OBSERVATIONS

Awareness of HbA_{1c} and Its Relationship With Diabetic Retinopathy Among Adult Diabetic Patients Attending a Tertiary Ophthalmic Center

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A major contributing factor to poor compliance to maintain HbA_{1c} <7% has been found to be a lack of patient awareness (1). Wang et al. (1) showed only 17% of participants understood HbA_{1c}, and 49% of participants had heard of the HbA_{1c} test. Their study also concluded that there was greater awareness of HbA_{1c} among the younger age groups and those with higher education levels. Despite the high prevalence of patients with diabetes in Asia, data on the association between awareness of HbA_{1c} and diabetic retinopathy are not available in the Singapore population.

Our study was a hospital-based, cross-sectional study of 506 diabetic patients aged 23–88 years in Singapore with different racial groups, including Chinese, Malay, Indian, and others.

Of the 623 patients invited, 507 were recruited (81.2% response rate). One was excluded because of incomplete data. The majority of patients who declined to participate cited a lack of time or interest in the study.

There were 257 (50.8%) men and 249 (49.2%) women with median age of 62.1 years. Patients' education level ranged from no formal education to a postgraduate degree. Two hundred seventy-one (53.6%) patients had diabetic retinopathy, and 148 (29.2%) patients had previous laser treatment.

We found significant differences among patients with different occupations ($P < 0.001$). There was significantly greater awareness among patients with younger age ($P < 0.001$), earlier onset of diabetes ($P < 0.001$), higher education ($P < 0.001$), those cared by endocrinologists ($P < 0.001$), and those aware that increased HbA_{1c} ($P = 0.007$) could cause blindness. More frequent visits to ophthalmologists ($P = 0.049$) or endocrinologists ($P = 0.035$) also increased the awareness of HbA_{1c}. However, those cared for by family physicians showed a negative association ($P < 0.001$). We hypothesize that this was because patients who see family physicians are less likely to have diabetic retinopathy, and thus were less aware of HbA_{1c} and diabetic retinopathy.

There were no significant differences between awareness of HbA_{1c} and sex or race. Having diabetic retinopathy or knowing diabetes could cause blindness was not associated with greater awareness of HbA_{1c}.

With multivariate logistic regression analysis, after adjusting for all other factors, higher education level, younger age, and longer duration of diabetes were still significantly associated with greater HbA_{1c} awareness. The odds of HbA_{1c} awareness decreased by 4% with every increase in age by 1 year ($P < 0.001$), and increased by 5% with every increase in the duration of diabetes by 1 year ($P < 0.001$). However, higher education level and being cared for by endocrinologists translates into more awareness ($P < 0.001$).

Studies by Colleran et al. (2) and Panja et al. (3) demonstrated that a better grading on the Michigan Diabetes Knowledge Test is associated with lower HbA_{1c} values. With each increase in the number of questions answered correctly, HbA_{1c} decreased by 0.239 ($r = -0.337$, $P < 0.003$). A meta-analysis by Norris et al. (4) showed that intervention via patient education reduced HbA_{1c} more than the control group by 0.76% (95% CI 0.34–1.18), 0.26% (0.21% increase–0.73% decrease), and 0.26% (0.05–0.48) at immediate, 1–3 months, and ≥4 months follow-up.

In summary, more resources should be channeled toward increasing the awareness levels to reduce the complication of diabetic retinopathy.

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References

1. Wang S, Tikellis G, Wong N, Wong TY, Wang JJ. Lack of knowledge of glycosylated hemoglobin in patients with diabetic retinopathy. Diabetes Res Clin Pract 2008;81:e15–e17
2. Colleran KM, Starr B, Burge MR. Putting diabetes to the test: Analyzing glycemic control based on patients' diabetes knowledge. Diabetes Care 2003;26:2220–2221
3. Panja S, Starr B, Colleran KM. Patient knowledge improves glycemic control: is it time to go back to the classroom? J Investig Med 2005;53:264–266
4. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. Diabetes Care 2002;25:1159–1171