

Effects of different dynamic sitting strategies in wheelchair seating

Submission date 12/11/2016	Recruitment status No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
Registration date 18/11/2016	Overall study status Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
Last Edited 20/10/2017	Condition category Signs and Symptoms	<input type="checkbox"/> Individual participant data

Plain English summary of protocol

Background and study aims:

For people who are wheelchair bound, lower back pain and pressure ulcers (wounds caused when area of skin is placed under pressure) are a big concern. The way a person sits in the wheelchair, including the position of the buttocks and weight put on the spine has an important role in the development of these problems. The aim of this study is to investigate the effects of different sitting positions on back angles and skin pressure in order to see if there is a way to reduce the risk of lower back pain and pressure ulcers in wheelchair-bound people.

Who can participate?

Healthy adult male or female volunteers aged between 20 and 65 years.

What does the study involve?

The participants perform of the seven different sitting positions in random order by drawing lots. Each test lasts for 20 minutes, with periodic changes at 5-minute intervals. The participants are asked to stand up and move around for 5 minutes between each test. Over each 20 minute test, participants have the angle of their spine and pressure on their skin measured.

What are the possible benefits and risks of participating?

There are no direct benefits or risks involved with participating in this study.

Where is the study run from?

Applied Biomechanics Laboratory, National University of Tainan (Taiwan)

When is the study starting and how long is it expected to run for?

March 2015 to November 2015

Who is funding the study?

Ministry of Science and Technology (Taiwan)

Who is the main contact?

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Contact information

Type(s)

Scientific

Contact name

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Additional identifiers

Protocol serial number

A-ER-103-375

Study information

Scientific Title

Biomechanical effects of different dynamic sitting strategies in wheelchair seating

Study objectives

Lumbar-pelvic angle and interface pressure are influenced by different dynamic sitting strategies.

Ethics approval required

Old ethics approval format

Ethics approval(s)

Institutional Review Board of National Cheng Kung University Hospital, 13/03/2015, ref: A-ER-103-375

Primary study design

Interventional

Study design

Single-centre randomised controlled trial

Study type(s)

Prevention

Health condition(s) or problem(s) studied

Lower back pain and pressure ulcers

Interventions

The initial settings for the experimental wheelchair forms a 100° angle between the backrest and seat cushion, and a 120° angle between the seat cushion and footrest. The seat cushion is adjusted to allow a gap between the cushion and popliteal fossa. When the participants are seated in the experimental wheelchair, they are asked to rest their upper body against the backrest, relax their arms and place them at their sides, try to keep their thighs parallel to the ground, place their feet firmly on top of the footrest at shoulder width, and look directly ahead. Next, they perform each of the 7 DSSs in random order by drawing lots:

1. Lumbar prominent dynamic sitting (LPDS): The lumbar adjustment module is positioned at L3 of participant, and the air bag provides dynamic adjustment by deflating to 0 cm and inflating to 4 cm at periodic intervals.
2. Back reclined dynamic sitting (BRDS): Upper body contact is maintained with the backrest in the experimental wheelchair, and the backrest tilt mechanism provides dynamic adjustment by tilting backward and forward between 100° and 150° at periodic intervals.
3. Femur upward dynamic sitting (FUDS): The femur adjustment module is positioned at the midpoint of the participant's femur, and the air bag provides dynamic adjustment by deflating to 0 cm and inflating to 4 cm at periodic intervals.
4. Lumbar prominent with back reclined dynamic sitting (LBDS): This combines the LPDS and BRDS settings.
5. Lumbar prominent with femur upward dynamic sitting (LFDS): This combines the LPDS and FUDS settings.
6. Back reclined with femur upward dynamic sitting (BFDS): This combines the BRDS and FUDS settings.
7. Lumbar prominent with back reclined with femur upward dynamic sitting (LBFDS): This combines the LPDS, BRDS, and FUDS settings.

Each DSS test lasts for 20 minutes, with periodic changes at 5-minute intervals. The participants are asked to stand up and move around for 5 minutes between each DSS test. Data on lumbar-pelvic angle were collected by the ultrasound-based motion analysis system (CMS20S Measuring System; zebris Medical GmbH, Isny im Allgäu, Germany), and the data on interface pressure were collected by the pressure-mapping mats (Body Pressure Measurement System; Tekscan Inc, South Boston, Massachusetts, USA).

Intervention Type

Device

Primary outcome(s)

Lumbar-pelvic angle is measured using the ultrasound-based motion analysis system over the 20 minutes of each DDS

Key secondary outcome(s)

Interface pressure is measured using the pressure-mapping mats over the 20 minutes of each DDS

Completion date

30/11/2015

Eligibility

Key inclusion criteria

1. Age 20-65 years
2. Able-bodied

Participant type(s)

Healthy volunteer

Healthy volunteers allowed

No

Age group

Adult

Sex

All

Key exclusion criteria

1. Spinal pathology
2. Musculoskeletal disorder
3. Those who have sought medical treatment for lumbar pain within the previous 6 months

Date of first enrolment

11/05/2015

Date of final enrolment

15/07/2015

Locations

Countries of recruitment

Taiwan

Study participating centre**National University of Tainan**

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Sponsor information

Organisation

Ministry of Science and Technology, Taiwan

ROR

<https://ror.org/02kv4zf79>

Funder(s)

Funder type

Government

Funder Name

Ministry of Science and Technology, Taiwan

Alternative Name(s)

Ministry of Science and Technology, R.O.C. (Taiwan), Ministry of Science and Technology of Taiwan, MOST

Funding Body Type

Government organisation

Funding Body Subtype

National government

Location

Taiwan

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated and/or analysed during the current study during this study will be included in the subsequent results publication.

IPD sharing plan summary

Other

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	09/12/2016		Yes	No