Evaluation of a 12-week weight management group for people with type 2 diabetes and pre-diabetes in a multi-ethnic population

Rosemary Huntriss, Helen White

Weight loss offers a positive approach to the treatment of diabetes and has a number of reported benefits, including improved insulin sensitivity, glycaemic control, improved mortality rates, restoration of beta-cell function and reduced dependence on diabetes medications. The aim of this pilot study was to evaluate clinical outcomes of a 12-week weight loss intervention for people with type 2 diabetes mellitus and pre-diabetes from a multi-ethnic population. Thirty-four people were enrolled on the programme and 21 completed the course. This intervention was shown to be clinically effective, with those opting for further support achieving better clinical outcomes. South Asian individuals remain difficult-to-treat in terms of clinical outcomes and intervention adherence. Future research should consider the most appropriate interventions for this patient group.

Diabetes is an increasing problem in society with prevalence continuing to rise (Wang et al, 2011). Being overweight and, in particular, obese, significantly increases the risk of type 2 diabetes (Narayan et al, 2007) and is positively associated with the micro- and macrovascular complications of the disease (Litwak et al, 2013). Weight loss offers a positive approach to treatment and has a number of reported benefits, including improved insulin sensitivity, glycaemic control (Pi-Sunyer, 2005), mortality rates (Williamson et al, 2000), restoration of beta-cell function (Lim et al, 2011) and reduced dependence on diabetes medications (Foster et al, 2013).

A small number of UK-based studies have successfully demonstrated the effectiveness of weight management services within primary care (Morrison et al, 2012; Counterweight, 2014; Logue et al, 2014) but so far none have evaluated the effectiveness of weight management groups specifically for people with diabetes or pre-diabetes, particularly in an area where diabetes prevalence is high.

The aim of this pilot study was to evaluate the outcomes of a weight management intervention for people with diabetes and pre-diabetes within a multi-ethnic population.

Methods

Subjects

Subjects were recruited from GP surgeries in Bradford, through healthcare professional referral or patient self-referral. Posters advertising the study were placed within the surgeries.

Inclusion criteria

People aged 18 years and over, English speaking and with either type 2 diabetes or pre-diabetes (diagnosed by HbA_{1c} 42–48 mmol/mol [6.0–6.5%]) and a co-existing BMI of >25 kg/m^2.

Exclusion criteria

Individuals are excluded if they have type 1 diabetes, or poorly controlled type 2 diabetes, with a high risk of hypoglycaemia (determined

Citation: Huntriss R, White H (2016) Evaluation of a 12-week weight management group for people with type 2 diabetes and pre-diabetes in a multi-ethnic population. *Journal of Diabetes Nursing* **20**: 65–71

Article points

1. This study evaluated a 12-week weight loss service for people with type 2 diabetes and pre-diabetes in Bradford, UK.
2. The intervention proved successful in terms of weight loss, improved glycaemia and improved psychosocial outcomes.
3. People who opted for on-going support fared better in terms of clinical outcomes.
4. South Asian individuals had higher attrition rates and poorer clinical outcomes and remain a difficult-to-treat population.

Key words

- Diabetes
- Pre-diabetes
- South Asian people
- Weight loss

Authors

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Page points

1. The sessions, undertaken at community health centres during the daytime, were of two hours' duration and ran for 12 weeks.
2. The dietary principles recommended to the group members include: energy restriction, low total fat intake, low saturated fat intake, higher unsaturated fat intake, increased physical activity, low glycaemic index and load and increased dietary fibre and whole grain intake.
3. The course also delivered education on carbohydrates. Participants were taught about dietary sources of carbohydrate, the effect of carbohydrate consumption on blood glucose levels, and the role and function of high and low glycaemic index foods.

by referring practitioner and acting dietitian). This was because the study was unable to offer specialist nurse support to help manage insulin and safety of these individuals.

Programme design

The sessions, undertaken at community health centres during the daytime, were of two hours' duration and ran for 12 weeks. The service had two teaching aims: weight loss and diabetes education encouraging self-management. The sessions were outlined as follows:

- Session 1: Introduction.
- Session 2: What is diabetes?, healthy eating and meal patterns.
- Session 3: Portion control and calories.
- Session 4: Individual phone consultation.
- Session 5: Carbohydrates.
- Session 6: Emotional eating.
- Session 7: Physical activity.
- Session 8: Supermarket tour.
- Session 9: Progress review.
- Session 10: Food rules.
- Session 11: Meal planning and recipes.
- Session 12: Moving forward.

Table 1. Baseline characteristics.

Population characteristics	Descriptive data	Number of participants who completed the programme	Number of participants who did not complete the programme
Number (*n*)	34	20	14
Gender	23 female, 11 male	13 female, 7 male	10 female, 4 male
Ethnicity (*n*)			
- White British	20 (58.8%)	14	6
- South Asian	12 (35.3%)	4	8
- Chinese	1 (2.9%)	1	0
- White European	1 (2.9%)	1	0
Age ± SD (years)	57.2 (±11.0)	61.2 (±9.6)	51.4 (±9.8)
Type 2 diabetes (*n*)	31 (91.2%)	17	14
Pre-diabetes (*n*)	3 (8.8%)	3	0
BMI ± SD (kg/m²)	36.6 (±5.6)	36.6 (±5.5)	38.1 (±8.1)

Participants were weighed at each session, reflected on the previous week's journey, focused on one topic as set out above and set a SMART (Specific, Measurable, Achievable, Realistic and Time-bound) goal to focus on for the next week based on that week's topic.

The session plans were created with content based around that recommended in NICE obesity guidelines (2006), Diabetes UK nutritional guidelines (2011) and practical advice from Weight Concern (2006). The role of the dietitian was to act as a facilitator to the activities and to generate discussions.

Participants were advised to aim for a 0.5 kg to 1 kg weight loss per week as per NICE guidance (2006). The dietary principles recommended to the group members include: energy restriction, low total fat intake, low saturated fat intake, higher unsaturated fat intake, increased physical activity, low glycaemic index and load, and increased dietary fibre and whole grain intake as recommended in the evidence-based Diabetes UK nutritional guidelines for the prevention and management of diabetes (2011). Behavioural strategies used include self-monitoring of behaviour, discussion of stimulus control, goal setting, problem-solving and encouraging a slower rate of eating as recommended in NICE obesity guidelines (2006).

The course also delivered education on carbohydrates. Participants were taught about dietary sources of carbohydrate, the effect of carbohydrate consumption on blood glucose levels, and the role and function of high and low glycaemic index foods in order to inform their dietary choices when self-managing their diabetes.

Data collection

Baseline data was recorded at programme start (see *Table 1*). Ethnicity was classified as White British, South Asian (Pakistan, Bangladesh and India), White European and Chinese, based on the ethnic groups in the population sample. The Problem Areas in Diabetes Scale (PAID) questionnaire was used to evaluate diabetes-related distress (Snoek et al, 2000).

Participants were weighed weekly, with a final

weight recorded at 12 weeks. A second PAID questionnaire was also administered at the last group session (week 12). For those that were not present at week 12, their most recent weight was taken from the 12-week course and they were sent a postal PAID questionnaire with a pre-paid envelope with a request for its return.

All participants were offered an optional monthly follow-up session at a central hospital venue after completion of the course. This offered the opportunity to be weighed, receive education or revision around a specific diet- or diabetes-related topic and discuss any issues with a dietitian.

The final data collection was undertaken 9 months after baseline values were collected. With individual consent, weight (kg) and HbA_{1c} (mmol/mol) were obtained retrospectively from the electronic clinical record (SystmOne) or, alternatively, from the follow-up group data.

Data analysis

Descriptive statistics were used to present demographic variables. When data was normally distributed, a paired *t*-test was used to compare changes in weight from baseline to 12 weeks and ANOVA (repeat measures) was used to report changes over 9 months for weight and HbA_{1c}. The median and the Wilcoxon signed rank test were used to describe non-parametric data (PAID score) and to compare the score between baseline and week 12.

Data were analysed using SPSS 22.0 (Chicago, Illinois) and results were classed as statistically significant when $P<0.05$. Attrition rates were calculated for all participants.

Permissions

Ethical approval was granted by Leeds Beckett University. Ethical permission was not required by Bradford Teaching Hospitals NHS Foundation Trust, who granted approval classing this study as a "service evaluation."

Results

Thirty-four people were recruited to the study. Of those enrolled, 70% were women, predominantly diagnosed with type 2 diabetes (91.2%) rather than pre-diabetes (8.8%) and were of predominantly White British (58.8%) and South Asian (35.3%) ethnicity.

In total, 21 (62%) completed the 12-week programme. Data from one further participant was considered anomalous due to water retention. Of the remaining 20 participants, 9-month weight loss data were available for

Table 2. Changes in participants' weight, BMI, HbA_{1c} and PAID score from baseline.

Outcome	Baseline	12 weeks	Change from baseline	*P* value	9 months	Change from baseline	*P* value
Weight (kg)	101.8 (±8.4) (*n*=20)	98.7 (±17.1) (*n*=20)	-3.1 (±2.3)	<0.001	97.8 (± 17.8) (*n*=15)	-4.8 (±6.3)*	0.01
BMI (kg/m2)	36.6 (±5.7) (*n*=20)	35.4 (±5.0) (*n*=20)	-1.2 (±1.2)	<0.001	34.4 (±2.1) (*n*=15)	-1.6 (±2.1)*	0.009
HbA_{1c} (mmol/mol)	61.7 (±13.7) (*n*=14)	-	-	-	53.4 (±12.2) (*n*=14)	-8.4 (±11.4)	0.017
PAID Score**	26.25 0–83.75 (*n*=17)	15.0 (0–52.5) (*n*=17)	-11.25	0.003	-	-	-

*Value based on only 15 participants with baseline, 12-week and 9-month values.

**All values are mean (SD) with the exception of PAID score reported as median (range).

Page points

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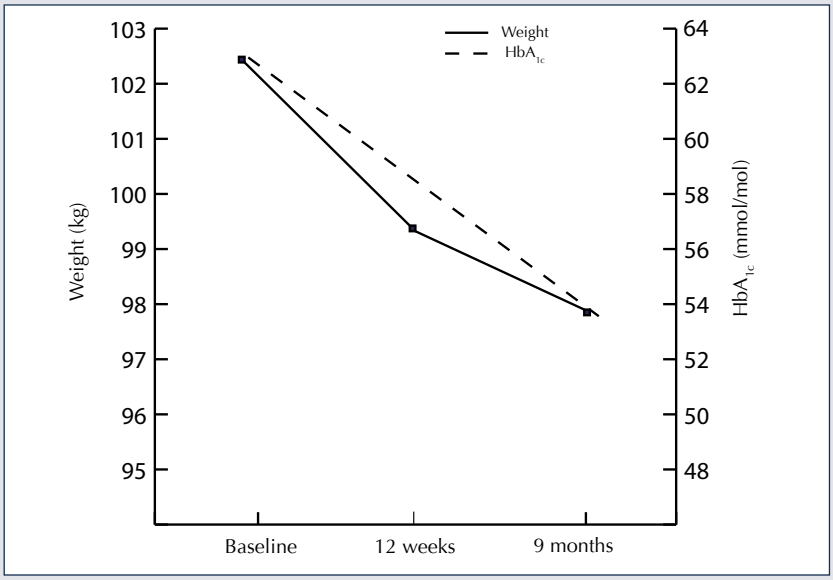

Figure 1. Short and longer-term change in weight and HbA_{1c}

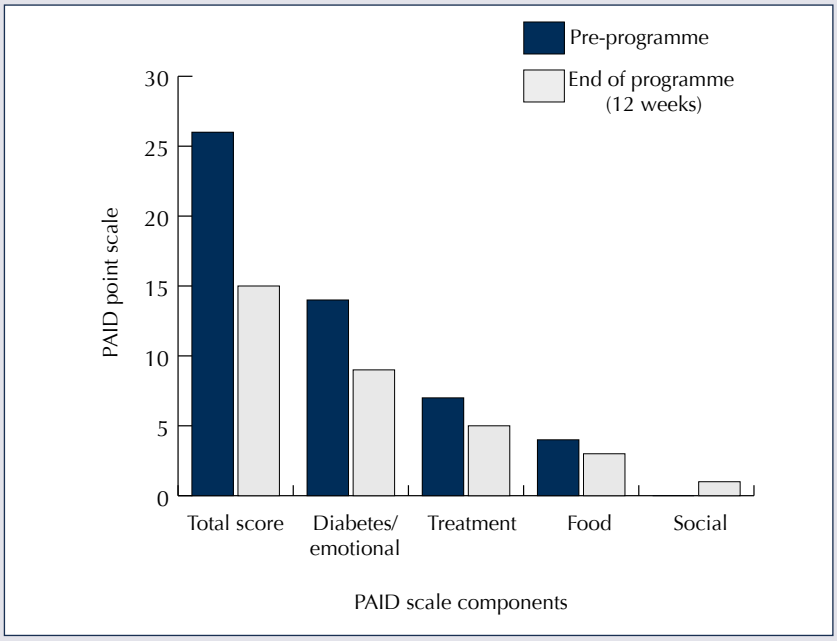

Figure 2. Median changes in total PAID score and its components from baseline to 12 weeks.

15 (44%) and HbA_{1c} data at baseline and 9 months were available for 14 individuals (41%). In total, 17 people (50%) completed a PAID questionnaire at baseline and 12 weeks (*Table 2*).

For the 20 participants completing the 12-week programme, their mean weight loss was 3.1 kg (±2.3 kg) $P<0.001$). This was a mean weight loss of 2.9%. Weight loss was sustained for the 15 participants who had follow-up weight measurements at 9 months. These people had an average weight loss of 4.8 kg (±6.3 kg), which was a 3.9% average weight loss ($F[1.1, 14.4]=8.6$; $P = 0.01$; see *Table 2*).

Diabetic control improved significantly at 9 months after the start of intervention, decreasing from a mean HbA_{1c} at baseline of 61.7 mmol/mol (7.8%) to 53.4 mmol/mol at 9 months (7.0%; $t[13]=27$; $P=0.017$). This equated to a mean reduction in HbA_{1c} value of 8.4 mmol/mol (0.8%; *Figure 1*).

PAID questionnaire data was available for 17 participants who completed the 12-week programme (*Figure 2*). An overall improvement was observed in diabetes-related stress, with a reported reduction from a median of 26.25 to 15 points on the PAID scale for the population as a whole ($P=0.003$). A reduction in stress for all components of reported diabetes-related distress was observed, with the exception of social stress, where median ratings increased over the time period (*Figure 2*). Similar reductions were observed for both genders over the 12-week period, with median PAID values reducing from 22.5 to 15 ($P=0.02$) for women and from 21.5 to 15 ($P=0.06$) for men.

A reduction in median PAID score was evident for both those with diabetes (27.5 to 15; $P=0.007$) and pre-diabetes (50 to 38; $P=0.66$).

PAID score improvement at 12 weeks was significantly correlated with weight loss at 12 weeks ($r=0.84$; $P<0.001$) and also weight loss at 9 months, ($r=0.51$; $P=0.04$).

Sustained engagement in the programme

A total of 13 participants (38%) attended at least one follow-up group session. These people achieved better clinical outcomes at 9 months than those who opted for no follow-up support. Those who attended at least one follow-up group appointment achieved a mean weight loss of 5.6 kg (±6.4 kg) at 9 months ($P=0.08$) and a mean improvement in HbA_{1c} of 9.9 mmol/mol (0.9%; $P=0.038$] at the same time point. Those who did not attend a follow-up appointment remained stable in weight over the 9-month period (0.3 kg ±3.4 kg; $P=0.921$) and in glycaemic control (4.5 mmol/mol [0.6%; $P=0.264$]).

Programme attrition

Attrition rates varied according to ethnicity; 70% of White British participants completed the 12-week programme, compared to only 33% of people of South Asian origin. Of the 14 people who failed to complete the programme, five cited lack of commitment, three cited language barriers, two said the programme was unsuitable and, of the remainder, one cited forgetfulness, one attended another course, one had water retention and the reason was unknown for the final person.

Discussion

The results of this pilot study have demonstrated that a 12-week diabetes weight loss intervention can deliver significant weight loss within a primary care setting. On average a 3.1 kg (2.9%) reduction in weight was reported at 12 weeks and 4.8 kg (4.3%) at 9 months, indicating that weight loss could be sustained despite known difficulties in trying to achieve weight loss in people with diabetes (Morrison et al, 2012).

In the current study, those who opted for on-going support following completion of the 12-week programme fared better in terms of weight loss and glycaemic control than those who did not opt for this service. These results support new guidance (NICE, 2014), which has advocated the benefits of on-going support following weight management interventions. The sustained weight loss at 9 months shown in this study was aligned with previous research that reported the effectiveness of primary care weight management provision above that of commercial weight loss programmes in the longer term (Jolly et al, 2011).

The results also indicate that completion of a 12-week diabetes weight loss group promoted a clinically significant improvement in HbA_{1c} at 9 months. The strong correlation between glycaemic control and weight loss that was sustained after the intervention suggests the important benefits of weight loss in this cohort. NICE (2008) recommend a target HbA_{1c} of 48–58mmol/mol (6.5–7.5%), dependent on risk factors. Preceding the programme, 36% of participants had an HbA_{1c} of 58 mmol/mol (7.5%) or lower. Six months after the programme completed, 71% of the participants had achieved this. Deakin (2013) demonstrated that X-PERT, the established 6-week structured education programme for people with type 2 diabetes, demonstrates a mean improvement in HbA_{1c} of 6.5 mmol/mol (0.6%) six months after the intervention. In achieving a reduction of 8.4 mmol/mol (0.8%), the current study exceeded these values, demonstrating the strength of the current intervention.

A systematic review and meta-analysis considering the effect of oral antidiabetic agents (OAAs) on HbA_{1c} found that most OAAs lowered HbA_{1c} levels by 5.5–13.75 mmol/mol (0.5–1.3%; Sherifali et al, 2010) demonstrating that a weight loss and educational diabetes course has the potential to be just as effective as some OAAs.

Following completion of the 12-week programme, participants reported a statistically significant improvement in diabetes-related distress using the PAID questionnaire, with a mean 10-point or 40% improvement across all domains and equitable reductions by gender.

Condition-related distress existed in people with diabetes and pre-diabetes, although the latter failed to show significance, in part due to small numbers. Andersson et al (2008) found that potential reasons behind anxieties in people with pre-diabetes include: having an uncertain future; their distress at the high risk of developing diabetes; apparent obstacles that could prevent them from optimising health and a reduction in freedom of lifestyle. Participants have endorsed these findings, expressing the need for education and support at diagnosis of pre-diabetes (Troughton et al, 2008). Virtanen et al (2014) concluded that psychological distress is associated with an accelerated progression on to type 2 diabetes for those with advanced pre-diabetes, highlighting the importance of controlling levels of distress within this population.

PAID score improvement at 12 weeks was statistically significantly correlated with weight loss at 12 weeks and 6 months, demonstrating the importance of the management of mental health and the person's ability to self-manage their condition, in promoting improved

Page points

1. The results of this pilot study have demonstrated that a 12-week diabetes weight loss intervention can deliver significant weight loss within a primary care setting.
2. Attrition rates varied according to ethnicity; 70% of White British participants completed the 12-week programme, compared to only 33% of people of South Asian origin.
3. Those who opted for on-going support following completion of the 12-week programme fared better in terms of weight loss and glycaemic control than those who did not opt for this service.

Page points

1. Studies have shown that social support is beneficial for physical and psychological health. This is in line with the current study, which showed that group-based interventions can help reduce diabetes-related stress.
2. The absence of a control group is a limitation of the study. A lack of a control means there is uncertainty over whether the outcomes were due to regular assessment, or to other initiatives that the subjects were participating in at that time, rather than the intervention alone.
3. Another limitation of the study is that diabetes medications were not monitored. Any newly commenced or increased doses of diabetes medications may have had a bearing on the overall HbA_{1c} improvement, rather than the intervention.

quality of life. When treating individuals with long-term conditions, the aims of successful and effective healthcare should include improving quality of life of these people as recommended by the Department of Health (2013).

Studies indicate social support is essential for maintaining physical and psychological health (Ozbay et al, 2007) with the impact of stressors on health and well-being being reduced when receiving additional social or group support (Thoits, 2010). This supports the evidence from the current study that group-based interventions offering social support have the ability to reduce diabetes-related stress.

The impact of ethnicity on programme completion was notable. Bradford is known for its large South Asian population. Out of the 13 people who did not finish the course, eight (62%) were South Asian. With only 33% of South Asian individuals completing the programme, the difficult-to-treat nature of this population group is highlighted once again.

One of the main reasons for attrition within this group was difficulty committing to the programme. Language was a barrier for three of the people, leading to self-discharge from the programme. Once participants were referred onto the programme, they were sent an opt-in letter. The letter signposted non-English speakers to another service; however, it was evident some people, perhaps due to misunderstanding of the instructions, still enrolled on to the group sessions. A phone call to all participants before the start of the course could have prevented this.

South Asian participants also fared worse in terms of mean weight loss, with an average of 2.9 kg at 9 months after start of intervention, in comparison to 6.4 kg in the Caucasian populations. Ludwig et al (2011) found that barriers included the influence of Islamic guidance, culture and familial expectations of home cooking, prioritisation of family concerns over individual desires and the perception that weight gain is inevitable due to ageing, childbirth or divine predestination. This suggests why improving health outcomes is so difficult with this particular group.

Singh et al (2012) suggested that interventions to involve significant family members could prove to achieve more successful health outcomes.

Study limitations

Despite early positive outcomes in those who engaged with the intervention, the study has several limitations that should be acknowledged. The absence of a control group is one such limitation and lack of a control means there is uncertainty over whether the outcomes were due to regular assessment, or to other initiatives that the subjects were participating in at that time, rather than the intervention alone.

The small sample size and fact that there was no intention-to-treat analysis should also be acknowledged, weakening the robustness of the results. Due to time restraints, long-term data were collected at 9 months (6 months after the intervention). Data collection repeated at 1 year would have been preferable for a fairer comparison to other interventions. Collection of long-term data (weight and HbA_{1c}) was reliant on information present on electronic patient records. These data were not available for all individuals within the required time period, which is another limitation, in terms of robust data collection.

Lastly, diabetes medications were not monitored during this study, meaning that newly commenced or increased doses of diabetes-related medications may have had a bearing on the overall HbA_{1c} improvement. The significant impact that OAAs or insulin can have on glycaemic control is well documented and understood (UK Prospective Diabetes Study Group, 1998; Sherifali et al, 2010) and the lack of these data in the present study presents an obvious confounding factor. Despite these limitations however, the study has provided valuable early data that forms the basis for further study and has addressed a recognised lack of evidence in this area.

Conclusion

An NHS-led weight management intervention in primary care has been shown to be a successful in people with diabetes and pre-diabetes by improving health outcomes in terms of weight, glycaemic control and improvement in

condition-related distress.

It is important for people with diabetes to be able to lose weight safely and effectively, keeping management of glycaemia a key priority. This specialist support and advice is not commonly available in commercial weight loss programmes. Support from adequately trained healthcare professionals would be advocated for this patient group. This study provides a basis for repeated interventions in larger samples to further evaluate the outcomes that can be achieved within this patient group. Further research could include additional measures, such as any change in diabetes medications. Further research is also needed to identify determinants for weight management success in South Asian individuals, which could drive development of interventions for this at-risk group. ■

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