Pottel's Equation for Estimation of Glomerular Filtration Rate

The retrospective study was carried out to examine performance of Pottel's height-independent equation compared to Schwartz's height-dependent equation to estimate glomerular filtration rate in 115 children in Indian setting. The Pottel's equation performed well compared to updated Schwartz equation (R^2=0.94, mean bias 0.25, 95% LOA=20.4, -19.9). The precision was better at lower range of estimated GFR.

Keywords: *Creatinine, Chronic kidney disease, Diagnosis*.

Estimation of glomerular filtration rate (GFR) is very important in clinical scenarios involving acute and chronic kidney diseases (CKD) [1-3]. Requirement of height for estimation of GFR in children is currently recognized as one of the hindrances of CKD screening [5,6]. Height independent equations were complex and difficult to be used at the bedside or field conditions till recently, when Pottel, *et al*. [5,7-9] proposed a simple height-independent equation to estimate GFR. Currently, Schwartz equation is the most commonly used equation in India. Pottel's equation can be potentially useful if height information is not known. Therefore, this study was undertaken to compare the performance of Pottel's equation against Schwartz equation in Indian setting.

The work was carried out in a tertiary-care referral centre in North-Eastern India. Records of all children aged 2-14 years admitted to the department of pediatrics over a period of one year, having documentation of serum creatinine, age and height were identified. Having a documentation of all of the three records constituted the sole inclusion criteria. Those with inadequate data were excluded. Data of 115 children were found eligible for analysis. The value of age dependent constant Q used by Pottel *et al*. [9] was adopted for this study. The estimated GFR (eGFR) was calculated using Pottel's equation and updated Schwartz equation [4,9] as follows:

a) Pottel's equation (e GFR Pottel's) :
eGFR=107.3/(Serum Creatinine/Q)

b) Updated Schwartz equation (eGFR Schwartz) :
eGFR= 0.413x L/Serum Creatinine

The mean bias was calculated by the differences between eGFR determined by Pottel and updated Schwartz equation. Standard deviation (SD) was calculated by standard statistical method. Horizontal lines were drawn at the mean difference, and at the limits of agreement (LOA), which are defined as the mean difference plus and minus 1.96 times the standard deviation of the differences.

The population consisted of predominantly non-CKD children with a male female ratio of 1.4:1. Serum creatinine measurements ranged from 0.2 to 11 mg/dL [mean (SD) 0.7 (1.26). The Pottel's equation demonstrated a correlation coefficient (r) of 0.97 and a coefficient of determination (R^2) of 0.94. Mean (SD) bias was 0.25 (10.29) with the 95% limit of agreement 20.4 and -19.9.

Pottel's equation has been derived and validated in Caucasoid children [9,10]. The findings in this study suggest that Pottel's equations performs well in Indian setting compared to updated Schwartz equation despite the dataset having relatively undernourished children (mean WHO height z-score -2.32 SD). The limitations of this study were a retrospective design, and that the true GFR was not estimated. The performance of the equation may be further improved by population-specific values of Q. Lower the eGFR, more was the agreement between the two equations (***Table* I**).

We conclude that Pottel's height-independent equation performs well in Indian children. As the precision is more in lower GFR it may be used to detect low GFR states in Indian children aged 2-14 years where height information is not available.

Contributors: HB: conceived the study, searched the literature and drafted the manuscript; SB: statistical analysis and helped in drafting the manuscript; BKD, CKN, SGD: collected data and participated in drafting of manuscript. All authors approved the final manuscript.
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TABLE I PERFORMANCE OF POTTEL'S AGAINST EQUATION SCHWARTZ EQUATION FOR ESTIMATED GFR

Subgroup analysis		*n*	*Bias Mean (SD)*	*95% CI of mean bias*	*95% LOA between two equation*	*P value*
Comparison of eGFR across 60 mL/min/1.73 m^2	>60 L/mim/1.73m^2	92	-0.27(11.37)	-2.58 to 2.04	-22.41 to 21.87	*P*<0.001
	≤60 L/mim/1.73m^2	23	-0.23(3.83)	-1.70 to 1.34	-7.73 to 7.27	
Comparison of eGFR across 90 mL/min/1.73 m^2	> 90 L/mim/1.73m^2	58	0.46(13.23)	-2.93 to 3.85	-25.58 to 26.50	*P*<0.001
	≤90 L/mim/1.73m^2	57	-1.00(5.82)	-2.49 to 0.40	-12.40 to 10.40	
Comparison by height-for-age z- score	z-score <-2SD	70	-4.62(7.93)	-2.76 to -6.48	-20.40 to 10.40	*P*<0.001
	z-score ≥-2SD	45	6.51(9.94)	3.60 to 9.40	-12.98 to 25.98	

eGFR: estimated glomerular filtration rate; GFR: glomercular filtration rate; LOA: limit of agreement.

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Causes of Death among Children Aged >5 Years in a Public Hospital in New Delhi

Retrospective analysis was done for 3817 children aged 5-12 years admitted in a tertiary-care, public hospital in New Delhi between January to December, 2015. Mortality rate was 5.8%. About 47.1% deaths were due to central nervous system involvement; viral meningoencephalitis being the predominant cause. Overall, infectious diseases caused >80% of deaths. Public health interventions to reduce child mortality need to review such data for effective measures.

Keywords: *Mortality, Outcome, Inpatient*.

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About eight million deaths took place every year among children aged between 5-12 years, with 93.7% of such deaths limited to low- and middle-income countries [1]. Not much information is available about the causes of deaths in this age-group in hospitalized patients [2]. The present study reviews the mortality of all children aged 5 to 12 years, admitted in a tertiary-care public hospital in New Delhi, between January to December, 2015.

Hospital records were retrieved and analyzed; and the data of surgical cases were excluded. Those who were discharged against medical advice or absconded were also excluded. All the diagnoses were coded by two physicians individually. Depending on the diagnosis, deaths were attributed to a particular system. In case of disagreement, an expert opinion was sought.

Out of 3817 admissions in this age-group, overall mortality rate was 5.8% (221, 57.9% males). It was 6.7%, after excluding 504 children who were discharged against medical advice or absconded. Mean age was 8.59 years. Most of the children (42.5%) died within 24 hours of admission. The mortality rate was slightly higher in females (5.7% against 5.5% in males). Overall, 34% and 43% deaths occurred in age group 5-7 years and 8-10 years, respectively.

About 47.1% deaths could be ascribed to central nervous system (CNS) causes. Overall, viral