

Urinary bladder function and acquisition of bladder control in healthy children

AKADEMISK AVHANDLING

som för avläggande av filosofie doktorsexamen med vederbörligt tillstånd av Sahlgrenska Akademin vid Göteborgs universitet, Institutionen för vårdvetenskap och hälsa, kommer att offentligt försvaras tisdagen den 12 juni 2007 kl. 13.00 i föreläsningssal 1, Drottning Silvias barn- och ungdomssjukhus, Göteborg

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The thesis is based on the following papers:

- I Jansson U-B, Hanson M, Hanson E, Hellström A-L, Sillén U. (2000) Voiding pattern in healthy children 0 to 3 years old: A longitudinal study. *Journal of Urology*, 164: 2050-2054.
- II Jansson U-B, Hanson M, Sillén U, Hellström A-L. (2005) Voiding pattern and acquisition of bladder control from birth to age 6 years – A longitudinal study. *Journal of Urology*, 174: 289-293
- III Jansson U-B, Sillén U, Hellström A-L. (2007) Life events and their impact on bladder control. *Journal of Pediatric Urology*, 3(3), 171-177.
- IV Jansson U-B, Danielson E, Hellström A-L. (2007) Parents' experiences of how their children became dry (Submitted 2007).

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The overall aim was to advance the knowledge of urinary bladder function and the acquisition of bladder control in healthy children.

The participants in papers I, II and III were from the same population (n=59). In paper IV the participants (n=22) were parents of children who had been dry for at least 6 months. The voiding pattern was observed through the 4-hour voiding observation method and thereafter through uroflow measurements and post-void residual urine (Papers I, II). Using a questionnaire, the parents' perceptions of the occurrence of life events, how upsetting they had been for the child and the degree of adaptation needed was studied (Paper III). In order to share parents' experiences of how their children became dry, parents were interviewed (Paper IV).

The children voided 5 times/4hours at 3 months of age and 2 times/4hours at 3 years. Signs of arousal during sleep at voiding were noted in the infants (76% and 90%) at ages 3 and 6 months respectively. The storing ability increased from 67 ml at 3 months to 123 ml at 3 years. Interrupted voidings were seen in decreasing numbers: 33% at 3 months and 3% at 2 years of age. The emptying ability decreased from 5 ml at 3 months to 0 ml at 3 years of age. Awareness of the voiding process was reported from age 1.5 years. Signs of bladder dysfunction were occasionally reported in 30-50% of the children from age 3 to 6 years. The children achieved day dryness at a median age of 3.5 years and night dryness at 4 years.

The children experienced an average of 5 life events. Half these life events were related to childcare, 24% to illness/accident/death, 16% to family composition and 9% to living conditions. The children had experienced these life events as negatively in 30% of the cases. Adaptation had been difficult in 15%. Many life events and difficulties in adapting to a life event were associated with a later age of dryness.

The parents experiences of how their children became dry were divided into four categories: "The time had come" including making a decision and having time, "New daily routines" including creating a positive atmosphere and testing different activities, "The child's willingness" including cognitive skills and personality traits, "Being like others" including unspoken rules and comparing the child with others to fit in and not to deviate.

Healthy children do not void at constant volumes and they do not empty their bladders completely at each voiding but at least once every 4 hours. The decreasing number of interrupted voidings and the fact that most voidings were performed while awake may indicate that the voiding process is part of a maturation process. Children become dry at later ages today. The more life events and the more difficult adaptation, the later the child will become dry. The parents experienced that they were responsible for initiating the process for their children to become dry and that the process is time consuming. The parents compared their children with others and tried to fit within the unspoken norms and limits about when it is not longer acceptable to wear diapers. The parents missed having support and guidance about how to help their children become dry. The findings from this thesis can be used as reference values in both healthy children and in children with bladder dysfunction.

Keywords: Urinary bladder, urination, reference values, life events, healthy children development bladder control, experiences, content analysis, potty training.