



LEVEL OF HbA_{1c} AND THE DEVELOPMENT OF DIABETES COMPLICATIONS IN INDIVIDUALS WITH TYPE 1 DIABETES IN RWANDA

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Context

- There is a paucity of research on type 1 diabetes mellitus (T1DM) in sub-Saharan Africa, where health systems are often inadequate to the task of managing chronic diseases, and it is difficult to get adequate access to diabetes care and insulin.
- To improve the quality of care in this region, more research is needed into the consequences of uncontrolled blood glucose.

Objective

The aim of the present study was to explore the the association between HbA_{1c} level and the development of kidney complications in type 1 diabetes mellitus patients in Rwanda

Methods

- From 2009 to 2018 a total of 1,348 individuals diagnosed with T1DM from Rwanda were registered in an e-database. Individuals with present kidney disease at first examination were excluded. After exclusion, 1216 individuals were included in the analyses of which 102 developed kidney complications. The mean age was 18.8 (+/-4.9) years and 53.9% were females.
- HbA_{1c} level was defined as in good control at HbA_{1c} ≤ 75 mmol/mol and poor control at HbA_{1c} >75 mmol/mol. The variable was categorized in the following groups: Low-low, low-high, high-low, high-high.
- Kidney complication/nephropathy was measured as microalbuminuria (ACR>30mg/g) or macroalbuminuria (ACR>300mg/24 h).
- Descriptive statistics and logistic regression were used to explore the distribution and the association between the variables.

Main findings

- The analysis showed that a continuously high HbA_{1c} level was associated with an OR=1.89 of developing kidney complications compared to those in steady good control.
- An unstable and fluctuating HbA_{1c} level increased the risk of developing kidney complications significantly compared to those in continuously good control.
- Going from low to high and from high to low levels of HbA_{1c} increased the odds of developing kidney complications 3.16 and 2.15 times, respectively, compared to individuals in good control.
- Multivariate analysis showed that glucose monitoring more than 1 time per day reduced the risk of developing kidney complications.

Conclusion

- The study indicates that higher and fluctuating levels of HbA_{1c} increase the risk of developing kidney complications, with the results being statistically significant. This finding underscores not only the significance of a low HbA_{1c} level, but also the importance of a steady and continuously low blood glucose levels.
- Measurement bias as well as selection bias, with the sickest individuals not being able to come to clinic visits, were considered a problem in this study.

For discussion and further investigation

- Follow-up data and dates will be used for survival analysis investigating the time until event. Cox-regression modeling.
- Categorization of HbA_{1c} level and the effect of fluctuation over time
- The effect of HbA_{1c} on other chronic and acute diabetes complications (neuropathy, ketoacidosis, hypoglycemia) will also be investigated



Photo source: <https://www.worlddiabetesfoundation.org/news/2017-fundraiser-rwanda-diabetes-awareness-and-support>

Multiple Logistic regressions model

Variable	Categories	P-value	OR	95 % CI
HbA _{1c}	Low-low	-	1	
	Low-high	p<0.001*	3.16	(1.60-6.17)
	High-low	p=0.01*	2.15	(1.18-3.94)
	High-high	p=0.02*	1.89	(1.09-3.32)
Glucose Monitoring	0	-	1	
	1	p=0.23	1.46	(0.76-2.63)
	2	p=0.16	0.59	(0.27-1.17)
	>2	p=0.01*	0.081	(0.01-0.38)

*Significant p-values (5 % significance level)

