

RINGKASAN
HUBUNGAN ANTARA SUDUT SENDI *HIP, KNEE* DAN *ANKLE* PADA *SIT TO STAND* DENGAN KESEIMBANGAN DINAMIK PENDERITA STROKE
HEMIPLEGIK

Stroke merupakan penyebab disabilitas jangka panjang terbesar di dunia. Paska serangan stroke, maka seseorang akan mengalami gangguan sensorimotor yang menyebabkan penderita mengalami gangguan keseimbangan dan berjalan. William dan kawan-kawan mendapatkan 66% penderita stroke mengalami gangguan mobilitas dalam hal ini transfer dan gangguan keseimbangan yang akan meningkatkan resiko jatuh.

Sit To Stand (STS) merupakan gerakan dari duduk ke berdiri, gerakan ini merupakan prasarat sebelum melakukan berbagai aktivitas fungsional. Definisi STS adalah perubahan posisi dari posisi yang lebih stabil menjadi kurang stabil dengan posisi *Center of Mass* (COM) yang lebih tinggi. Untuk dapat melakukan STS diperlukan torsi yang besar pada sendi dan kontrol sudut yang baik sehingga dapat mempertahankan COM tepat di atas *Base of Support* (BOS).

Tujuan penelitian ini untuk menentukan hubungan antara sudut sendi *Hip, Knee* dan *ankle* tungkai paretik yang terbentuk pada saat *Sit To Stand* dengan keseimbangan dinamik subyek stroke hemiplegik yang dinyatakan dengan Skor *Berg Balance Scale* (BBS). Sebanyak 16 partisipan (laki-laki 11; perempuan 5) dengan rentang usia 44 sampai 70 tahun berpartisipasi pada penelitian ini. Penelitian dilakukan pada laboratorium analisa gait, departemen Kedokteran Fisik dan

Rehabilitasi RSUD Dr. Soetomo. Pada penelitian ini pengukuran sendi dilakukan dengan cara pemberian marker pada sendi *hip, knee* dan *ankle*, dimana sebelumnya dilakukan penilaian *Berg Balance Scale*. Berdasarkan hasil analisa statistik didapatkan terdapat korelasi negatif yang signifikan antara sudut sendi *knee* pada saat *start* ($r=-0,625; p=0,01$) dan *peak* ($r=-0,557; p=0,025$) dan korelasi yang positif antara sendi *ankle* saat *peak* ($r=0,540; p=0,031$) dengan keseimbangan dinamik subyek.

Hasil penelitian ini mendapatkan korelasi negatif antara sudut sendi *knee start* dan *peak* yang terbentuk pada saat STS menunjukkan bahwa semakin besar sudut fleksi lutut pada saat STS maka keseimbangan dinamik semakin kurang stabil, sedangkan korelasi positif yang didapatkan pada sudut sendi *ankle peak* pada saat STS menunjukkan semakin besar sudut plantar fleksi *ankle* saat STS maka keseimbangan dinamik semakin baik.

SUMMARY
RELATIONSHIP BETWEEN HIP, KNEE AND ANKLE JOINT ANGLE
DURING SIT TO STAND WITH DYNAMIC BALANCE OF HEMIPLEGIC
STROKE PATIENTS

Stroke was the 1st cause of long term disability in the world. After stroke, the patients suffered from sensory motor impairment on the contralateral side of the brain lesion, that cause the patient had limitation on doing the functional activity daily living. The sensory motor impairment of stroke patients disturbing the ability of walking and balance. Williams et al, about 66% stroke populations that survive suffered from impairment of mobility due to transfer or changing position during functional activity such as lying to sit, sitting to standing, standing to walk and also balance disturbance that will increase the risk of fall.

Sit To Stand (STS) were movement from sitting to standing. Sit To Stand was a pre-exquisite before doing some functional activities, so STS was a main key and an indicator for functional ability. STS were changing position from stable to a less stable position, to a higher Center of Mass (COM) and more narrow Base of Support (BOS), thus need a great torsion and control on lower extremity joint so the COM right above the BOS

This research was carried to determine the relationships between hip, knee and ankle joint angle on the paretic side during STS with dynamic balance of hemiplegic stroke patients which we measure using Berg Balance Scale (BBS). This was an

observational analytic with cross sectional study. The research conduct in Laboratory of Gait Analysis Physical Medicine and Rehabilitation Departement of Soetomo Teaching Hospital. The population were stroke patients and the sample was a hemiplegic patients that can ambulate by himself. Sixteen participant (11 male;5 female) with chronic stroke 1st attack, age between 35-70 years old. The measurement of the angle was using marker at the Hip, Knee and ankle. Prior to the analiysis we measure the Berg Balance Scale. From the statistical analysis we found signifikan negative correlation between knee angle on the paretic side during start ($r=-0,625;p=0,01$) and peak ($r=-0,557;p=0,025$) with dynamic balance of hemiplegic stroke patient, there were also signifikan positif correlation between ankle joint angle on the paretic side during peak ($r=0,540; p=0,031$) with dynamic balance of hemiplegic stroke patients.

As the conclusion, negative correlation between knee angle during start and peak means that the greater knee flexion angle on the paretic side the dynamic balance were worst. And on ankle, the positive correlation means that the greater ankle joint angle on the paretic side during STS the balance were getting better.

ABSTRAK

HUBUNGAN ANTARA SUDUT SENDI *HIP, KNEE* DAN *ANKLE* PADA *SIT TO STAND* DENGAN KESEIMBANGAN DINAMIK PENDERITA STROKE HEMIPLEGIK

Astrid A.M. Manuputty, Meisy Andriana, I.P. Alit Pawana

Tujuan: untuk menentukan hubungan antara sudut sendi hip, knee dan ankle pada tungkai paretik pada Sit To Stand dengan keseimbangan dinamik subyek stroke hemiplegik.

Desain: analitik observasional dengan cross sectional study

Latar: Laboratorium Analisa Gait Departement Kedokteran Fisik dan Rehabilitasi RSUD Dr. Soetomo

Partisipan: Enam belas ($n=16$) pasien stroke hemiplegik serangan pertama dengan rentang usia 44-70 tahun (laki-laki=11; perempuan=5)

Intervensi: tidak dilakukan

Penilaian Keluaran: Sudut sendi Hip, Knee dan Ankle pada Sit To Stand dan Berg Balance Scale.

Hasil: terdapat korelasi negatif yang signifikan antara sudut sendi knee pada tungkai paretik saat start ($r=-0,625$; $p=0,01$) dan pada saat peak ($r=-0,557$; $p=0,025$) dengan keseimbangan dinamik subyek stroke hemiplegik. Korelasi positif yang signifikan didapatkan juga antara sudut sendi ankle saat peak ($r=0,540$; $p=0,031$) dengan keseimbangan dinamik subyek stroke hemiplegik.

Kesimpulan: korelasi negatif antara sudut sendi lutut saat start dan peak menunjukkan bahwa semakin besar sudut fleksi lutut yang terbentuk maka keseimbangan dinamik subyek tersebut semakin tidak stabil dan korelasi positif yang terbentuk pada sendi ankle maka semakin besar sudut ankle maka keseimbangan dinamik subyek stroke hemiplegik semakin stabil.

Kata kunci: STS, Berg Balance Scale, Kinematik, Sudut Sendi, Tungkai Paretik.

ABSTRACT

RELATIONSHIP BETWEEN HIP, KNEE AND ANKLE JOINT ANGLE DURING SIT TO STAND WITH DYNAMIC BALANCE OF HEMIPLEGIC STROKE PATIENT

Astrid A.M. Manuputty, Meisy Andriana, I.P. Alit Pawana.

Objective: to determine the relationship between hip, knee and ankle joint angle in the paretic side during Sit To Stand with dynamic balance of hemiplegic stroke patients.

Design: observational analytic with cross sectional study

Setting: Laboratory of Gait Analysis Physical Medicine and Rehabilitation Departement of Soetomo Teaching Hospital

Participants: Sixteen (n=16) hemiplegic stroke patients with 1st time stroke were assigned (male:11;female:5) with age between 44-70 years old.

Interventions: not applicable

Main outcome measures: Hip, Knee and Ankle Joint Angle during Sit To Stand and Berg Balance Scale.

Results: There were significant negative correlation between knee angle on the paretic side during start ($r=-0,625$; $p=0,01$) and peak ($r=-0,557$; $p=0,025$) with dynamic balance of hemiplegic stroke patient, there were also significant positive correlation between ankle joint angle on the paretic side during peak ($r=0,540$; $p=0,031$) with dynamic balance of hemiplegic stroke patients.

Conclusion: the negative correlation between knee angle during start and peak means that the greater knee flexion angle on the paretic side the dynamic balance were worst. And on ankle, the positive correlation means that the greater ankle joint angle on the paretic side during STS the balance were getting better.

Keyword: STS, Berg Balance Scale, Kinematic, Joint Angle, Paretic Side.