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## Data in Brief

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## Data Article

## Dataset on gait patterns in degenerative neurological diseases



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## ABSTRACT

We collected the gait parameters and lower limb joint kinematics of patients with three different types of primary degenerative neurological diseases: (i) cerebellar ataxia (19 patients), (ii) hereditary spastic paraparesis (26 patients), and (iii) Parkinson's disease (32 patients). Sixty-five gender-age matched healthy subjects were enrolled as control group. An optoelectronic motion analysis system was used to measure time-distance parameters and lower limb joint kinematics during gait in both patients and healthy controls.

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## Specifications Table

|                            |  |
|----------------------------|--|
| Subject area               | <i>Biomechanics</i>  |
| More specific subject area | <i>Movement disorders</i>  |
| Type of data               | <i>Tables</i>  |
| How data was acquired      | <i>The data were acquired using an optoelectronic motion analysis system (SMART-DX 500 System, BTS, Milan, Italy).</i>                               |
| Data format                | <i>analyzed</i>  |
| Experimental factors       | <i>No pretreatment was performed on the sample</i>   |
| Experimental features      | <i>Subjects were asked to walk barefoot at a comfortable, self-selected speed along a walkway approximately 10 m in length while looking forward</i> |
| Data source location       | <i>The data were recorded in the Motion Analysis Lab between October 2011 and May 2014 in Policlinico Italia, Rome, Italy</i>                        |
| Data accessibility         | <i>The data are available with this article</i>  |

## Value of the data

- The gait data provided here can be used for further analyses aimed at individuating uncommon subtypes of gait patterns.
- The data may serve as a benchmark for other researchers in the investigation on other types of gait disorders.
- Our data may be shared with those of other motion analysis LABs in order to improve the statistical analysis power.

## 1. Data

The data we are sharing with this article are gait spatio-temporal parameters and joint kinematics of patients affected by cerebellar ataxia, hereditary spastic paraplegia and Parkinson's Disease. Sixty-five gender-age-speed matched healthy subjects were enrolled as control group [1]. [Tables 1–4](#) shows

**Table 1**  
Cerebellar ataxic (CA) patients' anthropometric and clinical characteristics.

| Subject-ID | Gender (F/M) | SARA-total | Disease duration (years) | Diagnosis | Age (years) | Weight (kg) | Height (m) |
|------------|--------------|------------|--------------------------|-----------|-------------|-------------|------------|
| CA -1      | F            | 10         | 10                       | SAOA      | 60          | 52          | 1.5        |
| CA -2      | M            | 12.5       | 11                       | SAOA      | 58          | 70          | 1.69       |
| CA -3      | M            | 12         | 16                       | SAOA      | 46          | 69          | 1.67       |
| CA -4      | M            | 15         | 10                       | SCA1      | 45          | 69          | 1.74       |
| CA -5      | F            | 10         | 2                        | SAOA      | 64          | 63.5        | 1.62       |
| CA -6      | F            | 21         | 32                       | SCA1      | 32          | 54          | 1.59       |
| CA -7      | M            | 8          | 8                        | SCA1      | 43          | 66          | 1.74       |
| CA -8      | M            | 12         | 5                        | SCA2      | 35          | 73          | 1.73       |
| CA -9      | M            | 11         | 8                        | SCA1      | 49          | 72          | 1.76       |
| CA -10     | M            | 13.5       | 17                       | SAOA      | 47          | 91.5        | 1.7        |
| CA -11     | F            | 6          | 11                       | SAOA      | 71          | 54          | 1.58       |
| CA -12     | M            | 14         | 29                       | SAOA      | 46          | 72          | 1.71       |
| CA -13     | M            | 9          | 19                       | SAOA      | 49          | 75          | 1.73       |
| CA -14     | M            | 11         | 24                       | SCA3      | 54          | 76          | 1.7        |
| CA -15     | F            | 8          | 20                       | SCA3      | 50          | 64.5        | 1.66       |
| CA -16     | M            | 2          | 4                        | SCA1      | 33          | 51          | 1.63       |
| CA -17     | M            | 22         | 14                       | SCA2      | 40          | 87          | 1.67       |
| CA -18     | F            | 13         | 5                        | SCA2      | 48          | 56          | 1.53       |
| CA -19     | F            | 12.5       | 14                       | SAOA      | 54          | 68          | 1.48       |

patients' and healthy controls' anthropometric and clinical characteristics, while Tables 5–8 illustrates the patients' and controls' gait spatio-temporal parameters and joint kinematics.

2. Experimental design, materials and methods

Patients were asked to walk barefoot at a comfortable, self-selected speed along a walkway approximately 10 m in length while looking forward, while controls were asked to walk at slow speed. At least five trials were recorded for each patient and for each control. To avoid muscle fatigue, each trial was separated by a one-minute rest period.

Three-dimensional (3-D) marker trajectories were recorded using a frame-by-frame acquisition system (SMART Capture - BTS, Milan, Italy) and labeled using a frame-by-frame tracking system (SMART Tracker - BTS, Milan, Italy). Marker position data were interpolated and low-pass filtered using a zero-lag fourth-order Butterworth filter (6 Hz), [2] and analyzed using 3-D reconstruction software (SMART Analyzer, BTS, Milan, Italy) and MATLAB software (MATLAB 7.4.0, MathWorks, Natick, MA, USA).

The following time parameters were calculated for each subject: stance duration (time interval between two consecutive heel strikes of the same lower limb), swing duration (time interval between toe off and the next heel strike of the same lower limb), and double support duration (time interval with both feet on the floor), all expressed as a percentage of the stride duration. The following spatial parameters were computed for all the enrolled subjects: step length and step width, both expressed in meters. Furthermore, walking speed (m/s) and cadence (steps/min) were calculated for each subject.

Table 2  
Hereditary spastic paraparesis (HSP) patients' anthropometric and clinical characteristics.

| Subject-ID | Gender (F/M) | SPRS-total | Disease duration (years) | Diagnosis    | Age (years) | Weight (kg) | Height (m) |
|------------|--------------|------------|--------------------------|--------------|-------------|-------------|------------|
| HSP-1      | M            | 23         | 32                       | SPG4         | 66          | 63          | 1.62       |
| HSP-2      | M            | 7          | 12                       | SPG4         | 47          | 87          | 1.74       |
| HSP-3      | F            | 0          | 0                        | SPG4         | 30          | 78          | 1.52       |
| HSP-4      | F            | 28         | 33                       | SPG4         | 78          | 55.5        | 1.42       |
| HSP-5      | M            | 7          | 22                       | HSP-AD       | 35          | 75          | 1.84       |
| HSP-6      | M            | 17         | 15                       | SPG4         | 58          | 78          | 1.71       |
| HSP-7      | F            | 6          | 38                       | SPG4         | 43          | 57.5        | 1.62       |
| HSP-8      | M            | 12         | 3                        | Sporadic SPG | 39          | 99          | 1.7        |
| HSP-9      | M            | 12         | 15                       | SPG4         | 28          | 81          | 1.81       |
| HSP-10     | M            | 25         | 32                       | SPG4         | 34          | 57          | 1.7        |
| HSP-11     | F            | 6          | 36                       | SPG4         | 66          | 57          | 1.54       |
| HSP-12     | M            | 12         | 11                       | SPG4         | 56          | 75          | 1.64       |
| HSP-13     | F            | 2          | 18                       | SPG4         | 21          | 58          | 1.63       |
| HSP-14     | M            | 35         | 25                       | HSP-AD       | 49          | 70          | 1.7        |
| HSP-15     | M            | 8          | 10                       | SPG4         | 24          | 104         | 1.77       |
| HSP-16     | M            | 24         | 13                       | SPG4         | 58          | 72.5        | 1.7        |
| HSP-17     | M            | 3          | 12                       | SPG-AD       | 25          | 85          | 1.8        |
| HSP-18     | F            | 4          | 5                        | SPG4         | 43          | 69          | 1.7        |
| HSP-19     | M            | 16         | 12                       | SPG4         | 49          | 109         | 1.82       |
| HSP-20     | F            | 31         | 32                       | SPG4         | 72          | 69          | 1.58       |
| HSP-21     | M            | 26         | 16                       | Sporadic SPG | 30          | 75          | 1.72       |
| HSP-22     | M            | 28         | 29                       | SPG-AR       | 59          | 87          | 1.57       |
| HSP-23     | F            | 20         | 21                       | SPG-AR       | 56          | 73          | 1.59       |
| HSP-24     | F            | 18         | 21                       | SPG5         | 57          | 65.5        | 1.56       |
| HSP-25     | F            | 23         | 57                       | SPG31        | 72          | 77          | 1.49       |
| HSP-26     | F            | 12         | 48                       | SPG31        | 64          | 61          | 1.58       |

**Table 3**

Parkinson's disease (PD) patients' anthropometric and clinical characteristics.

| Subject-ID | Gender (F/M) | UPDRS III | Disease duration (years) | Diagnosis | Age (years) | Weight (kg) | Height (m) |
|------------|--------------|-----------|--------------------------|-----------|-------------|-------------|------------|
| PD-1       | M            | 15        | 11                       | IPD       | 60          | 66          | 1.61       |
| PD-2       | M            | 11        | 10                       | IPD       | 76          | 83.5        | 1.65       |
| PD-3       | F            | 6         | 4                        | IPD       | 66          | 58.5        | 1.55       |
| PD-4       | F            | 11        | 4                        | IPD       | 73          | 77          | 1.62       |
| PD-5       | F            | 26        | 4                        | IPD       | 76          | 69.5        | 1.54       |
| PD-6       | M            | 15        | 6                        | IPD       | 77          | 65          | 1.69       |
| PD-7       | M            | 12        | 3                        | IPD       | 75          | 85          | 1.65       |
| PD-8       | M            | 14        | 15                       | IPD       | 72          | 61          | 1.66       |
| PD-9       | M            | 17        | 9                        | IPD       | 70          | 71.5        | 1.7        |
| PD-10      | F            | 17        | 2                        | IPD       | 73          | 64.5        | 1.49       |
| PD-11      | F            | 21        | 2                        | IPD       | 70          | 62          | 1.5        |
| PD-12      | F            | 14        | 3                        | IPD       | 56          | 60          | 1.58       |
| PD-13      | M            | 19        | 6                        | IPD       | 73          | 59          | 1.54       |
| PD-14      | F            | 6         | 2                        | IPD       | 68          | 56.5        | 1.52       |
| PD-15      | M            | 18        | 14                       | IPD       | 61          | 70          | 1.53       |
| PD-16      | M            | 22        | 3                        | IPD       | 73          | 89          | 1.64       |
| PD-17      | F            | 28        | 5                        | IPD       | 70          | 93          | 1.55       |
| PD-18      | M            | 15        | 12                       | IPD       | 62          | 82.5        | 1.67       |
| PD-19      | F            | 17        | 9                        | IPD       | 73          | 77          | 1.58       |
| PD-20      | M            | 14        | 8                        | IPD       | 79          | 81          | 1.75       |
| PD-21      | M            | 10        | 7                        | IPD       | 66          | 90          | 1.69       |
| PD-22      | M            | 16        | 4                        | IPD       | 73          | 59          | 1.61       |
| PD-23      | M            | 11        | 4                        | IPD       | 74          | 80.5        | 1.69       |
| PD-24      | F            | 8         | 7                        | IPD       | 57          | 75          | 1.57       |
| PD-25      | F            | 20        | 6                        | IPD       | 72          | 61          | 1.55       |
| PD-26      | M            | 7         | 1                        | IPD       | 66          | 97          | 1.74       |
| PD-27      | M            | 13        | 6                        | IPD       | 71          | 88          | 1.66       |
| PD-28      | F            | 9         | 5                        | IPD       | 73          | 61.5        | 1.54       |
| PD-29      | M            | 14        | 9                        | IPD       | 50          | 82.5        | 1.74       |
| PD-30      | F            | 3         | 3                        | IPD       | 71          | 50          | 1.49       |
| PD-31      | M            | 11        | 3                        | IPD       | 73          | 63          | 1.58       |
| PD-32      | F            | 14        | 10                       | IPD       | 76          | 60          | 1.55       |

**Table 4**

Healthy controls' anthropometric characteristics.

| Subject-ID | Gender (F/M) | Age (years) | Weight (kg) | Height (m) |
|------------|--------------|-------------|-------------|------------|
| HC-1       | F            | 49          | 63          | 1.56       |
| HC-2       | M            | 71          | 92          | 1.83       |
| HC-3       | F            | 47          | 53.5        | 1.65       |
| HC-4       | F            | 59          | 63          | 1.56       |
| HC-5       | F            | 77          | 74          | 1.69       |
| HC-6       | M            | 38          | 74          | 1.75       |
| HC-7       | F            | 33          | 52          | 1.61       |
| HC-8       | F            | 38          | 50          | 1.62       |
| HC-9       | F            | 56          | 70          | 1.61       |
| HC-10      | F            | 43          | 56          | 1.58       |
| HC-11      | F            | 28          | 51          | 1.64       |
| HC-12      | M            | 46          | 76          | 1.73       |
| HC-13      | F            | 64          | 98          | 1.51       |
| HC-14      | F            | 43          | 52          | 1.6        |
| HC-15      | M            | 35          | 75          | 1.75       |
| HC-16      | M            | 57          | 88          | 1.79       |
| HC-17      | M            | 70          | 64.5        | 1.61       |
| HC-18      | F            | 74          | 76          | 1.7        |
| HC-19      | F            | 35          | 64          | 1.61       |
| HC-20      | F            | 53          | 55          | 1.58       |

**Table 4** (continued)

| Subject-ID | Gender (F/M) | Age (years) | Weight (kg) | Height (m) |
|------------|--------------|-------------|-------------|------------|
| HC-21      | M            | 39          | 75          | 1.65       |
| HC-22      | F            | 54          | 67          | 1.52       |
| HC-23      | F            | 52          | 66          | 1.58       |
| HC-24      | M            | 56          | 83          | 1.8        |
| HC-25      | M            | 57          | 71          | 1.65       |
| HC-26      | M            | 57          | 71          | 1.69       |
| HC-27      | M            | 38          | 73          | 1.8        |
| HC-28      | F            | 44          | 49          | 1.65       |
| HC-29      | M            | 63          | 94          | 1.8        |
| HC-30      | F            | 38          | 56          | 1.64       |
| HC-31      | M            | 47          | 85.5        | 1.73       |
| HC-32      | F            | 60          | 63          | 1.61       |
| HC-33      | M            | 56          | 78          | 1.725      |
| HC-34      | F            | 73          | 73          | 1.54       |
| HC-35      | F            | 61          | 60          | 1.54       |
| HC-36      | M            | 63          | 75.5        | 1.77       |
| HC-37      | M            | 27          | 81          | 1.82       |
| HC-38      | M            | 75          | 74.5        | 1.74       |
| HC-39      | M            | 61          | 67          | 1.8        |
| HC-40      | F            | 46          | 64          | 1.61       |
| HC-41      | M            | 34          | 73          | 1.76       |
| HC-42      | M            | 49          | 95          | 1.81       |
| HC-43      | M            | 29          | 65          | 1.7        |
| HC-44      | M            | 46          | 80          | 1.69       |
| HC-45      | M            | 65          | 67.5        | 1.71       |
| HC-46      | F            | 26          | 64          | 1.53       |
| HC-47      | F            | 37          | 70          | 1.59       |
| HC-48      | F            | 35          | 66          | 1.64       |
| HC-49      | F            | 66          | 51.5        | 1.49       |
| HC-50      | M            | 43          | 94          | 1.74       |
| HC-51      | M            | 41          | 92          | 1.76       |
| HC-52      | F            | 45          | 64          | 1.66       |
| HC-53      | M            | 51          | 78          | 1.82       |
| HC-54      | F            | 41          | 72          | 1.72       |
| HC-55      | M            | 44          | 68          | 1.64       |
| HC-56      | F            | 54          | 51          | 1.64       |
| HC-57      | F            | 59          | 61          | 1.69       |
| HC-58      | M            | 54          | 94          | 1.81       |
| HC-59      | M            | 35          | 96          | 1.71       |
| HC-60      | M            | 45          | 83          | 1.82       |
| HC-61      | M            | 33          | 75          | 1.71       |
| HC-62      | F            | 73          | 51          | 1.49       |
| HC-63      | M            | 69          | 73          | 1.76       |
| HC-64      | F            | 45          | 56          | 1.75       |
| HC-65      | M            | 58          | 70.5        | 1.69       |

**Table 5**  
Cerebellar ataxia (CA) patients' gait spatio-temporal parameters and joint kinematics.

| Subject_ID | R Stance (%) | L Stance (%) | R Swing (%) | L Swing (%) | R Double Supp. (%) | L Double Supp. (%) | R Step Length (m) | L Step Length (m) | R Speed (m/s) | L Speed (m/s) | R Hip ROM (°) | L Hip ROM (°) | R Knee ROM (°) | L Knee ROM (°) | R Ankle ROM (°) | L Ankle ROM (°) | Cadence (n°step/min) | Step Width (m) |
|------------|--------------|--------------|-------------|-------------|--------------------|--------------------|-------------------|-------------------|---------------|---------------|---------------|---------------|----------------|----------------|-----------------|-----------------|----------------------|----------------|
| CA -1      | 66.60        | 61.60        | 33.40       | 38.40       | 13.90              | 12.80              | 0.35              | 0.40              | 0.60          | 0.62          | 37.30         | 36.73         | 50.18          | 44.48          | 14.33           | 12.65           | 89.85                | 0.17           |
| CA -2      | 64.60        | 63.90        | 35.40       | 36.10       | 13.20              | 15.50              | 0.48              | 0.46              | 0.76          | 0.77          | 46.20         | 35.62         | 65.12          | 58.02          | 19.68           | 22.30           | 89.88                | 0.19           |
| CA -3      | 61.50        | 60.70        | 38.50       | 39.30       | 11.70              | 10.40              | 0.49              | 0.48              | 0.85          | 0.87          | 46.43         | 38.23         | 57.97          | 51.40          | 14.63           | 19.80           | 96.00                | 0.25           |
| CA -4      | 63.20        | 59.60        | 36.80       | 40.40       | 12.80              | 9.80               | 0.62              | 0.57              | 1.03          | 1.03          | 53.20         | 54.00         | 60.87          | 61.27          | 19.40           | 15.53           | 95.00                | 0.22           |
| CA -5      | 64.40        | 65.60        | 35.60       | 34.40       | 15.80              | 14.30              | 0.38              | 0.40              | 0.77          | 0.74          | 26.90         | 37.34         | 49.00          | 48.54          | 20.66           | 19.36           | 110.64               | 0.16           |
| CA -6      | 64.20        | 67.80        | 35.80       | 32.20       | 17.60              | 13.10              | 0.24              | 0.38              | 0.33          | 0.36          | 41.63         | 47.40         | 54.87          | 50.80          | 15.90           | 15.47           | 62.60                | 0.15           |
| CA -7      | 61.10        | 61.70        | 38.90       | 38.30       | 10.30              | 10.10              | 0.55              | 0.55              | 1.20          | 1.16          | 42.67         | 40.93         | 55.23          | 57.43          | 13.30           | 17.10           | 117.40               | 0.24           |
| CA -8      | 62.70        | 63.90        | 37.30       | 36.10       | 13.90              | 13.20              | 0.49              | 0.42              | 0.81          | 0.82          | 37.88         | 41.64         | 50.90          | 59.54          | 16.24           | 14.86           | 99.20                | 0.24           |
| CA -9      | 64.40        | 61.30        | 35.40       | 38.70       | 14.00              | 13.10              | 0.41              | 0.45              | 0.77          | 0.79          | 41.98         | 37.70         | 53.23          | 38.70          | 12.18           | 9.13            | 99.00                | 0.20           |
| CA -10     | 72.30        | 75.20        | 27.70       | 24.80       | 21.20              | 25.60              | 0.32              | 0.33              | 0.41          | 0.44          | 29.70         | 38.72         | 44.66          | 43.58          | 19.14           | 11.28           | 73.20                | 0.26           |
| CA -11     | 64.10        | 64.50        | 35.90       | 35.50       | 14.00              | 14.60              | 0.43              | 0.38              | 0.52          | 0.54          | 32.10         | 39.78         | 47.18          | 56.00          | 17.68           | 19.95           | 73.50                | 0.24           |
| CA -12     | 59.80        | 60.90        | 40.20       | 39.10       | 13.20              | 8.20               | 0.54              | 0.44              | 1.05          | 0.92          | 36.96         | 41.40         | 54.34          | 50.22          | 16.40           | 14.10           | 110.80               | 0.24           |
| CA -13     | 55.80        | 56.10        | 44.20       | 43.90       | 6.50               | 4.90               | 0.64              | 0.66              | 1.31          | 1.31          | 43.92         | 43.48         | 62.20          | 65.28          | 28.06           | 27.20           | 105.60               | 0.17           |
| CA -14     | 61.20        | 60.90        | 38.60       | 39.10       | 13.50              | 11.10              | 0.48              | 0.50              | 0.86          | 0.87          | 40.90         | 36.16         | 52.34          | 53.58          | 18.66           | 15.26           | 97.44                | 0.19           |
| CA -15     | 61.80        | 66.90        | 38.20       | 33.10       | 14.40              | 13.50              | 0.44              | 0.44              | 0.68          | 0.71          | 33.42         | 43.14         | 45.94          | 62.07          | 21.80           | 23.62           | 89.40                | 0.21           |
| CA -16     | 60.70        | 60.00        | 39.30       | 40.00       | 10.20              | 10.30              | 0.57              | 0.55              | 1.13          | 1.14          | 49.73         | 51.78         | 68.08          | 70.03          | 20.80           | 22.90           | 110.50               | 0.16           |
| CA -17     | 69.30        | 72.10        | 30.70       | 27.90       | 21.20              | 21.20              | 0.30              | 0.28              | 0.49          | 0.49          | 37.16         | 38.24         | 37.22          | 63.14          | 11.24           | 8.10            | 93.80                | 0.27           |
| CA -18     | 64.00        | 60.60        | 36.00       | 39.40       | 12.50              | 11.30              | 0.41              | 0.43              | 0.79          | 0.77          | 40.34         | 41.66         | 59.90          | 62.22          | 17.36           | 13.70           | 102.84               | 0.17           |
| CA -19     | 64.10        | 67.20        | 35.90       | 32.80       | 16.00              | 15.30              | 0.32              | 0.33              | 0.64          | 0.64          | 44.50         | 41.68         | 56.26          | 50.92          | 10.96           | 12.54           | 105.70               | 0.23           |

**Table 6**  
Hereditary spastica paraparesis (HSP) patients' gait spatio-temporal parameters and joint kinematics.

| Subject-ID | R Stance (%) | L Stance (%) | R Swing (%) | L Swing (%) | R Double Supp. (%) | L Double Supp. (%) | R Step Length (m) | L Step Length (m) | R Speed (m/s) | L Speed (m/s) | R Hip ROM (°) | L Hip ROM (°) | R Knee ROM (°) | L Knee ROM (°) | R Ankle ROM (°) | L Ankle ROM (°) | Cadence (n°step/min) | Step Width (m) |
|------------|--------------|--------------|-------------|-------------|--------------------|--------------------|-------------------|-------------------|---------------|---------------|---------------|---------------|----------------|----------------|-----------------|-----------------|----------------------|----------------|
| HSP-1      | 75.10        | 78.80        | 24.40       | 21.20       | 30.40              | 22.20              | 0.30              | 0.33              | 0.10          | 0.10          | 45.90         | 33.40         | 59.70          | 53.20          | 24.80           | 22.70           | 18.00                | 0.11           |
| HSP-2      | 62.90        | 66.40        | 37.10       | 33.60       | 13.70              | 15.40              | 0.50              | 0.45              | 0.75          | 0.76          | 43.40         | 38.30         | 52.47          | 52.80          | 22.40           | 21.20           | 90.20                | 0.21           |
| HSP-3      | 62.50        | 64.00        | 37.50       | 36.00       | 12.80              | 14.20              | 0.50              | 0.49              | 0.81          | 0.82          | 41.80         | 35.90         | 56.10          | 58.40          | 31.10           | 45.80           | 93.20                | 0.14           |
| HSP-4      | 84.00        | 85.00        | 16.00       | 15.00       | 33.80              | 33.20              | 0.13              | 0.25              | 0.15          | 0.15          | 18.00         | 13.85         | 28.35          | 33.68          | 21.98           | 24.93           | 44.10                | 0.20           |
| HSP-5      | 59.80        | 60.70        | 40.30       | 39.30       | 9.90               | 11.60              | 0.58              | 0.64              | 1.17          | 1.21          | 44.40         | 48.35         | 58.75          | 68.73          | 29.05           | 29.20           | 110.60               | 0.17           |
| HSP-6      | 78.80        | 79.10        | 21.20       | 20.90       | 28.10              | 28.30              | 0.22              | 0.30              | 0.15          | 0.15          | 44.40         | 33.60         | 57.00          | 39.10          | 23.60           | 11.50           | 33.15                | 0.18           |
| HSP-7      | 61.10        | 60.50        | 38.90       | 39.50       | 10.50              | 11.60              | 0.49              | 0.45              | 0.83          | 0.84          | 42.38         | 41.83         | 39.40          | 44.80          | 19.78           | 17.88           | 98.55                | 0.14           |
| HSP-8      | 61.40        | 59.40        | 38.60       | 40.60       | 10.70              | 9.60               | 0.55              | 0.55              | 1.00          | 0.99          | 48.70         | 40.22         | 46.04          | 47.26          | 15.68           | 14.76           | 98.40                | 0.18           |
| HSP-9      | 63.00        | 63.20        | 37.00       | 36.80       | 11.30              | 14.20              | 0.55              | 0.58              | 0.89          | 0.89          | 36.20         | 38.96         | 36.14          | 41.32          | 23.96           | 19.94           | 89.16                | 0.19           |
| HSP-10     | 64.50        | 72.50        | 35.50       | 27.50       | 20.10              | 18.30              | 0.25              | 0.33              | 0.33          | 0.34          | 20.60         | 39.30         | 24.60          | 47.40          | 12.70           | 16.90           | 66.80                | 0.19           |
| HSP-11     | 63.20        | 62.50        | 36.80       | 37.50       | 13.80              | 12.70              | 0.47              | 0.48              | 0.79          | 0.82          | 45.70         | 44.10         | 59.00          | 62.50          | 34.90           | 27.60           | 95.60                | 0.13           |
| HSP-12     | 62.90        | 63.70        | 37.10       | 36.30       | 14.50              | 12.00              | 0.45              | 0.46              | 0.71          | 0.72          | 39.70         | 43.10         | 46.50          | 48.50          | 19.80           | 20.60           | 88.20                | 0.17           |
| HSP-13     | 58.90        | 59.30        | 41.10       | 40.70       | 8.60               | 8.80               | 0.56              | 0.57              | 1.07          | 1.09          | 46.70         | 49.17         | 62.73          | 61.43          | 37.27           | 28.97           | 106.60               | 0.15           |
| HSP-14     | 77.30        | 80.20        | 22.70       | 19.80       | 27.40              | 32.90              | 0.30              | 0.24              | 0.14          | 0.15          | 32.38         | 40.85         | 39.15          | 47.28          | 25.53           | 31.30           | 29.40                | 0.14           |
| HSP-15     | 68.60        | 66.50        | 31.40       | 33.50       | 15.80              | 20.50              | 0.38              | 0.32              | 0.42          | 0.43          | 31.80         | 29.40         | 38.23          | 33.20          | 18.90           | 21.53           | 68.20                | 0.14           |
| HSP-16     | 60.80        | 59.60        | 39.20       | 40.40       | 12.60              | 8.20               | 0.60              | 0.63              | 1.12          | 1.12          | 44.77         | 48.83         | 44.17          | 44.03          | 23.30           | 28.37           | 101.80               | 0.21           |
| HSP-17     | 66.60        | 65.60        | 32.80       | 34.40       | 13.90              | 17.60              | 0.40              | 0.45              | 0.63          | 0.63          | 31.20         | 33.83         | 36.53          | 36.07          | 15.03           | 13.03           | 85.20                | 0.17           |
| HSP-18     | 60.10        | 60.40        | 39.90       | 39.60       | 10.50              | 10.10              | 0.61              | 0.58              | 1.13          | 1.14          | 50.73         | 43.50         | 63.63          | 57.05          | 37.85           | 27.73           | 106.00               | 0.14           |
| HSP-19     | 61.20        | 61.60        | 38.80       | 38.40       | 12.20              | 11.10              | 0.62              | 0.60              | 1.18          | 1.19          | 45.76         | 45.80         | 27.96          | 40.52          | 18.58           | 23.30           | 107.76               | 0.14           |
| HSP-20     | 88.30        | 86.40        | 11.70       | 13.60       | 37.90              | 35.70              | 0.13              | 0.15              | 0.12          | 0.12          | 25.55         | 16.20         | 37.35          | 28.55          | 13.95           | 18.68           | 51.00                | 0.24           |
| HSP-21     | 78.60        | 82.60        | 21.40       | 17.40       | 28.40              | 32.30              | 0.17              | 0.17              | 0.14          | 0.13          | 11.72         | 10.28         | 17.18          | 16.88          | 26.60           | 29.32           | 46.08                | 0.28           |
| HSP-22     | 66.50        | 70.50        | 33.50       | 29.50       | 16.90              | 20.30              | 0.31              | 0.35              | 0.46          | 0.46          | 40.06         | 37.66         | 36.26          | 25.66          | 12.84           | 22.80           | 81.12                | 0.17           |
| HSP-23     | 79.30        | 80.80        | 20.70       | 19.20       | 29.00              | 31.00              | 0.26              | 0.25              | 0.19          | 0.18          | 28.70         | 45.78         | 31.40          | 47.63          | 8.33            | 10.45           | 41.55                | 0.13           |
| HSP-24     | 68.10        | 65.90        | 31.90       | 34.10       | 18.10              | 15.70              | 0.37              | 0.34              | 0.63          | 0.61          | 39.87         | 32.13         | 45.97          | 35.23          | 23.87           | 21.00           | 94.60                | 0.16           |
| HSP-25     | 72.80        | 71.00        | 27.20       | 29.00       | 20.20              | 21.90              | 0.34              | 0.39              | 0.47          | 0.47          | 35.58         | 41.92         | 34.44          | 37.26          | 29.58           | 21.74           | 70.68                | 0.16           |
| HSP-26     | 60.30        | 57.60        | 39.70       | 42.40       | 8.60               | 9.20               | 0.46              | 0.45              | 1.02          | 1.02          | 32.80         | 42.72         | 46.84          | 41.10          | 28.78           | 22.90           | 123.60               | 0.17           |

**Table 7**

Parkinson's disease (PD) patients' gait spatio-temporal parameters and joint kinematics.

| Subject_ID | R Stance (%) | L Stance (%) | R Swing (%) | L Swing (%) | R Double Supp. (%) | L Double Supp.(%) | R Step Lenght (m) | L Step Lenght (m) | R Speed (m/s) | L Speed (m/s) | R Hip ROM (°) | L Hip ROM (°) | R Knee ROM (°) | L Knee ROM (°) | R Ankle ROM (°) | L Ankle ROM (°) | Cadence (n°step/min) | Step Width (m) |
|------------|--------------|--------------|-------------|-------------|--------------------|-------------------|-------------------|-------------------|---------------|---------------|---------------|---------------|----------------|----------------|-----------------|-----------------|----------------------|----------------|
| PD-1       | 58.90        | 63.70        | 41.10       | 36.30       | 12.80              | 9.80              | 0.44              | 0.56              | 0.82          | 0.83          | 32.47         | 44.47         | 35.13          | 57.33          | 23.63           | 27.80           | 92.80                | 0.15           |
| PD-2       | 68.10        | 67.30        | 31.90       | 32.70       | 19.70              | 15.60             | 0.29              | 0.23              | 0.44          | 0.45          | 19.12         | 20.66         | 29.72          | 31.02          | 17.48           | 16.70           | 99.24                | 0.15           |
| PD-3       | 60.80        | 62.20        | 39.20       | 37.80       | 12.30              | 11.90             | 0.45              | 0.46              | 0.92          | 0.93          | 41.60         | 40.63         | 52.10          | 49.85          | 22.73           | 22.55           | 110.55               | 0.16           |
| PD-4       | 63.40        | 62.00        | 36.60       | 38.00       | 12.20              | 12.10             | 0.52              | 0.55              | 0.89          | 0.91          | 38.90         | 36.18         | 57.75          | 57.90          | 29.65           | 34.55           | 93.00                | 0.15           |
| PD-5       | 69.50        | 72.40        | 30.50       | 27.60       | 16.30              | 24.30             | 0.34              | 0.31              | 0.41          | 0.40          | 28.10         | 26.68         | 42.55          | 41.23          | 26.63           | 24.85           | 69.45                | 0.18           |
| PD-6       | 61.40        | 57.90        | 38.60       | 42.10       | 8.90               | 10.90             | 0.44              | 0.46              | 0.96          | 0.98          | 35.53         | 31.53         | 55.33          | 49.93          | 19.33           | 18.65           | 116.20               | 0.15           |
| PD-7       | 61.70        | 60.90        | 38.30       | 39.10       | 11.50              | 11.70             | 0.52              | 0.50              | 0.84          | 0.87          | 40.60         | 43.70         | 49.97          | 50.77          | 20.30           | 22.30           | 93.80                | 0.17           |
| PD-8       | 57.90        | 58.70        | 42.10       | 41.30       | 8.30               | 7.40              | 0.56              | 0.55              | 0.96          | 0.95          | 42.30         | 38.50         | 61.10          | 56.90          | 27.33           | 23.10           | 94.40                | 0.17           |
| PD-9       | 60.70        | 59.00        | 39.30       | 41.00       | 10.10              | 9.30              | 0.51              | 0.47              | 0.92          | 0.92          | 38.05         | 33.38         | 53.08          | 40.98          | 21.10           | 16.65           | 103.95               | 0.15           |
| PD-10      | 61.00        | 60.70        | 39.00       | 39.30       | 12.60              | 9.20              | 0.38              | 0.38              | 0.70          | 0.70          | 31.66         | 29.64         | 46.40          | 43.97          | 20.97           | 22.23           | 102.48               | 0.15           |
| PD-11      | 77.70        | 75.30        | 22.30       | 24.70       | 29.60              | 24.30             | 0.14              | 0.23              | 0.19          | 0.19          | 25.82         | 21.50         | 27.50          | 26.62          | 11.84           | 11.92           | 59.40                | 0.16           |
| PD-12      | 66.40        | 65.10        | 33.60       | 34.90       | 14.40              | 17.50             | 0.40              | 0.39              | 0.59          | 0.65          | 35.00         | 33.27         | 41.23          | 40.00          | 19.03           | 21.43           | 89.00                | 0.14           |
| PD-13      | 63.80        | 64.30        | 36.20       | 35.70       | 15.30              | 13.30             | 0.34              | 0.36              | 0.52          | 0.52          | 30.23         | 30.53         | 50.25          | 57.80          | 21.28           | 24.50           | 83.70                | 0.16           |
| PD-14      | 60.40        | 59.00        | 39.60       | 41.00       | 10.30              | 9.80              | 0.46              | 0.48              | 0.90          | 0.90          | 44.83         | 41.50         | 52.77          | 45.60          | 20.60           | 23.10           | 105.40               | 0.14           |
| PD-15      | 63.10        | 62.50        | 36.90       | 37.50       | 13.10              | 12.80             | 0.37              | 0.43              | 0.96          | 0.97          | 36.30         | 38.18         | 50.15          | 52.25          | 19.55           | 20.35           | 133.65               | 0.18           |
| PD-16      | 64.20        | 64.30        | 35.80       | 35.70       | 12.60              | 17.30             | 0.43              | 0.44              | 0.73          | 0.74          | 32.77         | 29.97         | 46.67          | 43.83          | 25.97           | 23.73           | 94.60                | 0.15           |
| PD-17      | 70.00        | 64.80        | 30.00       | 35.20       | 19.60              | 15.60             | 0.31              | 0.37              | 0.51          | 0.50          | 29.40         | 28.90         | 42.75          | 32.85          | 22.48           | 27.05           | 86.85                | 0.16           |
| PD-18      | 66.10        | 63.00        | 33.90       | 37.00       | 14.60              | 14.80             | 0.36              | 0.37              | 0.66          | 0.66          | 29.34         | 25.62         | 48.70          | 37.66          | 18.00           | 13.32           | 100.80               | 0.16           |
| PD-19      | 62.70        | 64.50        | 37.30       | 1.60        | 14.60              | 13.00             | 0.38              | 0.35              | 0.66          | 0.66          | 35.33         | 29.93         | 50.23          | 39.83          | 17.65           | 18.13           | 100.50               | 0.13           |
| PD-20      | 59.20        | 60.60        | 40.80       | 39.40       | 9.50               | 10.10             | 0.40              | 0.40              | 0.84          | 0.82          | 29.85         | 28.10         | 44.50          | 47.48          | 15.22           | 20.48           | 116.40               | 0.17           |
| PD-21      | 61.40        | 61.90        | 38.60       | 38.10       | 11.80              | 11.30             | 0.47              | 0.41              | 0.95          | 0.97          | 27.20         | 30.96         | 45.76          | 55.22          | 18.96           | 28.64           | 122.40               | 0.19           |
| PD-22      | 61.40        | 62.50        | 38.60       | 37.50       | 10.90              | 13.10             | 0.35              | 0.37              | 0.70          | 0.71          | 29.04         | 29.00         | 37.14          | 39.34          | 17.52           | 19.78           | 111.00               | 0.14           |
| PD-23      | 60.80        | 60.20        | 39.20       | 39.80       | 11.10              | 10.00             | 0.57              | 0.57              | 1.19          | 1.22          | 44.25         | 45.61         | 56.58          | 74.15          | 26.10           | 27.08           | 118.20               | 0.12           |
| PD-24      | 55.50        | 64.80        | 44.50       | 35.20       | 11.40              | 9.60              | 0.52              | 0.52              | 0.81          | 0.80          | 45.33         | 47.30         | 45.83          | 52.95          | 23.38           | 32.30           | 84.75                | 0.15           |
| PD-25      | 65.40        | 62.70        | 34.60       | 37.30       | 14.50              | 13.40             | 0.43              | 0.46              | 0.88          | 0.90          | 39.53         | 37.83         | 52.30          | 54.50          | 27.50           | 24.60           | 110.00               | 0.15           |
| PD-26      | 63.70        | 59.90        | 36.30       | 40.10       | 12.00              | 11.40             | 0.49              | 0.49              | 0.98          | 1.00          | 35.53         | 36.98         | 54.58          | 61.20          | 29.05           | 26.08           | 112.20               | 0.18           |
| PD-27      | 62.10        | 62.20        | 37.90       | 37.80       | 11.30              | 13.40             | 0.44              | 0.51              | 0.95          | 0.95          | 44.03         | 38.33         | 53.83          | 52.23          | 19.38           | 18.38           | 112.80               | 0.16           |
| PD-28      | 68.50        | 66.30        | 31.50       | 33.70       | 16.40              | 18.20             | 0.35              | 0.34              | 0.42          | 0.42          | 26.98         | 29.84         | 43.14          | 44.60          | 29.76           | 25.40           | 67.92                | 0.17           |
| PD-29      | 61.30        | 59.30        | 38.70       | 40.70       | 11.20              | 9.00              | 0.58              | 0.59              | 1.18          | 1.19          | 19.96         | 20.22         | 56.27          | 48.00          | 24.87           | 23.83           | 112.80               | 0.14           |
| PD-30      | 61.70        | 63.00        | 38.30       | 37.00       | 11.80              | 11.90             | 0.40              | 0.42              | 0.78          | 0.78          | 38.37         | 40.20         | 55.30          | 55.37          | 17.03           | 23.57           | 107.60               | 0.15           |
| PD-31      | 64.50        | 64.40        | 35.50       | 35.60       | 14.30              | 14.50             | 0.41              | 0.41              | 0.77          | 0.78          | 27.43         | 29.27         | 45.53          | 45.03          | 22.47           | 16.67           | 105.60               | 0.19           |
| PD-32      | 71.20        | 70.60        | 28.80       | 29.40       | 22.10              | 21.50             | 0.12              | 0.12              | 0.26          | 0.25          | 15.30         | 15.87         | 23.63          | 27.23          | 14.00           | 16.47           | 82.40                | 0.18           |



**Table 8**  
Healthy controls' (HC) gait spatio-temporal parameters and joint kinematics.

| Subject_ID | R Stance (%) | L Stance (%) | R Swing (%) | L Swing (%) | R Double Supp. (%) | L Double Supp. (%) | R Step Length (m) | L Step Length (m) | R Speed (m/s) | L Speed (m/s) | R Hip ROM (°) | L Hip ROM (°) | R Knee ROM (°) | L Knee ROM (°) | R Ankle ROM (°) | L Ankle ROM (°) | Cadence (n°step/min) | Step Width (m) |
|------------|--------------|--------------|-------------|-------------|--------------------|--------------------|-------------------|-------------------|---------------|---------------|---------------|---------------|----------------|----------------|-----------------|-----------------|----------------------|----------------|
| HC-1       | 63.40        | 62.00        | 36.60       | 38.00       | 12.70              | 12.40              | 0.48              | 0.48              | 0.82          | 0.82          | 39.50         | 38.60         | 59.70          | 68.00          | 35.30           | 26.33           | 92.40                | 0.14           |
| HC-2       | 63.40        | 64.70        | 36.60       | 35.30       | 13.60              | 13.90              | 0.56              | 0.55              | 0.86          | 0.87          | 43.78         | 36.70         | 58.63          | 57.45          | 26.73           | 36.70           | 87.45                | 0.19           |
| HC-3       | 66.70        | 67.70        | 33.30       | 32.30       | 18.00              | 16.30              | 0.44              | 0.43              | 0.41          | 0.42          | 41.02         | 35.00         | 51.56          | 56.72          | 39.36           | 28.72           | 54.60                | 0.16           |
| HC-4       | 64.50        | 64.00        | 35.50       | 36.00       | 14.80              | 14.30              | 0.46              | 0.45              | 0.62          | 0.61          | 38.14         | 36.72         | 60.78          | 54.24          | 35.98           | 29.88           | 75.60                | 0.15           |
| HC-5       | 66.60        | 66.30        | 33.40       | 33.70       | 15.40              | 17.70              | 0.38              | 0.47              | 0.64          | 0.65          | 36.08         | 34.90         | 47.04          | 49.76          | 21.56           | 34.90           | 85.44                | 0.14           |
| HC-6       | 64.30        | 65.10        | 35.70       | 34.90       | 14.60              | 14.40              | 0.47              | 0.44              | 0.60          | 0.59          | 36.34         | 36.10         | 58.60          | 58.92          | 20.18           | 22.54           | 73.44                | 0.20           |
| HC-7       | 64.10        | 61.50        | 35.90       | 38.50       | 13.50              | 13.60              | 0.50              | 0.53              | 0.76          | 0.78          | 41.78         | 43.83         | 61.90          | 58.63          | 27.43           | 43.83           | 82.35                | 0.15           |
| HC-8       | 66.70        | 64.30        | 33.30       | 35.70       | 15.70              | 15.40              | 0.45              | 0.44              | 0.63          | 0.63          | 35.32         | 38.32         | 59.08          | 60.50          | 27.18           | 38.32           | 80.52                | 0.16           |
| HC-9       | 64.60        | 64.10        | 35.40       | 35.90       | 14.20              | 15.60              | 0.46              | 0.46              | 0.78          | 0.79          | 35.57         | 41.63         | 55.93          | 59.87          | 27.10           | 30.50           | 95.60                | 0.13           |
| HC-10      | 60.90        | 63.50        | 39.10       | 36.50       | 10.70              | 15.10              | 0.51              | 0.52              | 0.79          | 0.81          | 44.20         | 45.73         | 64.33          | 64.17          | 24.83           | 26.33           | 86.20                | 0.15           |
| HC-11      | 61.30        | 62.70        | 38.70       | 37.30       | 12.80              | 11.30              | 0.48              | 0.49              | 0.82          | 0.80          | 40.17         | 40.53         | 60.83          | 62.20          | 24.77           | 40.53           | 91.80                | 0.13           |
| HC-12      | 64.90        | 63.50        | 35.10       | 36.50       | 13.70              | 15.20              | 0.44              | 0.44              | 0.72          | 0.72          | 35.66         | 36.14         | 56.66          | 54.68          | 21.84           | 22.10           | 90.48                | 0.19           |
| HC-13      | 66.90        | 66.20        | 33.10       | 33.80       | 14.80              | 16.80              | 0.50              | 0.43              | 0.83          | 0.86          | 37.80         | 41.15         | 51.50          | 57.65          | 31.25           | 41.15           | 101.10               | 0.16           |
| HC-14      | 63.30        | 62.40        | 36.70       | 37.60       | 13.20              | 12.10              | 0.48              | 0.46              | 0.72          | 0.72          | 44.70         | 44.22         | 65.32          | 72.78          | 35.00           | 29.38           | 86.04                | 0.16           |
| HC-15      | 65.40        | 64.80        | 34.60       | 35.20       | 14.30              | 15.30              | 0.45              | 0.48              | 0.68          | 0.68          | 33.57         | 32.63         | 52.90          | 52.53          | 26.30           | 32.63           | 81.20                | 0.17           |
| HC-16      | 64.70        | 62.00        | 35.30       | 38.00       | 13.10              | 14.10              | 0.54              | 0.56              | 0.83          | 0.86          | 41.26         | 45.66         | 56.06          | 54.40          | 29.24           | 34.96           | 85.08                | 0.17           |
| HC-17      | 65.80        | 64.70        | 34.20       | 35.30       | 16.40              | 15.80              | 0.43              | 0.42              | 0.54          | 0.55          | 37.52         | 39.08         | 39.00          | 43.90          | 17.38           | 39.08           | 72.24                | 0.12           |
| HC-18      | 65.00        | 65.40        | 35.00       | 34.60       | 15.60              | 15.10              | 0.42              | 0.47              | 0.68          | 0.68          | 35.16         | 33.98         | 42.94          | 50.10          | 24.88           | 33.98           | 84.12                | 0.14           |
| HC-19      | 62.00        | 61.80        | 38.00       | 38.20       | 11.50              | 13.40              | 0.57              | 0.55              | 0.98          | 0.98          | 49.00         | 47.87         | 57.80          | 56.30          | 37.37           | 47.87           | 95.40                | 0.14           |
| HC-20      | 60.80        | 61.70        | 39.20       | 38.30       | 12.00              | 10.90              | 0.49              | 0.50              | 0.97          | 0.97          | 47.60         | 46.73         | 67.40          | 57.77          | 25.27           | 33.87           | 106.80               | 0.13           |
| HC-21      | 62.50        | 63.00        | 37.50       | 37.00       | 13.00              | 12.40              | 0.50              | 0.46              | 0.77          | 0.77          | 36.68         | 36.70         | 51.60          | 51.56          | 21.70           | 21.42           | 88.92                | 0.15           |
| HC-22      | 66.60        | 67.40        | 33.40       | 32.60       | 18.20              | 15.60              | 0.44              | 0.44              | 0.59          | 0.59          | 36.68         | 37.96         | 57.46          | 56.36          | 29.82           | 31.48           | 73.56                | 0.13           |
| HC-23      | 62.90        | 62.70        | 37.10       | 37.30       | 13.40              | 12.00              | 0.47              | 0.42              | 0.79          | 0.79          | 30.82         | 34.36         | 49.50          | 48.32          | 24.20           | 28.46           | 98.04                | 0.13           |
| HC-24      | 62.70        | 61.90        | 37.30       | 38.10       | 11.30              | 12.50              | 0.47              | 0.49              | 0.85          | 0.87          | 36.63         | 35.20         | 58.88          | 59.50          | 25.65           | 20.85           | 98.85                | 0.16           |
| HC-25      | 64.40        | 64.80        | 35.60       | 35.20       | 12.60              | 16.10              | 0.46              | 0.53              | 0.73          | 0.75          | 36.00         | 34.50         | 54.35          | 52.15          | 30.30           | 34.50           | 82.50                | 0.19           |
| HC-26      | 63.80        | 64.30        | 36.20       | 35.70       | 14.50              | 13.60              | 0.44              | 0.48              | 0.66          | 0.66          | 34.90         | 41.23         | 47.55          | 56.80          | 27.08           | 28.10           | 78.00                | 0.16           |
| HC-27      | 59.00        | 59.30        | 41.00       | 40.70       | 9.30               | 9.30               | 0.70              | 0.63              | 1.23          | 1.20          | 41.43         | 42.43         | 67.37          | 71.57          | 40.43           | 42.43           | 104.40               | 0.21           |
| HC-28      | 63.30        | 62.00        | 36.70       | 38.00       | 12.50              | 13.40              | 0.47              | 0.47              | 0.73          | 0.72          | 36.23         | 37.57         | 52.67          | 57.00          | 27.50           | 37.57           | 85.60                | 0.13           |
| HC-29      | 66.40        | 63.80        | 33.60       | 36.20       | 15.50              | 15.30              | 0.42              | 0.46              | 0.59          | 0.61          | 35.62         | 37.82         | 52.86          | 56.74          | 20.82           | 19.28           | 73.92                | 0.19           |
| HC-30      | 63.10        | 62.10        | 36.90       | 37.90       | 14.00              | 12.30              | 0.45              | 0.44              | 0.74          | 0.73          | 34.62         | 36.78         | 58.26          | 63.08          | 29.70           | 36.78           | 90.60                | 0.72           |
| HC-31      | 66.80        | 64.10        | 33.20       | 35.90       | 16.80              | 15.00              | 0.52              | 0.54              | 0.84          | 0.86          | 43.32         | 47.10         | 53.58          | 59.70          | 27.20           | 32.18           | 88.80                | 0.21           |
| HC-32      | 63.80        | 64.20        | 36.20       | 35.80       | 15.00              | 13.20              | 0.52              | 0.49              | 0.76          | 0.76          | 40.24         | 42.30         | 60.26          | 60.36          | 27.08           | 42.30           | 83.76                | 0.13           |
| HC-33      | 64.40        | 64.10        | 35.60       | 35.90       | 14.20              | 13.60              | 0.45              | 0.46              | 0.70          | 0.69          | 39.38         | 33.58         | 44.83          | 47.93          | 22.60           | 21.25           | 85.35                | 0.17           |
| HC-34      | 63.80        | 63.00        | 36.20       | 37.00       | 13.60              | 13.00              | 0.44              | 0.42              | 0.71          | 0.74          | 33.62         | 35.86         | 47.22          | 50.10          | 20.06           | 35.86           | 95.52                | 0.16           |
| HC-35      | 65.00        | 62.30        | 35.00       | 37.70       | 14.50              | 13.20              | 0.49              | 0.51              | 0.81          | 0.80          | 41.83         | 41.40         | 58.35          | 62.48          | 31.68           | 41.40           | 90.00                | 0.14           |
| HC-36      | 63.30        | 62.30        | 36.70       | 37.70       | 13.30              | 12.50              | 0.60              | 0.56              | 0.92          | 0.93          | 43.08         | 44.58         | 52.98          | 47.74          | 23.60           | 44.58           | 88.92                | 0.17           |
| HC-37      | 67.40        | 66.10        | 32.60       | 33.90       | 18.30              | 18.00              | 0.41              | 0.34              | 0.52          | 0.53          | 28.80         | 26.24         | 53.30          | 45.24          | 18.40           | 26.24           | 74.64                | 0.20           |

|       |       |       |       |       |       |       |      |      |      |      |       |       |       |       |       |       |        |      |
|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|-------|-------|-------|-------|-------|-------|--------|------|
| HC-38 | 62.70 | 64.40 | 37.30 | 35.60 | 14.10 | 14.00 | 0.49 | 0.49 | 0.72 | 0.70 | 39.42 | 41.76 | 47.18 | 45.06 | 26.54 | 41.76 | 82.32  | 0.20 |
| HC-39 | 60.70 | 60.50 | 39.30 | 39.50 | 11.40 | 9.70  | 0.61 | 0.58 | 1.02 | 1.01 | 39.90 | 42.33 | 49.57 | 58.23 | 23.50 | 42.33 | 93.40  | 0.15 |
| HC-40 | 61.00 | 60.90 | 39.00 | 39.10 | 11.40 | 10.90 | 0.55 | 0.51 | 0.86 | 0.87 | 40.86 | 46.36 | 60.26 | 52.70 | 33.40 | 35.12 | 89.88  | 0.13 |
| HC-41 | 60.60 | 61.10 | 39.40 | 38.90 | 9.80  | 12.10 | 0.60 | 0.63 | 1.06 | 1.05 | 48.25 | 44.75 | 60.50 | 60.33 | 37.50 | 44.75 | 94.50  | 0.16 |
| HC-42 | 64.90 | 65.30 | 35.10 | 34.70 | 14.60 | 15.90 | 0.49 | 0.46 | 0.66 | 0.67 | 35.50 | 37.90 | 44.95 | 46.75 | 18.05 | 18.00 | 77.40  | 0.19 |
| HC-43 | 62.00 | 60.50 | 38.00 | 39.50 | 11.10 | 11.90 | 0.54 | 0.54 | 1.09 | 1.10 | 36.18 | 39.13 | 50.48 | 53.83 | 25.30 | 39.13 | 110.40 | 0.15 |
| HC-44 | 67.50 | 66.30 | 32.50 | 33.70 | 17.20 | 16.20 | 0.40 | 0.43 | 0.63 | 0.62 | 33.55 | 35.00 | 54.50 | 51.65 | 28.70 | 35.00 | 84.30  | 0.20 |
| HC-45 | 68.30 | 67.80 | 31.70 | 32.20 | 18.60 | 17.60 | 0.43 | 0.47 | 0.57 | 0.57 | 37.87 | 39.43 | 56.87 | 54.40 | 28.47 | 39.43 | 70.00  | 0.15 |
| HC-46 | 65.50 | 66.50 | 34.50 | 33.50 | 17.00 | 15.40 | 0.43 | 0.44 | 0.58 | 0.59 | 40.13 | 38.63 | 56.43 | 59.43 | 23.73 | 38.63 | 75.45  | 0.15 |
| HC-47 | 63.20 | 61.70 | 36.80 | 38.30 | 13.00 | 11.90 | 0.48 | 0.46 | 0.93 | 0.92 | 36.80 | 38.75 | 55.35 | 55.60 | 26.40 | 38.75 | 109.80 | 0.20 |
| HC-48 | 66.10 | 64.90 | 33.90 | 35.10 | 15.40 | 15.60 | 0.46 | 0.46 | 0.70 | 0.71 | 35.58 | 36.34 | 45.18 | 57.24 | 30.82 | 36.34 | 87.60  | 0.15 |
| HC-49 | 61.60 | 61.20 | 38.40 | 38.80 | 11.60 | 10.90 | 0.49 | 0.47 | 0.91 | 0.91 | 48.88 | 47.68 | 58.15 | 66.40 | 27.78 | 47.68 | 104.40 | 0.12 |
| HC-50 | 67.40 | 67.50 | 32.60 | 32.50 | 17.40 | 17.30 | 0.35 | 0.42 | 0.55 | 0.56 | 26.04 | 28.94 | 34.06 | 43.62 | 13.94 | 16.30 | 81.12  | 0.22 |
| HC-51 | 60.90 | 61.00 | 39.10 | 39.00 | 11.20 | 11.50 | 0.60 | 0.56 | 0.88 | 0.87 | 36.12 | 37.38 | 60.34 | 60.68 | 34.16 | 30.20 | 84.00  | 0.20 |
| HC-52 | 61.20 | 60.60 | 38.80 | 39.00 | 11.50 | 11.60 | 0.56 | 0.52 | 0.78 | 0.76 | 48.34 | 43.66 | 61.08 | 62.34 | 30.82 | 34.20 | 79.56  | 0.15 |
| HC-53 | 60.30 | 60.90 | 39.70 | 39.10 | 9.70  | 11.20 | 0.60 | 0.64 | 1.20 | 1.22 | 43.67 | 45.53 | 45.77 | 52.10 | 31.27 | 45.53 | 102.20 | 0.18 |
| HC-54 | 66.10 | 64.90 | 33.90 | 35.10 | 15.10 | 15.80 | 0.43 | 0.43 | 0.60 | 0.59 | 34.04 | 30.88 | 48.10 | 49.60 | 18.02 | 30.88 | 75.36  | 0.16 |
| HC-55 | 64.70 | 65.70 | 35.30 | 34.30 | 15.90 | 14.10 | 0.43 | 0.48 | 0.60 | 0.59 | 38.18 | 35.66 | 51.16 | 48.62 | 20.00 | 27.60 | 97.20  | 0.16 |
| HC-56 | 59.70 | 59.90 | 40.30 | 40.10 | 12.20 | 10.00 | 0.51 | 0.49 | 0.89 | 0.89 | 39.70 | 40.63 | 60.78 | 65.35 | 26.25 | 40.63 | 99.30  | 0.14 |
| HC-57 | 65.40 | 67.60 | 34.60 | 32.40 | 16.70 | 16.40 | 0.46 | 0.46 | 0.57 | 0.57 | 41.45 | 43.10 | 57.80 | 59.35 | 39.00 | 43.10 | 68.10  | 0.12 |
| HC-58 | 63.70 | 63.80 | 36.30 | 36.10 | 13.70 | 13.50 | 0.54 | 0.50 | 0.84 | 0.84 | 41.94 | 43.36 | 58.26 | 55.16 | 19.88 | 21.08 | 90.36  | 0.21 |
| HC-59 | 65.20 | 64.20 | 34.80 | 35.80 | 15.30 | 14.10 | 0.38 | 0.41 | 0.70 | 0.70 | 29.88 | 30.84 | 49.44 | 48.60 | 19.66 | 30.84 | 97.44  | 0.21 |
| HC-60 | 63.80 | 63.90 | 36.20 | 36.10 | 12.70 | 14.20 | 0.54 | 0.50 | 0.70 | 0.70 | 42.38 | 42.86 | 59.94 | 59.68 | 24.88 | 23.22 | 95.76  | 0.19 |
| HC-61 | 64.30 | 63.30 | 35.70 | 36.70 | 14.10 | 13.50 | 0.48 | 0.54 | 0.88 | 0.88 | 41.07 | 41.57 | 55.03 | 59.30 | 26.00 | 41.57 | 94.20  | 0.16 |
| HC-62 | 58.80 | 60.50 | 41.20 | 39.50 | 10.50 | 7.30  | 0.49 | 0.45 | 0.91 | 0.89 | 41.23 | 41.20 | 53.17 | 60.93 | 33.17 | 41.20 | 103.20 | 0.14 |
| HC-63 | 65.00 | 65.80 | 35.00 | 34.20 | 16.10 | 14.50 | 0.44 | 0.48 | 0.57 | 0.57 | 36.08 | 38.56 | 40.44 | 47.44 | 16.48 | 38.56 | 69.72  | 0.15 |
| HC-64 | 64.10 | 63.60 | 35.90 | 36.40 | 14.40 | 13.10 | 0.48 | 0.52 | 0.73 | 0.74 | 37.78 | 36.62 | 55.86 | 50.32 | 34.88 | 36.62 | 82.08  | 0.15 |
| HC-65 | 65.80 | 63.60 | 34.20 | 36.40 | 14.50 | 14.40 | 0.42 | 0.43 | 0.71 | 0.70 | 33.38 | 33.18 | 50.44 | 49.18 | 23.26 | 33.18 | 92.64  | 0.16 |

The anatomical angles were computed for hip, knee, and ankle joints in the sagittal plane. From these variables, the RoM at each joint or segment, defined as the difference between the maximum and minimum value during the gait cycles, were derived. For each subject and each trial, kinematic data between two consecutive heel strikes of the same limb were time-normalized to 101 points, i.e. 0–100 % of the gait cycle, using a polynomial procedure, in order to exclude the influence of different stride durations, [3].

### Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at <https://doi.org/10.1016/j.dib.2017.12.022>.

### References

- [1] M. Serrao, G. Chini, M. Bergantino, D. Sarnari, C. Casali, C. Conte, A. Ranavolo, C. Marcotulli, M. Rinaldi, G. Coppola, F. Bini, F. Pierelli, F. Marinozzi . Identification of specific gait patterns in patients with cerebellar ataxia, spastic paraplegia, and Parkinson's disease: A non-hierarchical cluster analysis. *Hum. Mov. Sci.*, 2017, pii: S0167-9457(17)30089-1.
- [2] S.J. Howarth, J.P. Callaghan, Quantitative assessment of the accuracy for three interpolation techniques in kinematic analysis of human movement, *Comput. Methods Biomech. Biomed. Eng.* 13 (2010) 847–855.
- [3] S.A. England, K.P. Granata, The influence of gait speed on local dynamic stability of walking, *Gait Posture*. 25 (2007) 172–178.