REGULAR PHYSICAL ACTIVITY: CORRELATION WITH CONVENTIONAL CARDIOVASCULAR RISK FACTORS

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ABSTRACT

Objective: To correlate regular physical activity (RPA) with conventional cardiovascular (CV) risk factors.

Methods: In this study, 116 young adult males , 56 physically active and 60 physically inactive (sedentary), were included. Measurement of body mass index (BMI), basal energy expenditure (BEE) systolic and diastolic blood pressure (SBP, DBP) and serum concentrations of fasting blood glucose (FBG), total cholesterol (TC) , triglyceride (TG) , low density lipoprotein-cholesterol (LDL-C), and high density lipoprotein-cholesterol (HDL-C) were performed.

Results: Correlation and regression analysis revealed significant negative correlation of RPA with BMI (r: -0.414, P: 0.000), BEE (r: - 0.388, P: 0.000) SBP (r: -0.418, P: 0.000), DBP (r: -0.439, P: 0.000)), FBG (r: -0.425, P: 0.000), TC (r -0.291, P: 0.002) , TG (r: -0.408, P: 0.000) , LDL-C (r: -0.305, P: 0.001), and significant positive correlation with HDL-C (r :+0.430, P: 0.000).

Conclusion: The study demonstrated a strong inverse relationship between RPA and CVD risk. Therefore, practicing moderate RPA is crucial to maintain healthy life and improve cardiovascular fitness, and this considerably reduces the future risk of CVD and its adverse clinical consequences.

Key words: Regular physical activity, conventional cardiovascular risk factors cardiovascular disease risk

INTRODUCTION

Physical activity (PA) is indispensible to maintain life and its desirable qualities into advanced age[1]. Regular PA (RPA) is associated with a wide variety of health benefits. It has a positive effect on the quality of life and other psychological variables . In addition , it improves blood pressure (BP), lipid profile (LP), and cardiorespiratory fitness , and hence reduces the risk of coronary heart disease (CHD)[2-7]. The inverse relationship of RPA with cardiovascular disease (CVD) and CHD risk is mediated via its favorable effects on traditional CHD risk factors including obesity, elevated BP, dyslipidaemia , and diabetes[2,5,8-11]. These beneficial effects of

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RPA may have considerable public health implications in CHD prevention programmes. On the other hand, sedentary lifestyle is associated with several adverse health consequences , and increases the risk of chronic diseases such as CHD, type 2 diabetes mellitus (T2DM), cancer, osteoporosis and depression[12-18]. Physical inactivity is considered as an independent risk factor for CHD, and associated with low level of cardiorespiratory fitness, adverse LP, abnormal BP , vascular dysfunction and insulin resistance (IR).[13,14,19-21].

The aim of this present study was to correlate RPA with conventional cardiovascular (CV) risk factors.

SUBJECTS AND METHODS

One-hundred and sixteen male subjects were included in this prospective study. They were 56 physically active subjets 20-38 years of age , practicing regular moderate to vigrous PA with duration of more than 2 years. In addition, 60 , age- matched, physically inactive males were included, 17-43 years of age, living a sedentary lifestyle with no or little PA. The criterion for categorizing the subject as physically active when performing at least 30 minutes or more of moderate PA on most, or preferably all, days of the week[12]. All participants have no history of systemic diseases like T2DM or hypertension . Blood specimen were collected after 12 hours fasting. Determination of serum levels of total cholesterol(TC), high- density lipoprotein-cholesterol (HDL-C) and triglyceride (TG) were carried out enzymatically using kits from bioMerieux, France . All procedures were performed according to the instructions of the manufacturer. Quality control sera from bioMerieux were included in each assay batch for all analytes. The inter-assay coefficient of variation was 4.3% for TC, 4.6% for TG, and 4.1% for HDL-C. Low density lipoprotein- cholesterol (LDL-C) serum level was calculated using Friedewald

formula[22]: LDL- C = TC – (HDL – C + TG/5). Basal energy expenditure (BEE) was calculated using Harris and Benedict equation[23]:

BEE (Kcal/24h), (for males) = 66.473+ 13.752(W)+ 5.003(H) – 6.755(A)

Where: W = weight (kg), H = height (cm) and A = age (years).

Statistical analysis was performed Chi–square (X^2) and t- test. Correlation and regression analysis was carried out using SPSS programme. P < 0.05 was considered statistically significant.

RESULTS

The physiological and biochemical characteristics of physically active and sedentary persons are presented in Table 1. BMI, BEE, SBP and DBP were significantly lower among physically active people compared to sedentary ones (P<0.001). In addition, FBG, TG (P<0.001) and LDL-C (P<0.05) serum concentrations were significantly lower among physically active compared to sedentary people , whereas PA hours and HDL-C serum concentration were significantly higher among physically active compared to inactive males (P<0.001). On the other hand, serum TC level showed no significant differences between the two groups (P> 0.05). In addition, The frequency of cigarette smoking was significantly lower among physically active people (17.9%) in comparison to sedentary people (41.7%),(P<0.01).

Correlation and regression analysis revealed significant negative correlation of RPA with BMI (r: -0.414, P: 0.000), BEE (r: - 0.388, P: 0.000) SBP (r: -0.418, P: 0.000), DBP (r: - 0.439, P: 0.000)), FBG (r: -0.425, P: 0.000), TC (r -0.291, P: 0.002) , TG (r: -0.408, P: 0.000) ,LDL-C (r: -0.305, P: 0.001), and significant positive correlation with HDL -C (r :+0.430, P: 0.000).,Figs. 1-3.

DISCUSSION

Practically achievable input of RPA can have significant impact in counterating the low level of energy expenditure accompaying the modern lifestyle, and implicated as a risk factor for CHD , obesity and T2D [9,11,24,25].

With fast modernization all over the world and the employement of adverse lifestyle, most people are inadequately active or completely inactive[26-28]. This could , at least, partially explain the increasing prevalence of CVD elsewhere in the world[10,29,30].

The present study obviously demonstrated statistically significant correlations of RPA with a variety of modifiable CV risk factors. The significant positive correlation of RPA with HDL-C and the significant negative correlations with BMI, SBP, DBP, TC, TG, FBG and LDL-C are consistent with the observation of others[31-33]. These important correlations strongly support the favourable effects attributed to moderate RPA in reducing CHD risk, and also may have substantial implication in CHD prevention.

Moderate RPA seems indispensible preventive action in counteracting the CHD risk, not only because of it's inverse relationship with the CV risk, but also for it's crucial role in improving the other conventional CV risk factors notably BP, LP, glucose homeostasis and BMI[34-37] . In addition RPA is associated with remarkable improvement in insulin sensitivity[38] , and also causes a diversity of favourable changes in vascular function, notably increased nitric oxide production, decreased vascular aging, and regulation of endothelial function and vascular smooth muscle function[39,40]. It has been proposed that the cellular mechanisms contributing to endothelial dysfunction in CVD can be dealt with and repaired by signals associated with RPA[41]. This impact of PA on vascular endothelial function, nitric oxide production, and oxidative stress illustrate the substantial role of RPA prticipation in the prevention and management of CVD .

Interestingly, RPA improve not only the traditional CV risk factors, but, it has been shown that RPA produces a significant reduction in the levels of several inflammatory and thrombotic factors[2,42,43.] Thses variables are strongly implicated in the initiation and/or the progression of atherosclerotic CV disease and CHD[44-46]. An inflammatory background to atherosclerosis and CHD in now broadly accepted[47,48].

Regular leisure-time PA reduces the rate of CV mortality, independent of other CV risk factors[49]. Furthermore, regular physical training can improve the health of both adults and children. Among adults, RPA can reduce risk factors for chronic diseases such as CHD, hypertension, T2DM, colon cancer and depression, as well as all- cause- death rates[50]. Conversely, physical inactivity and low level of physical fitness represent an important precursor of premature mortality and morbidity from chronic disease[12,15].

In conclusion, a strong inverse relationship exists between RPA and CVD risk. Exercising moderate RPA is associated with a significant improvement in conventional CV risk factors, and remarkably minimizes the future risk of CVD as well as CV events.
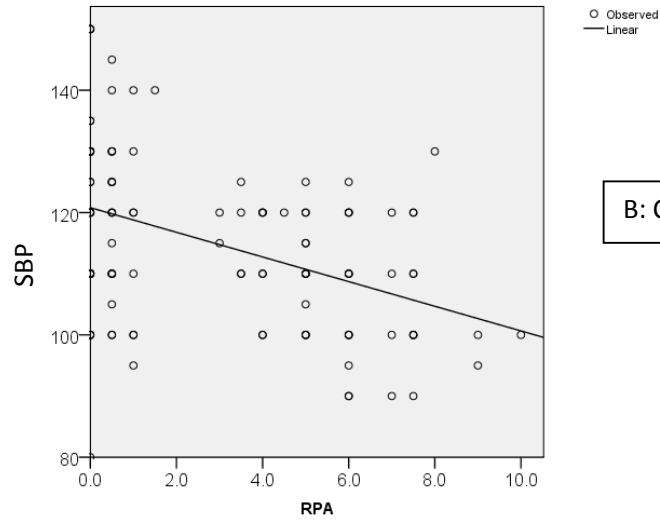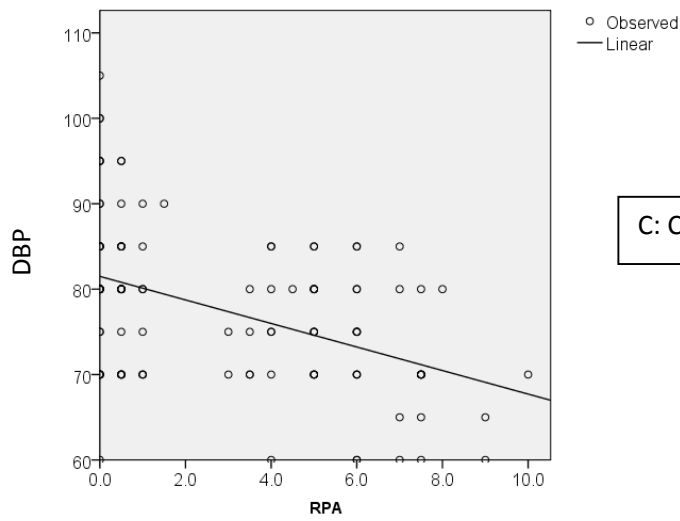
ACKNOWLEDGEMENTS

Regular Physical Activity: Correlation With Conventional Cardiovascular Risk Factors
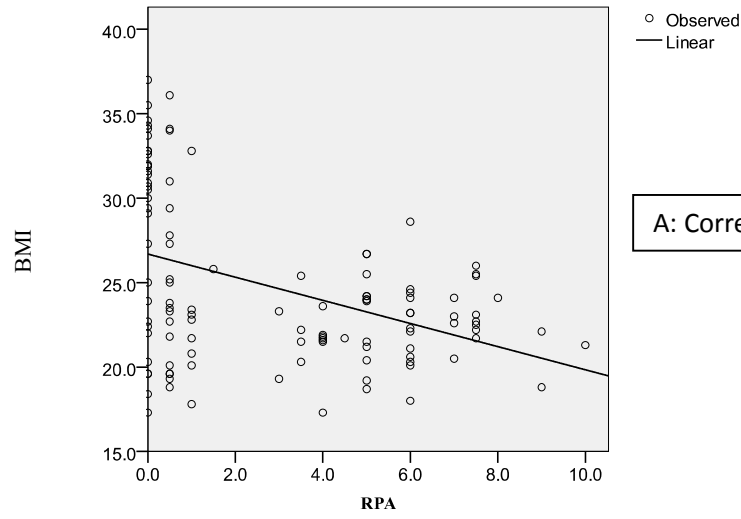
A: Correlation of RPA with BMI

B: Correlation of RPA with SBP

C: Correlation of RPA with DBP

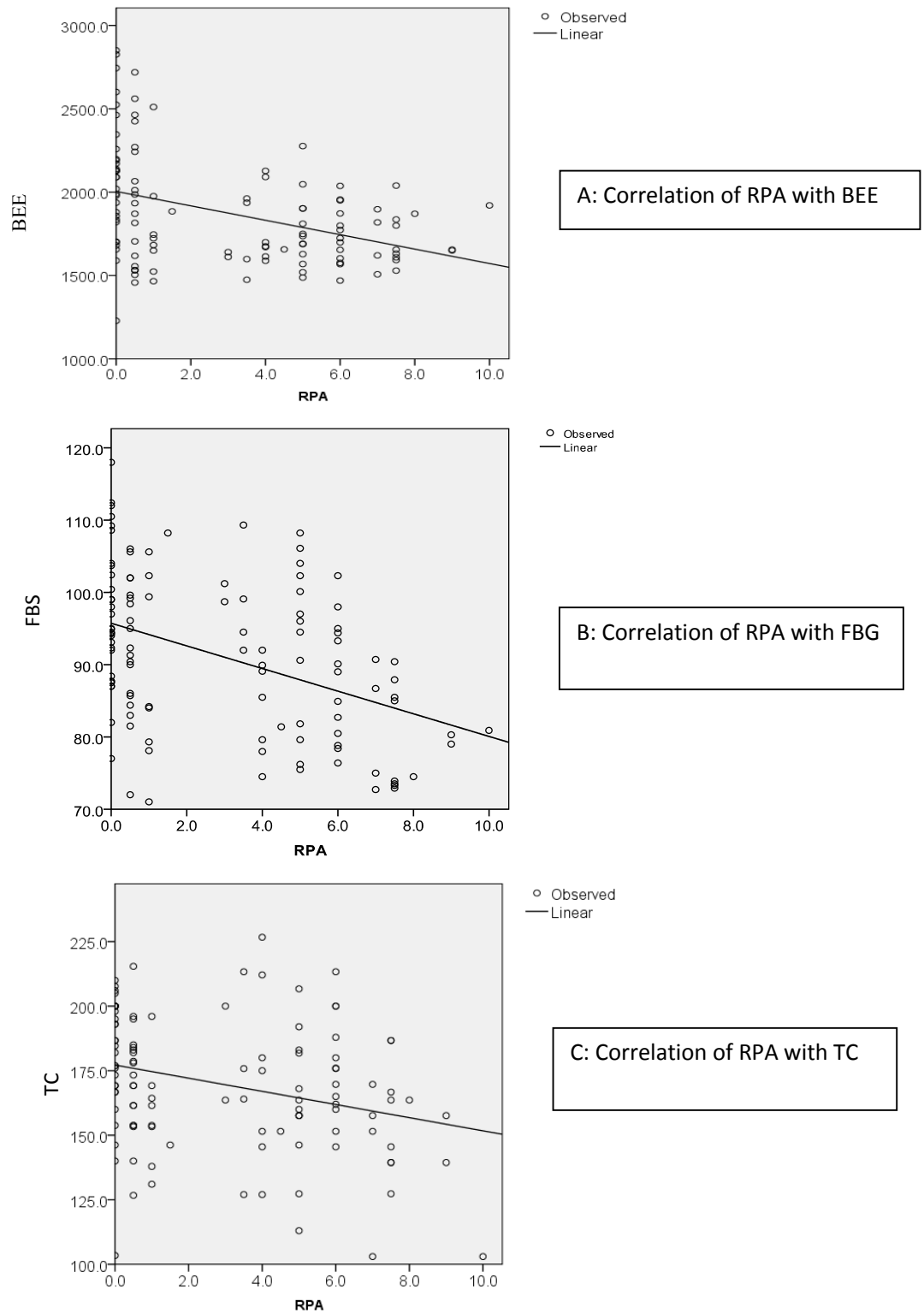Fig. 1 : Correlations of RPA with BMI, SBP and DBP

A: Correlation of RPA with BEE

B: Correlation of RPA with FBG

C: Correlation of RPA with TC

Fig. 2 : Correlations of RPA with BEE, FBG and TC

Regular Physical Activity: Correlation With Conventional Cardiovascular Risk Factors

A: Correlation of RPA with TG

B: Correlation of RPA with LDL-C
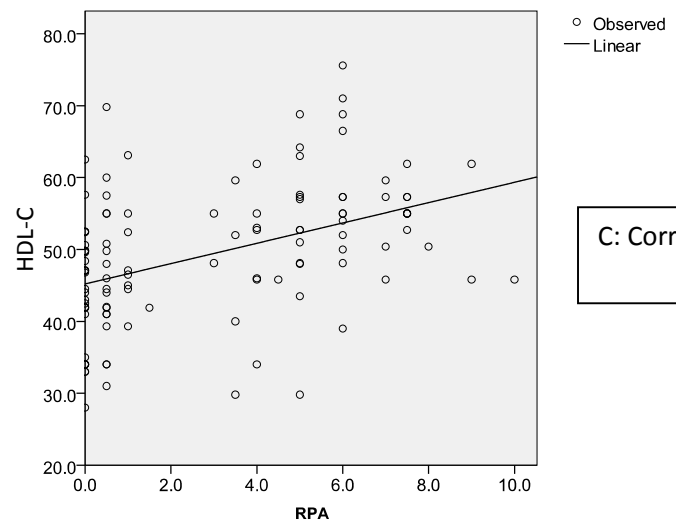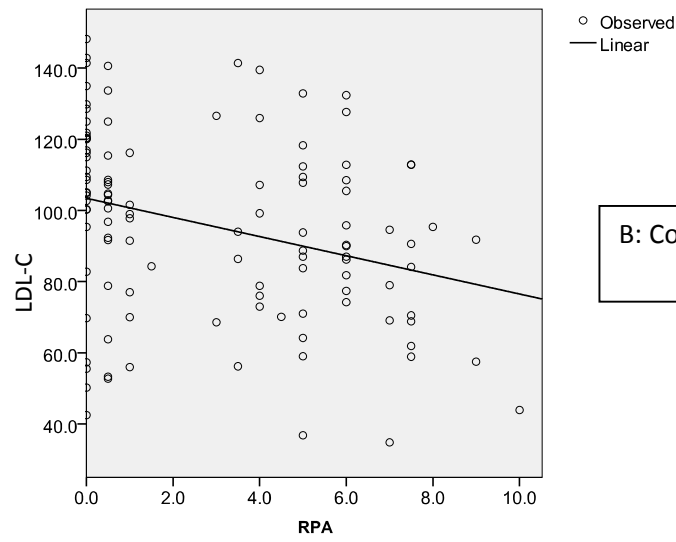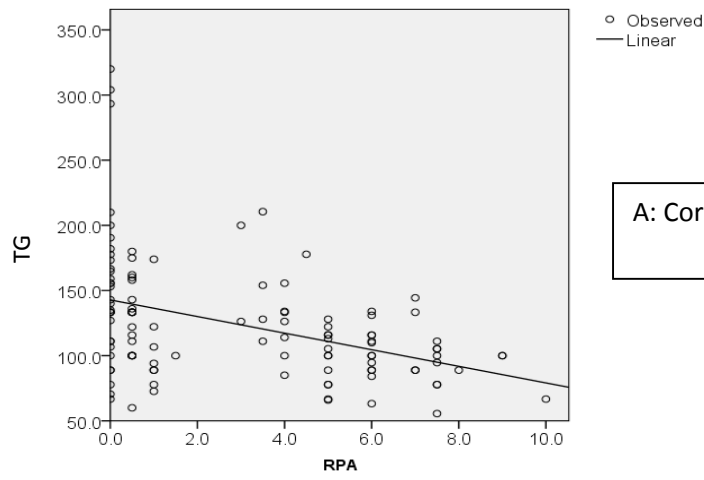
C: Correlation of RPA with HDL-C

Fig. 3 : Correlations of RPA with TG, LDL-C and HDL-C

Table 1. Physiological and biochemical characteristics of physically active and physically inactive subjects.

Parameter	Physically Inactive Subjects (n=60)	Physically Active Subjects (n=56)
Age (year)	25.8 (7.3)	23.8 (3.8)
BMI (kg/m2)	26.8 (5.7)***	22.5 (2.3)
BEE (Kcal/24))	2002.5 (377.9)***	1744.3 (183.9)
SBP (mm.Hg)	119.9 (15.2)***	109.4 (10.4)
DBP (mm.Hg)	81.0 (9.3)***	73.7 (7.4)
FBG (mg/dl)	94.7 (10.4)***	87.5 (10.2)
TC (mg/dl)	173.3 (25.2)	164.6 (27.1)
LDL-C (mg/dl)	100.3 (26.4)*	89.4 (25.1)
TG (mg/dl)	137.5 (52.9)***	109.1 (30.9)
HDL-C (mg/dl)	45.5 (8.6)***	53.4 (9.1)
PA (hours/week)	0.32 (0.39)***	5.7 (1.6)
Cigarette smoking	n=25 (41.7%)#	n=10 (17.9%)

Values are given in mean(SD) .
*: P < 0.05, ***: P < 0.001
#: X^2 = 7.81 (P<0.01)

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الفعالية البدنية المنتظمة: الترابط مع العوامل التقليدية القلبية الوعائية

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الخلاصة

الهدف: دراسة الترابط بين الفعالية البدنية المنتظمة والعوامل التقليدية القلبية الوعائية

الطريقة: شملت الدراسة ١١٦ من الذكور، ٥٦ من الفعالين بدنياً و٦٠ من غير الفعالين بدنياً. تم قياس معامل كتلة الجسم، معدل الايض الاساسي، ضغط الدم الأنقباضي و الانبساطي، سكر الدم، الكولسترول الكلي، الدهون الثلاثية، كولسترول البروتينات الدهنية واطئة الكثافة و كولسترول البروتينات الدهنية عالية الكثافة.

النتائج: وظهر هناك ترابط معنوي سالب بين الفعالية البدنية المنتظمة وكل من معامل كتلة الجسم ، معدل الايض الاساسي، ضغط الدم الأنقباضي و الانبساطي، سكر الدم، الكولسترول الكلي، الدهون الثلاثية، كولسترول البروتينات الدهنية واطئة الكثافة ، بينما ظهر هنلك ترابط معنوي موجب بين الفعالية البدنية المنتظمة وكولسترول البروتينات الدهنية عالية الكثافة.

الإستنتاجات: أظهرتهذه الدراسة وجود علاقة عكسية قوية بين الفعالية البدنية المنتظمة ومخاطر الإصابة بالأمراض القلبية الوعائية. لذلك فإن الممارسة المنتظمة للفعالية البدنية ذات المستوى المعتدل يعد أساسيا" للمحافظة على حياة طبيعية وتحسين الكفاءة القلبية الوعائية ،وبذلك التقليل بشكل كبير من المخاطر المستقبلية بالأمراض القلبية الوعائية و مضاعفاتها السريرية.

مفاتيح الكلمات: الفعالية البدنية المنتظمة، العوامل التقليدية القلبية الوعائية، مخاطر الإصابة بالأمراض القلبية الوعائية.

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