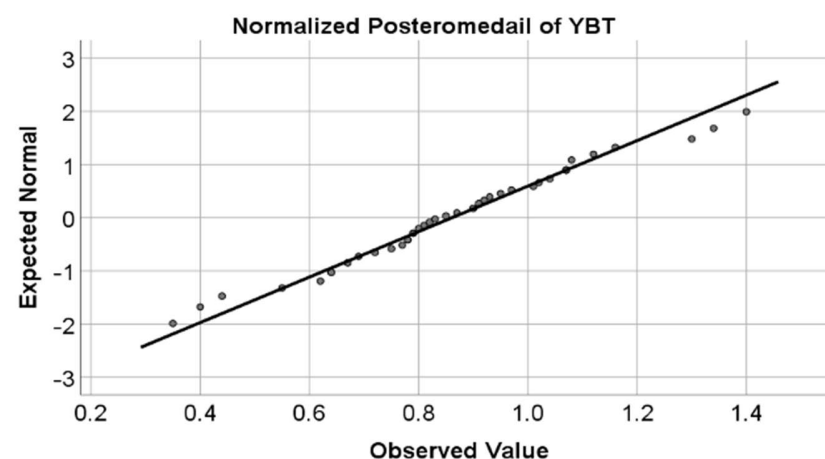
**Figure 13.** Q-Q plot for 1<sup>st</sup> peak ML-GRF (F6)



**Figure 14.** Q-Q plot for 2<sup>nd</sup> peak ML-GRF (F7)

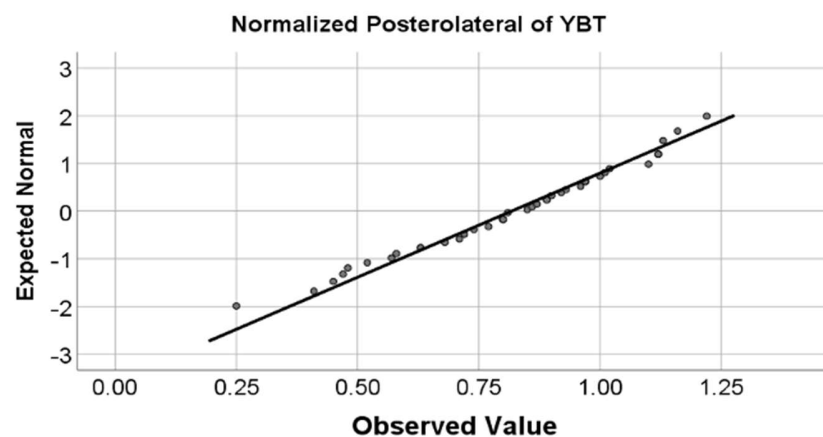


**Figure 15.** Q-Q plot for Normalized Anterior of YBT

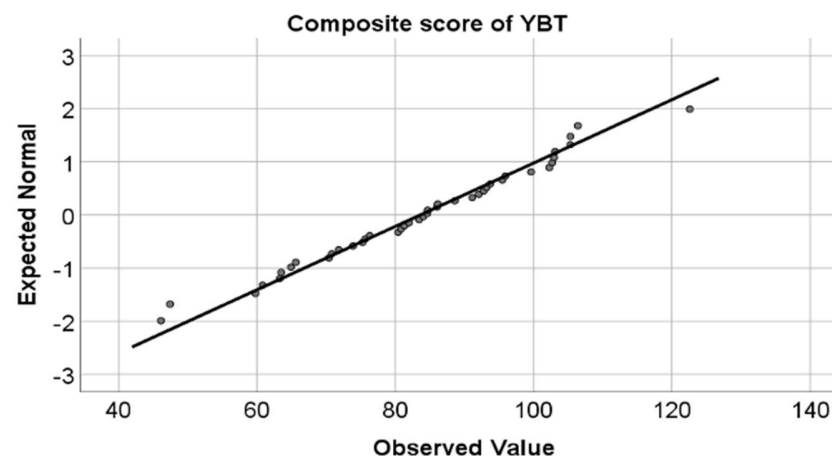


**Figure 16.** Q-Q plot for Normalized Posteromedial of YBT

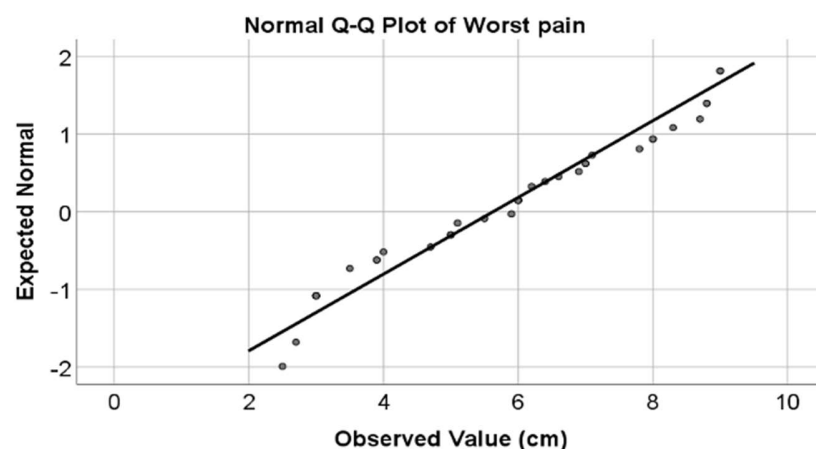
**Figures 13-16:** The Q-Q plots for 1<sup>st</sup> peak Mediolateral Ground Reaction Force (ML-GRF) (F6), for 2<sup>nd</sup> peak ML-GRF (F7), Normalized Anterior of Y Balance test (YBT), and Normalized Posteromedial of YBT, in which the observed data points align closely with the reference line, with no substantial deviations at either tail, indicating approximately normal distribution.



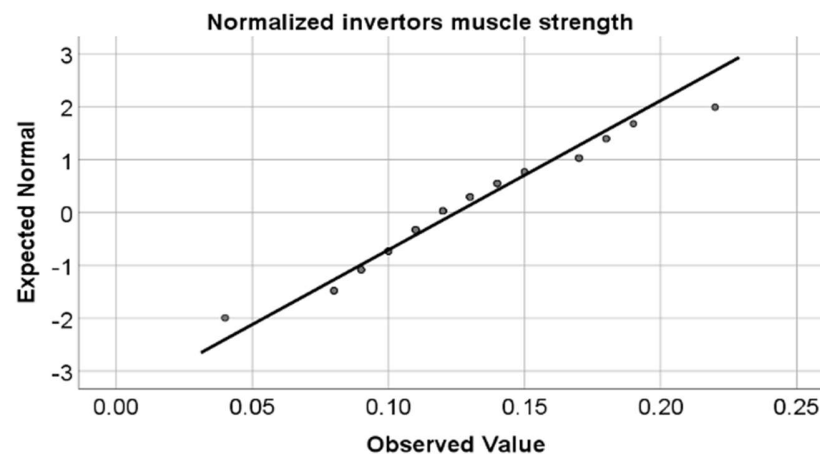
**Figure 17.** Q-Q plot for Normalized Posterolateral of YBT



**Figure 18.** Q-Q plot for Composite score

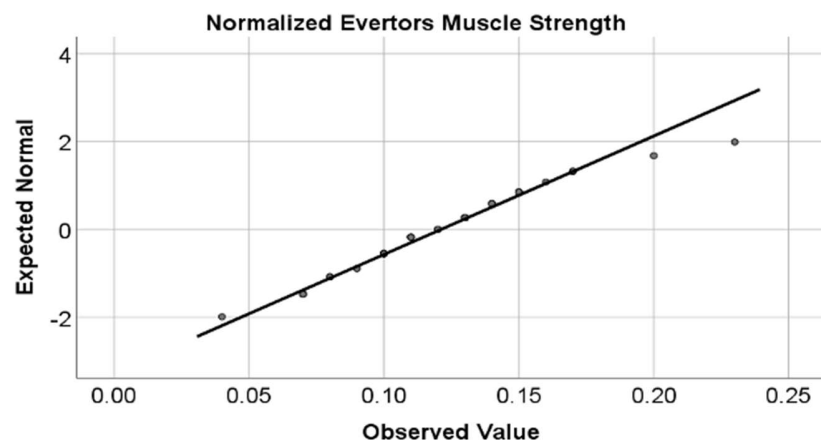


**Figure 19.** Q-Q plot for worst pain

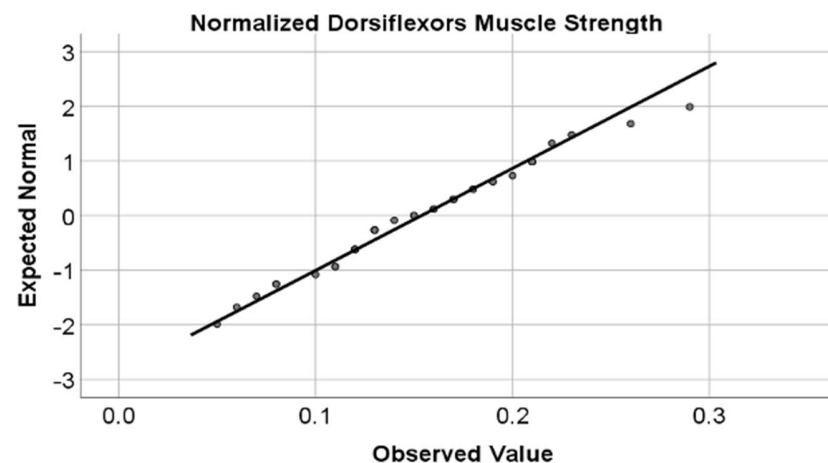


**Figure 20.** Q-Q plot for Normalized invertors muscle strength

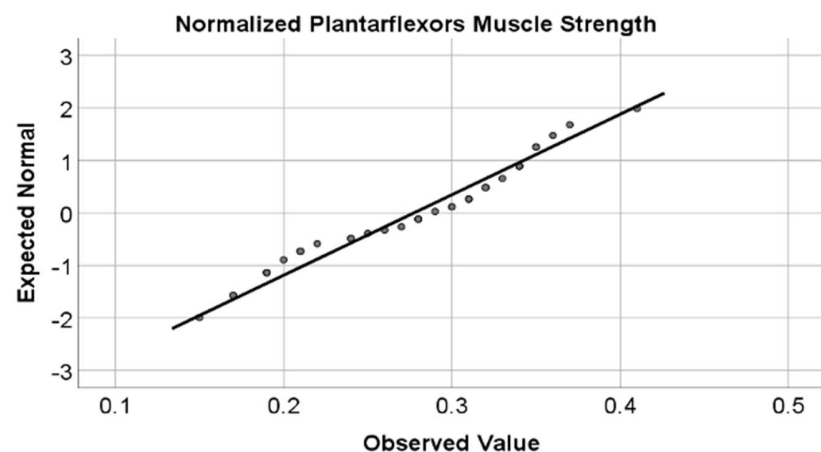
**Figures 17-20:** The Q-Q plots for the normalized Posterolateral and Composite score of YBT, worst pain, and normalized invertors muscle strength, in which the observed data points align closely with the reference line, with no substantial deviations at either tail, indicating approximately normal distribution.



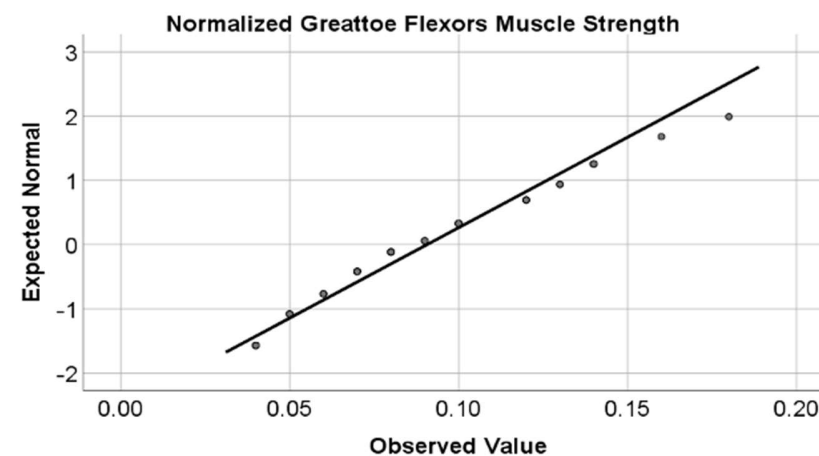
**Figure 21.** Q-Q plot of Normalized evertors muscle strength



**Figure 22.** Q-Q plot of Normalized dorsiflexors muscle strength

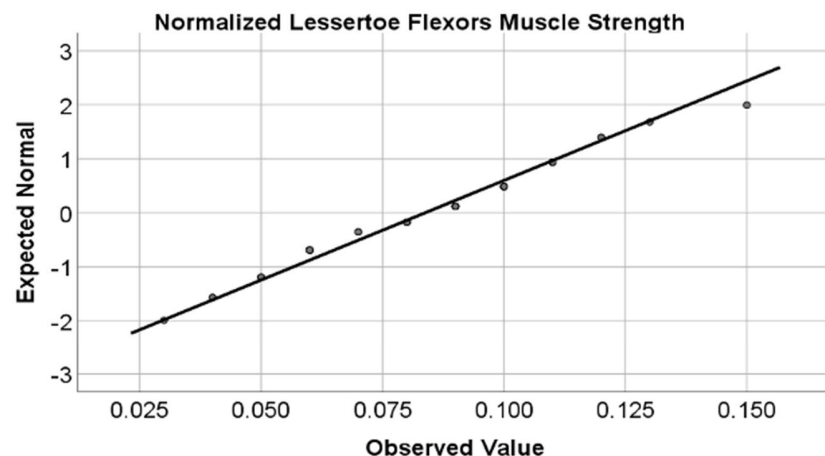


**Figure 23.** Q-Q plot of Normalized plantarflexors muscle strength

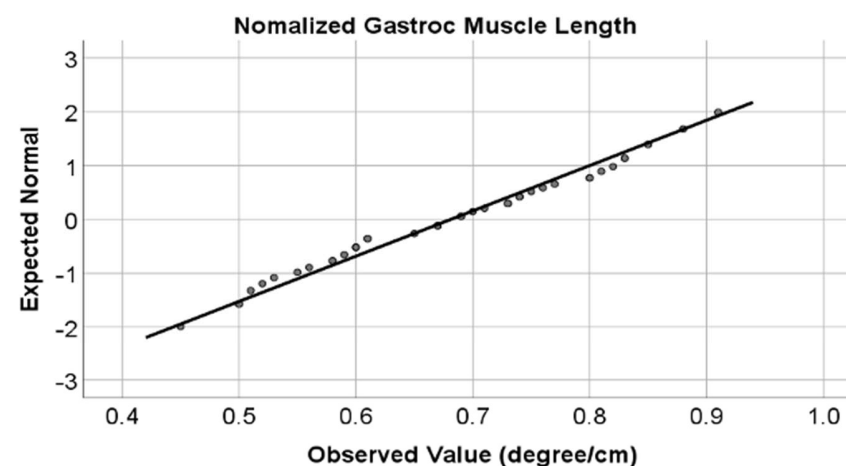


**Figure 24.** Q-Q plot of Normalized great toe flexors muscle strength

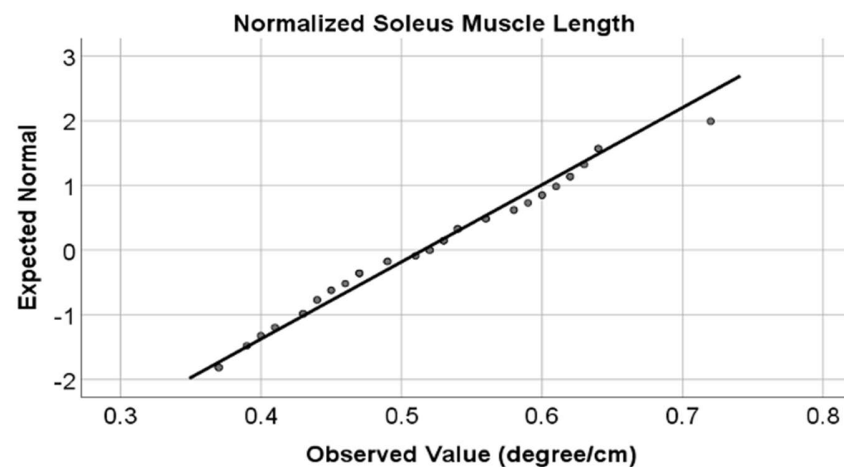
**Figures 21-24:** The Q-Q plots for normalized muscle strength of ankle evertors, dorsiflexors, plantarflexors, and great toe flexors, in which the observed data points align closely with the reference line, with no substantial deviations at either tail, indicating approximately normal distribution.



**Figure 25.** Q-Q plot of Normalized lesser toe flexors muscle strength



**Figure 26.** Q-Q plot of Normalized Gastroc muscle length



**Figure 27.** Q-Q plot of Normalized Soleus muscle length

**Figures 25-27:** The Q-Q plots for normalized muscle strength of lesser toe flexors, normalized muscle length of Gastrocnemius (Gastroc) and Soleus, in which the observed data points align closely with the reference line, with no substantial deviations at either tail, indicating approximately normal distribution.

## Supplementary Material 2

**Table 1** - Correlation between clinical outcomes and gait biomechanics in individuals with PF (n = 42)

| Clinical outcomes |           | Gait biomechanics         |                           |                           |                           |            |                          |                          |        |                          |                           |                           |                           |                          |        |
|-------------------|-----------|---------------------------|---------------------------|---------------------------|---------------------------|------------|--------------------------|--------------------------|--------|--------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------|
|                   |           | Cadence                   | Speed                     | Step length               | Step time                 | Step width | SST                      | DST                      | F1     | F2                       | F3                        | F4                        | F5                        | F6                       | F7     |
| Pain              | Worst     | -0.233                    | -0.249                    | -0.263                    | 0.210                     | 0.069      | 0.177                    | 0.149                    | -0.180 | <b>0.384<sup>b</sup></b> | -0.149                    | 0.292                     | -0.254                    | 0.001                    | 0.064  |
| Muscle length     | Gastroc   | <b>-0.402<sup>a</sup></b> | <b>-0.447<sup>a</sup></b> | -0.294                    | 0.187                     | 0.246      | -0.093                   | <b>0.497<sup>a</sup></b> | -0.125 | 0.204                    | <b>-0.321<sup>b</sup></b> | <b>0.326<sup>b</sup></b>  | <b>-0.336<sup>b</sup></b> | -0.140                   | -0.134 |
|                   | Soleus    | -0.222                    | <b>-0.360<sup>a</sup></b> | <b>-0.339<sup>a</sup></b> | 0.073                     | 0.265      | 0.029                    | 0.245                    | -0.158 | 0.257                    | -0.279                    | <b>0.329<sup>b</sup></b>  | -0.280                    | -0.081                   | 0.044  |
| Muscle strength   | Invertors | -0.015                    | 0.102                     | 0.080                     | -0.530                    | -0.282     | <b>0.410<sup>a</sup></b> | -0.199                   | 0.079  | 0.045                    | <b>0.356<sup>b</sup></b>  | -0.295                    | <b>0.351<sup>b</sup></b>  | 0.254                    | 0.179  |
|                   | Evertors  | -0.174                    | 0.080                     | 0.172                     | -0.019                    | -0.190     | <b>0.459<sup>a</sup></b> | -0.104                   | -0.079 | 0.101                    | 0.292                     | -0.269                    | 0.304                     | 0.089                    | 0.142  |
|                   | DF        | 0.095                     | 0.241                     | 0.033                     | -0.208                    | -0.173     | <b>0.324<sup>a</sup></b> | -0.287                   | -0.081 | -0.131                   | <b>0.311<sup>b</sup></b>  | -0.282                    | 0.288                     | 0.157                    | 0.134  |
|                   | PF        | 0.034                     | 0.244                     | 0.270                     | -0.042                    | -0.279     | 0.247                    | -0.156                   | 0.020  | -0.034                   | <b>0.382<sup>b</sup></b>  | -0.304                    | <b>0.362<sup>b</sup></b>  | <b>0.311<sup>*</sup></b> | 0.161  |
|                   | GTF       | 0.077                     | 0.143                     | 0.027                     | <b>-0.309<sup>a</sup></b> | -0.145     | 0.147                    | -0.179                   | -0.096 | -0.174                   | 0.244                     | -0.156                    | 0.101                     | 0.053                    | 0.128  |
|                   | LTF       | 0.004                     | 0.193                     | 0.144                     | -0.218                    | -0.251     | <b>0.342<sup>a</sup></b> | -0.178                   | -0.236 | -0.183                   | <b>0.313<sup>b</sup></b>  | -0.259                    | 0.285                     | 0.053                    | 0.128  |
| YBT               | ANT       | 0.261                     | <b>0.322<sup>a</sup></b>  | 0.084                     | <b>-0.339<sup>a</sup></b> | -0.035     | -0.105                   | -0.107                   | -0.099 | -0.249                   | 0.189                     | -0.183                    | 0.269                     | <b>0.487<sup>*</sup></b> | 0.160  |
|                   | PM        | 0.152                     | 0.201                     | 0.112                     | -0.022                    | -0.027     | -0.157                   | -0.109                   | 0.174  | 0.001                    | -0.183                    | -0.282                    | 0.131                     | 0.273                    | 0.116  |
|                   | PL        | 0.300                     | <b>0.342<sup>a</sup></b>  | 0.207                     | -0.227                    | -0.226     | -0.090                   | -0.207                   | 0.048  | -0.212                   | 0.269                     | <b>-0.343<sup>b</sup></b> | <b>0.307<sup>b</sup></b>  | <b>0.531<sup>*</sup></b> | 0.257  |
|                   | Composite | 0.276                     | <b>0.332<sup>a</sup></b>  | 0.166                     | -0.202                    | -0.126     | -0.137                   | -0.175                   | 0.144  | 0.031                    | 0.150                     | <b>-0.338<sup>b</sup></b> | 0.248                     | <b>0.492<sup>*</sup></b> | 0.213  |

**Note** <sup>a</sup>Significant correlation was tested by Pearson, <sup>b</sup>Significant correlation was tested by Spearman at  $p < 0.05$ ; Worst: worst pain; Gastroc: normalized gastrocnemius muscle length; Soleus: normalized soleus muscle length; DF: normalized dorsiflexor muscle strength; PF: normalized plantarflexor muscle strength; GTF: normalized great toe flexor muscle strength; LTF: normalized lesser toe flexor muscle strength; YBT: Y-Balance Test; ANT: normalized anterior reach; PM: normalized posteromedial reach; PL: normalized posterolateral reach; Composite: composite score; SST: single support time; DST: double support time; F1: 1<sup>st</sup> peak V-GRF; F2: midstance valley V-GRF; F3: 2<sup>nd</sup> peak V-GRF; F4: braking force; F5: propulsive force; F6: 1<sup>st</sup> peak ML-GRF; F7: 2<sup>nd</sup> peak ML-GRF.



**Table 2** - Correlation between clinical outcomes and gait biomechanics in the recent-onset PF subgroup (n = 19)

| Clinical outcomes |           | Gait biomechanics |                           |                           |                           |            |                          |                          |                           |        |                           |        |        |                          |        |
|-------------------|-----------|-------------------|---------------------------|---------------------------|---------------------------|------------|--------------------------|--------------------------|---------------------------|--------|---------------------------|--------|--------|--------------------------|--------|
|                   |           | Cadence           | Speed                     | Step length               | Step time                 | Step width | SST                      | DST                      | F1                        | F2     | F3                        | F4     | F5     | F6                       | F7     |
| Pain              | Worst     | -0.191            | -0.150                    | -0.332                    | 0.129                     | -0.159     | 0.265                    | 0.134                    | -0.240                    | 0.264  | 0.083                     | 0.206  | -0.293 | -0.148                   | -0.176 |
| Muscle            | Gastroc   | -0.433            | <b>-0.515<sup>a</sup></b> | -0.448                    | 0.016                     | -0.009     | 0.006                    | <b>0.550<sup>a</sup></b> | <b>-0.607<sup>b</sup></b> | 0.246  | <b>-0.480<sup>b</sup></b> | 0.274  | -0.158 | 0.020                    | -0.224 |
| length            | Soleus    | -0.214            | -0.401                    | <b>-0.626<sup>a</sup></b> | -0.106                    | 0.156      | 0.187                    | 0.205                    | -0.343                    | 0.225  | -0.447                    | 0.064  | -0.199 | 0.047                    | -0.092 |
| Muscle strength   | Invertors | -0.168            | -0.034                    | -0.044                    | 0.077                     | -0.185     | <b>0.486<sup>a</sup></b> | -0.133                   | -0.187                    | 0.237  | 0.127                     | -0.066 | 0.125  | 0.041                    | 0.100  |
|                   | Evertors  | -0.240            | 0.015                     | 0.070                     | 0.015                     | -0.349     | <b>0.469<sup>a</sup></b> | -0.062                   | -0.168                    | 0.203  | 0.243                     | -0.128 | 0.200  | -0.071                   | 0.111  |
|                   | DF        | -0.161            | 0.131                     | 0.080                     | -0.036                    | -0.217     | <b>0.481<sup>a</sup></b> | -0.218                   | -0.156                    | 0.249  | 0.059                     | -0.231 | 0.146  | -0.098                   | 0.143  |
|                   | PF        | -0.200            | 0.049                     | 0.135                     | 0.162                     | -0.194     | 0.284                    | -0.055                   | 0.035                     | 0.164  | 0.192                     | -0.285 | 0.211  | 0.070                    | 0.070  |
|                   | GTF       | 0.276             | 0.303                     | 0.058                     | <b>-0.480<sup>a</sup></b> | -0.420     | 0.194                    | -0.293                   | -0.011                    | -0.106 | 0.177                     | -0.080 | -0.021 | -0.039                   | -0.031 |
|                   | LTF       | 0.067             | 0.259                     | 0.075                     | -0.306                    | -0.376     | 0.401                    | -0.204                   | -0.044                    | -0.035 | 0.212                     | -0.183 | 0.110  | 0.102                    | 0.161  |
| YBT               | ANT       | 0.187             | 0.230                     | -0.149                    | -0.409                    | 0.060      | -0.018                   | -0.046                   | -0.010                    | -0.240 | 0.046                     | -0.219 | 0.191  | <b>0.474<sup>a</sup></b> | 0.111  |
|                   | PM        | 0.147             | 0.340                     | 0.230                     | -0.062                    | -0.168     | 0.082                    | -0.204                   | 0.177                     | -0.103 | 0.088                     | -0.398 | 0.114  | 0.223                    | 0.164  |
|                   | PL        | 0.228             | 0.340                     | 0.239                     | -0.101                    | -0.352     | 0.061                    | -0.135                   | 0.223                     | -0.173 | 0.257                     | -0.430 | 0.175  | 0.178                    | 0.033  |
|                   | Composite | 0.218             | 0.371                     | 0.175                     | -0.178                    | -0.215     | 0.063                    | -0.173                   | 0.182                     | -0.141 | 0.164                     | -0.367 | 0.119  | 0.304                    | 0.124  |

**Note:** <sup>a</sup>Significant correlation was tested by Pearson, <sup>b</sup>Significant correlation was tested by Spearman at p < 0.05; Worst: worst pain; Gastroc: normalized gastrocnemius muscle length; Soleus: normalized soleus muscle length; DF: normalized dorsiflexor muscle strength; PF: normalized plantarflexor muscle strength; GTF: normalized great toe flexor muscle strength; LTF: normalized lesser toe flexor muscle strength; YBT: Y-Balance Test; ANT: normalized anterior reach; PM: normalized posteromedial reach; PL: normalized posterolateral reach;; Composite: composite score; SST: single support time; DST: double support time; F1: 1<sup>st</sup> peak V-GRF; F2: midstance valley V-GRF; F3: 2<sup>nd</sup> peak V-GRF; F4: braking force; F5: propulsive force; F6: 1<sup>st</sup> peak ML-GRF; F7: 2<sup>nd</sup> peak ML-GRF.

**Table 3** - Correlation between clinical outcomes and gait biomechanics in the chronic-onset PF subgroup (n = 23)

| Clinical outcomes |           | Gait biomechanics |                          |             |                           |            |                           |                           |        |                          |                          |                           |                          |                          |        |
|-------------------|-----------|-------------------|--------------------------|-------------|---------------------------|------------|---------------------------|---------------------------|--------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------|
|                   |           | Cadence           | Speed                    | Step length | Step time                 | Step width | SST                       | DST                       | F1     | F2                       | F3                       | F4                        | F5                       | F6                       | F7     |
| Pain              | Worst     | -0.305            | -0.361                   | -0.204      | 0.395                     | 0.277      | 0.097                     | 0.226                     | -0.126 | <b>0.522<sup>b</sup></b> | -0.329                   | 0.371                     | -0.340                   | 0.097                    | 0.212  |
| Muscle length     | Gastroc   | -0.279            | -0.387                   | -0.255      | 0.313                     | 0.363      | -0.197                    | 0.387                     | 0.139  | 0.085                    | -0.148                   | 0.361                     | -0.360                   | -0.268                   | -0.072 |
|                   | Soleus    | -0.235            | -0.352                   | -0.155      | 0.282                     | 0.346      | -0.098                    | 0.351                     | -0.047 | 0.319                    | -0.133                   | <b>0.525<sup>b</sup></b>  | -0.354                   | -0.150                   | 0.116  |
| Muscle strength   | Invertors | 0.062             | 0.214                    | 0.213       | -0.172                    | -0.335     | 0.371                     | -0.289                    | 0.222  | -0.033                   | <b>0.518<sup>b</sup></b> | <b>-0.525<sup>b</sup></b> | <b>0.548<sup>b</sup></b> | 0.379                    | 0.222  |
|                   | Evertors  | -0.086            | 0.159                    | 0.237       | -0.148                    | -0.167     | <b>0.512<sup>a</sup></b>  | -0.269                    | -0.006 | -0.031                   | 0.340                    | -0.391                    | <b>0.428<sup>b</sup></b> | 0.179                    | 0.166  |
|                   | DF        | 0.293             | 0.349                    | 0.001       | <b>-0.472<sup>a</sup></b> | -0.162     | 0.233                     | <b>-0.466<sup>a</sup></b> | -0.049 | -0.372                   | <b>0.512<sup>b</sup></b> | -0.264                    | 0.318                    | 0.291                    | 0.130  |
|                   | PF        | 0.277             | <b>0.453<sup>a</sup></b> | 0.405       | -0.371                    | -0.391     | 0.223                     | -0.366                    | -0.014 | -0.308                   | <b>0.593<sup>b</sup></b> | -0.360                    | <b>0.463<sup>b</sup></b> | <b>0.475<sup>a</sup></b> | 0.220  |
|                   | GTF       | -0.141            | -0.016                   | 0.019       | -0.095                    | 0.116      | 0.102                     | -0.010                    | -0.154 | -0.214                   | 0.308                    | -0.239                    | 0.215                    | 0.288                    | 0.341  |
|                   | LTF       | -0.059            | 0.155                    | 0.219       | -0.171                    | -0.175     | 0.328                     | -0.190                    | -0.321 | -0.304                   | 0.367                    | -0.309                    | 0.385                    | 0.028                    | 0.111  |
| YBT               | ANT       | 0.407             | <b>0.449<sup>a</sup></b> | 0.318       | -0.361                    | -0.177     | -0.180                    | -0.284                    | -0.149 | -0.299                   | 0.359                    | -0.192                    | 0.299                    | <b>0.504<sup>a</sup></b> | 0.201  |
|                   | PM        | 0.208             | 0.040                    | -0.050      | -0.004                    | 0.085      | <b>-0.468<sup>a</sup></b> | 0.002                     | 0.154  | 0.072                    | -0.214                   | -0.178                    | 0.029                    | 0.322                    | 0.083  |
|                   | PL        | 0.351             | 0.351                    | 0.213       | -0.407                    | -0.096     | -0.251                    | -0.312                    | -0.084 | -0.249                   | 0.267                    | -0.297                    | 0.383                    | <b>0.760<sup>a</sup></b> | 0.393  |
|                   | Composite | 0.362             | 0.299                    | 0.159       | -0.289                    | -0.055     | -0.372                    | -0.221                    | -0.011 | -0.138                   | 0.174                    | -0.266                    | 0.275                    | <b>0.636<sup>a</sup></b> | 0.278  |

**Note:** <sup>a</sup>Significant correlation was tested by Pearson, <sup>b</sup>Significant correlation was tested by Spearman at p < 0.05; Worst: worst pain; Gastroc: normalized gastrocnemius muscle length; Soleus: normalized soleus muscle length; DF: normalized dorsiflexor muscle strength; PF: normalized plantarflexor muscle strength; GTF: normalized great toe flexor muscle strength; LTF: normalized lesser toe flexor muscle strength; YBT: Y-Balance Test; ANT: normalized anterior reach; PM: normalized posteromedial reach; PL: normalized posterolateral reach; Composite: composite score; SST: single support time; DST: double support time; F1: 1<sup>st</sup> peak V-GRF; F2: midstance valley V-GRF; F3: 2<sup>nd</sup> peak V-GRF; F4: braking force; F5: propulsive force; F6: 1<sup>st</sup> peak ML-GRF; F7: 2<sup>nd</sup> peak ML-GRF.