Validity of Self-Report of Cardiovascular Risk Factors in a Population at High Risk for Stroke

Ayan K. Dey, BSc,*‡ Akram Alyass, MSc,† Ryan T. Muir, B.H.Sc,‡§ Sandra E. Black, MD, FRCP(C),*‡§‖¶ Richard H. Swartz, MD, PhD, FRCP(C),*‡§‖¶ Brian J. Murray, MD, FRCP(C), D,ABSM,‡‖¶ and Mark I. Boulos, MD, MSc, FRCP(C)‡§‖¶

Background: Screening for vascular risk factors is commonly assessed through self-report, despite reports of low sensitivity using this approach in healthy populations. The validity of self-reported vascular risk factors in a population at high risk for stroke has yet to be explored. *Aims:* This study investigated the validity of self-reported cardiovascular risk factors (e.g., hypertension, hypercholesterolemia, and type II diabetes mellitus) in a population of patients with a recent history of high-risk transient ischemic attack or minor stroke. *Methods:* Data were extracted from patient questionnaire responses and medical records (n = 101). Agreement between self-report and clinical measures (blood pressure, fasting blood glucose, lipid profile, and active medications) was assessed using estimates of sensitivity, specificity, and positive and negative predictive values for each vascular risk factor. *Results:* Forty-nine percent of the study population inaccurately self-reported at least 1 vascular risk factor. Sensitivities of self-report for hypertension, hypercholesterolemia, and diabetes were 84.5% (confidence interval [CI]: 72.1-92.2), 57.5% (CI: 44.1-69.7), and 77.8% (CI: 57.3-90.6), respectively, while specificities were 76.7% (CI: 61.0-87.7), 83.3% (CI: 67.3-93.2), and 95.4% (CI: 87.8-98.9), respectively. Accuracy of self-report for hypercholesterolemia was significantly lower than that for diabetes ($P < .001$) and hypertension ($P < .05$), with 42.6% of those with high cholesterol under-reporting their diagnosis. Logistic regression revealed that odds of accurate self-report were greater among younger adults and males. *Conclusions:* These results highlight the need for clinicians, scientists, and epidemiologists to be cautious when

From the *Institute of Medical Science, University of Toronto, Toronto, Ontario, Canada; †Department of Clinical Epidemiology & Biostatistics, McMaster University, Hamilton, Ontario, Canada; ‡Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada; §L.C. Campbell Cognitive Neurology Research Unit, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada; ‖Evaluative Clinical Sciences, Hurvitz Brain Sciences Research Program, Sunnybrook Research Institute, Toronto, Ontario, Canada; and ¶Division of Neurology, Department of Medicine, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada.

Received June 22, 2015; revision received August 15, 2015; accepted August 18, 2015.

During the recruitment of the study cohort, Dr. Boulos was supported by a Focus on Stroke Research Fellowship, which was funded by the Heart and Stroke Foundation of Canada, the Canadian Stroke Network, and the Canadian Institutes of Health Research. Dr. Swartz is supported by the Heart and Stroke Foundation of Canada New Investigator Award and the Henry J.M. Barnett Scholarship. Ayan K. Dey is supported by a Canadian Institutes of Health Research MD/PhD studentship award.

Authors' contributions: A.K. Dey, M.I. Boulos, A. Alyass, and R.T. Muir contributed to writing the manuscript. A. Alyass and A.K. Dey contributed to the statistical analysis of the data. A.K. Dey and R.T. Muir also contributed to the data collection. S.E. Black, R.H. Swartz, and B.J. Murray provided editorial and technical support.

Address correspondence to Mark I. Boulos, MD, MSc, FRCP(C), Sunnybrook Health Sciences Centre, Room A442-2075 Bayview Avenue, Toronto, Ontario M4N 3M5, Canada. E-mail: mark.boulos@sunnybrook.ca.

1052-3057/$ - see front matter

http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2015.08.022

screening for vascular risk factors using self-report measures as cross validation against objectives measures reveals poor sensitivity. Our results also highlight a lack of public education concerning these significant conditions. **Key Words:** Stroke—TIA—self-report—vascular risk factors—validity—screening—sensitivity.

Introduction

Information on the prevalence of diseases in the population is typically gathered through the use of self-report measures during public health surveys. Self-report measures are preferred as they are cost-effective and time efficient relative to physical examinations and lab testing. The accuracy of self-reported data on medical history is influenced by several factors such as the patient's knowledge and understanding of the relevant information, ability to recall it, willingness to report it, and whether the disease has yet to be diagnosed. In light of these factors, the rate of inaccurate self-reporting may be significant and may vary by disease and population.

Hypertension, hypercholesterolemia, and type II diabetes mellitus (T2DM) are important chronic diseases and cardiovascular risk factors that contribute greatly to the global burden of disease and are pertinent risk factors for stroke. The validity of self-report for these 3 risk factors is questionable, however, as a number of large population studies have reported sensitivity estimates for hypertension, hypercholesterolemia, and T2DM as low as 33.3%,[1] 44%,[2] and 58.9%,[3] respectively, when self-report measures were compared to objective markers of disease (see Table 1 for review). While the vast majority of past studies sampled healthy populations, to our knowledge, no studies have assessed the validity of self-reported measures for the aforementioned cardiovascular risk factors among individuals at high risk of future stroke. In such individuals, awareness of vascular risk factors is crucial to facilitate proper medical management that could prevent future stroke.

The primary aim of the present study was to assess the validity of self-reported measures of major cardiovascular risk factors in a population of patients with a recent history of high-risk transient ischemic attack (TIA) or minor stroke—a population known to be at high risk for incident or recurrent stroke. Secondary aims included identifying determinants for self-reported accuracy.

Materials and Methods

The present study used data from a previously completed cohort study conducted at the Sunnybrook Health Sciences Centre (Toronto, Canada) Stroke Prevention Clinic and inpatient ward. All recruited subjects were between the ages of 18 and 80 and had experienced a high-risk TIA and/or minor stroke within 2 weeks of recruitment and data collection. A total of 101 subjects with complete data on self-reported status for hypertension, diabetes, and hypercholesterolemia, and biometric data were included. Biometric data (i.e., systolic blood pressure, fasting glucose, hemoglobin A1C, low-density lipoprotein cholesterol [LDL-C], and a list of medications being used before the index TIA/stroke) were assessed complementary to self-reported information on hypertension, diabetes, and hypercholesterolemia status. This approach allowed for an evaluation of the validity of self-reported data against objective measures for each vascular risk factor. Additional information such as data on depressive symptoms

Table 1. *Summary of previously published studies examining the validity of self-report*

Author	Year	N	Condition	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Molenaar et al.[3]	2007	4950	T2DM	58.9	99.4		
Bowlin et al.[4]	1996	628	T2DM	75.0	98.0	48.0	99.0
Bowlin et al.[4]	1996	628	Hypercholesterolemia	47.0	80.0	77.0	52.0
Martin et al.[5]	2000	599	Hypercholesterolemia	59.0	84.0	63.0	82.0
Newell et al.[2]	2000	79	Hypercholesterolemia	44.0	91.0	87.0	55.0
Natarajan et al.[6]	2002	8236	Hypercholesterolemia	51.0	89.0	87.0	55.0
Bowlin et al.[4]	1996	628	Hypertension	57.0	82.0	54.0	84.0
Vargas et al.[7]	1997	8409	Hypertension	71.0	90.0	72.0	89.0
Molenaar et al.[3]	2007	4950	Hypertension	34.5	96.4		
White et al.[8]	2012	13,451	Hypertension	83.9	92.0	95.4	74.1
Dave et al.[1]	2013	16,598	Hypertension	33.3	89.5		

Abbreviations: NPV, negative predictive value; PPV, positive predictive value.