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Validation of Recall of Body Weight over a 26 year Period in Cohort Members of Adventist Health Study 2

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Keywords

Recall Bias; Correlation Coefficient; Overweight; Elderly; Body Mass Index

INTRODUCTION

The validity of recall of past body weight has been measured in several studies (1–8), and tends to be high (R>0.8) in young and middle aged adults. In elderly subjects (>65 years), recall of past body weight has been reported in one study of Canadian men(8). The paucity of validation data for recall in older age is noteworthy given the need for accounting for age and disease-related weight change in prospective studies.

In the present study, our objective was to assess the validity of 26-year recall of past body weight in a sample of 2,727 cohort members (mean age of 70 years at time of recall) of the Adventist Health Study-2 (AHS-2). AHS-2 represents the most recent prospective cohort study (n=96,710) of US and Canadian Adventists enrolled during 2002–07. Adventists have, for the past 50 years, been enrolled in NIH-funded prospective studies to investigate how healthful lifestyle patterns (i.e. diet, low BMI, physical activity, avoidance of tobacco) contribute to lower rates of non-communicable disease(9). Thus, validation of the AHS-2 data on recall of past body weight will allow investigations of lifestyle and health outcomes that account for weight variability due to age, disease, and lifestyle factors.

MATERIALS AND METHODS

The Adventist Health Study-2 (AHS-2) is a prospective study (n=96,710) that enrolled a cohort during 2002–2007 to investigate the role of lifestyle exposures (diet, physical

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activity, anthropometrics) and health on outcomes such as cancer and mortality. The design of this study has been described elsewhere(10). The questionnaire is divided into sections on medical history, diet, supplement use, physical activity, anthropometrics (current, adulthood), and female reproductive history. For anthropometrics, subjects reported their current weight and height and additionally reported their weight at ages 20, 30, 40, 50, 60, and 70 years.

The AHS-1 study design has been described in extensive detail elsewhere (9, 11). A total of 34,198 returned the AHS-1 lifestyle questionnaire that includes self-reported height and weight. Among non-Hispanic whites, the response rate to the lifestyle questionnaire was in excess of 75%.

Of 96,710 AHS-2 cohort members, 5,649 participated in the AHS-1 conducted earlier. The mean of time elapsed between report of body weight in AHS-1 (1977–1982) and report in AHS-2 was 26.1 years (95% CI=26.06, 26.14). Of the 5,649 AHS-2 cohort members, we selected 2,727 cohort members who reported their current body weight during the following age ranges in AHS-1: 28–32 years, 38–42 years, 48–52 years, 58–62 years, and 68–72 years old. Thus in this sample a comparison could be made to the recall of past body weight at age 30, 40, 50, 60, and 70 years in AHS-2.

To assess the validity of recalling weight at ages 30–70 years during AHS-2, we calculated a mean (and 95% confidence interval) of the difference given by current weight reported at the AHS-1 baseline minus the corresponding recall of past body weight reported 26 years later at AHS-2. Validity was also assessed by computing a correlation between recalled (AHS-2) and current (AHS-1) weight.

RESULTS

The average age of the sample (n=2,727)of non-Hispanic white AHS-2 cohort was 70 years (SD 10.5 years). The mean difference between current weight reported 26 years prior in AHS 1 and recall of past body weight in AHS-2 was only 0.67 kg (95% CI=0.42, 0.91). This indicates an underestimation in the recall of past body weight during ages 30–70 years.

In table 1, we present the demographics of the study sample and also an evaluation of how the validity of recall of past body weight as measured by a mean difference (current weight at AHS-1 minus recall of past body weight at AHS-2) varies by socio-demographic factors. We found that the underestimation that occurred in the recall of past body weight is greater in older age subjects, in both women and men, and in obese subjects. Interestingly, among higher income subjects (>$100,000 annual household income), we found non-significant differences between current weight at AHS-1 and recall of past body weight 26 years later in AHS-2.

Validation was also assessed by computing that past recall of age-specific body weight in AHS-2 and current AHS-1 weight at the corresponding age range were highly correlated ($r = 0.88$, $p<0.0001$). For recall of weight at age 30, 40, 50, 60, and 70 years the statistically significant ($p<0.0001$) validation correlations coefficients were respectively: 0.87, 0.89, 0.90, 0.86, and 0.83.

DISCUSSION

Our findings from AHS-2 cohort members indicate that the validity of 26-year recall of body weight during adulthood was very high in an older sample (mean age of 70 years). Thus, these survey measures have good potential for use in studies of weight variability in the AHS-2 cohort. The misclassification that was identified tended to be in the direction of

underestimation and was particularly prominent in 26-year recalls given by the obese and the very old (ages > 90 years). The recall of past body weight for these subgroups should, therefore, be interpreted with caution.

Similar findings have been reported in the Manitoba Follow-up Stud in Canada(8), and in an analysis of the older subjects of the Charleston Heart Study in the US(1). Specifically, a relation between cognitive function and error in the recall of body weight was shown in the Charleston Heart Study, such that there was an increase in correlation between recalled weight and the reported weight after excluding elderly subjects who with cognitive impairment assessed by tests of mental status and memory. In our sample, the lower accuracy at older ages (i.e. recall of weight at 70 years) could be indicative of age-related memory loss(12), although other contributing factors may exist.

In the AHS-2 sample the underestimation of past body weight among the obese could be evidence of a social desirability bias. Also noteworthy was the greater underestimation of past weight by ever smokers as compared to never smokers. Previous studies (13, 14) have indicated that weight gain after quitting smoking may increase recall weight underestimation in such populations.

Implications for Confounding by Disease-related Weight Loss in Studies of BMI and Health Outcome

Several recent studies have shown that some of the attenuation in risk due to overweight/obesity during older age may be due to confounding by disease-related weight loss(15, 16). At least some of this bias could be corrected if there is accurate data on adult body weight during the pre-baseline period. The findings in this report and from a few previous studies (table 4) do indicate good validity correlations (r> 0.8) for recall of body weight 20–28 years before the baseline survey in a cohort study.

The underestimation of recall weight among overweight/obese subjects misclassifies BMI from higher to lower category, thus attenuating risk of BMI-mortality relation in elderly subjects.

Overall, the evidence that this misclassification is differential across both age and adiposity needs to be incorporated into the interpretation of weight history and health outcome literature. These data could be used as a basis for regression calibration when analyzing effects of past body weight on an outcome.

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TABLE 1

Demographics of the sub-sample of AHS-2 cohort members and relation with validity of recall of past body weight as assessed by mean weight difference of (n=2,727)

			95% Confidence Interval	
	N	Mean Weight Difference (in Kg)**	LL	UL
Male	1057	0.52	0.14	0.90
Female	1670	0.76	0.44	1.08
Age at AHS-2				
<65 years	831	−0.16	−0.61	0.30
>= 65 to <75 years	757	0.84	0.36	1.31
>= 75 to <85 years	816	1.0	0.58	1.43
>= 85 years	323	1.53	0.81	2.25
Recall of Weight at Age:				
30 years	691	−0.01	−0.52	0.49
40 years	724	0.59	0.11	1.08
50 years	890	0.87	0.46	1.27
60 years	384	1.43	0.78	2.08
70 years	38	1.85	−0.26	3.96
BMI at AHS-2				
<19	172	0.67	−0.09	1.44
>=19 to <25	1160	0.08	−0.19	0.36
>=25to <30	942	0.48	0.07	0.90
>=30 453	2.54	1.65	3.43	
Education				
Grade School	32	1.08	−1.77	3.92
Some High School	113	1.48	0.31	2.65
High School Diploma	254	0.89	−0.13	1.90
Trade School Diploma	91	2.08	0.17	3.99
Some College or higher	2206	0.54	0.28	0.79
Annual Household Income				
Less than $10,000	158	1.09	0.09	2.08
$11,000 – $20,000	190	1.77	0.78	2.76
$21,000 – $30,000	265	0.76	−0.16	1.69
$31,000 – $50,000	449	0.69	0.14	1.25
$51,000 – $70,000	340	0.62	−0.13	1.38
$76,000 – $100,000	219	0.39	−0.48	1.26
$101,000 – $200,000	257	−0.25	−0.85	0.36
More than $200,000	78	−0.62	−1.97	0.73
Smoker				
Never-Smoker	2,407	0.58	0.33	0.84
Ever-smoker	286	1.45	0.54	2.35

** AHS-1 weight reported at specific age - AHS-2 recall of past body weight at that age