

The profile of physical activity and coronary risk factors in Monica Jakarta survey

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Abstrak

Untuk mengetahui gambaran aktifitas fisik harian (termasuk olahraga) dan pengaruhnya terhadap faktor risiko koroner telah dilakukan survei pada penduduk di tiga kecamatan wilayah DKI Jakarta Raya menggunakan kuisioner, pemeriksaan fisik, laboratorium dan rekaman EKG 12 hantaran. Dari kuisioner didapat data aktivitas fisik (beban kerja dan olah raga), dan kebiasaan merokok. Beban kerja dibagi atas ringan, sedang dan berat, sedangkan aktifitas olahraga dinilai teratur (≥ 2 kali perminggu), tidak teratur (≤ 1 kali), serta tidak ada kegiatan olahraga. Selain itu, dilakukan pemeriksaan tekanan darah (dengan penggolongan menurut kriteria WHO), kolesterol (hiperkolesterolemia > 200 mg%), dan EKG (memakai kode Minnesota). Analisis statistik mempergunakan perangkat SPSS. Dari 2400 orang terdapat 2073 (86,4%) responden yang terdiri dari 1086 wanita dan 987 laki-laki. Gambaran aktifitas fisik secara keseluruhan: 33,4% ringan, 50,7% sedang dan 15,8% berat. Berolahraga teratur 22,5%, tidak teratur 30,3% dan tidak berolahraga 47,2%. Olahraga yang dilakukan: jalan kaki 45,0%, senam 22,0%, jogging/lari 15,6%, bulu tangkis 6,5%, bola voli/sepakbola 4,1%, tenis 3,8% dan golf 0,1%. Prevalensi hipertensi secara bermakna lebih rendah pada orang dengan aktifitas fisik berat (12,0%) dibanding aktifitas sedang (44,8%) maupun ringan (43,2%) ($P < 0.003$), demikian pula prevalensi hiperkolesterolemia (13,2% : 50,8%) ($P < 0.0003$) dan merokok (19,7% : 44,1% : 36,2%) ($P < 0.00001$). Prevalensi kelainan EKG (infark lama atau iskhemia) lebih rendah pada yang teratur berolahraga (19,0%) dibanding yang tidak teratur (22,7%) atau sama sekali tidak berolahraga (58,3%) ($P < 0.05$). Dari penelitian ini ternyata jumlah penduduk dengan aktifitas cukup (termasuk olahraga yang teratur) masih rendah. Oleh karena itu, diperlukan promosi dalam upaya preventif mengatasi faktor risiko penyakit kardiovaskular. (*Med J Indones 2001; 10: 34-41*)

Abstract

A population study was done to know the profile of daily physical activity including sports, and its influence on major coronary risk factors in three districts of Jakarta using questionnaire, physical and laboratory examination, and 12 leads ECG. The questionnaire gave the data about physical activity (work load and sport), and smoking habit. Work load was divided into light, moderate and heavy. Sport activity was divided into regular (\geq twice a week, 20 minutes or more), irregular (\leq once or occasional), and no sport activity. In addition, blood pressure (hypertension was grouped according to WHO criteria), total cholesterol (regarded as hypercholesterolemia when > 200 mg%), and ECG were measured. ECG interpretation was done using Minnesota Code. Statistical analysis was done using SPSS. Out of 2400 people there were 2073 (86.4%) respondents that consist of 1086 females and 987 males. The profile of physical activity as a whole showed 33.4% light, 50.7% moderate and 15.8% heavy activity. Only 22.5% of respondents had sport regularly, while 30.3% had sport irregularly, and 47.2% had no sport activity. The type of sport was walking (45.0%), callisthenic (22.0%), jogging/running (15.6%), badminton (6.5%), volley ball/soccer (4.1%), tennis (3.8%), and golf (0.1%). There was a significant difference in the prevalence of hypertension between people with heavy (12.0%), moderate (44.8%) and light work load (43.2%) ($P < 0.003$), in the prevalence of hypercholesterolemia (13.2%: 50.8%: 36%) ($P < 0.0003$), and smoking (19.7%: 44.1%: 36.2%) ($P < 0.00001$), respectively. The difference also occurred in the prevalence of abnormal ECG (Q/QS, ST and T abnormalities) between people having regular sport (19.0%), irregular (22.7%), and no sport activity (58.3%) ($P < 0.05$). The number of respondents having enough physical activity (including regular sport) was relatively low. Therefore, promotion should be done as a preventive method to overcome cardiovascular risk factors. (*Med J Indones 2001; 10: 34-41*)

Keywords: Sport, ECG.

Physical inactivity has been known to be one of the coronary risk factors but reference data in Indonesia is very limited. Charles Darwin with his evolution theory "survival of the fittest" had shown us that the fittest or the strongest will survive or win, and gave us the idea about it.¹ From his study on bus driver and conductor,

Morris et al. reported for the first time that the prevalence of coronary heart disease was lower in bus conductor. His second study on postmen confirmed that coronary disease incidence was lower in physically active employee compared with inactive group.² Rose³ and Taylor, et al.⁴ also supported the result of Morris study base on their five years study on train workers.

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Paffenberger in his study on Longshoreman after 21 years confirmed that coronary disease incidence was

lower in men with heavy compared to those with light work load, both in morbidity and mortality. Survival rate was higher in men with heavy compared to those with moderate or light work load.⁵ The same result was reported by Paffenberger in his study on Harvard Alumni family. Coronary disease incidence was lower in alumnus who was physically active compared to those who was physically inactive. Minimal physically active was equal with walking 6 kilometers on flat surface or two-block distance, or with climbing two flights of stairs.

In the last decade, Coronary Heart Disease prevalence has decreased in the United States of America. This fact shows us that this decrease is correlated with increased daily physical activity including sport activity.⁶⁻⁹ In addition, no data showed that increased physical activity would increase morbidity or mortality due to coronary disease incidence, neither in healthy individual nor in coronary heart patient who performed cardiac rehabilitation program.⁶⁻⁹ To know the profile of physical activity including sport and its influence on coronary risk factors, we did a survey on the population of three districts of South Jakarta.¹¹⁻¹⁶

METHODS

The study was done on the population of Mampang Prapatan, Kebayoran Baru, and Cilandak located in South Jakarta from July 1988 to December 1988. In this study a complete questionnaire was used. In addition, physical examinations, 12-lead electrocardiograms and laboratory examinations were done. A multi stage cluster randomized sampling was done on 57,000 people, and at last 2073 respondents were included in the study. Their age range was 25-64 years, and they consisted of 1086 females and 987 males. Special physical activity questionnaire was used according to Monica Optional Study on Physical Activity, and physical activity was divided into work load and sport activity.

*Work load*⁸⁻¹⁰

Work load was divided into 3 categories :

Light work load

All kind of job, which is mostly done in sitting position (desk job) and causes no significant haemodynamic changes such as no increase in heart or respiration rate, or sweating, or equivalent with 3 - 5 METs/4-6 kcal/10 ml/kg/min, is considered as giving light work load.

Moderate work load

All kind of job which slightly increases heart and respiration rate, and sweating, or equivalent with 5 - 7 METs/6-8 k cal/25 ml/kg/min, is considered as giving moderate work load.

Heavy work load

Job which is mostly done using muscle strength such as laborer, and causes a significant increase in heart and respiration rate, and sweating, or equivalent to more than 7 METs/8 k cal/25 ml/kg/min, is considered as giving heavy work load.

To weigh the work load we use haemodynamic changes caused by respondents' occupation. Government employees who did desk job such as writing or doing administration were classified as having light work load. A tailor or a barber or women who served herself in her house were classified as having a moderate work load. A laborer or a farmer or a mechanics were classified as having heavy work load.

Sport activity

According to sport activity the respondents were divided into those who have a sport activity or not. If the respondents were engaged in sport activity, they were further divided into those having regular and irregular sport. They were regarded as having regular sport if sport was done twice a week for at least 20 minutes each or more, and they were regarded as having irregular sport, if it was done once a week or occasionally. In addition, each sport activity was stated, such as calisthenics, walking, jogging, running, badminton, soccer, volleyball, golf, martial art, and others.

Coronary risk factor included in this study was hypertension (the blood pressure was grouped according to WHO criteria), hypercholesterolemia (the respondents were regarded as having hypercholesterolemia if their cholesterol levels were >200 mg%), and smoking. Electrocardiogram was evaluated according to Minnesota code.¹⁷⁻¹⁹ Statistical analysis was performed using computer SPSS package.

RESULTS

Work load

The distribution of respondents based on occupation and sex is shown in Table 1.

Table 1. Distribution of respondents based on occupation and sex

Oc	Male	Female	Total
GE	202 (20.5%)	68 (6.3%)	270 (13%)
P	332 (33.6%)	50 (4.6%)	382 (18.4%)
M	127 (12.9%)	70 (6.5%)	197 (9.5%)
B	122 (12.4%)	58 (5.3%)	180 (8.7%)
R	85 (8.5%)	7 (0.6%)	91 (4.4%)
F	28 (2.8%)	4 (0.4%)	32 (1.5%)
S	16 (1.6%)	5 (0.5%)	21 (1.0%)
H	4 (0.4%)	795 (73.3%)	799 (38.6%)
J	72 (7.3%)	28 (2.6%)	100 (4.8%)
Total	987 (100%)	1085 (100%)	2072 (100%)

Oc=Occupation, GE=Government employee; P=Private, M= Merchant-diser, B= Businessman, R= Retired, F= Farmer, S= Student, H= Housekeeping, J=Jobless

Based on gender difference, men have both more variable and heavy job (with the exception of housekeeping) compared to women.

Based on gender difference it is apparent that there were more men working for each type of job compared to women. The same was true for those that did not work, with the exception of housekeeping. However, there were also men who did housekeeping.

Men who were not working were 7.3%, while women were only 2.6%, it seems that women are easier to get jobs than men, although most women had housekeeping job.

As a whole, based on work load, about 33.4%, 50.7% and 15.8% of the respondents had light, moderate and heavy job respectively (Figure 1).

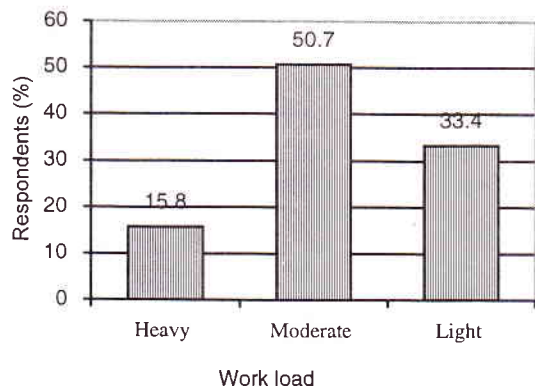


Figure 1. Distribution of respondents based on work load (n=2071)

Sport activity

About 22.5%, 30.3%, and 47.2% of respondents did regular, irregular and no sport activity, respectively (Figure 2).

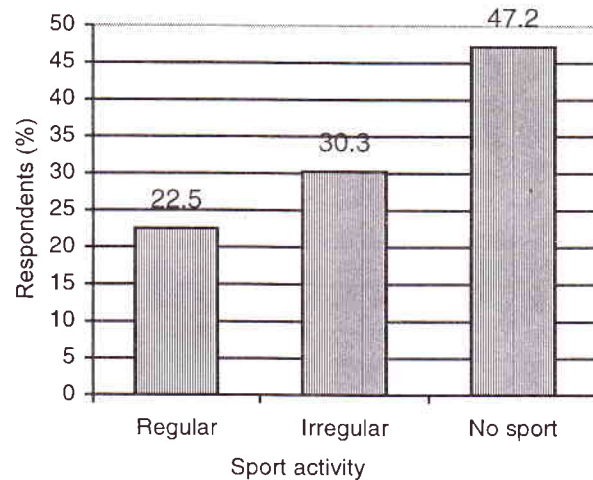


Figure 2. Distribution of respondents based on sport activity (n=2071)

The type of sport done was shown in Figure 3. Based on sex difference, more men do regular and irregular sport compared to women (Figure 4).

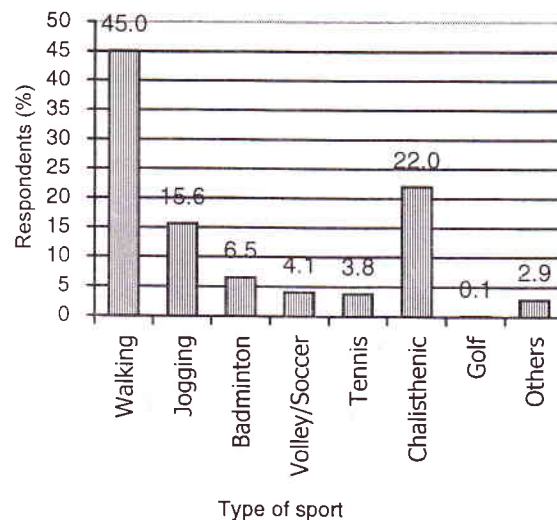


Figure 3. Distribution of respondents based on type of sport (n=1087)

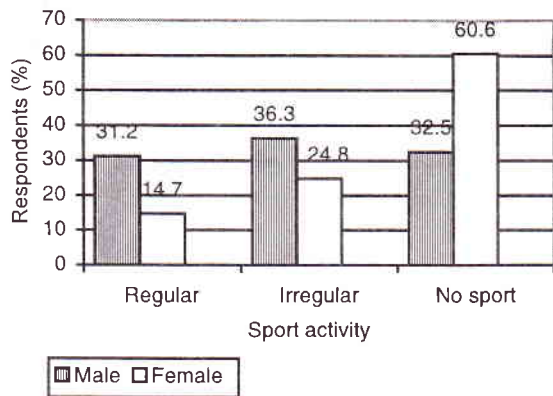


Figure 4. Distribution of respondents based on sport activity and sex (n=2071)

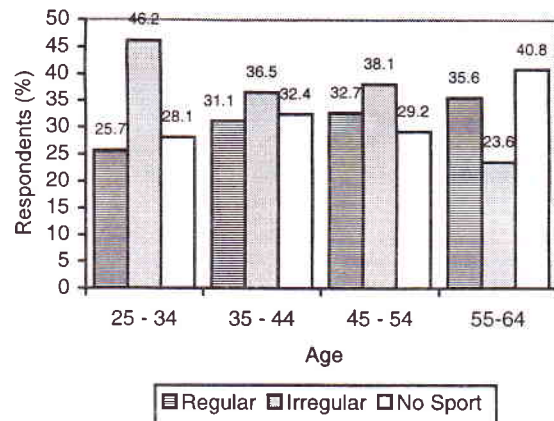


Figure 5. Distribution of respondents based on regular activity correlated with age in male (n=986)

Calisthenics was mostly done by women, but jogging/running, badminton, volley ball/soccer, and tennis were mostly done by men (Table 2).

Table 2. Distribution of respondent base on type of sport and sex

TS	Male	Female	Total
W	275 (4.1%)	214 (50.2%)	489 (45.0%)
JR	138 (20.9%)	32 (7.5%)	170 (15.6%)
C	93 (14.1%)	146 (34.3%)	239 (22.0%)
B	59 (8.9%)	12 (2.8%)	71 (6.5%)
V	36 (5.4%)	9 (2.1%)	45 (4.1%)
T	35 (5.3%)	6 (1.4%)	41 (3.8%)
G	-	1 (0.2%)	1 (0.1%)
O	25 (3.8%)	6 (1.4%)	31 (2.9%)
Total	661 (100%)	426 (100%)	1087 (100%)

TS=Type of Sport, W=Walking, JR=Jogging/Running, C=Calisthenics, B=Badminton, VS=Volley/Soccer, T=Tennis, G=Golf, O=Others

Regular sport activity of male respondents increased with age, but in female these was no change in regular sport activity (Figure 5 and 6).

Correlation between physical activities and risk factors

Correlation between work load and smoking

Smoking habit was correlated with work load. Respondents who smoked regularly tended to have lighter work load (Figure 7).

Statistical analysis showed significance difference ($P < 0.00001$) in the percentage of respondents having heavy, moderate and light work load among smokers (Figure 7).

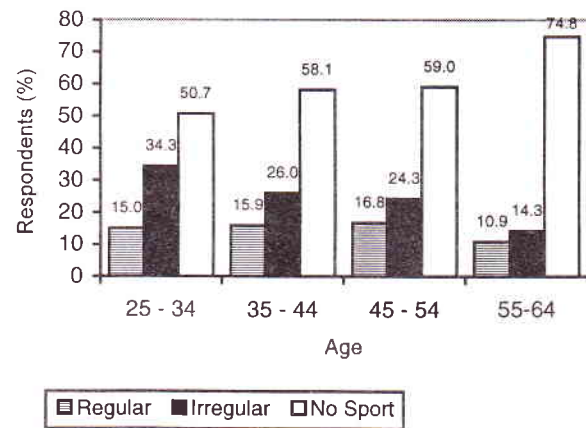


Figure 6. Distribution of respondents based on regular activity correlated with age in female (n=1085)

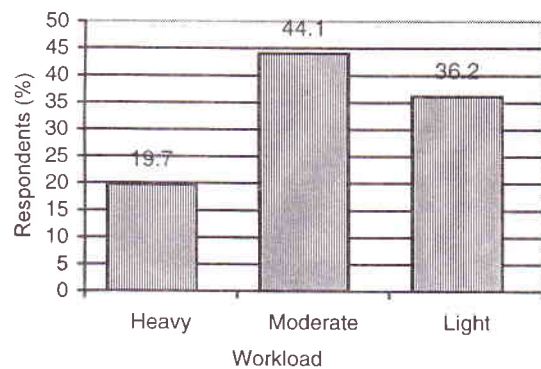


Figure 7. Distribution of respondents based on work load among regular smokers

Calisthenics

Respondents who did calisthenics exercise regularly, 45.6%, 47.7%, and 6.7% of them had light, moderate, and heavy work load, respectively.

Tennis

Respondents who did tennis, 56.1%, 39%, and 4.9% of them had light, moderate, and heavy work load, respectively.

Badminton

Respondents who did badminton, 39.4%, 40.8%, and 19.7% of them had light, moderate, and heavy work load, respectively.

Volley and soccer

Respondents who played volley and soccer, 37.8%, 46.7%, and 15.6% of them had light, moderate, and heavy work load, respectively.

Golf

Unfortunately only 1 woman played golf and she had light work load.

As a whole, between the various kind of sports there were significant differences in the percentage of respondents having light, moderate, and heavy work load ($P < 0.0035$).

Correlation between sport activity and abnormal ECG

Among the respondents, 211 had abnormal ECG according to Minnesota Code (Q/QS, ST and T).

Q/QS was observed in 17 respondents who had sport regularly, 12 respondents who had sport irregularly, and 30 respondents who had no sport activity.

ST was observed in 15 respondents who had sport regularly, 17 respondents who had sport irregularly, and 31 respondents who had no sport activity.

T was observed in 8 respondents who had sport regularly, 19 respondents who had sport irregularly, and 42 respondents who had no sport activity.

This study showed that sport activity had a protective effect (less abnormal ECG), and statistical analysis showed a significant difference between respondents having regular, irregular and no sport activity in the occurrence of abnormal ECG ($P < 0.05$) (Figure 11).

DISCUSSION

Until recently, common coronary risk factors, i.e. hypertension, hyperlipidemia, diabetes mellitus, smoking,

obesity, and stress are well studied in Indonesia as well as abroad. However, physical activity was neglected.

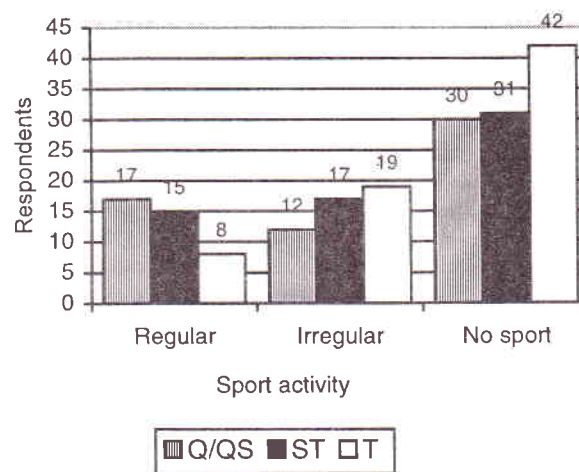


Figure 11. Correlation between sport activity and abnormal ECG (n=211)

This study showed that physical activity including sport had a good effect on coronary risk factors.

The profile of work load as a whole was 33.4% light, 50.7% moderate, and 15.8% heavy. The population in metropolitan city had more light and moderate work load. According to gender, more male had heavy work load than female (17.3% : 14.3%), and more female had light or moderate work load than men.

The prevalence of respondents who had regular sport was only 22.5%, while 30.3% had irregular and 47.2% had no sport activity. It means that physical inactivity occurred in a high percentage of the population. From this data we have to encourage the people to exercise more regularly.

In this study, there was a significance difference in the prevalence of hypertension in people who had heavy work load (12.0%) compared with moderate (44.8%) and light work load (43.2%) ($P < 0.003$).

In various studies, physical activity have shown to reduce overweight, maintain body weight, reduce peripheral resistance and decrease blood pressure.

There was a significant difference in the prevalence of hypercholesterolemia in respondents who had heavy work load (13.2%) compared with moderate (50.8%) and light work load (36.0%) ($P < 0.0003$). Physical

activity increases metabolism as a whole including lipid metabolism, and decrease cholesterol level.

Also there was a significant difference in the prevalence of smoking in people who had heavy work load (19.7%) compared with moderate (44.1%) and light (36.2%) work load ($P < 0.00001$). It was surprising that heavy job decreased the prevalence of smoking; it seemed that people with light work load had more opportunity to smoke compared with those with heavy work load.

In addition, in this study, sport activity had a protective effect against the occurrence of abnormal ECG. Recent data have shown that regular sport will enhance endothelial function and prevent atherosclerotic process.²⁰⁻²²

This study revealed that heavy physical activity and regular sport reduced the prevalence of hypertension, hypercholesterolemia, smoking, and abnormal ECG. This study supports the result of Morris and Paffenberger. Heavy physical activity and regular sport reduced coronary heart disease prevalence through decreasing coronary risk factors.

The prevalence of population who had heavy work load was 15.8 %, and who did regular sport was 22.5%, this means that only 38.3 % of the population had enough physical activity, so we have to encourage the other 61.7% to change their daily activity by working hard or doing regular sport.

Regular walking should be introduced widely since childhood, because it is very easy and cheap, and the government should increase the sidewalks for people to walk, and forbid the use of side walks by street vendors.

From the different kinds of sports, walking, jogging/running, and calisthenics, which are inexpensive and easy to do, are the most popular. What is needed is the encouragement to be more physically active and do regular sports for those with light to moderate work load. For those who have heavy work load, sport is not a must, but if needed they can do light sport such as calisthenics.

The government's campaign for the community to motivate them to do sport with the motto: "no day without sport" should perhaps be added to "regular and continuous sport." Another campaign should also be added: "run if you can, or at least walk, and if it is not possible, then do calisthenics."

In conclusion, the number of respondents engaged in physical activity including sport was low. Heavy physical activity and regular sport were related to less prevalence of hypertension, hypercholesterolemia and abnormal ECG.

Physical activity including sport should be promoted especially those that are inexpensive and relatively easy, such as calisthenics, walking, jogging and running

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