Research Article

Population based screening for diabetes: experience in Mumbai slums, Maharashtra, India

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ABSTRACT

Background: The number of diabetic patients has increased over the years due to urbanization, high intake of unhealthy diet and a sedentary lifestyle. Majority remain undiagnosed as no systematic screening programme exists in the country. There is evidence that early diagnosis through simple screening test followed by confirmatory test can help to diagnose asymptomatic diabetics, thereby reducing or delaying the onset of complications. The programme aims for early diagnosis of diabetes through a population based screening programme.

Methods: In the selected area, house-to-house visit was done to identify individuals aged 25 and above with and without diabetes. Those without a history of diabetes and consenting to participating were subjected to random capillary blood glucose testing. Those found to have raised blood glucose levels were further offered confirmatory testing at the urban health training centre or referred to their physician for further evaluation.

Results: The participation rate for random capillary blood glucose testing in the community was very high. 70% of those available were tested using rapid blood glucose testing device. Amongst the 315 individuals tested, mainly women, 14% were found to have blood glucose levels above 140 mgs%. However the number of persons reporting for further evaluation was very poor. Only one person reported for further evaluation and was diagnosed as diabetic and inititated on treatment.

Conclusions: Though it is possible through a population based screening programme to identify individuals with raised blood glucose levels, to what extent it will translate into early diagnosis of diabetes is uncertain.

Keywords: Diabetes, Screening, Random capillary blood glucose, Prevalence

INTRODUCTION

Diabetes is an emerging health problem in our country with an increasing trend observed over the years. As reported by International Diabetes Federation, the prevalence of diabetes in the age group of 20-79 years is 9.09% (65.1 million) in the year 2013.[1] Globally it is estimated that 387 million people had diabetes in 2013, which will increase to 592 million by 2035.[2] Around 46.3% are undiagnosed and every 7 seconds one person dies due to diabetes.[2] The Indian Council of Medical Research had estimated that, Maharashtra would have 6 million individuals with diabetes and 9.2 million with

pre-diabetes in the year 2011.[3] In India, urbanization, changes from traditional healthier diets to high-refined carbohydrate intake, and sedentary lifestyle have contributed to a steep increase in the prevalence of diabetes in India.[4]

In India, especially in urban areas, though there is access to screening methods and antidiabetic medicines, very few people access the facilities for screening.[5] There could be various reasons for people not undergoing screening ranging from lack of awareness, poverty, lack of time, lack of priority for health to a negligent attitude. There is evidence throughout the world that screening for

diabetes will result in early diagnosis and treatment. A study by Chatterjee suggests that screening for diabetes may be cost-effective intervention as compared to no screening.[6] In India, there is no systematic awareness and screening programme being offered for diabetes, except in few places where the pilot project of national programme for prevention and control of cancer, diabetes, cardiovascular diseases and stroke.[7]

Usually the diagnosis of diabetes is an outcome of investigations when patient presents with signs and symptoms of the disease or signs of complication or when being worked up for surgery. Even though it is a known fact that history of diabetes in parents increases the risk, there is no routine screening of family members.

The WHO report on screening for diabetes, reports various screening strategies and the advantages and disadvantages of different testing strategies.[8] Given the high prevalence of diabetes in the country and the proven fact that early diagnosis leads to early initiation of treatment and thereby a reduction or delay in onset of complications, we decide to implement a programme aiming for early diagnosis of diabetes.

The programme through its population based screening strategy using random capillary blood glucose testing aims to identify individuals with raised blood glucose levels and confirming the diagnosis through laboratory diagnostic tests as prescribed in standards of diabetes care.[9]

METHODS

The programme was implemented in an urban slum of Mumbai, Maharashtra, India which is an urban field practice area of the department of community medicine of a private medical college located in the heart of Mumbai city. The population is predominantly Hindu by religion, Marathi and Telugu speaking and belonging to the low socio-economic group.

The population avails the health care facilities of the nearby government hospital, government dispensaries and the private practitioners apart from the urban health training centre. The urban health training centre runs a specialised clinic for hypertension and diabetes patients where investigations and medications are provided at a highly subsidised rate.

The screening programme was implemented over a period of six months between January 2014 to July 2014 using a standardised tool to record demographic profile, history of current illnesses, history of diabetes and the random blood glucose level reading. Standardised testing procedure for random capillary blood glucose as described in WHO STEPS guidelines was followed.[10] Ethics committee approval was obtained prior to starting the screening programme in the community. All those individuals aged 25 years and above, available at the time

of home visit and consenting for blood testing was included.

Programme implementation

Two health workers were trained on how to measure random capillary blood glucose levels using glucometer machine (glucocheck). During the training period the health workers, practiced on one another, then worked at the urban health centre for 3 days to practice on the patients attending the centre, following which they started the community survey. During this training, the health workers received in-depth information about diabetes, risk factors for diabetes, prevention of diabetes, when and where to refer individuals with raised blood glucose levels. They also received training on basic communication skills.

The trained health worker then visited the households in the selected study area to create awareness on diabetes and importance of screening for diabetes. A free random blood sugar testing was offered to individuals aged 25 to 69 years without a prior history of diabetes mellitus. The age of 25 years was chosen based on the WHO STEPS recommendation for NCD risk factor survey. Those eligible individuals consenting to participate in the study were subjected to random capillary blood glucose testing using Glucocheck machine. The guidelines described in WHO STEPS manual for doing blood glucose measurement procedure were followed.[10] Individuals found to have random capillary blood glucose levels of 140 mg/dl and above were asked to undergo further confirmatory testing.[11]

A line list of all beneficiaries tested was prepared and the individuals with raised capillary blood glucose levels of 140 mg/dl were further followed up. An initial reminder home visit was made after an interval of two weeks following the screening test to find out whether the individual has visited their physician or laboratory for confirmatory test. Those who had not visited their physician were counselled and motivated again to get confirmatory blood test done. Again two more home visits were made with an interval of one week. If in spite of three home visits, the individual failed to get a confirmatory test, no further attempts were made to motivate the individual. The demographic data, the reading of blood test and the follow up information was entered into excel programme and analyzed using basic excel function commands.

RESULTS

In the programme area, there were 865 houses, but majority of the houses were locked at the time of visit. A few households refused to participate. The household with whom the health worker was able to interact was 53.64%. The average household size is 4.2%. Majority of the population (98%) was Hindu. Proportion living in rental houses was 17%.
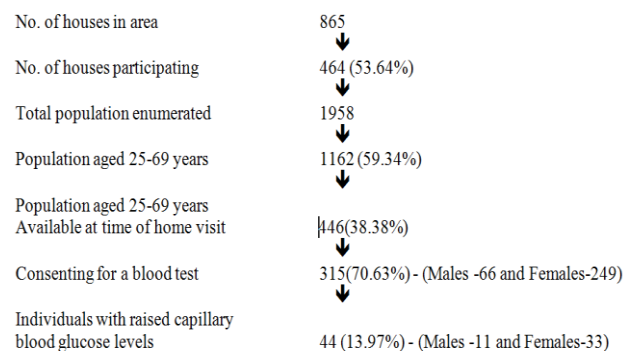
Through house-to-house survey, total population enumerated was 1958, of whom 1162 individuals were between 25-69 years of age; 52.24% females and 47.76% males. Amongst those aged 25 years and above, 161 (9.25%) patients were known diabetics. Amongst the remaining 1001 individuals, 446 individuals were available at the time of the study of which 315

individuals (70.63%) consented for blood test. Males were 66 in number and females were 249 in number. The average age of the beneficiaries was 44.54 years. The average age of the males was 45.89 years and that of females was 44.18 years. The remaining 131 who were not tested included those with diabetes and those refusing to undergo testing.

Table 1: Age sex distribution of individuals with raised blood sugar.

Age group	Male n=66	Female n=249	Total n=315
25-34 years	2/17	3/64	5/81
35-44 years	2/17	8/80	10/97
45-54 years	3/16	9/57	12/73
55-64 years	3/10	7/23	10/33
65 years and above	1/6	6/25	7/31
Total	11/66	33/249	44/315

The prevalence of raised capillary blood glucose taking a cut-off level of 140 mg/dl by random capillary blood glucose method was 13.97% (44). The proportion with raised capillary blood glucose was 16.67% (11) among males and 13.25% (33) among females. The age standardised prevalence of raised capillary blood glucose was 15.07% (overall), 16.5% (males) and 14.68% (females).

No. of houses in area — 865 ↓
No. of houses participating — 464 (53.64%) ↓
Total population enumerated — 1958 ↓
Population aged 25-69 years — 1162 (59.34%) ↓
Population aged 25-69 years Available at time of home visit — 446 (38.38%) ↓
Consenting for a blood test — 315 (70.63%) - (Males -66 and Females-249) ↓
Individuals with raised capillary blood glucose levels — 44 (13.97%) - (Males -11 and Females-33)

Figure 1: Flow chart showing community participation and prevalence of raised capillary blood glucose.

All the 44 individuals with raised capillary blood glucose levels were referred to the laboratory at the Urban Health Centre for confirmation of diagnosis or were asked to visit their physician for evaluation. The choice of visiting the urban health centre laboratory or their physician was left to the individual. These individuals with raised capillary blood glucose levels were visited again after an interval of 2-3 weeks to find out if they had undergone fasting and postprandial blood glucose testing. During the first follow up home visit, none of the patients had visited their physician. Two more follow up visits after an interval of one week to the patient revealed that only one

of the patients had undergone diagnostic test and was labelled as a case of diabetes.

DISCUSSION

In the present programme, the health workers were able to meet only 54% of the households in the area. Amongst the individuals aged 25 to 69 years, only 446 (39%) were available. In urban areas, most of the houses are locked during the daytime, as all the adult members of the household are at work. Thus a screening programme will not receive adequate response if the hours of survey are not suitably adjusted to meet the needs of the community. However in urban Mumbai, most people leave their houses early in the morning and return very late in the evening. Thus finding a suitable timing so as to maximize coverage in urban area will always be a challenge.

Of the individuals available at the time of the study, 70.63% consented for blood tests. Amongst the 29% who were not tested, majority were known diabetes patients and a handful of people who did not have diabetes refused to participate. Thus the community participation for random capillary blood glucose testing at home is high.

Self-reported prevalence of diabetes mellitus in the present study was 13.85% as compared to the urban figures of 7.3% in ICMR study.[12] In the present study the prevalence of raised random capillary blood glucose level was 13.97%, which is similar to the findings of other studies. Prevalence of diabetes was 12.33% in urban Bengaluru as detected by blood glucose testing which is almost similar to our study findings.[13] The prevalence of raised blood glucose was found to be 9% by Rathod.[14]

Though lot of efforts were made to motivate the individuals to undergo further confirmation test, only 1

amongst the 44 individuals with raised blood glucose underwent confirmatory test. In a study conducted by Shewade where OPD patients were screened for raised blood glucose, they found that the screening yielded only 3.5% case detection rate, because of poor compliance to confirmatory tests.[15] The study by Shewade showed that the individuals going for definitive diagnostic tests was 30%, which is much higher than our study but still low.[11] American diabetes association states that community based screening is not an effective strategy.[9]

CONCLUSION

This study shows that though people are keen to undergo blood glucose testing, especially when offered at their doorstep they do not make an extra effort on their own to undergo further testing when recommended. It reflects that the people do not usually bother about health conditions till they become symptomatic. Diabetes being a slow killer disease, the effects of the disease is usually not perceived by the people. It is sort of considered normal to be having diabetes and therefore a delay in action by the people. It appears that a population based screening programme in the community for diabetes may not yield the results unless the community perceives its importance and accords high importance to health over other issues.

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