

## ECHOCARDIOGRAPHIC CHANGES IN PERSONS WITH METABOLIC SYNDROME

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### Abstract:

**Objective:** The metabolic syndrome represents a constellation of risk factors for cardiovascular disease. The aim of the present study performed to determine the echocardiographic changes in asymptomatic persons with metabolic syndrome.

**Methods:** A prospective study of twenty-nine normal control and fifty subjects with metabolic syndrome was performed. Descriptive characteristics were recorded and all subjects underwent detailed echocardiography study. During echocardiography left ventricular volume, wall motion abnormalities, ejection fraction (EF), fraction shortening (FS), systolic and diastolic functions were studied and compared in both normal control and metabolic syndrome subjects.

**Results:** Descriptive characteristics were similar in both groups. None in control group and eight out of fifty in study group had left ventricular volume abnormalities ( $P=0.023$ ). Regarding left ventricular wall motion abnormalities, none in control group and fifteen out of fifty subjects with metabolic syndrome had left ventricular wall motion abnormalities ( $P=0.001$ ). None in control group and fourteen out of fifty subjects with metabolic syndrome had ejection fraction and fraction shortening abnormalities ( $P=0.002$ ). None of the control group and ten out of fifty subjects (20%) had systolic dysfunction and fourteen subjects (28%) had diastolic dysfunction, with a P-value of 0.035.

**Conclusion:** A symptomatic subject with metabolic syndrome had significant echocardiographic abnormalities compared with normal subjects.

### Introduction:

Diabetes mellitus is associated with a 2 to 4 fold increased rate of death from coronary artery disease<sup>(1)</sup>. However, vascular disease is present before diabetes as shown by the 2 to 3 fold increased rate of death from coronary artery disease, in

impaired glucose tolerance and metabolic syndrome<sup>(2)</sup>. Endocrine dysfunction and precursor of atherosclerosis is present in both prediabetics and diabetics<sup>(3)</sup>. On this basis, I hypothesize that echocardiographic abnormalities may exist in asymptomatic subjects due to presence of strong risk factors for cardiovascular disease. To address this

## Hyperlipidemia in Saudi Arabia

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### ABSTRACT

**الأهداف:** يعتبر فرط الدهون من العوامل المعروفة لحدوث أمراض شرايين القلب الإكليلية. ومن المتوقع ازدياد فرط الدهون في المملكة العربية السعودية. الغرض من تصميم هذه الدراسة هو معرفة مدى انتشار فرط الدهون عند السعوديين من الجنسين، ما بين أعمار ٣٠-٧٠ سنة في المجتمع الريفي والحضري.

**الطريقة:** هذه الدراسة المجتمعية لتفحص السعوديين البالغين من أعمار ٣٠ سنة إلى ٧٠ سنة من البهوت المختارة خلال خمس سنوات من عام ١٩٩٥ إلى عام ٢٠٠٠ م في المملكة العربية السعودية. استخلصت البيانات من بداية المرض وحصل فحص سريري كامل وتحليل الدم الصائم للدهون. تم تحليل البيانات لمعرفة مدى انتشار ارتفاع الكوليسترول ( $\geq 5.2$  ممول/ل) ومدى انتشار ارتفاع الدهون الثلاثية ( $\geq 1.69$  ممول/ل) في المملكة العربية السعودية.

**النتائج:** إجمالي عدد السعوديين بالدراسة كان ١٦٨٩٩ شخصاً وكان المعدل الكلي لارتفاع الكوليسترول في المملكة العربية السعودية هو ٥٤.٩%. وكان معدل نسبة الكوليسترول هو  $5.4 \pm 1.52$  ممول/ل. وكان المعدل للرجال هو ٥٤.٩%، بالمقارنة بنسبة ٥٣.٢٩% للنساء. ولاحظ أن المعدل أعلى للسعوديين المقسمين بالمدن بنسبة ٥٣.٤% مقارنة للسعوديين بالريف ٥٥.٣%. أما المعدل الكلي لارتفاع الدهون الثلاثية هي ٤٠.٣% وكان معدل نسبة الدهون الثلاثية هو  $1.8 \pm 1.29$  ممول/ل. وكان المعدل أعلى للرجال ٤٧.٦%، بالمقارنة بنسبة ٣٣.٧% للنساء.

**خاتمة:** المعدل الكلي لانتشار فرط الدهون للسعوديين البالغين في المملكة العربية السعودية في ارتفاع متزايد. مما يشير إلى ارتفاع محتمل لمعدل الإصابة بأمراض الشرايين الإكليلية في المستقبل. نتصح بأنه يجب اتخاذ برنامج توعوي في المملكة العربية السعودية عند سن مبكر كالتربية والنمط الحياتي.

**Objectives:** To determine the prevalence of hyperlipidemia among Saudis of both genders in rural and urban communities.

**Methods:** Selected Saudis in the age group of 30-70 years were studied over a 5-year period between 1995 and

2000 in Saudi Arabia. Data were obtained from history, physical examination, and analysis of fasting plasma lipids. The data were analyzed to classify individuals with hypercholesterolemia (HC) (total cholesterol  $\geq 5.2$  mmol/l), and hypertriglyceridemia (HT) (total triglycerides  $\geq 1.69$  mmol/l). Logistic regression analysis was performed to provide a risk assessment model and correlation with other coronary artery disease (CAD) risk factors.

**Results:** The number of study samples included in the final analysis was 16,819. The prevalence of HC was 54% with mean cholesterol level of  $5.4 \pm 1.52$  mmol/l. Prevalence of HC among males was 54.9% and 53.2% for females, while 53.4% among urban Saudis and 55.3% for rural Saudis. Hypertriglyceridemia prevalence was 40.3% with mean triglycerides level of  $1.8 \pm 1.29$  mmol/l. Males had statistically significant higher HT prevalence of 47.6% compared to 33.7% in females ( $p < 0.0001$ ).

**Conclusions:** Hyperlipidemia is reaching higher prevalence rates in KSA. This finding may suggest that CAD will soon be a major health problem. Reduction in obesity by adopting healthier eating habits, and increasing physical activity are of considerable importance to our community.

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Over the past 3 decades lipids have gained great importance in the medical community, reflected by the large number of publications in the medical literature. Lipids play an integral role in human physiology and excess lipids has been shown to be a risk factor for coronary artery disease (CAD), as well

# Prevalence of physical activity and inactivity among Saudis aged 30-70 years

## *A population-based cross-sectional study*

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### ABSTRACT

**Objectives:** To assess physical activity levels among Saudi adults, and to examine the relationships of physical activity with body mass index (BMI), waist circumference (WC) and obesity prevalence.

**Methods:** Data taken from the Coronary Artery Disease in Saudis Study which is a National Epidemiological Health Survey carried out between 1995 and 2000. Participants included 17395 Saudi males and females aged 30-70 years, selected randomly using a multistage stratified cluster sampling technique. Leisure-type and sport-related physical activities including walking were assessed using an interviewer-administered questionnaire. The activities were classified into five intensity categories and assigned metabolic equivalents (MET) according to the compendium of physical activity. Based on the intensity, duration and frequency of physical activity, subjects were classified into active or inactive category.

**Results:** Inactivity prevalence (96.1%) was very high. There were significantly ( $p < 0.001$ ) more inactive females (98.1%) than males (93.9%). Inactivity prevalence increases with increasing age category, especially in males, and decreases with increasing education levels. Inactivity was the highest in the central region (97.3%; 95% CI = 96.8-97.8%) and the lowest in the southern region of Saudi Arabia (94.0%; 95% CI = 93.2-94.8%). Further, active individuals exhibited lower values of BMI and WC.

**Conclusion:** These findings reveal the sedentary nature of Saudi population. The overwhelming majority of men and women did not reach the recommended physical activity levels necessary for promoting health and preventing diseases. The high prevalence of inactivity among Saudis represents a major public health concern.

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During the past 3 decades, Saudi Arabia has undergone enormous changes in lifestyle, including physical activity patterns and eating habits. These dramatic lifestyle changes have undoubtedly considerable negative impacts on societal health. Indeed, such lifestyle transformation was thought to have been responsible for the recent epidemic of non-communicable diseases along with their complication in the country.<sup>1-3</sup> A recent community-based national study,<sup>2</sup> involving adult Saudis between 30 and 70 years, showed that the overall prevalence of coronary heart disease (CHD) and diabetes mellitus<sup>3</sup> to be 5.5% and 23.7%, respectively. However, the expected increase in ischemic heart disease mortality in the Middle East region in 2020 compared to 1990 was estimated to be the greatest among all regions of the world (146% increase in women and 174% increase in men).<sup>4</sup> This is greatly attributed to the high presence of major CHD risk factors. Prevention of noncommunicable diseases depends on controlling the predisposing risk factors, including physical inactivity.

## Coronary artery disease in Saudi Arabia

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### ABSTRACT

**Objectives:** Coronary artery disease (CAD) is a major public health problem worldwide. To our knowledge, there is no national data available from community based studies on prevalence of CAD in the Kingdom of Saudi Arabia (KSA). Therefore, we designed this study with the objective to determine the prevalence of CAD among Saudis of both sexes, between the ages of 30-70-years in rural as well as urban communities. Further, to determine the prevalence and clinical pattern of the major modifiable risk factors for CAD among the same population. This work is part of a major national study on CAD in Saudis Study (CADISS).

**Methods:** This is a community based study conducted by examining subjects in the age group of 30-70-years of selected households during 5-year period between 1995 and 2000 in KSA. Data were obtained from history using a validated questionnaire, and electrocardiography. The data were analyzed to provide prevalence of CAD and risk assessment model.

**Results:** Nine hundred and forty-four subjects, out of 17232 were diagnosed to have CAD. Thus, the overall

prevalence of CAD obtained from this study is 5.5% in KSA. The prevalence in males and females were 6.6% and 4.4% ( $P < 0.0001$ ). Urban Saudis have a higher prevalence of 6.2% compared to rural Saudis of 4% ( $P < 0.0001$ ). The following variables are found to be statistically significant risk factors in KSA: age, male gender, body mass index (BMI), hypertension, current smoking, fasting blood glucose, fasting cholesterol and triglycerides.

**Conclusions:** The overall prevalence of CAD in KSA is 5.5%. A national prevention program at community level as well as high risk groups should be implemented sooner to prevent the expected epidemic of CAD that we are seeing, beginning. Measures are needed to change lifestyle and to address the management of the metabolic syndrome, to reduce modifiable risk factors for CAD. A longitudinal study is needed to demonstrate the importance of reducing modifiable risk factors for CAD in KSA.

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Coronary artery disease (CAD) is a major public health problem in industrialized nations.<sup>1</sup> In the United States of America (USA), for example, CAD is the leading cause of death in adults, accounting for approximately one-third of all deaths in subjects over the age of 35-years.<sup>2</sup> Hence, emphasis on its

primary as well as secondary prevention was given great attention by health authorities in western countries. While age adjusted mortality from CAD is gradually falling in developed countries, it is set to become an epidemic in developing countries, and over the next 20-years will probably become the

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# Metabolic syndrome in Saudi Arabia

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## ABSTRACT

**Objectives:** Metabolic syndrome (MS) is a well-established risk factor for the development of coronary artery disease (CAD). We designed this study to obtain the prevalence of MS and each of its components in Saudi Arabia. This study is part of Coronary Artery Disease in Saudi Study (CADISS).

**Methods:** We conducted this community-based national epidemiological health survey by examining Saudi subjects in the age group of 30-70 years of selected households over a 5-year period between 1995 and 2000 in Saudi Arabia. We interviewed all subjects, examined and took measurements of their blood pressure, weight, height, waist circumference, as well as fasting samples of plasma glucose, triglycerides, and high-density lipoprotein (HDL) cholesterol. We obtained the prevalence of MS based on the presence of at least 3 of the following: abdominal obesity (waist circumference >102 cm (40 inch) in male and >88 cm (35 inch) in female), triglycerides  $\geq 150$  mg/dl (1.69 mmol/L), HDL cholesterol <40 mg/dl (1.03 mmol/L) in male and <50 mg/dl (1.29 mmol/L) in female, blood pressure  $\geq 130/85$  mm Hg, fasting glucose  $\geq 110$  mg/dl (6.1 mmol/L) as defined by the Adult Treatment Panel (ATP) III in 2001.

**Results:** We included 17,293 subjects in this survey during the study period. The overall age-adjusted

prevalence of MS in Saudi Arabia obtained from this study is 39.3%. Age adjusted prevalence in males is 37.2% and crude prevalence is 40.9% (95% confidence interval [CI] 39.8-42), while females have a higher prevalence of 42% and crude prevalence of 41.9% (95% CI 40.9-42.9). Saudi subjects from urban areas have significantly higher prevalence of 44.1% (95% CI 43.2-45) compared to those living in rural areas of 35.6% (95% CI 34.3-36.7) ( $p < 0.0001$ ). Low HDL affects 81.8% of females and 74.8% of males with MS leading all other factors, and it continued to be consistent in all different age groups. Metabolic syndrome is a risk factor for CAD, as the prevalence of CAD was higher among patients with MS (6.7%) compared to subjects without MS (4.6%) ( $p < 0.0001$ ).

**Conclusions:** The prevalence of MS is high in Saudi Arabia. Low HDL cholesterol plays a major role in the contribution to the MS in Saudi Arabia. Therefore, we recommend routine assessment for the components of MS in patients with CAD, furthermore, we encourage aggressive management of the MS for primary prevention of CAD, particularly, measures to increase HDL cholesterol.

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**M**anagement of coronary artery disease (CAD) has evolved to include various strategies not

limited to interventions after cardiac event secondary to CAD, but addressing the predisposing

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# Obesity in Saudi Arabia

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## ABSTRACT

**Objectives:** Obesity and overweight are well known risk factors for coronary artery disease (CAD), and are expected to be increasing in the Kingdom of Saudi Arabia (KSA) particularly among females. Therefore, we designed this study with the objective to determine the prevalence of obesity and overweight among Saudis of both gender, between the ages of 30-70 years in rural as well as in urban communities. This work is part of a major national project called Coronary Artery Disease in Saudis Study (CADISS) that is designed to look at CAD and its risk factors in Saudi population.

**Methods:** This study is a community-based national epidemiological health survey, conducted by examining Saudi subjects in the age group of 30-70 years of selected households over a 5-year period between 1995 and 2000 in KSA. Data were obtained from body mass index (BMI) and were analyzed to classify individuals with overweight (BMI = 25-29.9 kg/m<sup>2</sup>), obesity (BMI  $\geq$ 30 kg/m<sup>2</sup>) and severe (gross) obesity (BMI  $\geq$ 40 kg/m<sup>2</sup>) to provide the prevalence of overweight and obesity in KSA.

**Results:** Data were obtained by examining 17,232 Saudi subjects from selected households who participated in the study. The prevalence of overweight was 36.9%. Overweight is significantly more prevalent in males (42.4%) compared to 31.8% of females ( $p < 0.0001$ ). The age-adjusted prevalence of obesity was 35.5% in KSA with an overall prevalence of 35.6% [95% CI: 34.9-36.3], while severe (gross) obesity was 3.2%. Females are significantly more obese with a prevalence of 44% than males 26.4% ( $p < 0.0001$ ).

**Conclusions:** Obesity and overweight are increasing in KSA with an overall obesity prevalence of 35.5%. Reduction in overweight and obesity are of considerable importance to public health. Therefore, we recommend a national obesity prevention program at community level to be implemented sooner to promote leaner and consequently healthier community.

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It is ironic that as people continue to suffer from malnourishment and starvation in some poor parts of the world, others are gone to the other extreme of being overweight or obese particularly in developed as well as developing countries. A large number of individuals in our society perceive overweight or obesity as being healthy in contrast to

the western world, where growing numbers of people recognize that being overweight or obese is associated with major health problems such as diabetes mellitus (DM), coronary artery disease (CAD) and stroke. At the same time, most overweight or obese people do not know which foods best meet their nutritional and weight loss

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# Diabetes mellitus in Saudi Arabia

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## ABSTRACT

**Objective:** Diabetes mellitus (DM) is a major public health problem worldwide, and it is a known risk factor for coronary artery disease (CAD). New recommendations for the diagnosis of diabetes have changed the epidemiology of DM. Therefore, we designed this study with the objective to determine the prevalence of DM among Saudis of both sexes, between the ages of 30-70-years in rural as well as urban communities. This work is part of a major national project: Coronary Artery Disease in Saudis study (CADISS) that is designed to look at CAD and its risk factors in Saudi population.

**Methods:** This study is a community-based national epidemiological health survey, conducted by examining Saudi subjects in the age group of 30-70-years of selected households over a 5-year period between 1995 and 2000. Data were obtained from history, fasting plasma glucose levels, and body mass index. The data were analyzed to classify individuals as diabetic, impaired fasting glucose and normal, using 1997 American Diabetes Association (ADA) criteria, which was adopted by the World Health Organization (WHO) in 1998, to provide prevalence of DM in the Kingdom of Saudi Arabia (KSA).

**Results:** A total of 17232 Saudi subjects were selected in the study, and 16917 participated (98.2% response rate). Four thousand and four subjects (23.7%), out of 16917 were diagnosed to have DM. Thus, the overall prevalence of DM obtained from this study is 23.7% in KSA. The prevalence in males and females were 26.2% and 21.5% ( $p < 0.00001$ ). The calculated age-adjusted prevalence for Saudi population for the year 2000 is 21.9%. Diabetes mellitus was more prevalent among Saudis living in urban areas of 25.5% compared to rural Saudis of 19.5% ( $p < 0.00001$ ). Despite the readily available access to healthcare facilities in KSA, a large number of diabetics 1116 (27.9%) were unaware of having DM.

**Conclusion:** The overall prevalence of DM in adults in KSA is 23.7%. A national prevention program at community level targeting high risk groups should be implemented sooner to prevent DM. We further recommend a longitudinal study to demonstrate the importance of modifying risk factors for the development of DM and reducing its prevalence in KSA.

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**D**iabetes mellitus (DM) is a medical problem that can affect individual's health through involvement of several body systems. With its inevitable complications, a diabetic patient may end up crippled in a way or another, for instance: losing sight, having leg amputation, hooked up on

hemodialysis machine, or suffering from congestive cardiac failure due to coronary artery disease (CAD). Therefore, healthcare providers have addressed the impact of DM and the magnitude of the problem in many countries. Fascinatingly, the prevalence of DM is highly

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## Articles

# Alterations of erythrocyte free radical defense system, heart tissue lipid peroxidation, and lipid concentration in streptozotocin-induced diabetic rats under coenzyme Q<sub>10</sub> supplementation

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### ABSTRACT

**Objective:** Free radicals play an important role in genesis and development of various chronic diseases and aging. Our objective is to study the effects of coenzyme Q<sub>10</sub> (CoQ<sub>10</sub>) supplementation on erythrocyte antioxidants, heart tissue lipid peroxidation end products and lipid concentration in different age of diabetic rats.

**Methods:** In this study, the activities of superoxide dismutase (SOD), glutathione peroxidase (GSH-Px), and the content of reduced glutathione (GSH) were determined in erythrocytes. The products of lipid peroxidation were determined in the heart tissues of streptozotocin-induced diabetic rats and in healthy rats at 4, 8, and 13-months of age. The above mentioned antioxidant systems of erythrocytes were also determined after supplementation of diabetic and healthy rats with CoQ<sub>10</sub>. This study was carried out in King Fahad Medical Research Center, Jeddah, Kingdom of Saudi Arabia between 2000 and 2001.

**Results:** In erythrocytes of diabetic rats the activity of GSH-Px was significantly decreased ( $p < 0.001$ ) in all different age groups, whereas the activity of SOD was significantly increased ( $p < 0.001$ ). However, in

erythrocyte of streptozotocin-induced diabetic rats, the concentration of GSH and high-density lipoprotein (HDL)-cholesterol were significantly lower than non-diabetic rats. Moreover, the concentration of heart tissue lipid peroxidation end products, and plasma glucose, cholesterol and triacylglycerol were significantly increased ( $p < 0.001$ ) in all age groups of diabetic rats. Daily supplementation with CoQ<sub>10</sub> (10 mg/kg body weight, one month) after induction of diabetes to the rats resulted in the following changes: an increase in both erythrocyte GSH concentration and GSH-Px activity, and slightly increases in plasma HDL-cholesterol. However, SOD activity was significantly decreased ( $p < 0.05$ ). In addition, the levels of lipid peroxidation end products, and triacylglycerol were significantly decreased ( $p < 0.05$ ) in diabetic rats supplemented with CoQ<sub>10</sub>.

**Conclusion:** The results of the present study indicated that CoQ<sub>10</sub> supplementation helps to prevent clinical complications during the course of the disease in diabetic rats.

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