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Research Article

RISK OF DEVELOPING DIABETES MELLITUS IN SELECTED SEDENTARY WORKING PROFESSIONALS OF COIMBATORE CITY IN INDIA AND IMPACT OF 'DIABETES & NUTRITION EDUCATION'

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ABSTRACT

India has more than 60 million diabetics and the number is continuously increasing. Indian Diabetes Risk Score (IDRS) is a tool which helps in detecting the level of risk of developing diabetes. Sedentary working professionals (n=200) of coimbatore city in India were selected using convenience sampling technique and relevant data were collected to assess the 'diabetes risk' as proposed in the tool 'IDRS'. Individualised 'nutrition and diabetes education' was imparted to them and the impact was studied. Statistical analysis was done using SPSS 16.0 package. On consolidating the 'risk scores' derived based on age, waist circumference, physical activity and family history as given in the tool 'IDRS', the following results were obtained: "HIGH RISK (score ≥ 60) of developing diabetes" was observed among 77.6 % and 33.3 % of selected male and female sedentary working professionals respectively. Moderate risk (score 30 - 50) was noted among 22.4 % of male and 64.6 % of female sedentary working professionals. Low risk (score < 30) was observed only among 2.1% of females. Wider studies will be of great use in screening and early diagnosis of diabetes which will help in control of this dreadful disorder and prevention of complications.

INTRODUCTION

Diabetes was once common in old age and late adulthood. But unfortunately it is now prevalent among young adults and even among younger age groups which is not a good sign. India, once known as the 'diabetes capital of the world' was home to 61.3 million patients with type II diabetes mellitus in 2011 with predictions of 101.2 million diabetics by 2030 (International Diabetes Federation 2013 and Mohan *et al.*, 2004). Though several predisposing factors namely family history, age, obesity, sedentary lifestyle and stress have been highlighted, most important factors to assess the risk of developing diabetes mellitus are said to be age, abdominal obesity, family history and physical inactivity (Mohan *et al.*, 2005). They have given a simple tool 'INDIAN DIABETES RISK SCORE' (IDRS) which helps in detecting the level of risk of developing diabetes. If the level of risk is high, such individuals may be screened early for diabetes by subjecting to suitable diagnostic procedures, as early detection of diabetes will help to control the disorder inorder to prevent complications.

Among the above four risk factors given age and family history are non- modifiable factors but physical inactivity is one of the major causes of abdominal obesity and many other ailments including diabetes. It is possible to correct the modifiable factors through lifestyle modifications for which intensive 'diabetes and nutrition education' is essential. Hence the present study has been taken up with the objectives listed here under:

1. To study the level of risk of developing diabetes using the tool 'IDRS' among selected sedentary working professionals in Coimbatore city and
2. To study the impact of 'diabetes and nutrition education'.

METHODOLOGY

Ethical clearence for conducting the study has been obtained from Coimbatore Medical College Hospital (GH) after making necessary presentations. Sedentary working professionals (n = 200) from software companies, call centres, insurance companies, banks, academic institutions etc. in Coimbatore city were selected using convenience sampling technique. After explaining the importance of the study, oral consent was obtained.

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Study Questionnaire

A. Questionnaire I was framed to elicit information from the selected sedentary working professionals (n=200) on age, waist circumference, types of physical activities done and family history of diabetes to assess the 'diabetes risk' as proposed in the tool 'IDRS'.
B. Questionnaire II had 15 questions to assess the initial knowledge (pre-test) on nutrition and diabetes (n = 200). The prepared questionnaires were given to the selected sedentary working professionals and the data were collected. To impart diabetes and nutrition education, 36 powerpoint slides were prepared with great care including information regarding body mass index, broca's index, normal blood glucose levels, types of diabetes mellitus, etiology, symptoms, complications of uncontrolled diabetes mellitus, dietary management including glycemic index, importance of physical activity etc. and education was imparted to them individually. Using the same questions used for the pre-test, a post-test was held and through paired 't' test impact of the education program was studied. The prepared slides were given to them for their future reference.

RESULTS

Age has been specified as the first criterion in the tool 'IDRS' to assess the risk of developing diabetes. Table 1 clearly indicates that majority of the selected sedentary working professionals were less than 50 years old and 69.5 % of the selected sedentary working professionals recorded high risk score of 20 - 30 with respect to age. Only 30.5 % of them registered 'zero' risk score.The prevalence of type 2 diabetes increases with age although the patterns of incidence vary considerably. Type 2 diabetes in relatively affluent societies usually develops in the middle to older age groups. In developing countries, however, because of the younger age distribution of the population, many cases occur in young and middle aged adults (Kenny *et al.*, 1995).

Table 1 Age and Waist Circumference of the Selected Sedentary Working Professionals (n= 200) and the Corresponding Risk Score

Risk Score (IDRS)	Age			Waist circumference					
	Age (Yrs)	Selected Sedentary Working Professionals		Waist Circumference (cm)	Selected FEMALE Sedentary Working Professionals		Waist Circumference (cm)	Selected MALE Sedentary Working Professionals	
		No.	%		No.	%		No.	%
0	0- 34	61	30.5	< 80	0	0	< 90	35	23
10	-	-	-	80 – 89	45	94	90 – 99	87	57
20	35-49	133	66.5	≥ 90	3	6	≥ 100	30	20
30	≥ 50	6	3		-	-		-	-
	Total	200	100		48	100		152	100

Waist circumference is the most widely used measure to quantify central obesity (Pouliot *et al.*, 1994). Table 1 gives the waist circumference and the respective risk score for the selected females and males in the present study. Shockingly, 94 % of the female and 57 % of the male selected sedentary working professionals registered risk score of '10'. Higher risk score of '20' was registered among 6 % of females and 20 % of males. None of the females had 'zero' risk score indicating that all of them had high waist circumference whereas 23 % of the males had 'zero' risk score. The predisposition of abdominal obesity is thought to be one of the causes of high risk to diabetes and cardiovascular diseases associated with obesity in Asians (Hossain *et al.*,2007), considering the fact that Asians have lower body mass index (BMI) but higher percentage of body fat than their white counterparts (Wang *et al.*, 1994).

Waist circumference is an indicator of abdominal fat content (Ball *et al.*, 2006), and consequently is a good independent indicator of insulin resistance, dyslipidemia and hypertension in children and adults (Lee *et al.*, 2006 and Zhang *et al.*, 2008).

Table 2 Waist Circumference of the Selected Sedentary Working Professionals in Comparison with the "Who Cut-Off Points for Risk of Metabolic Complications (2008)"

Indicator	Female			Male			Risk of metabolic complications
	WHO cut-off points	No.	%	WHO cut-off points	No.	%	
Waist Circumference	> 80 cm	45	94	> 94 cm	87	57.2	Increased
	> 88 cm	-	-	> 102 cm	30	20	Substantially increased
Total		45	94		117	77	

In table 2, a comparison of waist circumference of the selected sedentary working professionals was made with the "WHO cut-off points for risk of metabolic complications". As per the "WHO cut-off points" for WC, "increased risk of metabolic complications" were observed among both women (WC > 80cm - 94%) and men (WC > 94cm - 57%) of the present study. "Substantially increased risk of metabolic complications" were observed in 20% of the selected male workers (WC >102cm).

The cut-off values that define abdominal obesity also differ among guidelines. The International Diabetes Federation (2006) defines central obesity as a waist circumference greater than 94 cm in Europid men and greater than 80 cm in Europid women. The federation also recommend 'ethnic specific cut-off values', for example, waist circumference greater than 90 cm for south Asian, Chinese and Japanese men.

Hence, it is important that these ethnic specific cut-off values for waist circumference are taken into consideration before categorising people based on parameter.

Considering the types of physical activities done by the selected subjects, there is a discouraging result in table 3 showing that 'zero' risk score was observed in none of the subjects as they were involved in neither physical exercises nor strenuous work. Astonishingly high risk score of '20' and '30'

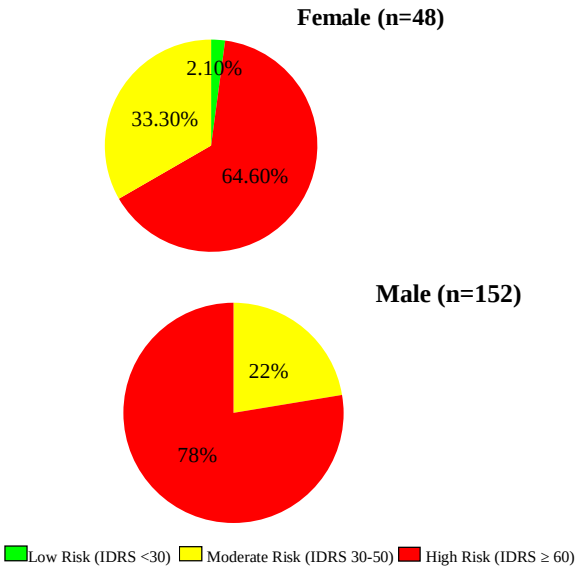
were recorded by 23 % and 77% of the selected sedentary working professionals respectively.

Table 3 Risk Score Corresponding to Types of Physical Activity and Family History of Diabetes among the Selected Sedentary Working Professionals (n = 200)

Risk Score (IDRS)	Selected Sedentary Working Professionals					
	Types of Physical Activities	No.	%	Family History of Diabetes	No.	%
0	Exercise + strenuous work	0	0	No Family History	42	21
10	-	-	-	Either Parent	67	33.5
20	Exercise (or) strenuous work	46	23	Both Parents	91	45.5
30	No Exercise / strenuous work	154	77	-	-	-
	Total	200	100		200	100

It is pertinent to quote here that, low levels of physical activity and physical fitness (both cardiovascular and musculoskeletal) are prominent, independent and modifiable risk factors for the development of T2DM (Dunstan *et al.*, 2002, Magliano *et al.*, 2008, Barr *et al.*, 2005 and Meisinger *et al.*, 2005). Furthermore, lifestyle modification, including exercise training now represents a central strategy in diabetes prevention (Pan *et al.*, 1997, Tuomilehto *et al.*, 2001, Knowler *et al.*, 2002, Ramachandran *et al.*, 2006, Kosaka *et al.*, 2005, Lindstrom *et al.*, 2006 and Li *et al.*, 2008).

According to Hariri *et al.* (2006), study of family history of diabetes is a useful screening tool for detection and prevention of diabetes. Regarding the family history of diabetes in the present study, risk score of 20 (both parents), 10 (either parent) and zero (no family history) was observed among 45.5 %, 33.5 % and 21% of the selected subjects respectively. Family history has been shown to be a risk factor for a majority of chronic diseases of public health significance, including cardiovascular disease (CVD), type II diabetes mellitus, etc. Family history of specific diseases reflects the consequences of genetic susceptibility, shared environment and common behaviours (Yoon *et al.*, 2002).



On consolidation, "HIGH RISK (score ≥ 60) of developing diabetes" was observed among 77.6 % and 33.3 % of selected male and female sedentary working professionals respectively. Moderate risk (score 30 - 50) was noted among 22.4 % of male and 64.6 % of female sedentary working professionals. Low risk (score < 30) was observed only among 2.1% of females.

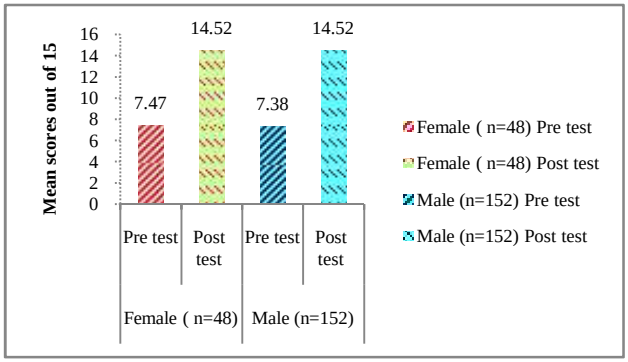


Figure 2 Mean Scores obtained by the Selected Sedentary Working Professionals in the Pre and Post Test of Knowledge on Diabetes and Nutrition

Nutrition education is defined as "any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition-related behaviours conducive to health and well-being (Contento, 2011). As Research evidence indicates that type 2 diabetes can be delayed or prevented with lifestyle modifications (Knowler *et al.*, 2002), the present study also aimed at it to impart 'nutrition and diabetes education' to sedentary working professionals.

From the figure 2, it is construded that the mean scores obtained by the selected male and female sedentary working professionals were 7.47 and 7.38 out of 15 respectively in the pre-test of their knowledge on diabetes and nutrition. After the education program the mean scores in both the categories were found to double in the post test recording a statistically and satisfactorily significant improvement ($p = > 0.05$).

This knowledge gained, if practiced, would undoubtedly modify their life style which would certainly prevent / delay type 2 diabetes mellitus.

DISCUSSION

Finding the level of risk through such tools, will proceed to screening (for diabetes), early diagnosis, control of the disorder and prevention of complications. As prevention is better than cure, wide education programs on diabetes and nutrition will help to increase the awareness among the public who are drowned in taboos about food, health, diseases and treatments. As it has been predicted that 101.2 million Indians will be affected by diabetes by 2030, health professionals should take up more awareness programs to protect the nation from this dreadful disorder.

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