Abstract: Acceleration, angular velocity and electromyographic (EMG) signal at the lower limb muscles, specially over both leg's Tibialis Anterior muscles are highly non-stationary, even if no perturbing influences can be identified during walking at any speed. This study analyzed the fractal dynamics (i.e., complexity of gait time series) in the walking gait time series of four types of signals obtained from wearable sensors such as IMUs (inertial measurement units), i.e., accelerometer signals which represents the acceleration experienced by the body, gyroscope signals which is the angular velocity, and magnetometer signals which is magnetic field vector, and Electromyographic (EMG) signal from both leg’s Tibialis Anterior muscles. Gait time series from twenty-two healthy participants were analyzed while they performed walking at their comfortable speed. The scaling exponents (i.e., α-values) of the gait dynamics were accomplished by evaluating their fluctuation through detrended fluctuation analysis (DFA), which is most common and widely used non-linear technique for any non-stationary time series. DFA (the scaling exponents α) results established an anti-persistent in EMG and acceleration signal, less persistent pattern in angular velocity and persistent (i.e., long-range or fractal-like correlations) in magnetometer signal. This fractal complexity or noise patterns obtained from the EMG and inertial signals might provide new approaches for assessing and forecasting sudden injury risk during walking.