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LETTER

Comparing beverage consumption, physical activity and anthropometry among young adult urban- and rural-dwelling African women

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Beverage consumption, physical activity, body mass index and waist circumference were compared in age-matched (aged 18–30 years) groups of young South African women from urban ($n = 78$) and rural ($n = 94$) settings. Obesity was higher in the rural group, driven by a higher consumption of sugar-sweetened beverages and low physical activity.

Keywords: African, BMI, rural, sugar-sweetened beverages, urban

Background

The prevalence of overweight and obesity in African women is high and projected to continue rising in the sub-Saharan African region.[1] In comparison, most Western countries have shown marked increases in the incidence of obesity from 1980, but plateauing around 2006. The data demonstrate that the prevalence of the disease has lowered from the 2006 estimates in more affluent countries, while still rising in low- and middle-income countries (LMIC).[1] Data confirm that, in most regions, women have a higher risk of obesity compared with men, and this is particularly evident in Africans.[1] The divide in the incidence of obesity also appears to be narrowing between rural and urban black South African women.[2] The aim of this study was to compare beverage consumption, physical activity and anthropometric measures of obesity among young adult urban- and rural-dwelling African women and to determine the association between these variables.

Methods

This cross-sectional study was conducted at the University of the Witwatersrand, Johannesburg (the urban cohort) and in Mukondeleli, a rural village in the Limpopo province, South Africa. In the urban cohort, registered students aged between 18 and 30 years were invited to participate on campus, while in the rural cohort age-matched women were recruited via community talks at the community centre for the purposes of this study. The Human Research Ethics Committee (Medical), University of the Witwatersrand approved the study protocols (ethics certificate number for the rural study: M170377; ethics certificate number for the urban study: M170591), and all participants gave written consent. Trained fieldworkers administered all questionnaires and collected anthropometry measurements. An electronic digital scale was used to measure body weight (Seca, Chino, CA, USA), and stature was measured using a stadiometer (Seca, Chino, CA, USA). BMI was calculated as weight (kg)/height (m^2). Waist circumference was measured using a non-elastic spring tape between the lowest ribs and the iliac crest. Obesity was defined as either BMI ≥ 30 kg/m^2 or waist circumference ≥ 80 cm. Self-reported moderate-to-vigorous physical activity (MVPA) and sitting time in minutes per week were collected using the global physical activity questionnaire.[3] Beverage consumption was determined using the BEVQ-15,[4] an item-based questionnaire to elicit consumption of sugar-sweetened beverage intake and water. The BEVQ-15 is a rapid assessment tool that quantifies habitual beverage intake in grams and energy content in adults. Respondents are asked to indicate 'how often' and 'how much' of a beverage they had consumed in the past month. Responses for the 'how often' category range from 'never or less than 1 time per week' up to '3+ times per day'; 'how much' ranges from 'less than 180 ml (¾ cup)' up to 'more than 600ml (2½ cups).' Examples of these items (cans, juice cartons or household glasses) were verbally described to participants to assist with recall of serving size of beverages. The estimated total kilocalories from beverages were calculated using the estimated energy consumption from each of the 15 items. The total of kJ consumption is calculated from the estimated energy consumption for each item. Total sugar-sweetened beverages (SSB) kJ, total milk, and alcohol intake was also calculated. The total SSB kJ was then divided into quintiles of consumption, ranging from 0 to 1988 kJ.

Statistica version 13.2 (TIBCO Software Inc, Palo Alto, CA, USA) was used for all analyses. Descriptive statistics and univariate analyses were used to determine the association between beverage consumption, physical activity, waist and BMI.

Results

The 172 enrolled participants included 78 urban and 94 rural-dwelling young women with a mean age of 21.7 ± 3 years and a mean BMI of 25 ± 6.4 kg.m^{-2}. Table 1 demonstrates that obesity levels in the rural group were higher than the urban group (22.3% vs. 15.4%, $p < 0.05$). Those participants in the urban group had higher sitting times and MVPA than the rural group ($p < 0.05$). Consumption of fruit juice, soft drinks and sweetened tea was higher in the rural group compared with the urban group ($p < 0.05$), while consumption of unsweetened and alcoholic beverages was similar between the groups.

Sitting time was lower in quintiles 2 and 3 compared with quintile 1 of SSB kJ intake (both $p < 0.05$). In a univariate analysis SSB quintile 5 was positively associated with BMI (β 0.16, $p = 0.04$). Waist was positively associated with sitting time quintile 2 (β 0.18, $p = 0.02$), and negatively associated with completion of high school (β −0.18, $p = 0.02$).

Table 1: Characteristics and beverage intake of urban- and rural-dwelling young women

Factor	Urban (n = 78)	Rural (n = 94)
Age (years)	20.8 ± 2.19	22.4 ± 3.36*
Completed high school (%)	100	30.9*
Height (m)	1.63 ± 0.06	1.60 ± 0.08*
Weight (kg)	63.9 ± 15.2	65.7 ± 16.1
BMI (kg/m^2)	24.1 ± 5.49	25.9 ± 7.0
WC (cm)	75.1 ± 11.1	81.4 ± 14.8*
WC ≥ 80 cm (%)	29.5	46.8*
BMI ≥ 30 (%)	15.4	22.3*
Sitting time (mins/day)	355 (120, 720)	210 (120, 330)*
MVPA (mins/week)	450 (300, 600)	240 (180, 300)*
SSBs, % consumers and intake (ml/day)		
Fruit juice, 100%, unsweetened	48 (61.5%) **2.73 (0, 16.2)**	33 (35.1%) **0 (0, 5.5)***
Sweetened juice	44 (56.4%) **4.85 (0, 81.7)**	55 (58.5%) **0 (0, 114.4)**
Soft drinks	51 (65.4) **15.2 (0, 57.0)**	73 (77.7%) **38 (15.1, 212.8)***
Diet soft drinks	9 (11.5%) **0 (0, 0)**	4 (4.3%) **0 (0, 0)**
Sweetened tea drinks (iced tea)	35 (44.9%) **0 (0, 27.2)**	65 (69.1%) **8 (0, 24)***
Tea/coffee with sugar (hot)	53 (67.9%) **23.4 (0, 65.6)**	51 (54.3%) **20.5 (0, 65.6)**
Energy drinks	11 (14.1%) **0 (0, 0)**	13 (13.8%) **0 (0, 0)**
Unsweetened drinks, % consumers and intake (ml/day)		
Whole milk	37 (47.4%) **0 (0, 65.1)**	42 (44.7%) **0 (0, 65.1)**
2% milk	6 (7.7%) **0 (0, 0)**	6 (6.4%) **0 (0, 0)**
Skimmed milk	12 (15.4%) **0 (0, 0)**	4 (4.3%) **0 (0, 0)**
Tea/coffee black, no sugar	16 (20.5%) **0 (0, 0)**	18 (19.1%) **0 (0, 0)**
Alcoholic drinks, % consumers and intake (ml/day)		
Beer	8 (10.3%) **0 (0, 0)**	10 (10.6%) **0 (0, 0)**
Hard liquor	7 (9.0%) **0 (0, 0)**	1 (1.1%) **0 (0, 0)**
Wine	10 (12.8%) **0 (0, 0)**	7 (7.4%) **0 (0, 0)**

Note: Data presented as mean ± SD or median (interquartile range, IQR) or percentage; the BevQ-15 results are presented as n (%) consumers and median (IQR) in bold; BMI = body mass index; MVPA = moderate vigorous physical activity; SSB = sugar-sweetened beverages; WC = waist circumference; $p < 0.05$ versus urban-dwelling young adults.
*Significant differences between urban and rural groups, Mann–Whitney test, t-test or chi-square test.

Discussion

This comparative study observed that the presence of obesity risk was higher in a rural group of young African women compared with urban-dwelling women, suggestive of the nutritional transition occurring in this setting, but in a direction opposite than expected. The SSBs seem more popular than dairy and non-sweetened alternatives in this study; however, consumption of SSBs was significantly higher in rural women compared with urban-dwelling women. Given the lower MVPA in the rural group, energy expenditure is not likely to be excessive and may contribute to obesity and obesity-related cardiometabolic risk. Our findings of an association between lower education and waist indicate that there may be challenges for public health interventions, particularly as vulnerable populations are targeted by multinationals in LMICs in their marketing of SSBs.[5] Thus, there seems to be an imbalance between well-funded advertising drives to increase consumption of SSBs, and a drive to improve nutrition education for public health benefit. The recent introduction of the sugar tax may be one such platform that contributes to funds to improve primary health care; however, education campaigns such as improving comprehension of nutritional fact labelling and disease prevention are urgently needed. Our data suggest higher intakes of most SSBs amongst the rural participants. The taxation of SSBs may lead to changes in beverage consumption behaviours but regular monitoring is required. Finally, contemporary innovations such as smartphone technology can encourage consumers to make healthier food and beverage choices.

Conclusions

This study highlights the need to address obesity through targeted public health initiatives, especially amongst rural-dwelling young adult females who have higher intakes of SSBs and lower physical activity.

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