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ORIGINAL ARTICLE

Prospective cohort analyzing risk factors for chronic kidney disease progression in children ☆,☆☆

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KEYWORDS

Chronic kidney disease;
Epidemiology;
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Abstract

Objective: To identify risk factors for chronic kidney disease (CKD) progression in Brazilian children and to evaluate the interactions between factors. Q2

Methods: This was a multicenter prospective cohort in São Paulo, involving 209 children with CKD stages 3–4. The study outcome included: (a) death, (b) start of kidney replacement therapy, (c) eGFR decrease >50% during the followup. Thirteen risk factors were tested using univariate regression models, followed by multivariable Cox regression models. The terms of interaction between the variables showing significant association with the outcome were then introduced to the model.

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☆☆ Study conducted at Hospital Samaritano de São Paulo, São Paulo, SP, Brazil.

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Results: After a median follow-up of 2.5 years (IQR=1.4–3.0), the outcome occurred in 44 cases (21%): 22 started dialysis, 12 had >50% eGFR decrease, seven underwent transplantation, and three died. Advanced CKD stage at onset (HR=2.16, CI=1.14–4.09), nephrotic proteinuria (HR=2.89, CI=1.49–5.62), age (HR=1.10, CI=1.01–1.17), systolic blood pressure Z score (HR=1.36, CI=1.08–1.70), and anemia (HR=2.60, CI=1.41–4.77) were associated with the outcome. An interaction between anemia and nephrotic proteinuria at V1 (HR=0.25, CI=0.06–1.00) was detected.

Conclusions: As the first CKD cohort in the southern hemisphere, this study supports the main factors reported in developed countries with regards to CKD progression, affirming the potential role of treatments to slow CKD evolution. The detected interaction suggests that anemia may be more deleterious for CKD progression in patients without proteinuria and should be further studied.

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PALAVRAS-CHAVE

Doença renal crônica;
Epidemiologia;
Fatores de risco;
Cuidado Progressivo
do Paciente;
Pediatria

Coorte prospectiva que analisa os fatores de risco para progressão de doença renal crônica (DRC) em crianças

Resumo

Objetivo: Identificar os fatores de risco para progressão da DRC em crianças do Brasil e avaliar as interações entre os fatores.

Métodos: Coorte prospectiva multicêntrica em São Paulo, envolvendo 209 crianças com DRC em estágios 3-4. O resultado do estudo incluiu: a) óbito, b) início da terapia de substituição renal, c) redução de > 50% na taxa estimada de filtração glomerular (eGFR) durante o acompanhamento. 13 fatores de risco foram testados utilizando o modelo de regressão univariada seguido do modelo de regressão multivariado de Cox. Os termos de interação entre as variáveis mostraram associação significativa e foram introduzidos ao modelo.

Resultados: Após média de acompanhamento de 2,5 anos (IIQ=1,4 a 3,0), 44 casos (21%) apresentaram resultado: 22 iniciaram diálise, 12 apresentaram redução de > 50% na eGFR, 7 foram submetidos a transplante e 3 morreram. Estágio avançado de DRC no acometimento (RR=2,16, IC=1,14-4,09), proteinúria nefrótica (RR=2,89, IC=1,49-5,62), idade (RR=1,10, IC=1,01-1,17), escore Z da pressão arterial sistólica (RR=1,36, IC=1,08-1,70) e anemia (RR=2,60, IC=1,41-4,77) foram associados ao resultado. Foi detectada interação entre anemia e proteinúria nefrótica na primeira visita (V1) (RR=0,25, IC=0,06-1,00).

Conclusões: Como a primeira coorte de DRC no hemisfério sul, este estudo estuda os principais fatores relatados em países desenvolvidos com relação à progressão da DRC, afirmando o possível papel dos tratamentos para mostrar a evolução da DRC. A interação detectada sugere que a anemia pode ser mais nociva na progressão da DRC em pacientes sem proteinúria e deve ser ainda mais estudada.

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Introduction

Chronic kidney disease (CKD) has devastating consequences in children and adolescents. It is a progressive disease ranging from anatomical changes and mild functional urinary tract disorders to the complete loss of kidney functions. CKD is defined as a glomerular filtration rate (GFR) lower than 90 mL/min/1.73 m² for more than three months, and is classified in five stages based on the severity of GFR decrease.¹

Several types of treatment can be used to slow disease progression or to minimize associated comorbidities.² The treatment is different for each stage of CKD, and the disease evolution rate is not uniform. Thus, knowledge of the risk factors for CKD progression has important practical implica-

tions, because it allows preparation for and optimization of therapy.

Previous studies have suggested that a higher CKD stage is associated with a greater likelihood of disease advance.³ Furthermore, nephrotic proteinuria, hypoalbuminemia, high blood pressure (BP), dyslipidemia, male gender, and anemia could accelerate GFR decrease.^{4,5} Puberty can also increase the rate of CKD progression; it is believed that sex hormones can promote faster deterioration of kidney function.⁶

The aforementioned studies were conducted in economically developed countries in the northern hemisphere. However, the factors associated with faster CKD progression found in these studies may not be entirely applicable to other geographic regions or to less economically developed

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