

Burden of Syndrome X Among Females in Karachi, Pakistan

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All the authors contributed significantly to the research that resulted in the submitted manuscript.

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ABSTRACT

Aim: The co-relation of hypertension with hyperglycemic indicates the allocation of a common physiologic predecessor, suggested to be insulin tissue resistance. Insulin resistance is associated with a number of risk factors, identified and acknowledged as a metabolic syndrome or Syndrome X. Syndrome X is a term instead of a disease itself, used to emphasize determinants that increases the possibilities of cardiovascular disorders to approximately 2 times and for type II diabetes to 5 times.

Objective: The main objective of this study is to estimate the risk of Syndrome X among the females of Pakistan as well as the suggestions to control the spreading of the syndrome through advising proper lifestyle changes.

Methods: A random sampling method was used to do population-based cross-sectional study among 150 out of 280 women aged 35-55 years. Pregnant female and those who didn't fast for 8-12 hours were excluded from all analyses. The data was obtained via percentage system.

Results: The national survey conducted implied that the metabolic syndrome is now very common in Pakistan, affecting about 30.66% and 56% (based on classification of amended guidelines of NCEP, and IDF respectively) of female population of age group of 35-55 years, being more common in women than above age of 50 years.

Conclusions: Syndrome X spread because of age factor and obesity as well as due to diabetes type II, hypertension and dyslipidemia. Adding exercise and diet to instigate weight loss in life the foundation of treatment. Atherogenic dyslipidemia, hypertension, and hyperglycaemia are treated with pharmacological involvement.

Keywords: Hypertension, hyperglycaemia, insulin tissue resistance, metabolic syndrome.

INTRODUCTION

Metabolic syndrome can be defined through a number of different prospects and ordinance of mutual dependency of biochemical, metabolic, physiological and clinical influences, directly

increasing the cardiovascular diseases risk and type II diabetes mellitus, leading to ultimate increase in mortality rate [1]. Other assorted factors that also contribute in this syndrome involves abdominal and visceral adiposity, insulin resistance, hypertension, dyslipidemia involving arterial blockage, endothelial dysfunction, long term stress, and genetic

vulnerability [2-4]. Over the years the variety of constituents that form metabolic syndrome (MetS) has had a number of titles compromising of plurimetabolic syndrome, eponymous Reaven syndrome, the deadly quarter, syndrome X, insulin resistance syndrome and dysmetabolic syndrome X. Despite the fact that MetS have been noticed and examined largely in last 2-3 decades, syndrome comparable to MetS have been discussed for about a century in the medical books.

Although the explanation of all syndromes point towards the same dysmetabolic phenotype but they may differ by factors or principle. First time, this Syndrome X was originated in 1920 by Kylin, a Swedish physician, described the Syndrome X associated with hyperglycemic and hypertensive association along with the gout [5]. Another scientist Vague in 1947 reported that the visceral obesity was the main factor associated with the metabolic abnormalities observed in most of the cardiovascular disorders and type II diabetes [6]. This was followed by Avogaro and Crepaldi forwarding an intellectual extract improvising that syndrome included a close correspondence between obesity, hypertension and hyperglycemia in an annual meeting at the European Association for Study of Diabetes (EASD) in 1965 [7]. This domain proceeded in 1988 when Reaven gave a Banting Lecture on metabolic syndrome and categorized as syndrome X as a congregation of risk factors for diabetes and cardiovascular disorders [8]. The foremost benefaction of Reaven was the inception of insulin resistance concept in the following syndrome. Without mentioning of visceral obesity and adiposity in his definition of metabolic syndrome which was afterwards added as decisive abnormality.

Kaplan, in 1989 assigned a new name of the syndrome i.e. "The deadly quartet", which compounded the elevation of blood pressure, visceral adiposity, insulin intolerance, and increased levels of triglycerides, thereafter in 1992, it was again renamed as "The insulin resistance syndrome" [9]. Even after, a mass of people carried on their efforts for developing a diagnostic guiding principle for recognition of syndrome X [10].

The first legitimate definition of the syndrome X was given by the World Health Organization (WHO) in 1998 [11], while the European Group for the Study of Insulin Resistance (EGIR) responded to this with a modification in the definition [12]. Then the National Cholesterol Education program (NCEP) reported its

own definition in 2001 [13, 14]. In the following interpretation, NCEP/ATPIII sets syndrome X pattern which requires 3 out of 5 components compromising: hypertension, abdominal obesity or sex-specific waist circumference (WC), decreased high density lipoprotein cholesterol (HDL-C), increased fasting glucose (IFG) without omission of diabetes and triglyceride levels [14]. Eventually the American Association of Clinical Endocrinologists also represented its perspective over the definition of metabolic syndrome [15]. The diversity in the metabolic syndrome definitions put forward for consideration of one integrated definition [16]. In April 2005, International Diabetes Foundation (IDF) suggested the definition of metabolic syndrome with the basic focus of central obesity [17]. It suggested that a person with metabolic syndrome should be centrally avoirdupois, with adiposity delineated on the basis of waist circumference. The other traits, out of which 2 or more are necessary for syndrome X were hyperglycemia, dyslipidemia (elevated triglycerides concentration, & HDL-cholesterol concentration), and hypertension [1, 17, 18].

This survey was done to study components of syndrome X preponderance and the risk level in female population enlisted at public health centres of an urban society located in Karachi, Pakistan. The main aim of the research was to produce a base for precautions of syndrome X based on these factors, with the general objective of decreasing the type II diabetes and cardiovascular space system with syndrome X in females.

METHODOLOGY

Design, Participants and Ethical Considerations

In apparent research, epidemiological studies accorded pervasiveness and consequences of Syndrome, conducted under Dr. Majid Khan, during January'2017 - January'2018, in Diabetic clinic located in Gulshan-e-Iqbal, Karachi, Pakistan where data was obtained via percentage-system. Total 150 patients out of 280 were randomly chosen for research premises, excluding pregnant women and individuals fasting for less than 8 hours where, they were enlightened about the objective. The participants willingly signed to be a part of the research with assurance of confidentiality about private details. According to IDF and ATP III guidelines, patient with syndrome X should have 2 or

more traits from the following, i.e. avoirdupois, be adipose at waist circumference, have elevated plasma glucose concentration, dyslipidemia, hypertension [19], while according to NCEP/ATP III the individual should have 3 or more traits [14].

Demographic Characteristics

Anthropologic attributes included age, hypertension, hyperglycaemia, dyslipidemia and clinical manifestations collected from contributor's health records.

Risk Factors

Measurements involved were fasting glucose levels, lipid profiles, blood pressure and waist circumference. A specimen was enlisted in the National Health and Nutrition Examination Service (NHANES), 1992-2002 using a multistage and stratified sample design [20]. Interviews of female participant between 35-55 years of age were conducted and invited to attend general health awareness camps where they undergo few anthropometric measurements, blood pressure monitoring and fill questionnaires (for collecting information on individual's past medical history, behavioral characteristics and socio-demographics) along with providing venous blood sample in 8-12 hours fasting state for analyzing fasting glucose levels, and lipid profile [21, 22].

Waist circumference was measured at narrowest point, i.e. high point of iliac crest at the minimal respiration rate nearest to 0.1cm [23]. The Body mass index was calculated after measuring height in m² and body weight in Kg [24, 25]. In general health awareness camps BP was measured by taking three readings at 60-sec intervals via a standard mercury sphygmomanometer with participants sitting once a 5-min rest. 2nd and 3rd measurements average was used in the study. Fasting glucose levels were categorized into three, normoglycemia with a concentration 100mg/dl of fasting plasma glucose, impaired fasting glucose at 100-126mg/dl, and undiagnosed diabetes at 126mg/dl [26]. Hypertension was define as BP: $\geq 130/85$ mm Hg and hypercholesterolemia was reported if total cholesterol concentration was ≥ 200 mg/dl [27].

These concentrations were measured using reference analytic methods only for participants who attended morning examination [28].

RESULTS

Epidemically, Syndrome X is prevailing and is analogous with mortality, marked morbidity and costs around the globe. The chances of CVD and diabetes can be reduced by an early detection and treatment of the syndrome through guidelines recommended by habits and dietary changes to loose weight and other therapies for hypertension and dyslipidemia.

The Figure 1 shows the familiar traits among 150 members with metabolic syndrome and their risk factors. As the definition was stated by IDF 30.66% of participators ($n = 46$) possessed central obesity with more than two risk factors and were categorised in having metabolic syndrome. 56% of members ($n = 84$) possessed central obesity with more than 3 risk factors and were categorised in having metabolic syndrome set by NCEP III standards.

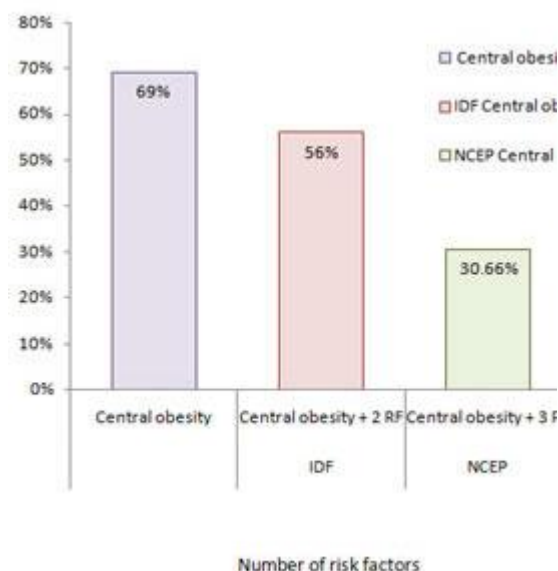


Figure 1. Prevalence (%) of number of risk factors for diagnosis of METs.

Central obesity was the fundamental element in syndrome X. Many patients of syndrome X counter obesity which can only be reduced by limiting calories and increasing exercise in your life [29, 30]. Recent researches revealed upsetting statistics of population with central obesity (Figure 2). The study revealed that 69.33% of population had central obesity although 30.66% of the population had less than and equal to 85cm waist circumference and were found to be safe.

Along with central obesity, the pervasiveness of the contributing risk factors in Syndrome X included hypertriglyceridemia as the prevalent risk factor of all, perceived in 30.66% of the sample along with low HDL-cholesterol in 30% of the sample. While the corresponding risk factors, hyperglycemia, hypercholesterolemia, and hypertension were 50.66 %, 37.33% and 58.66% respectively. The highest prevalence rate for Central obesity was 69.00% in comparison to the normal body weight, as shown in Table 1 and Figure 2.

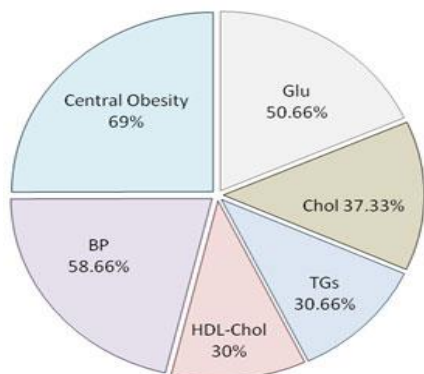


Figure 2. Prevalence (%) of contributing RF for the development of METs.

Participants with Syndrome X displayed higher TG and total cholesterol levels along with Low HDL-

Table 1. Demographic characteristics.

Variable	Category	Total (N = 150)	
		Frequency (n)	Percentage
Age	≥ 50	96	64 %
	< 50	54	36 %
WC (cm)	≥ 85	46	30.66 %
	< 85	104	69.33 %
BP (mmHg)	≥ 130/85	62	41.33 %
	< 130/85	88	58.66 %
TG (mg/dL)	≥ 150	104	69.33 %
	< 150	46	30.66 %
HDL-C (mg/dL)	< 50	45	30 %
	≥ 50	105	70 %
CHOL (mg/dL)	≥ 200	94	62.66 %
	< 200	56	37.33 %
FPG (mg/dL)	≥ 110	74	49.33 %
	< 110	76	50.66 %

WC, waist circumference; BP, blood pressure; TG, triglyceride; HDL-C, high-density lipoprotein cholesterol; CHOL, cholesterol; FPG, fasting plasma glucose

Cholesterol, elevated Blood Pressure, and FPG levels as shown in Figure 3.

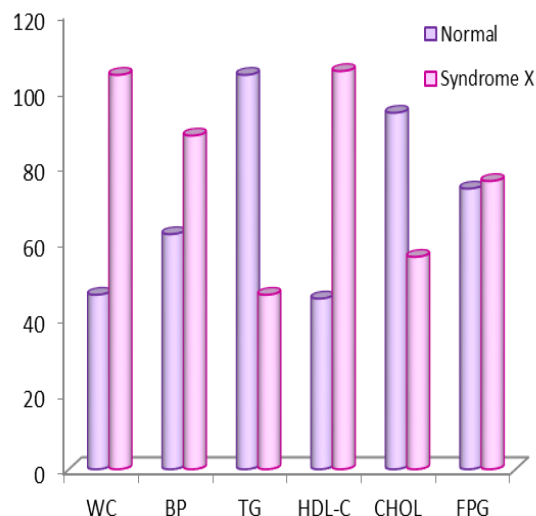


Figure 3. Contributing demographic characteristics.

The survey also suggested that the females with metabolic syndrome are more likely to develop hypertension and CVD about twice and they can develop diabetes type II 5 times faster as compared to people with no metabolic syndrome [31].

DISCUSSION

The following study looked upon the preponderance qualities of syndrome X with CVD and diabetes type II risk in a population study which is known to be more affected to health injustices. The studies showed that the risk of cardiovascular disorders and diabetes type II depended on the presence of syndrome X and each risk element suggested the necessity of giving primary prevention of CVD and diabetes type II through correct management. Nearly as suggested by the definition of IDF, 56% members had syndrome X and almost 30.66% were like to have syndrome X according the standards of NCEP ATP III. The research showed that syndrome X is more common in this study population than that in US adults (27%) [32] and Korean adults (32.4%) [33]. It was also highly common as compared to syndrome X in Asian Indians, i.e. 5% in rural community and increases to 1/3 in urban areas in India [34].

The gender specific prevalence declared that there was a higher probability of syndrome X in the states of the gulf Cooperative Council (Kuwait, Oman, Qatar, Bahrain, Saudi Arabia, and United Arab Emirates) is greater than for US population information, at 21% to 37% in men and 32% to 43% in women. This proofs that women are more like to develop syndrome X then men [35].

WC and BP are the risk factors for syndrome X in mean age of 57.4 years and the figure came out to be different as compared to the last targeted diabetic study but the FGP turned out to be lower in this research [36].

Our opinion according to research is that risk factors are different in both cases without and with syndrome X. With syndrome X FPG and WC level were higher in women by 50.66% and 69.33% respectively. BP was also higher by 58.66% comparing to those of women without syndrome X. Thus this shows that specific management for every patient is required such as those of BP, WC and FPG levels. Participators with syndrome X had higher TG levels (30.66%) than those without it. However, HDL-C level was lower by 30% compared with woman without syndrome X which clearly shows proper management of HDL-C and TG levels should be done.

Recent researches show that abdominal obesity and metabolic syndrome can play a conceiving role in the preponderance of both the premature atherosclerosis and diabetes as seen in south Asians [37, 38]. The

risks are mostly high in women or young though some other researches show that it is more common in elderly people and men too [39]. Restless efforts are needed to prevent syndrome X in Pakistan focusing on hypertension diabetes and smoking as well as dyslipidemia. There several reasons which become the contributing factor for the observed differences in diabetes type II profile and CVD [40, 41].

CONCLUSION

The collected figures gave an evident witness of high familiarity and frequency of risk factors associated with the syndrome X among the females of Karachi, Pakistan. The possible effect of the undesirable excessive body weight gave an association of presence of other risk factors. Its presence along with any other two or more risk factors strengthened the importance of possible preventions and treatments of obesity in females so as to decrease the chances of metabolic syndrome and consequent diseases.

STUDY LIMITATIONS

Study limitations should be taken into consideration when interpreting the findings of this study. This study population was recruited from only urban population residing in Gulshan area, Karachi, Pakistan using convenience sampling. Future studies including populations in urban as well as rural areas would provide more information about vulnerable populations in general. This study suggests that further studies with a prospective research design, such as a cohort study or randomized controlled trial, are needed to examine the prevalence of metabolic syndrome in female populations and its relationship with the level of CVD and Type II diabetes mellitus risk.

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