

Summary result overview

Inclusion Criteria:

The patients were selected according to the following criteria:

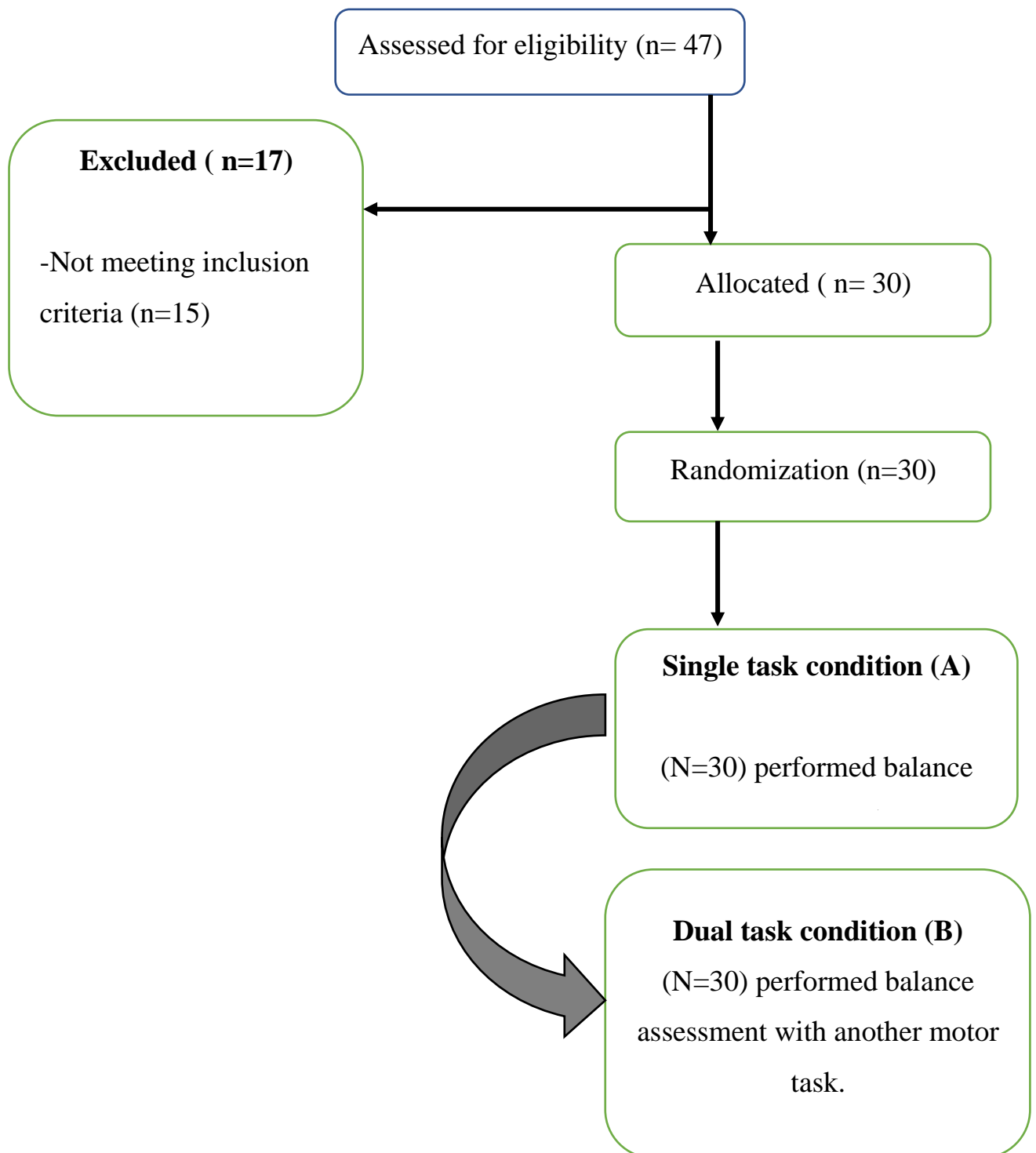
- Definite diagnosis of relapsing-remitting multiple sclerosis of ataxic type, fulfilled the Revised McDonald's criteria for diagnosis of multiple sclerosis 2010 (Polman et al., 2011).
- A score of 1.0 to 4.0 on the Expanded Disability Status Scale (EDSS).
- A score of 30 to 26 in Montreal Cognitive Assessment (MoCA).
- Age ranged from 30 – 40 years old.
- All patients were in the remission period.
- Last attack occurred at least in the past two months.
- All Patients were ambulant.
- Patients were medically stable.
- Ability to understand and follow instructions.
- Patients were free from any secondary complications such as contractures or deformities.
- Patients signed informed consent.

Exclusion Criteria

The patients were excluded when they have one of the followings:

- Any other neurological deficits or orthopedics abnormalities preventing participation in the study.

- Patients who have any other inflammatory or infectious diseases, e.g. arthritis.
- Pregnant female patients.
- Cardiovascular and Pulmonary diseases.
- Patients with active or uncontrolled pathologies (i.e. cancer, hypertension).
- Patients with severe cognitive deficits.
- Patients with any psychiatric disease.
- History of seizure.



Flow Chart of study participants

No adverse events.

Outcome measured:

- Balance indices under single task condition measured by Biodex balance system as , Mediolateral stability index , anteroposterior stability index, overall stability index.
- Balance indices under dual task condition measured by Biodex balance system as , Mediolateral stability index , anteroposterior stability index, overall stability index.
- Time of Timed up and go test(TUG) and (TUG-dual).

Summary results:

The selected patients balance was assessed under two different conditions.

Single task condition(A): Patients had balance assessment using Biodex Balance System and TUG test.

Dual task condition (B): Patients had balance assessment using Biodex Balance System under two motor dual tasks conditions “holding a tray task “and “coin transfer task” , besides the TUG -motor test.

Different balance variables were calculated after taking an average of total three trial for each task. The choice of starting task was done randomly for each patient with three days rest in between.

The comparison between the two conditions results revealed:

-Antero posterior stability index (APSI) : There was a significant difference in APSI between single , tray and coin transfer tasks, with a highest increase in the coin transfer task. The mean difference between single and coin transfer task showed high significant increase in APSI at coin transfer task , the mean difference between single and tray task showed no difference in APSI , the mean difference between tray and coin transfer task showed significant increase in APSI at coin transfer task.

-Medio lateral stability index (MLSI) : There was a significant difference in MLSI between single , tray and coin transfer tasks, with a highest increase in the coin transfer task. The mean difference between single and coin transfer task showed high significant increase in MLSI at coin transfer task , the mean difference between single and tray task showed no difference in MLSI , the mean difference between tray and coin transfer task showed significant increase in MLSI at coin transfer task.

-Overall stability index (OASI) : There was a significant difference in OASI between single , tray and coin transfer tasks, with a highest increase in the coin transfer task. The mean difference between single and coin transfer task showed significant increase in OASI at coin transfer task , the mean difference between single and tray task showed no difference in OASI, the mean difference between tray and coin transfer task showed significant increase in OASI at coin transfer task.

-Timed Up and Go Test (TUG and TUG dual) : There was a significant increase in time of TUG dual test in comparison to TUG single test time.