**RESEARCH PROPOSAL**

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**Research Proposal**

**1. Title**

* *Scientific title:* To Identify the effect of heat stress physical functioning in persons with Multiple sclerosis patient.
* *Lay title:* The effect of heat stress on the physical performance on individuals of Multiple sclerosis

**2. SUMMURY**

The current research aims to address the effect of heat stress on the physical functioning on MS patient. For the purpose of find out the effect of heat stress on multiple sclerosis patient comparison between two groups one with healthy individuals and the second will be patients with multiple sclerosis will be Performed. The data will be obtained with the help of scientific search engines and analyzed using Statistical methods.by assessing this topic, it will be possible to understand the effect of heat stress more in depth and to point the areas that need the participation of the scientific community to further research.

**3. Project Details**

**3.1 Background & Rationale**

MS is characterized by motor dysfunction and weakness in muscles. It is originated from autoimmune demyelination of the central nervous system (Christogianni et al., 2018). The localization of this demyelination results in different sets of symptoms; however, temperature sensitivity worsens them in all cases (Marino, 2009). The increasing prevalence rates of MS and the effects of temperature sensitivity in it (Sun, 2017) make this research relevant.. Following this topic, literature reviews were created to address the sensory and cognitive symptoms of MS patients when the temperature becomes a variable (Christogianni et al., 2018; Marino, 2009). Sun considered death rates and its link with temperature exposure, and finally, Chaseling, explored a possible solution to the effects of water on heat sensitivity management (Chaseling et al., 2018). These studies cover the impact and mechanisms of temperature sensitivity by studying groups of MS patients. However, considering the variability on the set of symptoms a patient can present, it has not been considered that the subjective outcomes patients provide can be used as a tool to create more reliable outcomes. The main purpose of the research is to measure heat stress in all stages of MS population and its effect on physical functioning

**3.2 Aims & Research Questions**

For this study to find out the effect of heat stress on the physical function and the worsening of the symptoms in the MS population in between 30-50 age group as well as to find out the effect of heat stress in all stages of MS population: PRMS: Relapse remitting; PPMS: Primary progressive; SPMS: Secondary progressive. This will serve as a form to understand more in-depth the necessity to address this topic and the main point that needs to be assessed by the scientific community. Therefore, the research question can be resumed as follows

* **How the heat stress impact on physical functioning in Multiple sclerosis patient?**

**3.3 Research Design & Methodology**

The study will use the randomized controlled trial (RCT) design for a population size of 30 patients. The Control Group (CG) will include 15 healthy patients while the Experimental Group (EG) will include 15 patients with diagnosed MS, as provided for under the inclusion and exclusion criteria

**3.3.1 Inclusion Criteria**

Patients that will be included in the EG must be a diagnosed MS patient with either primary, relapsing, remitting, or secondary progressive MS. Their expanded disability status scale (EDSS) must be between 0.0 and 5.5. The patients must belong to the age group 30-50 years.

**3.3.2 Exclusion Criteria**

Sample prospects that have the following clinical characteristics must not be included in the EG: any cardiac disease, hypertension (any increase in blood pressure before or during the screening process), other diseases that may preclude a sustained heat exposure, other medical and mental disability, and other diseases associated with the central nervous system (CNS) instead of MS.

**Setting**

The study will be performed in an outpatient department of the hospital properly arranged with the administration for the conduct of this study.

**3.4 Outcome Measure**

**The following outcome measures will be used to examine the physical function of MS patient.**

*1.The Timed 25-foot Walk Test (TWT)*

TWT, also known as the T25-FW, is the standard mobility tests used in the neurological diagnosis of MS and is popular among neurologists. Because MS damages some areas of the brain and the spinal cord, mobility problems are expected to manifest in MS.

*2.Grip Strength (GS)*

GS is measured using a hydraulic hand dynamometer, which measures the power or torque of the muscles associated with the hand grip. As the patient squeezes the handles of the HHD, hand grip power can be calculated. Thus, HHS is commonly used in measuring the maximum grip force.

*3.The Five Time Sit to Stand Test (5T-SST)*

The 5T-SST measures an aspect of physically transferable skills. It provides a method to quantify the functional strength of the lower extremity while, simultaneously or separately, identifying the movement strategies that the patient uses to complete transitional movements.

*4.The Tandem Stance (TS)*

The TS is a clinical measure of the standing balance of the person with MS, assessing postural steadiness in a heel-to-toe position in a temporal manner.

**3.4.3 Experimental Test**

The experimental test will implement all measures in subsection 3.4.2 in two points: immediately after heat exposure (Point 1) and one hour after heat exposure (Point 2). Body temperature (T) will be measured using the Vital Sense® telemetric physiological Monitoring system (Mini Mitter Co., Inc., Ben, OR).

**3.5 Data Management & Analysis**

Group differences in age and physical functioning variables will be compared at baseline and after the experiment using the Mann-Whitney U-test. Meanwhile, differences between groups in sex will be controlled using the x2 test. The SPSS software will be used in this study to perform mathematical calculations of data obtained at the baseline, involving demographic data, to generate statistical descriptive analysis.

**4. Research Plan / Timeline**

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| --- | --- | --- | --- | --- | --- |
| Months | Key activities | | | | |
| Ethics  Application | Patient recruitment | Data collection | Data analysis  write up | Paper submission |
| 1 | *Week 1- 2*  Determination of ethical consequences | *Week 2 - 3*  Determination of exclusion criteria |  |  |  |
| 2 |  | *Week 1*  Determination of study groups | *Week 2- 4*  Determination of search engines |  |  |
| 3 |  |  | *Week 1- 4*  Collecting data process |  |  |
| 4 |  |  | *Week 1- 2*  Organization of the data obtained | *Week 3- 4*  Application of exclusion criterion |  |
| 5 |  |  |  | *Week 1- 4*  Analysis of outcome table |  |
| 6 |  |  |  | *Week 1- 2*  Conclusions | *Week 3- 4*  Last details and submission of paper |

**5. Budget / Costs**

As previously mentioned, this study represents low-cost research. The only costs that could be considered are the use of the EndNote program and the cost to access papers if needed.

