

C. Pei, J. Wang, P. Tuan, C.S. Lin, W.M. Chi. *Prototype development and evaluation for the pressure-relieving system of the regular wheelchairs*. *Gerontechnology* 2008; 7(2):187. The pressure sore is the major cause of admissions to hospitals for patients with impaired mobility and sensory functions, and for elderly patients¹. When the patient is in a sitting position, the pressure evolves from the both sides of the ischial tuberosities and ischium-coccyx areas. To aim at the regular wheelchair users to prevent the pressure sores, in general, it can be achieved by doing push-ups, leaning sideways or forward voluntarily². Unfortunately, these activities also increase the risk of falling. To counter this problem, we have developed an electrical controlled tilt-in space pressure-relieving system which is designed for the regular wheelchair users (*Figure 1*). The purpose of this research is twofold: (i) To determine, while repositioning, in what sitting posture the pressure reduction on the surface of the seat is maximal; (ii) To evaluate the characteristics of the pressure-relieving system in different tilting angles by a pilot test on ischial tuberosities pressure distribution of seated subjects. **Methods** Six males with able-bodies (mean age 80 ± 3.1 yrs, weight 60 ± 2.6 kg, height 166 ± 9.7 cm) participated in the study, and two ways of measuring we adopted: (i) Varying the tilting angles continuously from 0° to 90° ; (ii) A series of 7 postures: 0° , 10° , 20° , 30° , 40° , 50° , and 60° in posterior direction. The pressure plate measured the pressure distribution from the ischial tuberosities and ischium-coccyx areas at the body-seat interface. In each posture, the seating pressure was calculated by averaging four readings over two minutes. **Results and discussions** The preliminary result shows that: (i) In the ischial tuberosities area, the pressure decreases while the tilting angles increase; (ii) In the ischium-coccyx area, the pressure shows an increasing trend while the tilting angles increase from 10° to 30° , and then the pressure decreases dramatically at the tilting angles of 40° and beyond. This is due to some subjects were in slouchy postures while the tilting angles were larger than 0° during the process; (iii) The pressure increases in the ischial tuberosities area when the tilting angles were smaller than 45° during the process if the subjects put their feet on the footrest of the wheelchair. The conclusion and suggestion: (i) The prototype system can provide the pressure reduction effectively. (ii) While conducting the pressure relieving process, subject must keep the feet naturally flagging and not put them on the footrests of the wheelchair. (iii) The slouchy sitting position should be corrected during the pressure relieving process. Further study for the system must be done to assess how the tilting angles affect users physiologically and psychologically, and to organize the system's standard operation procedure including a full-scale and statistical significance research for the care givers as well as the patients.

References

1. Staas WE, Cioschi HM. *Western Journal of Medicine* 1991;154:539-544
2. Aissaoui R, Lacoste M, Dansereau J. *IEEE Transactions On Neural Systems And Rehabilitation Engineering* 2001;9:215-224

Keywords: pressure relieving system, tilt-in space, ischial tuberosities, pressure sores

Address: Nan Kai Institute of Technology, Taiwan; E: 95MG009@nkc.edu.tw

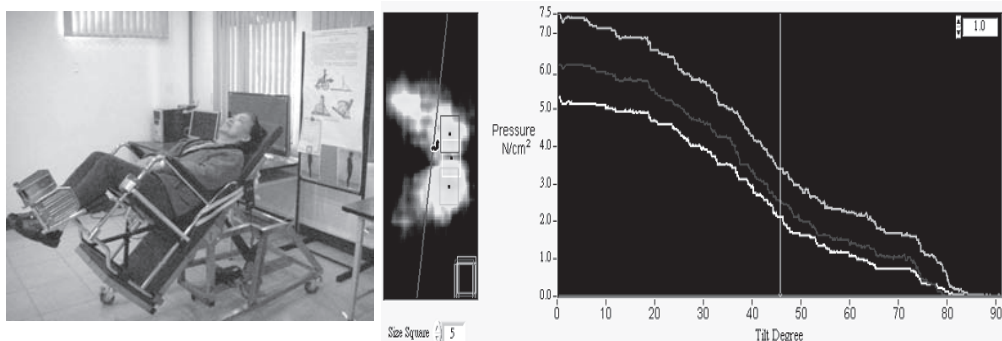


Figure 1 (Left) Prototype pressure-relieving system. (Right) Pressure curves in ischial tuberosities (middle and top) and ischium-coccyx areas (lower) as the tilt angles change continuously