Lipid Profile Status amongst the Pilots of Kuwait Air Force

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Abstract

Introduction: Dyslipidemia has been established as one of the most important modifiable risk factors for cardiovascular diseases. Dyslipidemia is highly prevalent in the general population of Kuwait as well as in armed forces personnel.

Objective: To assess the prevalence of dyslipidemia amongst the pilots of Kuwait Air Force.

Materials and Methods: This descriptive cross-sectional study was carried out in Medical Directorate, Armed Forces Hospital Kuwait from July 2017 to June 2018. One hundred and twenty-six Kuwaiti Air Force pilot were included in this study. Lipid profile [Total Cholesterol (TC), Triglyceride (TG), Low density lipoprotein cholesterol (LDL-C) and High density lipoprotein cholesterol (HDL-C)] were measured from fasting blood and were categorized based on the National Cholesterol Education Programme Adult Treatment Panel III criteria (NCEP-ATP III).

Results: Mean ($\pm$SD) age of the 126 participants was 32.5$\pm$7.4 years. Among them 56.3% were current smoker. As per BMI (Body Mass Index) criteria 49.2% and 26.2% of the pilots were overweight and obese respectively. Most common lipid abnormality was high LDL-C (46%), followed by high TC (39.7%), low HDL-C 36.5%) and high TG (18.3%). Positive correlation between BMI and TG level and LDL-C level (r=0.273, p=0.001 & r=0.177, p=0.049 respectively) and negative correlation between BMI and HDL-C (r= -0.286, p=0.001) were found. BMI was found to be an independent predictive factor for dyslipidemia.

Conclusions: Dyslipidemia and obesity was alarmingly high in the pilots of Kuwait Air Force and should be considered as a matter of medical concern.

Key-words: Kuwait Air Force Pilot, Dyslipidemia, Obesity, Body Mass Index, Lipid Profile.

Introduction

Abnormal level in one or more of four lipids fractions including elevation of plasma TC, TG, LDL-C or low HDL-C level is termed as dyslipidemia, that contributed to the development of arthrosclerosis[1]. Atherosclerotic cardiovascular disease is the most common cause of death worldwide and the burden of disease is projected to rise substantially over the next few decades[2]. For a longer healthy life it is essential to identify dyslipidemia early and initiate treatment accordingly. However, dyslipidemia tends to be overlooked due to the lack of obvious early signs[3].

Total population of Kuwait is around 4.2 million and 45% of whom are Kuwaiti citizens[4]. Free universal education and medical care are available for the citizens and thus they can enjoy a high standard of living. The economy was boomed with the discovery of oil in the 1950s. This brought about intense changes in food accessibility and living quality in the country[5]. An improved caloric intake with a simultaneous decrease in levels of physical activity are thought to be the main causes of high rates of overweight and obesity[6-11]. It has been estimated that about one-half of females of Kuwaiti and one-third males are obese[12,13]. Likewise, dyslipidemia is highly prevalent and on an increasing trend in Kuwait[14, 15].

In line with the general population obesity and dyslipidemia might affect military populations. If it so, it could imposes an additional health hazard, and pilots are no exception[16]. Whereas members of military forces with their favorable physical conditions[17,18] are generally considered as one of the healthiest layers of each society, some recent studies reported a trend toward increasing cardiovascular risk factors among military personnel[19,20].

However, studies focusing on air force pilots in Kuwait are scarce. Therefore, information on the current pattern of dyslipidemia remains limited, which might hinder the implementation of pertinent and effective control and prevention strategies. With this context, we investigated the prevalence of adverse serum concentrations of TC, LDL-C, HDL-C, and TG among a group of Kuwaiti Air Force Pilot and to correlate these with anthropometric and demographic factors.

Materials and Methods

This descriptive cross-sectional study was carried out in Medical Directorate, Armed Forces Hospital Kuwait from July 2017 to June 2018. The study protocol was approved by the ethical review committee of the Medical Directorate, Armed Forces Hospital. Written informed consent was acquired from all study participants. Data were collected using a pretested structured questionnaire containing questionnaire and checklist.

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All consecutive pilots attending the annual health check-up schedule were enrolled for the study. Participants were subjected to face-to-face interview by the attending physicians to know their demographic and job characteristics and health-related habits. Anthropometric measurements (Height and weight) were measured twice using a height-weight scale. Measuring instruments had been calibrated before Subjects stood with bare feet and wore light clothing, and then the averages were calculated. Body mass index (BMI) was calculated as weight (kg) divided by height (m) squared. Blood pressure was measured after subjects had been seated for at least ten minutes. Venous blood samples were collected and serum lipid profiles, including TC, TG, HDL-C and LDL-C were assayed by the automated spectrophotometer and enzymatic colorimetric method with the use of Olympus AU640 autoanalyzer (Olym-pus, Kobe, Japan).

Dyslipidemia was defined according to the criteria set by the NCEP-ATP III and classified into four different types[21]: (a) hypertriglyceridemia was defined as having serum triglycerides ≥150 mg/dl (b) hypercholesterolemia was defined as having total cholesterol ≥200 mg/dl (c) low HDL-C was defined as having HDL-C ≤40 mg/dl and (d) high LDL-C was defined as having ≥130 mg/dl. Overweight was defined as a BMI ≥25.0 kg/m^2 and <30.0 kg/m^2, and obesity was defined as a BMI ≥30 kg/m[22,23]. Participants were categorized as either current smoker or non-smoker (including ex-smoker) based on their smoking behavior.

After collection, data were entered into Microsoft excel to generate a master sheet. Then they were fed into SPSS (Statistical Package for Social Sciences) windows version 23.0 for analysis. Continuous data were presented as mean (standard deviation) and qualitative data were expressed as frequency (percentage). Correlation between age and lipid fractions as well as BMI and lipid fractions was analyzed by Pearson correlation coefficient. Multivariate analysis was conducted to determine the independent predictor of dyslipidemia. A p value < 0.05 was considered statistically significant.

Results

The mean age of the participants was 32.5±7.4 years. Majority (42.1%) of the individuals were in the age group of below 30 years. Seventy one (56.3%) pilots were current smoker and they smoked 18 sticks (±7) per day on an average. Family history of HTN and DM were reported by 40.5% and 33.3% pilots respectively. More than one fourth (26.2%) of the participants were obese (BMI ≥30kg/ m^2) and around half (49.2%) of the participants were overweight (BMI 25 to 29.9 kg/ m^2). Mean systolic and diastolic blood pressure were within normal range(Table-I).

Table-I: Demographic and clinical characteristics of the respondents (n=126)

Variables (unit)	Category	Frequency (percentage)*
Age (years)	<30	53 (42.1%)
	30-40	51 (40.5%)
	>40	22 (17.5%)
	Mean±SD	32.5±7.4
	Range	22-52
Smoking behavior Amount of smoking (sticks per day)	Smoker	71 (56.3%)
	Non-smoker	55 (43.7%)
	Mean±SD	18±7
F/H of hypertension	Present	51 (40.5%)
	In father	23 (45.1%)
	In mother	16 (31.4%)
	Both parents	12 (23.5%)
F/H of diabetes mellitus	Present	42 (33.3%)
	In father	13 (31.0%)
	In mother	16 (38.1%)
	Both parents	13 (31.0%)
Height (cm)	Mean±SD	175.5±7.4
Weight (kg)	Mean±SD	84.8±13.2
Body mass index (kg/m^2)	Mean±SD	27.6±3.9
	<25	31 (24.6%)
	25-29.9	62 (49.2%)
	≥30	33 (26.2%)
Systolic blood pressure (mmHg)	Mean±SD	110.9±10
Diastolic blood pressure (mmHg)	Mean±SD	71.3±8.7

*Data were expressed as frequency (percentage)

Lipid sub fraction analysis revealed high LDL-C to be the commonest abnormality, noted in 46.0% of the participants followed by hyper-cholesterolemia noted in 39.7%, low HDL-C noted in 36.5% and hypertriglyceridemia noted in 18.3% of the study population (Table-II).

Table-II: Lipid profile of Kuwaiti Air Force Pilot (n=126)

Variables (unit)	Category	Frequency (percentage)*
Cholesterol (mg/dl)	Mean±SD	193.8±30.5
	Range	104.4-309.4
	<200	76 (60.3%)
	≥200	**50 (39.7%)**
HDL (mg/dl)	Mean±SD	45.5±11.5
	Range	15.5-88.9
	<40	**46 (36.5%)**
	≥40	80 (63.5%)
LDL (mg/dl)	Mean±SD	127.7±25.5
	Range	38.7-205
	<130	68 (54.0%)
	≥130	**58 (46.0%)**
Triglyceride (mg/dl)	Mean±SD	101.4±58.4
	Range	17.7-382
	<150	103 (81.7%)
	≥150	**23 (18.3%)**

Data were expressed as frequency (percentage)

In the present cohort of 126 pilots data revealed that HDL-C, LDL-C and triglyceride were correlated significantly with BMI. As the BMI increased LDL-C and triglyceride increased and HDL-C decreased. However, in the study population age had no significant association with any of the lipid sub fraction (Table-III).

Table-III: Correlation coefficient analyses between age, BMI and lipid profile (n=126)

Variable		Cholesterol	HDL-C	LDL-C	Triglyceride
Age	r	0.134	-0.077	0.171	0.073
	P value	0.134	0.390	0.056	0.381
BMI	r	0.126	-0.286	0.177	0.273
	P value	0.160	**0.001^S**	**0.047^S**	**0.002^S**

r=correlation coefficient; S: Significant statistically.

Out of 126 studied pilots, 35 (27.8%) had normal lipid profile with respect to serum cholesterol, HDL-C, LDL-C and triglyceride. However, majority of the pilots (36.5%) had abnormality in two sub fractions of lipids (Figure 1 and 2).
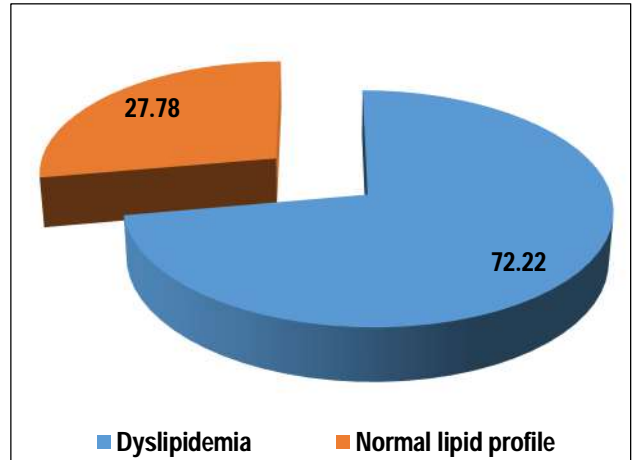

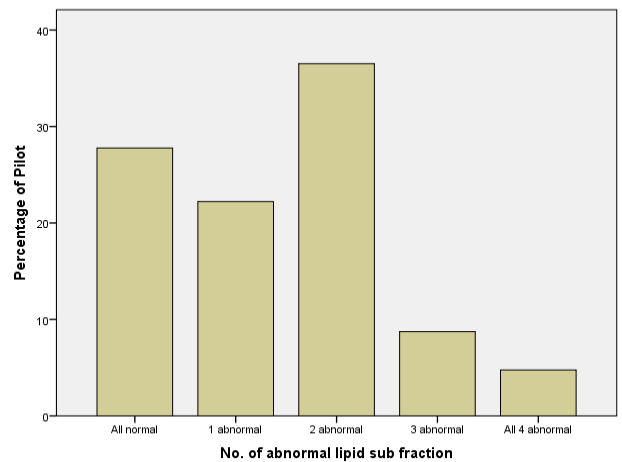**Figure-1:** Dyslipidemia among Kuwaiti Air Force Pilot (n=126)

Figure-2: Pattern of lipid abnormality (n=126)

Age, current smoking, F/H (Family History) of DM, F/H of HTN and BMI were entered into a multivariate logistic regression model to ascertain the independent predictive factors for dyslipidemia. Current smoking and higher BMI were significantly associated with having dyslipidemia among pilots (Table-IV).

Table-IV: Association of dyslipidemia with different factors (n=126)

Variables	Odds ratio (OR)	95% CI of OR		P value
		Lower	Upper	
Age (years)	1.058	0.991	1.131	0.092
Smoking	2.410	1.004	5.781	**0.049^S**
F/H of HTN	1.035	0.407	2.631	0.943
F/O DM	0.524	0.198	1.385	0.193
BMI	1.224	1.082	1.385	**0.001^S**

CI: Confidence interval; S: Significant statistically

Discussion

To the best of our knowledge, dyslipidemia was not studied among Kuwaiti Air Force Pilot and the current study was the first initiative in this purpose. The findings of this study shows that the overall proportion of dyslipidemia, overweight and obesity were high among the pilots, 72.2%, 49.2% and 26.2% respectively. These findings are in agreement with another study as the prevalence of dyslipidemia is common among pilots[24].

Averages of lipid limits indicated standard values for the Kuwaiti Air Force pilots which are consistence with the study conducted in the Israeli Air Force pilot[25]. Mild, moderate, or severe hyperlipidemias were observed in 78% of the 229 fighter Polish Air Force pilots [26].

Lipid abnormalities noted in the present study reveal high LDL-C to be the most common lipid abnormality followed by high TC levels. This is in disagreement with an Indian study where hypertriglyceridemia to be the most common lipid abnormality followed by low HDLC levels[27]. However, the Indian study was conducted over selected aircrew population rather than Air Force Pilot like this study.

Obesity is the most important cause for dyslipidemia. This is evident in the present study suggested by revealing a positive correlation of BMI with TG and LDL-C and a negative correlation with HDL-C. Singh G et al. observed in their study even though BMI correlated with cholesterol and LDL-C levels, it did not correlate with elevated TG and HDL-C levels [27].

It should be noted that pilots included in the current study were part of the Kuwaiti population and they are exposed to the decisive factors(traditional Kuwaiti diets, lack of physical activity) responsible for the development of obesity and dyslipidemia. More than 50% of Kuwaiti adults were suffering from hyperlipidemia as evident by the earlier studies from Kuwait where standard diagnostic measurements were used[28,29]. More than half of the female patients and more than three fourth of the male patients attending the coronary care units in different hospitals in Kuwait had hyperlipidemia[30].

Conclusion

The overall BMI status and the lipid profile of the air force pilots interviewed in this study appeared to be not satisfactory. The prevalence of abnormal lipid measurements was common. A fairly huge number of pilots had BMI values of ≥25 kg/m². Smoking tobacco was also reported in addition. Anthropometric variable BMI predicted dyslipidemia is better in this group than any one particular variable. A healthy diet and regular exercise plan should be encouraged and ensured in this population. Finally, appropriate health promotion and nutrition education program need to be planned and operationalized by the policymakers.

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