Ambulation and cognitive factors associated with muscle function in adults with Spina Bifida

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Mode of mobility and cognitive capacity varied widely within the group and mode of mobility was revealed to differ between persons with similar muscle function. In the total sample, 106 (54%) participants were ambulatory, and 90 persons (46%) were wheelchair users in daily life. Cognitive function was reduced in the whole population, and more so in those with hydrocephalus (HC).

References

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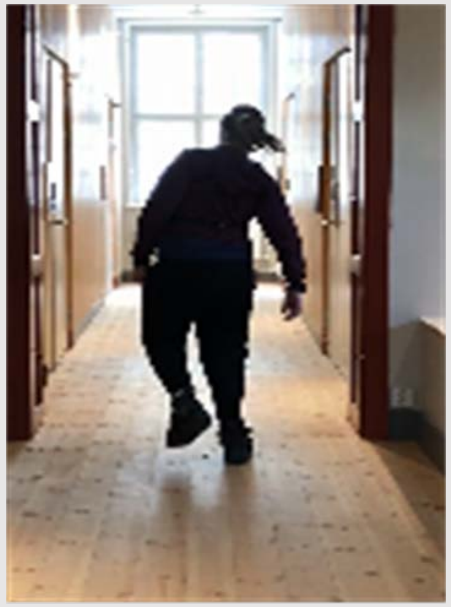
Introduction Spina Bifida (SB) is a complex congenital spinal cord malformation, often associated with physical and cognitive impairments[1-3]. Mode of mobility differs between ambulation and wheelchair use. Today the adult group is increasing as most persons reach adulthood and live longer[4-5]. Persons with sacral or low lumbar SB usually maintain their walking ability into adulthood, whereas those with higher levels of malformations often cease to walk[6-7].

Aim To describe ambulatory performance and cognitive function in relation to level of muscle function in an adult cohort (≥18 years) with SB.



Methods/participants

A total cohort of individuals ≥ 18 years with SB (n=219) registered at a regional outpatient clinic were offered participation; 196 persons (18-73 years, 104 women) were included. Mode of mobility was categorized according to Hoffer[8] together with assessment of muscle- and cognitive function. The participants were assigned to different muscle function (MF) groups[6].

Mode of mobility

According to the criteria by Hoffer[8]

- Community ambulators
- Household ambulators
- Non-functional ambulators
- Wheelchair for mobility

Muscle function (MF) levels

According to the criteria by Bartonek[6] and Bendt[9]

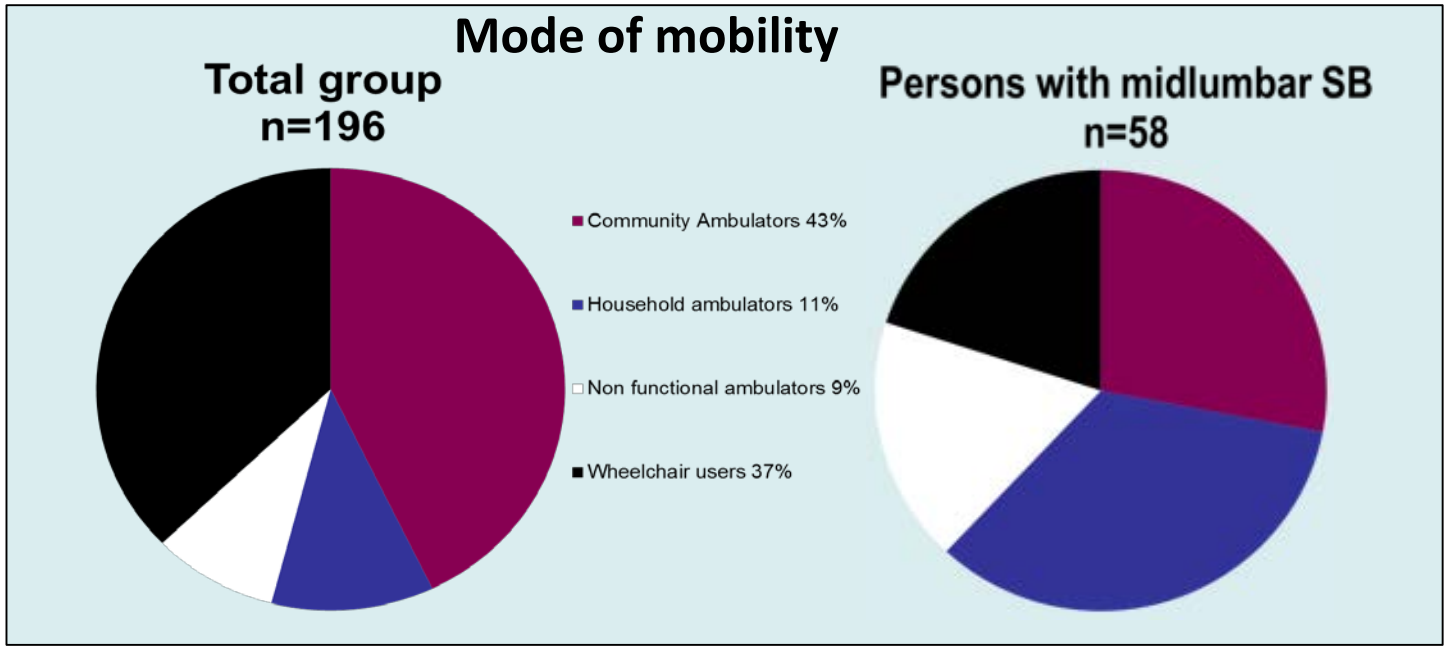
Level	Muscle function
MF 0	No loss of muscle strength
MF 1	Weakness of foot intrinsic muscles, grade ≤ 3 Good-to-normal plantar flexors, grade 4–5
MF 2	Fair or less plantar flexion, grade ≤ 3 Fair or better knee flexion grade ≥ 3 Poor to fair or better hip extension and/or hip abduction, grade ≤ 2–3
MF 3	Good to normal hip flexion and knee extension, grade 4–5 Fair or less knee flexion grade ≤ 3 Traces of hip extension, hip abduction and below knee muscles
MF 4	No knee extension activity Poor or less hip flexion grade ≤2 Fair or good pelvic elevation, grade 2-4
MF 5	No muscle activity in the lower limbs No pelvic elevation

Cognitive capacity

- The coding test for psychomotor speed and executive function[10]
- The block design test for spatial psycho-motor ability and executive function[10]
- The FAS test for verbal executive ability and mental speed[11]

Results

- In MF level 0 and 1 all were community ambulators, while in MF level 5 all used a wheelchair.
- In MF levels 2, 3 and 4 there was a mix of ambulation and wheelchair use, even though they had the same level of muscle function.
- Lower level of MF was independently associated with a higher proportion of participants with HC ($p < 0.000$), contractures ($p<0.000$) and presence of scoliosis and/or former spine surgery ($p=0.000$).
- Overall the participants performed 1 SD below the general population on the cognitive tests, with a significant difference ($p<0.001$) with (123 (63%)) and without HC.



We aim to further study motor-cognitive performance in adults with SB with different muscle function and link their performance to physical and cognitive functions.