Title: A community faith centre based screening and educational intervention to reduce the risk of type 2 diabetes: A feasibility study

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Highlights:

- This study presents novel data on screening yield for diabetes and impaired glucose regulation and uptake to group education to reduce diabetes risk delivered within a faith center setting. This addresses an unmet need for high quality studies assessing this method of screening and education
- The data on screening yield and uptake is relevant to the current debate on design and implementation of diabetes prevention programs.
- The study presents data describing the performance of a risk assessment score for identifying undiagnosed diabetes and impaired glucose regulation when used in a South Asian population.

Aims: People of South Asian origin experience higher rates of diabetes and complications of diabetes compared to white Europeans. Therefore, it is important to identify those with undiagnosed diabetes and those at high risk of developing diabetes, in order to intervene with lifestyle intervention to reduce risk and prevent complications. We conducted a study to assess the feasibility of delivering a faith centre based pathway for screening and referral to group education for high risk individuals to increase screening uptake and reduce diabetes risk.

Methods: Opportunistic screening and early intervention strategy for people at risk of diabetes and cardiovascular disease in local faith centres. The screening consisted of a diabetes risk assessment tool and a near patient test for HbA1c. Participants found to be at high risk of diabetes (HbA1c 6-6.4%/42-46mmol/mol) were offered a 'walking away from diabetes' group educational intervention aimed at increasing exercise levels and reducing diabetes risk.

Results: 252 participants were screened during four screening events. 202 participants (80.2%) gave consent for their data to be included in the analysis. 72.4% of participants were found to have a high diabetes risk score. 32 participants (15.8%) had a HbA1c result 6%-6.4%/42-46mmol/mol). Eight participants (4.0%) had a HbA1c ≥6.5%/≥47mmol/mol). Of those eligible for the diabetes prevention education programme, 18 participants (56.3%) attended.

Conclusions: This study confirms that screening followed by group education within faith centre settings is feasible and acceptable to participants. The strategies chosen were effective in achieving a high screening yield and high uptake of group education.

Keywords: Public health, screening, prevention, ethnic health

Introduction

The prevalence of type 2 diabetes (T2DM) and people at high risk of T2DM in the UK have been rising at an increasing rate in the last two to three decades and both are predicted to continue to rise over the next five to ten years [1]. To address the rising prevalence of diabetes in the UK, there are plans to increase healthcare investment in programmes aimed at preventing or delaying the onset of T2DM and diabetic complications as part of the National Diabetes Prevention Programme (NDPP) [2] [3]. Primary care based interventions such as the NHS health checks programme[4] promote risk assessment using risk scores [5], followed by early intervention to prevent lifestyle related diseases such as CVD and T2DM. Risk scores for T2DM tend to perform best in terms of correctly identifying those with T2DM and those at high risk if they are used in populations which are of a similar demographic to the population used to develop the risk score [5]. As a result of this, there are a number of different risk scores which have been developed and implemented globally. The Leicester Self-assessment score (LSAS) has been developed to assess diabetes risk in an ethnic population in Leicester. The LSAS is a simple paper based questionnaire which allows calculation and understanding of diabetes risk. The risk score was developed using logistic regression using a large local dataset [6]. The risk score has been externally validated and performs well in the local population compared to other commonly used risk scores [5].

The focus on risk assessment and early intervention is particularly important for South Asian (SA) populations because they represent a significant proportion of the population in the UK [7] and are known to experience higher prevalence of diabetes and a disproportionate number and severity of diabetic complications[1] [8]. SA populations may also be less likely to attend screening offered through general practices [9].

Systematic review evidence has shown that previous attempts to adapt screening and lifestyle interventions to SAs have met with limited success. In particular, low level of recruitment, retention and follow up of 'high risk' participants has hampered efforts to screen individuals from SA groups[10, 11]. In addition to this, lifestyle interventions are often not sufficiently culturally tailored or are not informed by theoretical models and as a result, the methodological quality of relevant studies is often low[12]. There is also evidence of low uptake of screening attributed to factors including a fatalistic belief towards developing T2DM which may be relevant to informed decisions over screening behaviour or behaviour change[13] [14]. Factors such as family dynamics can also mean that it may be difficult to attend health care settings without the support of other family members [15]. It has also been suggested that there is a low level of conceptual understanding of the risk of developing diabetes amongst some SA groups[15].

To address the lack of uptake of screening and lifestyle interventions, a different approach has been advocated which includes health promotion focussing on prevention delivered in faith centre settings. There is a small but growing body of literature reporting on such activities aimed at screening in these settings for cardiovascular risk factors such as blood pressure and cholesterol[16, 17]. The key factors that have been identified in promoting uptake are linguistic and cultural competence in the context of effective communication of health advice[18] within these initiatives. Success in previous faith based screening interventions has also been attributed to the involvement of community volunteers and peer educators[17] [19]. Involving members of the community in the design and delivery of interventions is important in overcoming barriers and meeting the needs of the community in relation to engagement in clinical trials [20-22].

In this paper we report the results of a feasibility study conducted in faith centre settings to provide T2DM screening and communication of risk, followed by referral to structured group education in Punjabi, Sikh and Gujarati Hindu communities in Leicester.

Research aims

The primary aim of this study was to assess the feasibility of faith centre based screening for T2DM and 'high risk status' and group education for those at high risk, in line with the recently published NICE guidance and recommendations on prevention[4].

The secondary aim was to evaluate the performance of the Leicester self-assessment score (LSAS) in a South Asian population.

Methods

Screening Pilot

The screening methods described below were piloted on a small scale in a local mosque with approximately 25 participants in February 2013. Piloting the screening methods allowed the screening team to gain knowledge to inform the planning of the subsequent screening sessions as part of the study. The length of time needed to complete screening for each patient in addition to the resources required was used to inform the design and planning of further screening sessions as part of the study.

Ethical approval

Ethical approval was obtained from West of Scotland NHS research ethics committee 3, reference number 12/WS/0262. Favourable opinion was granted on 12th October 2012.

Recruitment of screening sites

An approach utilising a voluntary community partner group with existing links with local faith organisations was chosen in order to identify four screening sites. This partner organisation carry out similar events in the local area and their expertise and links were used in the planning and facilitating of screening events. Once dates and times for the screening sessions had been agreed with leaders from each faith centre, posters and leaflets were placed in the faith centres two weeks prior to the screening to increase awareness of the event. Screening took place at weekends when faith centres were at their busiest with people attending religious services.

Recruitment of participants

Participants were recruited to the study using an opportunistic approach. Screening was carried out between April and June 2013 in faith centres around Leicester, United Kingdom. Members of the public aged 35 to 75 without an existing diagnosis of diabetes, and who were able to give written consent were eligible to take part. As the primary aim of the study was to test feasibility of the screening and education methods and to gather data on uptake, a formal sample size calculation was not used in the study design.

Prior to undergoing screening, participants were given the option of participating in the screening without giving consent for their data to be shared with the research team. Data included in this analysis relates to the 202 participants who provided consent for their data to be included.

For all participants who consented to take part in the study, following the screening, a letter was provided to take to their GP on their next visit. The letter contained all of their screening results. Patients with a raised HbA1c ≥6.5 (≥47mmol/mol) were advised to visit their GP as soon as possible for a confirmatory test.

The screening team

All members of staff were trained on the eligibility criteria for participants and the process of taking written informed consent. This training was delivered by a senior member of the research team (MS). Interpreters supported the process of written informed consent during the delivery of the screening programme at the faith centres. Volunteers with healthcare experience were recruited

from a local community group to assist with anthropometric measurements. A study clinician (GP) co-ordinated each screening event and gave individualised advice to all participants based on their results using the LSAS as a basis for explaining diabetes risk factors and explained any further action which was required.

Data Collection

Demographic information including age, gender, ethnicity, religion and contact details was collected using a standardised data collection form from participants. Further information including BMI, waist circumference, history of high blood pressure and familial history of diabetes was collected to allow calculation of the LSAS. The format of the screening is shown in figure 1.

HbA1c measurement

HbA1c assessment was carried out using four Siemens DCA Vantage 2000 analysers[23]. All point of care testing equipment was subjected to internal quality control testing according to the manufacturer's guidance prior to use. A cut off of ≥6.5 (≥47mmol/mol) was used for referral to GP for confirmatory testing for diabetes and was based on current national guidance[4].

Participants with an HbA1c value 6-6.4% (42-46mmol/mol) were notified of the date and time of the education session immediately after the screening. A reminder phone call was made to each participant one week prior to the education session.

Educational Intervention

The structured group educational offered to participants at risk of diabetes was the 'Walking Away from Diabetes' programme (henceforth referred to as Walking Away), a pragmatic structured education programme lasting three hours aimed at promoting walking activity in individuals identified as having an increased risk of developing T2DM. Walking Away has good evidence of efficacy in a multi-ethnic population and has been described in detail elsewhere [24, 25]. In brief, Walking Away has a theoretical underpinning and was developed using the Medical Research Council's Framework for Complex Interventions to Improve Health [25]. The programme is aimed at targeting knowledge and beliefs of diabetes risk, as well promoting walking activity through increasing self-efficacy, discussing barriers and promoting self-monitoring and goal setting through pedometer use. Incremental goal setting is encouraged based on each individual's ability and up to

an overall increase of 3000 steps/day over baseline levels. Participants were supplied with a pedometer and diary before attending Walking Away in order to access baseline physical activity levels. The programme also has an accredited educator training and quality assurance pathway [25]. For this feasibility study one general practitioner and one non-clinical member heath care assistant, both of whom were able to communicate in a variety of different local languages (Gujarati, Urdu, Punjabi), were trained to deliver the programme and received quality assurance and mentoring by national trainers. The education sessions were held at the faith centre within 4 weeks of screening

Analysing the performance of the risk score

To evaluate the performance of the risk score in identifying those with abnormal glycaemic control, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) with 95% confidence intervals (CI) were calculated using a cut point of ≥16 points for two different outcomes. The score was firstly validated against the outcome defined as a HbA1c result ≥6% (42mmol/mol)(i.e at high risk of T2DM) , and secondly a HbA1c ≥6.5% (47mmol/mol)(ie T2DM). A cut point of ≥16 has previously shown the highest levels of specificity and sensitivity in identifying those with abnormal glucose levels[5].

Results

Screening

252 participants were screened during four screening visits during April to June 2013 (Figure 2). Mean number of participants screened at each faith centre was 63. Screening sessions lasted between three and four hours. 202 participants (80.2%) gave consent for their data to be included in the analysis. Demographic information for participants is presented in table 1. LSAS data was available for 188 participants, of which 143 (70.8%) had a high LSAS. HbA1c results were available for all 202 participants. Eight (4.0%) participants had a HbA1c result in the 'diabetes' range ≥6.5% (47mmol/mol) and 32 participants (15.8%) had a HbA1c of 6-6.4% (42-46mmol/mol).

Education Sessions

Sessions were held four weeks following the initial screening and lasted approximately three hours. Thirty two participants had an HbA1c result between 6-6.4% and were eligible to be invited to take part in the structured education sessions. Of those invited, 18 (56.3%) attended. The most common reason for non-attendance reported by participants was the timing of the sessions.

Performance of the risk score

Using a cut point of ≥16 points on the LSAS yielded a sensitivity of 90.38% (74.30- 94.67), a specificity of 31.33% (24.02-39.41), PPV of 24.25% (15.48-34.91) and NPV of 90.38 (78.97-96.80) to detect participants with a HbA1c ≥6% (42mmol/mol). Values for detecting participants with a HbA1c ≥6.5% (47mmol/mol) are shown in table 2.

Discussion

This study found that undertaking direct to consumer screening for diabetes and diabetes risk status was feasible within faith centres in areas with high South Asians populations and that over half of those found be an high risk for T2DM and referred to a lifestyle intervention went on to attend. South Asian community groups are often considered 'hard to reach' in terms of their engagement with conventional health screening programmes delivered by primary care providers, for example NHS health checks[9]. The results of this study are therefore relevant to the key aims of national prevention programmes such as the NHS Diabetes Prevention Programme[3] in the UK and other prevention initiatives for recruiting and referring high risk individuals for screening and behaviour change interventions and for reducing health inequalities globally.

The screening yield found in this study compares favourably with the results from primary care based screening[6]. Due to differences in prevalence rates, both nationally and internationally, comparison with other studies using similar methodologies is of limited use in evaluating effectiveness. However, the screening yield compares favourably with current data on local prevalence rates for undiagnosed T2DM[8]. There is very limited data reporting on uptake and attendance rates for structured education delivered within community faith centres. Data that does exist suggests that the level of uptake from the current study is higher than the limited number of published studies with a similar design[26] with the screening yield also being similar [27]. Indeed, the percentage of individuals who attended the structured education programme after referral was higher than the 37% modelled for the NHS prevention programme which was based on more traditional referral pathways through primary care [28]. The most common reason for non-attendance was timing of the sessions. It is anticipated that wider scale implementation of this method would make it feasible to offer participants a flexible choice of education sessions at alternative times (weekdays or evenings). It would be necessary to work more closely with communities to determine the most appropriate times for these sessions in order to maximise participant acceptability and uptake.

The success of this study in terms of the rate of uptake of the initial screening test and the educational intervention can be attributed in part to the involvement of community volunteers. Involving members of the community in the design and delivery of the screening intervention ensured that delivery was sensitive to the cultural, language and literacy needs of the local population[29]. An approach using community based participatory research methods would be necessary in the future development and delivery of a more culturally tailored educational intervention which may aid understanding of T2DM and its risk factors in this high risk group[20].

Analysis of data relating the performance of the risk score in the population screened (Table 2) yielded high values for sensitivity and lower levels for specificity when compared to performance in a multi-ethnic population [5]. However, it must be noted that the values are not directly comparable. The HbA1c outcome for this analysis was defined by a single near patient test. The outcome for the analysis of performance in a multi-ethnic population was defined by the gold standard method which is based on two separate venous blood samples[30]. Despite this, the practical implications of these results are that if the LSAS is used as part of a stepwise screening strategy in areas with large South Asian populations, the majority of participants would still require a follow up blood test. However, the high NPV suggests that the LSAS performs well in ruling out undiagnosed T2DM or IGR in this group. Further development or refinement of the risk score may be necessary to provide a tool which discriminates better between those with normal and abnormal HbA1c values.

This study has important strengths and limitations. The design and methodology used for the current study should ensure that the data reported is of sufficient quality to inform the implementation and delivery of future screening and prevention programmes for T2DM. This is in contrast to a previous synthesis of similar data which reported that in general, the quality of reporting of faith centre based screening interventions is low[12]. The main limitation of the study was that as the method of screening was opportunistic, we did not record data on screening uptake. However, at all of the screening sessions we screened to capacity, in that the number of participants screened had to be capped due to limited resources (staff and HbA1c test strips). It was evident that if more resources were available a higher number of participants could have been screened. In addition, participants from the current study who exceeded referral cut offs for HbA1c were referred to their practitioner for a confirmation of their diagnosis. The rate at which participants attended their practice and the result of any confirmatory test were not captured. Uptake of a referral for a confirmatory test following a screening at a community setting is a weakness which has previously been reported in other screening studies [31].

Further research to refine the educational component of the screening programme would be beneficial. Future curriculum development would be based on the most up to date evidence with further work to ensure cultural relevance to specific populations also required [32] [33].

Conclusion

Delivery of a screening intervention to high numbers of participants within a faith centre setting is feasible and well received by participants. This opportunistic method of screening has the potential to extend the reach of structured primary care based screening to identify hard to reach groups at high risk of T2DM in line with current public health priorities of improving coverage of screening and uptake. The results of this study may help inform health care initiatives such as the NHS National Diabetes Prevention Programme[3] and confirms the potential of embedding identification and referral pathways of high risk participants directly within the community.

References Used

[1] International Diabetes Foundation. Diabetes Atlas sixth Edition. 2012.
[2] Public Health England. Five Year Forward View London, UK2014.
[3] Public Health England. NHS Diabetes Prevention Programme (NHS DPP). 2015.
[4] National Institute for Health and Care Excellence. Preventing type 2 diabetes: risk identification and interventions for individuals at high risk. London NICE; 2012.
[5] Gray L, Taub N, Khunti K, Gardiner E, Hiles S, Webb D, et al. The Leicester Risk Assessment score for detecting undiagnosed type 2 diabetes and impaired glucose regulation for use in a multiethnic UK setting. Diabetic Medicine. 2010;27:887-95.
[6] Webb D, Gray L, Khunti K, Srinivasan B, Taub N, Campbell S, et al. Screening for diabetes using an oral glucose tolerance test within a western multi-ethnic population identifies modifiable cardiovascular risk: the ADDITION-Leicester study. Diabetologia. 2011;54:2237-46.
[7] Office for National Statistics. Ethnicity and National Identity in England and Wales 2011. London 2011.
[8] Information Centre for Health and Social Care. Disease prevalence, Quality and Outcomes Framework (QOF) for April-March 2012, England. 2012.
[9] Carter P, Bodicoat D, Davies M, Ashra N, Riley D, Joshi N, et al. A retrospective evaluation of the NHS Health Check Programme in a multi-ethnic population. Journal of Public Health. 2015:fdv115.
[10] Douglas A, Bhopal RS, Bhopal R, Forbes JF, Gill J, Lawton J, et al. Recruiting South Asians to a lifestyle intervention trial: experiences and lessons from PODOSA (Prevention of Diabetes & Obesity in South Asians). Trials. 2011;12:220.
[11] Bhopal RS, Douglas A, Wallia S, Forbes JF, Lean ME, Gill JM, et al. Effect of a lifestyle intervention on weight change in south Asian individuals in the UK at high risk of type 2 diabetes: a family-cluster randomised controlled trial. The Lancet Diabetes & Endocrinology. 2014;2:218-27.
[12] Chapman J, Qureshi N, Kai J. Effectiveness of physical activity and dietary interventions in South Asian populations: a systematic review. British Journal of General Practice. 2013;63:e104-e14.
[13] Johnson M, Everson-Hock E, Jones R, Woods HB, Payne N, Goyder E. What are the barriers to primary prevention of type 2 diabetes in black and minority ethnic groups in the UK? A qualitative evidence synthesis. Diabetes research and clinical practice. 2011;93:150-8.
[14] Macaden L, Clarke CL. Risk perception among older South Asian people in the UK with type 2 diabetes. International journal of older people nursing. 2006;1:177-81.
[15] Grace C, Begum R, Subhani S, Kopelman P, Greenhalgh T. Prevention of type 2 diabetes in British Bangladeshis: qualitative study of community, religious, and professional perspectives. BMJ. 2008;337.
[16] DeHaven MJ, Hunter IB, Wilder L, Walton JW, Berry J. Health programs in faith-based organizations: are they effective? American Journal of Public Health. 2004;94:1030-6.
[17] Jones CA, Nanji A, Mawani S, Davachi S, Ross L, Vollman A, et al. Feasibility of community-based screening for cardiovascular disease risk in an ethnic community: the South Asian Cardiovascular Health Assessment and Management Program (SA-CHAMP). BMC public health. 2013;13:160.
[18] Szczepura A. Access to health care for ethnic minority populations. Postgraduate Medical Journal. 2005;81:141-7.
[19] Farooqi A, Bhavsar M. Project Dil: a co-ordinated primary care and community health promotion programme for reducing risk factors of coronary heart disease amongst the South Asian community of Leicester—experiences and evaluation of the project. Ethnicity and Health. 2001;6:265-75.
[20] Las Nueces D, Hacker K, DiGirolamo A, Hicks LS. A systematic review of community-based participatory research to enhance clinical trials in racial and ethnic minority groups. Health services research. 2012;47:1363-86.
[21] Peek ME, Cargill A, Huang ES. Diabetes health disparities a systematic review of health care interventions. Medical Care Research and Review. 2007;64:101S-56S.

[22] Fleury J, Keller C, Perez A, Lee SM. The role of lay health advisors in cardiovascular risk reduction: a review. American journal of community psychology. 2009;44:28-42.
[23] Lenters-Westra E, Slingerland R. Six of eight hemoglobin A1c point-of-care instruments do not meet the general accepted analytical performance criteria. Clin Chem. 2010;56:44-52.
[24] Yates T, Davies MJ, Henson J, Troughton J, Edwardson C, Gray LJ, et al. Walking away from type 2 diabetes: trial protocol of a cluster randomised controlled trial evaluating a structured education programme in those at high risk of developing type 2 diabetes. BMC family practice. 2012;13:46.
[25] Yates T, Davies M, Gorely T, Bull F, Khunti K. Effectiveness of a pragmatic education program designed to promote walking activity in individuals with impaired glucose tolerance a randomized controlled trial. Diabetes Care. 2009;32:1404-10.
[26] Choudhury S, Brophy S, Fareedi M, Zaman B, Ahmed P, Williams R. Examining the effectiveness of a peer-led education programme for Type 2 diabetes and cardiovascular disease in a Bangladeshi population. Diabetic Medicine. 2009;26:40-4.
[27] Hanif M, Valsamakis G, Dixon A, Boutsiadis A, Jones A, Barnett A, et al. Detection of impaired glucose tolerance and undiagnosed type 2 diabetes in UK South Asians: an effective screening strategy. Diabetes, Obesity and Metabolism. 2008;10:755-62.
[28] NHS England. Consultation Guide: National Procurement for the Provision of Behavioural Interventions for People with Non-Diabetic Hyperglycaemia,. London 2015.
[29] Quiñones AR, Portland V. Interventions to improve minority health care and reduce racial and ethnic disparities: Department of Veterans Affairs, Health Services Research & Development Service; 2011.
[30] World Health Organization. Use of glycated haemoglobin (HbA1c) in diagnosis of diabetes mellitus: abbreviated report of a WHO consultation. 2011.
[31] Willis A, Rivers P, Gray LJ, Davies M, Khunti K. The Effectiveness of Screening for Diabetes and Cardiovascular Disease Risk Factors in a Community Pharmacy Setting. PloS one. 2014;9:e91157.
[32] Dunkley AJ, Bodicoat DH, Greaves CJ, Russell C, Yates T, Davies MJ, et al. Diabetes Prevention in the Real World: Effectiveness of Pragmatic Lifestyle Interventions for the Prevention of Type 2 Diabetes and of the Impact of Adherence to Guideline Recommendations. Diabetes care. 2014;37:922-33.
[33] Balk EM, Earley A, Raman G, Avendano EA, Pittas AG, Remington PL. Combined diet and physical activity promotion programs to prevent type 2 diabetes among persons at increased risk: a systematic review for the Community Preventive Services Task Force. Annals of internal medicine. 2015;163:437-51.

Table 1. Demographic/screening results

	Total (n=202)	**Men (n=99)**	**Women (n=103)**
Age (Median)(IQR)	56.20 (9.7)	56 (47-63.5)	58.5 (50-63.5)
BMI (mean)(SD)	26.3 (4.2)	26.3 (4.2)	26.3 (4.2)
Blood pressure			
Systolic (median)(IQR)	136 (118-146)	137 (125-145)	130 (115-147)
Diastolic (median)(IQR)	82 (74-90)	84 (76-90)	80 (73-91)
HbA1c (median)(IQR)	5.6 (5.4-5.9)	5.6 (5.4-5.9)	5.6 (5.4-5.9)
LSAS (median)(IQR)	20 (15-25)	21 (16-26)	19 (15-23)
Waist circumference (mean)(SD)	94.84 (11.3)	98.6 (10.8)	91.1 (10.6)
Family history of diabetes			
Yes (%)	45 (22.3)	21 (21.2)	24 (23.3)
No (%)	157 (77.7)	78 (78.8)	79 (76.7)
History of hypertension			
Yes (%)	63 (31.2)	32 (32.3)	31 (30.1)
No (%)	139 (68.8)	67 (67.7)	72 (69.9)
Smoker			
Yes (%)	30 (14.9)	17 (17.2)	13 (12.6)
No (%)	172 (85.1)	82 (82.8)	90 (87.4)

Table 2. Performance of the Leicester Self-assessment Score

	Sensitivity	Specificity	Positive predictive value	Negative predictive value
HbA1c ≥6 (%) (95% CI)	90.38 (74.30- 94.67)	31.33 (24.02-39.41)	24.25 (15.48-34.91)	90.38 (78.97-96.80)
HbA1c ≥6.5 (%)(95% CI)	75.0 (34.91-96.81)	27.7 (21.37-34.93)	4.41 (1.64-9.37)	93.33 (85.12-97.80)

Figure 1. Format of screening