Efficacy of Mobile Phone Messaging in Prevention of Type 2 Diabetes by Lifestyle Change in Men at High Risk – A Randomised Clinical Trial in India

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Design

In many prediabetic individuals, type 2 diabetes can be prevented by lifestyle modification. Successful lifestyle intervention programmes have been labour intensive. It is estimated that there are more than 800 million mobile telephones in India. Mobile phone messaging which is inexpensive may be used as an alternative tool for communication for educational and motivational purposes. A prospective randomized, primary prevention trial of two years was conducted in Indian working men with impaired glucose tolerance.

The men were employed in public and private sector industrial units in South East India (Chennai, Tamil Nadu and Visakhapatnam, Andhra Pradesh). The inclusion criteria for screening were: age 35–55 years; ownership of a mobile phone and ability to read and understand SMS in English; positive family history of diabetes and/or body mass index ≥ 23.0 kg/m². Among the 8471 subjects screened for impaired glucose tolerance, by a two staged oral glucose tolerance test. 537 were chosen for the study and were randomised in two groups.

The intervention group (n=271) received frequent text messages on lifestyle modification using mobile phones while 266 controls received standard lifestyle modification advice only at the baseline. The primary trial outcome was the incidence of diabetes in the intervention relative to the control group. Analysis was by intention to treat. Secondary outcomes included: (1) body mass index (kg/m²); (2) waist circumference (cm); (3) systolic and diastolic blood pressure (mmHg); (4) lipid profile (total and high density lipoprotein cholesterol (mmol/l) and triglycerides (mmol/l)); (5) dietary total energy intake and (6) physical activity score. The acceptability of text messaging was assessed by questionnaire in the SMS (intervention) group.

Ancillary analysis variables were not prespecified and included HOMA-IR and insulinogenic index calculated at the baseline and annual visits and estimates of adherence to dietary and physical activity recommendations.

(Clinical trial registration number NCT00819455).

Results

The cumulative incidence of diabetes was lower in those who received text messages than in controls. Fifty subjects (18.5 per cent) in the intervention group developed diabetes over the study period compared with 73 controls (27.4 per cent), and Cox Regression analysis showed the difference was statistically significant. The hazard ratio for intervention vs control was 0.64 (95 per cent CI: 0.446-0.917), p = 0.015). This
meant a relative risk reduction of 36% in 2 years of intervention. The number needed to treat to prevent one case of diabetes was 11 (95 per cent CI: 6-55).

The intervention was acceptable to the participants. At the end of follow-up, the proportion of participants adherent to diet was higher (OR:1.357 [95% CI: 1.01-1.83]; P=0.0442) but adherence to physical activity recommendations did not differ in the two groups.

Significant predictors of incident diabetes were increased body mass index, lower dietary compliance, higher baseline values of HOMA-IR, and 120 minutes plasma glucose, and lower insulinogenic index.

**Conclusions**

Mobile phone text messaging is an effective and acceptable method to deliver lifestyle modification advice and support to prevent type 2 diabetes in men at high risk.