Weight loss and ethnicity: a very low calorie diet induces an enhanced reduction in waist circumference in an Asian population when compared to a Caucasian population.

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Abstract

Aims: To determine if British Asians of Indian or Pakistani descent differ in their baseline characteristics and in response to a 12 week very low calorie diet (VLCD). To determine if changes in weight and waist circumference in response to a VLCD differs between Asians and Caucasians

Methods: Weight loss was achieved using a nutritionally complete (energy deficient), very-low-calorie diet (VLCD) with an average daily intake of 550kcal (≥50g protein,≥50g carbohydrate, mean 15.9g fats and ≥100% recommended daily allowances (RDA) for key vitamins and minerals), alongside a unique behaviour change programme (LighterLife –LL). Data from Asians recruited onto LL total in 2009/2010 for whom 12 week weight change information were available were analysed. Waist circumference data were available for a subset of Asians. These were age, body mass index, and gender matched to a Caucasian population and compared by independent t-test.

Results: No differences were observed between the Indian and Pakistani group for baseline measurements or weight change at 12 weeks. Caucasians had a greater percent excess body weight loss (%EBWL) than Asians at 12 weeks (72.4 ± 22.1 vs 48.9 ± 18.0, $p < 0.0001$). However, Asians had a greater waist circumference reduction per kilogram of weight loss when compared to Caucasians (1.16 ± 0.7 vs 0.95 ± 0.3, $p = 0.037$).

Conclusions: It appears that despite a greater %EBWL for Caucasians, Asians had a greater waist circumference reduction per kilogram of weight loss using a VLCD approach for a 12 week period.

Introduction

Data from the 1992 Singapore National Health Survey clearly demonstrated that despite living under similar socio-economic conditions and having similar diets, Chinese, Malay and Asian Indians differed in the prevalence of obesity and type 2 diabetes (T2D) (Tan et al, 1999); where Asian Indians had the greatest prevalence of T2D of the three groups (Tai et al, 2000). Similarly, it has been reported that for the same body mass index (BMI), the body fat percentage in Asian Indians is higher than Caucasians as well as other Asian populations (Rush et al, 2009).

Evidence also suggests that Asian Indians store a greater proportion of their body fat viscerally which has been associated with greater risk of T2D and cardiovascular disease risk (Anjana et al, 2004). Due to this, the World Health Organisation (WHO) recommends using lower BMI values to define a healthy BMI for Asians than for Caucasians. Hence, for Asian populations a BMI of 23-25 kg/m^2 is considered overweight and a BMI >25 kg/m^2 is considered obese (World Health Organisation, 2004).

In the review by Abate and Chandalia (2003), they explain that the prevalence of diabetes in rural areas of India is 2%, 8% in urban areas such as Madras, but that Asian Indians who migrate to the UK or other westernised countries have about four times higher prevalence of diabetes compared to those living in India. In the CRD report 5 (NHS Centre for Reviews and Dissemination, 1996), it is made clear that South Asians in the UK experience significantly raised rates of cardiovascular disease. In fact, they report that South Asian populations in the UK overall have approximately 40% higher death rates from coronary heart disease (CHD) than the Caucasian population. Surveys attempting to identify causes of raised mortality in South Asians found a higher prevalence of insulin resistance in this group which is associated with increased rates of obesity and central obesity.

The benefits of lifestyle modification in native South Asians in subjects with impaired glucose tolerance (IGT) was unknown until a prospective randomised controlled trial demonstrated that lifestyle modification (diet and exercise) significantly reduced the incidence of diabetes in Asian Indians with IGT (Ramachandran et al, 2006). There remains scarce evidence of the benefits of lifestyle modification and dietary intervention in native or migrant South Asians in the literature. One exception is the Diabetes Prevention Programme where 4.4% of the study participants were Asians (including 20 Pacific Islanders) where lifestyle modification was as effective in this group as in other ethnic groups for preventing diabetes (Diabetes Prevention Program Research Group, 2002). Similarly, Balagopal et al (2008) also demonstrated improvements in hyperglycaemia and type 2 diabetes in adults and adolescents by improving dietary patterns (increasing fibre and protein uptake; substituting of white rice with millets, sprouted legumes and vegetables; reducing fat intake and portion sizes.)

Comment [iam1]: Are you sure these are from the Indian Sub-continent ? In the US Asian usually means SE Asia

Comment [cr2]: It was not defined in the paper and have contacted the author. – Reply from Bill Knowler "The Asian-American group was small in number, so we did not subclassify them further. They consisted of people identifying their origins as from anywhere in Asia, including India or southest Asia. I'm sorry I can't provide further details."

To date, there is no evidence for the use of alternative dietary approaches to weight loss such as very low calorie diets (VLCDs) and behavioural therapy in this population. We therefore investigated the effectiveness of VLCDs in Asians self-referred to the LighterLife Total VLCD programme. We aimed to determine if self-reported Indian and Pakistanis differ in their baseline characteristics and in response to a 12 week very low calorie diet (VLCD). We also investigated changes in weight and waist circumference in response to a VLCD between Asians and age, BMI and gender-matched Caucasians.

Comment [iam3]: 1st generation or born in UK?

Comment [cr4]: We do not have that information – as mentioned in the limitations (although perhaps not clearly)

Methods

LighterLife Total is a commercial weight-management programme for individuals with BMI≥30. It offers the opportunity to lose weight and to identify personal psychological motivation for over-consumption, thereby enabling participants to develop robust strategies for more successful weight management in the future.

Participants were self-referred and were asked to have their GPs or healthcare provider assess their medical status using a standardised form provided by LighterLife. For those individuals who were eligible, weight loss was achieved using a nutritionally complete (energy deficient), very-low-calorie diet (VLCD) with an average daily intake of 550kcal (≥50g protein,≥50g carbohydrate, mean 15.9g fats and ≥100% recommended daily allowances (RDA) for vitamins and minerals including Vitamins A, C, D, E, K, thiamine, riboflavin, niacin, B6, B12, folic acid, biotin, and pantothenic acid, calcium, phosphorous, iron, zinc, magnesium, iodine, potassium, sodium, copper, manganese, selenium, molybdenum, chromium, chloride, fluoride).

Participants undertook the VLCD alongside a unique behaviour-change programme developed specifically for weight management in the obese. This is informed by concepts from cognitive behavioural therapy and transactional analysis (transactional cognitive behavioural therapy – TCBT®) and addiction/change theory (Cooper et al, 2003; DiClementi, 2003; Leach, 2006; Buckroyd and Rother, 2007). It is delivered in small, single-sex, weekly groups by LighterLife weight-management counsellors who are specifically trained in the facilitation of behaviour change.

Abstinence from conventional food on the LighterLife Total VLCD provides patients with the clarity of explicit boundaries around food and drink. Coupled with the behaviour-change work done in group, this helps patients to create a reflective space in which to explore the reasons for their overeating and develop new strategies – both practical and psychological – for long-term weight management.

Data from self-reported Asians recruited onto LL Total in 2009/2010 for whom 12 week weight change information were available were analysed. Baseline demographics and 12 week changes in weight were compared for Indians and Pakistanis. All variables were assessed for normality. Those variables which were not normally distributed were log transformed. Baseline comparisons were carried out by independent t-test for continuous data and by Chi square for categorical data.

Waist circumference data were available for a subset of Asians. These were age, BMI and gender matched to a Caucasian population and compared by independent t-test. Excess weight for Caucasians was calculated based on an ideal BMI of 25 kg/m^2 while excess weight for Asians was calculated based on an ideal BMI of 23 kg/m^2. Data were analysed using SPSS for Windows (version 15.0) (SPSS Inc., Chicago, IL, USA).

Results

Of the 1407 Asians recruited onto LL Total in 2009/10, 12 week weight change data were available for 510 clients. Of these clients, 128 were Pakistani (113 females) and 382 were Indian (316 females). Baseline demographics for these two groups are presented in Table 1. Changes in weight and %EBWL at 12 weeks are presented in Table 2.

Of the 510 Asian clients who had weight change data at 12 weeks, waist circumference data were available for 101 (83 females, 18 males) of these. As there were no differences at baseline, Indians and Pakistanis were joined to form an Asian group which was compared to 101 age, BMI and gender-matched Caucasians. Caucasians were significantly taller, and heavier at baseline, however, Asians had significantly greater excess weight. Significantly greater excess weight in Asians was only observed in women, although a similar trend was observed in men (Table 3). At 12 weeks, %EBWL was greater in Caucasians. Weight loss was significantly different in women only, where Caucasian women lost more weight than Asian women. A similar trend was observed in men, but did not reach statistical significance (Table 4). The amount of waist circumference reduction per kilogram lost was greater in Asians than Caucasians (Table 4).

Discussion

Our results suggest that despite a smaller %EBWL after 12 weeks on a VLCD, Asians have a greater reduction in waist circumference per kilogram lost when compared to an age, BMI and gender matched Caucasian population. This is particularly relevant as it is well documented that Asians have greater prevalence of abdominal obesity and cardiovascular health risk (Khoo et al, 2011). Upon reviewing client records, it appeared that Asians generally presented with a lower BMI. This suggests Asian patients may be motivated to attempt weight-loss interventions earlier than Caucasians or that they are aware of the different thresholds defining obesity.

Both the Asian and Caucasian groups achieved a body-weight reduction on this programme well in excess of that known to reduce weight-related co-morbidity risk, thus providing evidence to support the effectiveness of VLCDs in obese individuals from minority ethnic groups. Nevertheless, %EBWL was greater for Caucasians than Asians using a VLCD. Interestingly, weight loss has also been found to be greater in Caucasians than Asians in response to weight loss medications such as Orlistat and Sibutramine (Osei-Assibey et al, 2011). It remains unclear as to why there is such a discrepancy between the groups and whether this can be attributed to a biological or environmental factor. Data on insulin resistance in these participants would have been beneficial. It has been observed that Asians have increased prevalence of insulin resistance (Mente et al, 2010) which has been associated with hindering weight loss when compared to individuals with a normal insulin response (Rolland and Broom, 2009). Mente et al (2010) also suggest that lower levels of adiponectin may be involved in the greater insulin resistance observed in Asians. In addition, Khoo et al (2011) argue that differences in insulin sensitivity between different ethnic groups may be due to ethnic-specific sensitivity to the effects of increasing adiposity including body fat distribution, in particular in the visceral area.

This study did have some limitations. The inclusion of other factors in our analysis such as; education, income, time of migration (or generation of migration/nation of birth), lifestyle, medication, smoking, alcohol drinking, physical activity would have been beneficial. In addition, locating the anatomical waist can be problematic in the obese (Stewart et al, 2010). We accept waist circumference is an imperfect measure of adiposity, and more accurate methods of assessing adiposity and fat distribution may have shed more light on the results observed. Finally, the self-reporting nature of the ethnicity data collection, resulting in possible misclassification in mixed-race participants may have underestimated the associations observed.

As Kumanyika (2008) suggests, special attention should be paid to weight interventions in ethnic minority populations as there is concern that typical programmes may not be as effective in these populations as compared to others.

The implications for ethnic predisposition to obesity and associated co morbidities needs to be taken into account when designing public health policies and considering best practice for weight management. Fortunately, there have been programmes initiated aiming at increasing awareness and prevention of childhood obesity (CHETNA – Children Health Education Through Nutrition and Health Awareness programme; MARG – Medical Education for Children/Adolescents for Realistic Prevention of Obesity and Diabetes and for Healthy Ageing) (Bhardwaj et al, 2008; World Diabetes Foundation, 2007) but the success of these programmes may be improved if better informed by dietary intervention studies in these specific populations. Hence, we are in agreement with the CRD report (NHS Centre for Reviews and Dissemination, 1996) and Avenell et al (2004) who suggest that there is a need for longer term studies in ethnic groups.

To our knowledge, we are the first to report the greater reduction in waist circumference per kilogram lost in Asians as compared to Caucasians. It remains unclear as to whether this relationship is specifc to the use of a VLCD or if it would be observed using other dietary interventions (i.e. low fat, reduced calorie diets) or exercise, and if this relationship remains present in the longer term.

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Table1: Baseline demographics for Asians who underwent LL total (n=510).

	Indian	Pakistani	P
Age	37.0 ±10.6	36.9 ± 10.0	0.947
Weight (kg)	96.4 ± 17.8	98.6 ± 16.0	0.197
Height (m)	1.63 ± 0.09	1.64 ± 0.08	0.300
BMI (kg/m^2)	36.2 ± 4.7	37.0 ± 6.1	0.180
Excess weight (kg)	35.2 ± 14.6	36.8 ± 12.7	0.263
Gender			
males	66	15	0.136
females	316	113	

BMI – Body mass index. Data presented as means ± standard deviation. Excess weight was calculated using a BMI of 23 kg/m^2.

Table 2. Comparison of 12 week changes for Indians compared to Pakistanis.

	Indian	Pakistani	P
Weight loss	-14.6 ± 5.7	-15.6 ± 6.9	0.148
% EBWL	45.0 ± 18.4	44.5 ± 18.4	0.800

% EBWL – percent excess body weight loss. %EBWL was calculated based on a BMI of 23 kg/m^2. Data presented as means ± standard deviation.

Table 3: Comparison of baseline measurements for Asians versus Caucasians. (n= 101 matched pairs)

	All (n = 101 matched pairs)			Men (n = 18 matched pairs)			Women (n = 83 matched pairs)		
	Asian	Caucasian	P	Asian	Caucasian	P	Asian	Caucasian	P
Age	36.6 ± 11.4	36.6 ± 11.3	0.977	39.8 ± 10.9	39.9 ± 10.6	0.950	35.9 ± 11.4	35.9 ± 11.3	0.996
Height (m)	1.64 ± 0.1	1.67 ± 0.1	0.002	1.76 ± 0.1	1.81 ± 0.1	0.018	1.61 ± 0.1	1.64 ± 0.1	<0.0001
Weight (kg)	96.2 ± 17.4	100.9 ± 18.5	0.045	117.0 ± 21.5	126.5 ± 22.0	0.182	91.7 ± 12.6	95.4 ± 12.0	0.040
BMI (kg/m^2)	35.8 ± 4.4	35.9 ± 4.6	0.854	37.8 ± 5.8	38.5 ± 6.1	0.728	35.4 ± 4.0	35.4 ± 4.0	0.999
Waist circumference (cm)	107.9 ± 14.3	109.5± 13.9	0.415	125.6 ± 14.9	125.4 ± 16.3	0.961	104.0 ± 10.9	106.1± 10.6	0.227
Excess weight (kg)	34.5 ± 13.6	30.8 ± 14.2	0.012	46.0 ± 19.0	44.3 ± 19.7	0.182	32.1 ± 10.8	27.9 ± 10.7	0.004

BMI – Body mass index. Excess weight was calculated based on a BMI of 23 kg/m^2 for the Asian group and a BMI of 25 kg/m^2 for the Caucasian group. Data presented as means ± standard deviation.