EFFECT OF DURATION OF DIABETES ON CARDIO-METABOLIC RISK FACTORS IN RED MEAT CONSUMING TYPE TWO DIABETIC FEMALES ON ORAL HYPOGLYCEMICS

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ABSTRACT

In another forty years women will have the highest disease burden of diabetes. Effect of oral hypoglycemics on Cardio-metabolic risk factors in red meat consuming female type 2 diabetic patients needs to be studied. The aim of this study was to assess the relation between duration of diabetes on glycemic control, blood pressure and obesity in red meat consuming female type 2 diabetic patients on oral hypoglycemics. The study group consisted of female diabetic patients predominantly consuming red meat diet aged between 27 to 65 years. They were divided into two groups based on their duration of diabetes (viz. <5 years, >5 years of age). Their FBS, PPBS, Blood pressure and BMI were noted. These parameters between two groups of red meat consumers were measured by unpaired t-test. The data when analysed statistically revealed that female diabetic patients with more than five years of diabetes was positively associated with poor glycemic control in terms of both FBS and PPBS(p < 0.05). There was significantly higher Blood Pressure in old (more than five years) female diabetic patients (p < 0.05). We found that increased duration of diabetes was associated with poor glycemic control, and hypertension in female patients of type 2 diabetes consuming of red meat on oral hypoglycemics.

KEYWORDS: Diabetes, Red Meat, Blood Pressure, Hypoglycemics.

INTRODUCTION

The epidemics of Diabetes mellitus and Obesity are fast emerging as biggest health threat. 40 million persons with diabetes live in India and this number is predicted to rise to almost 70 million by 2025 according to the Diabetes atlas published by the International Diabetes Federation [1].

Insulin resistance is a major constituent of the metabolic syndrome - characterized by central fat, hyperglycemia, hyperinsulinemia and dyslipidemia [2]. Good glycemic control is important for the prevention of renal and metabolic complications of diabetes as well as for the prolongation of the development of major cardiovascular disease in long term.

The prevalence of diabetes increased as women aged, with the highest prevalence among aged 75 and over. The North Carolina diabetes prevention and control fact sheet of February 2009 projected that women will account for the majority of diabetic cases by the year 2050 [1]. Obesity, weight gain and physical inactivity are major risk factors for type 2 diabetes among women. In female population cyclical hormonal changes also contribute to development of complications of diabetes, hypertension and obesity. This study is thus aimed at correlating the blood glucose, blood pressure and body mass index in advancing cases of female diabetic patients consuming red meat on oral hypoglycemics.

MATERIALS AND METHODS

This is a study done on the patients of diabetes mellitus attending the Yenepoya Medical College hospital, Mangalore, Karnataka, India from Jan 2010 to May 2010.
The study group consists of female patients aged between 27 to 65 years on oral hypoglycemics consuming red meat. They were divided into two groups based on their duration of diabetes (viz. <5 years, >5 years of age).

Their anthropometric measurements, Blood Pressure (BP) recordings, Fasting Blood Sugar (FBS), Post Prandial Blood Sugar (PPBS) were noted.

Body mass index (BMI) was calculated as weight (in kilograms) divided by standing height (in meters squared). According to standard guidelines, those with a BMI greater that 24.9 kg/m² were defined as overweight and those with a BMI greater than 29.9 kg/m² were defined as obese.

People with systolic/diastolic blood pressure levels >/= 140/90 mmHg were defined as having hypertension. These parameters between two groups of red meat consumers were measured by unpaired t-test.

RESULTS
Different parameters of the study group were measured by using unpaired t-test. The statistical software SPSS ver17 & MS Excel were used for analysis. All tests were two-tailed and conducted at the 0.05 significance level. The results revealed that females with less duration of DM tend to have significantly lower blood glucose levels. The older group patients have hypertensive pattern of blood pressure recordings and were significantly higher than the younger group patients. Both the groups have similar BMI. Patients with more than ten years of diabetes are significantly in higher age group (Table 1).

Table 1: Comparison between various parameters of diabetes (<5 years) & diabetes (>5 years) in female type 2 diabetic patients (Mean ± SD).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>&lt;5 years</th>
<th>&gt;5 years</th>
<th>p-value</th>
<th>Confidence interval (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>40.94 ± 11.63</td>
<td>50.41 ± 11.84</td>
<td>0.0001*</td>
<td>-14.16 to -4.77</td>
</tr>
<tr>
<td>FBS</td>
<td>132.38 ± 47.32</td>
<td>171.67 ± 82.39</td>
<td>0.0034*</td>
<td>-65.23 to -13.34</td>
</tr>
<tr>
<td>PPBS</td>
<td>211.78 ± 78.82</td>
<td>248.69 ± 87.05</td>
<td>0.029*</td>
<td>-69.95 to -3.86</td>
</tr>
<tr>
<td>SBP</td>
<td>132.8 ± 15.78</td>
<td>146.67 ± 21.48</td>
<td>0.0003*</td>
<td>-21.26 to -6.47</td>
</tr>
<tr>
<td>DBP</td>
<td>84.73 ± 9.27</td>
<td>90.23 ± 10.79</td>
<td>0.0074*</td>
<td>-9.48 to -1.51</td>
</tr>
<tr>
<td>BMI</td>
<td>24.04 ± 3.58</td>
<td>24.88 ± 3.57</td>
<td>0.24**</td>
<td>-2.27 to 0.59</td>
</tr>
</tbody>
</table>

*p<0.05**p>0.05

DISCUSSION
The effect of Age on Blood Glucose levels in red meat consuming diabetic Women:
In this study, we found that consumption of red meat was associated with a poor glycemic control in middle-aged women. Our findings are consistent with recent evidence from the Nurses’ Health Study II of younger and middle-aged U.S. Women [3]. Red meat appeared entirely responsible for the elevated diabetes risk in these large cohort studies [4]. Nevertheless, red meat is also a major source for saturated fat, cholesterol, animal protein, and heme iron. It has been shown that certain types of fat from red meat may play a major role in the development of type 2 diabetes [5].

However, cholesterol intake tended to be positively related to an elevated risk of diabetes. Cholesterol intake from red meat may thus explain the observed association between red meat intake and poor glycemic control. Recently, body iron overload has been postulated to promote insulin resistance and increase type 2 diabetes risk [6-10].

Endogenous estrogens levels are sufficient to exert a full protective effect against insulin resistance and glucose intolerance in experimental mice [11]. Estrogen receptors ERalpha and ERbeta exist in beta-cells. The role of ERbeta is still unknown, yet ERalpha plays an important role in the regulation of insulin biosynthesis, insulin secretion and beta-cell survival. Activation of ERalpha by 17beta-estradiol (E2) and the environmental estrogen bisphenol-A (BPA) promotes an increase of insulin biosynthesis through a non-classical estrogen-activated pathway that involves phosphorylation of ERK1/2. Hence those who are in menstruating phase of life are generally protected against hyperglycemia. In post menopausal women, due to hyper stimulation of beta cells, they have a tendency to produce insulin resistance [12].

The effect of Age on Blood Pressure levels in red meat consuming diabetic Women:
In our study, red meat consumption in elderly aged females had higher blood pressure. Studies have shown that consumption of red meat was positively associated with 15-year cumulative incidence of increased blood pressure in black and white women. Red meat may contain higher amounts of saturated fat, sodium, nitrates, or other food compounds that are detrimental to blood pressure [13-15]. Furthermore, the consumption of red meat 1–2 times/d was associated with a 20–40% higher risk of developing elevated blood pressure than was the consumption of red meat 0.6 times/d. The mechanism through which higher meat intake may lead to higher blood pressure is unclear, except that intake of meat replaces other foods, such as whole grains, fruit, and vegetables, through a “substitution effect” [13].

Hormonal fluctuation in women influences the blood pressure in different age groups. At the time of menopause, in addition to aging and together with the loss of estradiol (which is known to decrease renin release), this poor suppression of renin by salt could contribute to the development of salt-sensitive hypertension in elderly women. 

...
women and may reflect an interaction between the renin system and menopausal status [16].

Androgens could also play a role in the rise in BP observed in menopausal women. Several studies have suggested that sex steroid hormones have direct vascular effects that may contribute to the gender differences in BP regulation [17-19]. However, there is also some evidence suggesting that female sex hormones may actually protect against a salt-induced increase in BP, possibly by augmenting the renal excretion of sodium. Thus, when Dahl salt-sensitive (DS) rats receive a high-sodium diet, female rats become less hypertensive than male rats [20]. A greater rise in BP has also been reported in spontaneously hypertensive female rats after ovariectomy [21,22].

The effect of duration of diabetes on blood glucose in diabetic red meat consuming Women:

In the present study it appears the blood glucose both fasting and post prandial increases significantly with increased duration of diabetes even though there are on oral hypoglycemics. This has been observed by similar studies conducted by Bo et al, which shows increased mortality with advancing years of diabetes along with usage of oral hypoglycemic [23]. In another similar study by Fang et al shows females have higher risk of increased variability in blood sugar [24]. In yet another observation it appears that Diabetic foot ulcer is more common in females and occurs more frequently with increased duration of diabetes [25].

The effect of duration of diabetes on blood pressure in diabetic red meat consuming Women:

Our observation shows that both systolic and diastolic blood pressure increased significantly with increased duration of diabetes in females. Similar observation has been made in another population by Mubarak et al, where the sample size was 1000. Even though the subjects were aware of consequence of hypertension with diabetes, still the blood pressure could not be controlled in 50% of cases as disease progressed [26]. In yet another study by Lynch et al it has been observed that blood pressure was poorly controlled in Type 2 Diabetes even in young age [27].

In summary, our study indicates that a higher the age group of red meat consuming diabetic females, higher will be their blood glucose and Blood Pressure. Hence hormones may play a major role in regulation of the above parameters in red meat consuming diabetic women.

ACKNOWLEDGEMENT
Dr. Moosabba, Professor and Medical Superintendent, Department of General Surgery, Yenepoya Medical College, Mangalore.

REFERENCES


