SUMMARY OF MEASUREMENTS

Collected data is included in the Excel. You can find 5 sheets. Articular, muscular and neural assessment + Psyc assessment baseline were taken at baseline (days from the accident can also be found on the sheets), and the last sheet, “Psyc assessment 6 months”, includes information collected thorugh e-mail 6 months after the first assessment. Therefore, only measurements of neck pain intensity, headache intensity, neck disability index, pain catastrophizing scale, tampa scale kinesiophobia-11, and the State-Trait Anxiety Inventory were collected.

You can also find subjects classified into 2 groups, according to the presence (group 1) or absence (group 2) of headache at baseline.

**Psychological assessment**

*Visual Analogue Scale (VAS).* Neck pain and headache intensity was assessed using the VAS, with a score varying from 0 to 100 (0=no pain; 100=worst pain imaginable), which has established good reliability.

*Neck Disability Index (NDI).* The Spanish version of the NDI was used to evaluate neck disability (internal consistency Chronbach’s alfa 0.80; excellent reliability ICC (95%CI)=0.88 [0.63 to 0-95]; good construct validity when compared to Global Rating of Change (p<0.001)) and is commonly used to assess disability in people with WAD.

*Tampa Scale Kinesiophobia-11 (TSK-11).* The Spanish version of the TSK-11 was used to measure fear of movement (internal consistency Chronbach’s alfa 0.79). This tool is composed of 11 items and scores range from 1 (strongly disagree) to 4 (completely agree). The total score can range from 11 to 44, with higher scores reflecting greater kinesiophobia. The TSK-11 has good test-retest reliability (ICC (95% CI) 0.81 (0.71 to 0.88)) and a highly significant correlation with change scores on the TSK (r=0.93, P<0.001).

*Pain Catastrophizing Scale (PCS).* The Spanish version of the PCS was used (internal consistency Cronbach’s alfa 0.79, good test-retest reliability ICC 95%CI=0.84). This scale is composed of 13 items and the total score ranges from 0 to 52, with higher scores reflecting greater levels of pain catastrophizing. Good convergent validity was observed with a high correlation with the Fear Avoidance Belief Questionnaire (r=0.66).

*The State-Trait Anxiety Inventory.* The Spanish version of this questionnaire (internal consistency Cronbach’s alfa 0.92; test-retest reliability with an ICC of 0.80 (95%CI: 0.66 to 0.89) was used to assess anxiety; good construct validity since negative correlation was found with Short Form Health Survey-12 mental health (rho=-0.6752). This questionnaire comprises two different scales of 20 items each and scores range from 0-60, with higher scores indicating higher anxiety.

***Articular system***

*Cervical Range of Motion (CROM,º).* Flexion, extension, lateral-flexion and rotation were assessed in a relaxed sitting position using a smartphone Xiaomi® MiA2. Participants were asked to sit comfortably on a chair with back support with both feet flat on the floor, and their hips and knees at 90º. Smartphone apps (Android Clinometer Application for the frontal plane and Smartphone Compass Application for the horizontal plane) were used for this purpose, as previously described.

*Passive Accessory Intervertebral Movements (PAIVMs).* Central and bilateral posterior-anterior intervertebral movements were applied as a grade III over C1-C3 (central, spinous processes) and C0-C1/C3-C4 (bilateral, zygapophyseal joints). The pain intensity provoked through the movement was recorded on via a Numeric Rating Scale (NRS), ranging from 0 (no pain) to 10 (worst pain imaginable).

*Flexion-Rotation Test (FRT).* The participant lay in supine on the plinth. They were asked to relax while their neck was moved to end range cervical flexion by the examiner. In this flexed position, the head and neck were passively rotated as far as possible within comfortable limits, and the number of degrees (º) of rotation was recorded with the Smartphone Compass Application. The test was performed bilaterally.

*Forward Head Posture (FHP).* FHP was assessed in a relaxed standing and sitting position via a lateral photograph taken from a distance of 1.5 metres. Reference markers were placed on the spinous process of C7 and on the tragus of the ear, which were identified through palpation. The smartphone image was introduced in FHPapp to obtain the calculation of the Cranio-Vertebral Angle (CVA). FHP was defined as a CVA smaller than 48º, as described previously.

***Muscular system***

*Muscle palpation.* Palpation was performed at predetermined points over different muscles. A single location in the middle of muscle belly was palpated and the participants were asked to rate their pain intensity upon palpation over the upper trapezius, suboccipitalis, masseter, temporalis and sternocleidomastoid (SCM) bilaterally. Pincer palpation was performed for upper trapezius and SCM whereas pressure palpation was performed for the remaining muscles. Pain intensity was recorded via a NRS, ranging from 0 (no pain) to 10 (the worst pain imaginable). All points were assessed with the subject laying supine with the neck in a neutral position.

*Cranio-Cervical Flexion Test (CCFT).* The participant lay supine with the neck in a neutral position, supported by towels as needed. An uninflated pressure cuff (Chattanooga Stabilizer Group Inc., Hixson, TN, USA) was placed behind the neck so that it abutted the occiput and was then inflated to a stable baseline pressure of 20 mmHg, filling the space between the testing surface and the neck without pushing the neck into a lordosis. The highest level of the five stages of the cranio-cervical flexion test (22-30 mmHg) that was held for 10 seconds without substitution using excessive superficial neck muscle activity was recorded as described previously. The highest level they achieved over the two repetitions of the test was used for analysis.

*Neck flexor endurance.* The test was performed with the participant positioned in supine on the plinth. The participant’s head was positioned in slight upper cervical flexion by the examiner who placed his left hand on the table just below the participant’s occiput. The participant was then asked to gently flex his/her upper neck and lift his/her head off the examiner’s hand while retaining upper cervical flexion. Verbal feedback (“tuck your chin in” or “hold your head up”) was given to the participant when their head touched the examiner’s hand during the test. The test was terminated if the participant was unable to maintain the position of their head off the examiner’s hand despite verbal encouragement or if they reached the maximum holding time of 30 seconds.

*Neck extensor endurance.* This test measured the time, in seconds, to keep the head steady, while lying in a prone position with the head over the edge of the plinth in a neutral position. This test was terminated if the participant lost the position despite verbal encouragement or reached a maximum holding time of 30 seconds.

*Active cervical extension in 4-point kneeling (4K Extension).* Positioned in 4-point kneeling on a plinth, the participant was asked to look between their hands, then look down to flex the head and the neck together as far as they could go and then curl their neck and head back up into extension as far as they could whilst keeping their gaze fixed between their hands. The test aimed to assess the quality of cervical extension while keeping the cranio-cervical region in a neutral position. Poor performance was considered if the patient was unable to dissociate mid-lower from upper cervical extension, as described previously. The test was considered successful if the participant was able to perform the test in at least one of the two repetitions.

*Active upper cervical rotation in 4-point kneeling (4K Upper Rotation).* Positioned in 4-point kneeling on a plinth, the participant was asked to perform small ranges of cranio-cervical rotation to both sides (no greater than 40º), while maintaining their neck in a neutral position. Poor performance was considered when the patient was unable to dissociate upper cervical rotation movement from movement at the typical cervical region i.e., excessive motion of the typical region occurs. The test was considered successful if the participant was able to perform the test in at least one of the two repetitions.

***Neural system***

*Mechanosensitivity of the median, radial and ulnar nerves.* Upper limb neurodynamic tests (ULNT) for the median (ULNT1), radial (ULNT2) and ulnar (ULNT3) nerves were assessed as described previously. The elbow was the last joint moved (extension for median and radial, flexion for ulnar nerve) during each test and the range of elbow extension was recorded in degrees (º) with a standard goniometer at the point where the patient reported discomfort.

*Mechanosensitivity during Upper Limb Neurodynamic Testing (ULNT) combined with Cranio-Cervical Flexion (CCF).* The patient was asked to perform active CCF and then the ULNT1 was performed as described previously. The elbow was the last joint moved and the range of elbow extension was recorded in degrees (º) with a standard goniometer at the point where the patient reported discomfort.

*Pain Pressure Thresholds over the median, radial, ulnar, supra-orbital and greater occipital nerve.* Pressure pain thresholds were measured bilaterally using a digital algometer (Force TenTM-Model FDX, Wagner, Greenwich, USA) with a surface area of round tip of 1cm2 and were recorded in N/cm2. The supra-orbital nerve was tested over the supra-orbital notch (at the junction between the medial third and the two lateral thirds of the upper part of the margin of the orbit); the median nerve was located over the cubital fossa medial to and adjacent to the biceps tendon; the radial nerve was marked where it passes through the lateral intermuscular septum between the medial and lateral heads of the triceps brachii to enter the mid to lower third of the humerus; the ulnar nerve was located in the groove between the medial epicondyle and the olecranon; the greater occipital nerve was assessed approximately two centimetres medial to the greater occipital protuberance.

**Proposed measurements to include in analysis**

· Flexion-Rotation Test

· Cervical Range of Motion

· Cranio-cervical Flexion Test

· Cervical flexor endurance

· Cervical extensor endurance

· Pressure-Pain Threshold over Supraorbital and Greater Occipital Nerves (theoretically, more relationship with possible trigeminal sensitization)