End stage renal disease in type 1 diabetes – Time trends and risk factors

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Akademisk avhandling

som med vederbörligt tillstånd av Rektor vid Umeå universitet för avläggande av filosofie/medicine doktorsexamen framläggs till offentligt försvar i Betula, målpunkt L, by 6M, plan 0, fredagen den 30 November, kl. 09:00. Avhandlingen kommer att försvaras på svenska.

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Abstract

Background and aims: Sweden has a high incidence of type 1 diabetes (T1D) and the incidence is increasing worldwide. The incidence is now twice as high as when the registration of childhood onset T1D in Sweden started in 1977. One of the major risk factors for developing late complications such as renal failure (ESRD) is duration of T1D. With a disease onset early in life this could lead to young patients with serious complications. It is therefore of interest to follow these patients to see how the risk for complications develops over time. In the first study, time trends in onset of ESRD due to diabetes (type 1 and 2) and other causes of kidney failure were studied as well as the age at onset of ESRD. To follow up on this, the aim of the second study was to look at cumulative incidence in ESRD and analyse possible time trends and gender differences in a younger diabetes population with known T1D duration. An earlier study had shown a low incidence of ESRD and now 8 more years of follow up could be added. Besides genetics, metabolic control is a factor with strong impact on the future risk of complications. The social environment of the child and adolescent with diabetes influence the understanding and management of the disease and hence the blood glucose control. Social vulnerability and/or low education imposes even more stress on the individual which could negatively influence disease management. The aim of the third study was therefore to study the impact of socio-economic status (SES) on the risk of developing ESRD in the young diabetes population. The aim of the fourth study was to analyse time trends in the treatment choices once the patients develop ESRD, the survival and cause of death in treatment and how it has developed over time.

Study population: In all studies, data from the Swedish Renal Register (SRR) were used. The data on the T1D patients with onset before the age of 15, used in studies II-IV, came from the Swedish Childhood Diabetes Register (SCDR). In study II we also retrieved data from the Swedish National Diabetes Register (NDR) and the Diabetes Incidence Study in Sweden (DISS). All registers have national coverage. The diabetes registers were linked to the SRR to find the patients who had developed ESRD. In study III we used the linkage between the SCDR, the SRR and Longitudinal integration database for health insurance and labour market studies (LISA).

Results: Even though the incidence of ESRD in Sweden remained stable, the incidence of ESRD due to T1D decreased over the studied years, 1991-2010. We did not see a concurrent change for T2D. The age when the T1D patients developed ESRD had increased by 3 years and this was not seen in patients with other causes of ESRD. For patients in the SCDR the increase in age was almost 6 years. The cumulative incidence of ESRD in Sweden due to T1D is still low, 5.6% at a maximum follow up of 38 years (median 23). The incidence of ESRD is decreasing when comparing onset of T1D in the 1970’s and 80’s to onset in the 90’s, even when adjusting for T1D duration. Once they had developed ESRD, the survival in renal replacement therapy (RRT) had also improved over the years. The longest survival was seen after receiving a kidney transplant which about 50% of the patients do.

When analysing social risk factors for development of ESRD we found that the educational level of both parents, but especially the mothers, affected the child’s risk of developing ESRD. The strongest association of education however was seen in the T1D patients own education. There was also an increased risk of developing ESRD if any or both of the parents had received income support.

Conclusion: The incidence of ESRD due to T1D is decreasing in Sweden and the age at onset of ESRD has increased by at least 3 years. There was a significant decrease in development of ESRD over time. The patients have a longer survival once in RRT today and many of them are transplanted, further improving their survival. Growing up in families with a lower SES increases the risk of later developing ESRD, a finding worthy of recognition in the clinical setting.

Keywords
End stage renal disease, renal replacement therapy, type 1 diabetes, diabetes nephropathy, socioeconomy and epidemiology