

The Effect of Different Physical Activity Levels on Chronic Diseases among Middle-Aged Faculty in Local Universities

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Abstract. Objective: to Explore Effects of Different Physical Activity Levels on the Risk of Chronic Disease among Middle-Aged Teachers in Local Universities, and to Provide Empirical Reference for the Intervention of Physical Activity in Chronic Disease among Middle-Aged Teachers and the Improvement of Quality of Life. Methods :a Total of 103 Effective Data Were Measured, Aged From45 to 59,the International Physical Activity (Pa)Questionnaire Was Adopted to Define the Levels of Pa, High Physical Activity Level Group(Hg, n=19),Moderate Physical Activity Level Group(Mg, n=47),Low Physical Activity Level Group(Lg, n=37).the Indexes of Common Cardiovascular Diseases Such as Osteoporosis and Arteriosclerosis Were Tested,One-Way Anova Was Used to Investigate the Effects of Different Levels of Pa on Indicators of Chronic Diseases among This Group, Correlation Analysis between Osteoporosis Disease Risk Factors and Pa Was Analyzed by Spearman Correlation, Using Spss19.0 Software, and the Significance Level Was $P<0.05$, $P<0.01$.Results :(1)the Proportion of Normal Bone Mass in Group m Was 57.4%, Followed by 52.6% in Group h and 43.2% in Group l. the t-Value of Bone Mineral Density in Group h and m Was Significantly Higher Than in Group l ($P<0.01$), While That in Group m Was Significantly Higher Than That in Group h ($P<0.05$).(2)There Was No Significant Effect on Blood Pressure in Different Physical Activity Level Groups, Hd Lin Group m and h Was Significantly Higher Than That in Group l ($P\leq 0.01$), and Ldl in Group m Was Significantly Lower Than That in Group l ($P\leq 0.01$). There Was No Significant Difference in Hdl \ Ldl between Group m and h. Conclusions:(1)People of Low Pa Level Are Vulnerable to Osteoporosis, Cardiovascular Disease and Other Chronic Diseases.(2)Moderate Pa Level is the Best Choice for Maintaining Normal Bone Mass and Improving Indicators of Cardiovascular Chronic Disease.(3)High Level of Pa Has a Certain Improvement Effect on Bone Mass and Cardiovascular Disease in Middle-Aged People, But the Effect is Not as Good as the Moderate Level of Physical Activity.

KEYWORDS: Physical Activity (Pa), Local Universities, Middle-Aged Teachers, Osteoporosis, Cardiovascular Chronic Disease

1. Introduction

Chronic Diseases Have Gradually Become a Major Threat to Human Health^[1].the High-Knowledge Group Represented by Teachers Mainly Has a Work and Life Style of “Sedentary “, Which with High Incidence of Obesity, Diabetes, Cardiovascular Disease and Other Chronic Diseases^[2],Local Universities Are in the Critical Period of Transformation and Development, Due to the Pressure of Scientific Research, Teaching and Meeting the Work Demands of Evaluation and Professional Certification At All Levels, Overtime and Staying Up Late Are Becoming More and More Common. What is the Pa Level of This Group and Whether the Incidence of Chronic Diseases is Higher Are More Worthy of Attention than the Faculty of Universities That Have Been Established and Matured. Studies Have Shown That Lack of Pa is Closely Related to the Occurrence of Chronic Diseases^[3].

In 2019, the State Council Issued the ‘Opinions on Implementing Healthy China action’, Noting That It Should Focus on Key Groups Such as Workers and the Elderly, Strengthen Prevention and Control of Chronic Diseases Such as Cardiovascular Diseases^[4].in This Context, It is of Great Theoretical and Practical Significance to Study the Pa in the Daily Life of Middle-Aged People, and to Provide Empirical Evidence for the Formulation of More Scientific Exercise Prescription for Middle-Aged People in View of Its Impact on Chronic Diseases Such as Osteoporosis and Atherosclerosis.

2. Research Objects and Methods

2.1 Objects

A Total of 108 Teachers Aged 45to 59 from a Local University in Guizhou Were Randomly Selected. among Them, All the Subjects for Physiological Index Test Came from the Subjects in the Previous Questionnaire Survey, among Which Those with Heart Disease and Major Genetic Diseases Screened out in the Questionnaire Were Removed, and They Became the Official Subjects after Obtaining the Consent of the Subjects and Signing the Informed Consent of the Subjects and Being Tested.2 Invalid Questionnaires Were Removed, and There Were 3 Cases of Disease Samples. the Final Effective Samples Were 103 Cases, with an Average Age of (52.1±8.2) Years.

2.2 Methods

2.2.1 Questionnaire Method

The “International Physical Activity Questionnaire “Was Used to Define the Pa Level of the Subjects. the Form of the Questionnaire Was a Retrospective Questionnaire of “7 Days of Pa”, Which Included Daily Work, Daily Life, Daily

Traffic, Physical Exercise and Leisure Activities.

Objects were divided into three levels, of which High level PA(Hg) was defined as no less than 3 days /week of vigorous activity, and the cumulative weekly activity was no less than 1500met-min /week. Moderate PA(Mg) was defined as intense activity of not less than 3 days per week, not less than 20 minutes per session, or moderate intensity activity of not less than 600 met-min /week of not less than 30 minutes per day, not less than 5 days per week. Low PA(Lg) was defined as a state of physical activity that cannot meet the above two criteria^[5-6]. The reliability and validity of the questionnaire have been fully tested in the elderly population in China^[7].

According to the results of the questionnaire, the subjects were divided into three groups, namely Hg, n=19; Mg, n=47; Lg, n=37.

2.2.2 Experimentation

Osteoporosis (bone mineral density T), blood pressure (systolic/diastolic), atherosclerosis risk (high/low density lipoprotein), and other indicators were tested in MeiNian health-100 management co., LTD.

2.2.3 Mathematical Statistics

The data was input in excel, and after the logical test, SPSS19.0 software was used for statistical analysis, and the statistical results were expressed as $X \pm S$. One-way anova was used to investigate the effects of different levels of PA on indicators of chronic diseases among this group, Correlation analysis between osteoporosis disease risk factors and PA was analyzed by spearman correlation and the significance level was $P < 0.05$, $P < 0.01$.

3. Results

3.1 Effects of Different Levels of Pa on the Risk of Osteoporosis in Middle-Aged Teachers

Bone density decline is the most influential factor for osteoporosis risk, and it is an important basis for predicting fracture risk. In medicine. Bone status is usually evaluated by T value, When it between -1 and 1, bone mass is normal; when T value is below -1, bone mass is decreased.

3.1.1 Comparison of Different Pa Levels to Bone Mineral Density

As shown in table 1, the bone mass of middle-aged teachers in different PA level groups was different. The proportion of normal bone mass in group M was the highest, up to 57.4%, followed by that in group H, up to 52.6%. The normal proportion of bone mass in group L was 43.2%. The results of one-way anova showed that among the middle-aged faculty and staff, the mean bone mineral density

T value of group H and group M was higher than that of group L within the normal range and showed a significant difference ($P < 0.01$). When comparing group M with group H, the bone mineral density T value of group M was closer to the good state range and significantly higher than that of group H ($P < 0.05$).

Table 1 Comparison of Bone Mineral Density with Different Physical Activities

Group	Indicator		
	Bone mass normal (number, percentage)	Osteopenia (number, percentage)	BMDT-value
Hg(n=19)	10(52.6%)	9(47.4%)	-0.84±0.15 ^{##}
Mg(n=47)	27(57.4%)	20(42.6%)	-0.42±0.28 ^{**/#}
Lg(n=37)	16(43.2%)	21(56.8%)	-1.42±0.45

Note: ^{**}Indicates a very significant difference compared with group L, $P < 0.01$;

[#] Indicates a significant difference between group M and group H, $P < 0.05$.

3.1.2 Correlation between Pa Level and Bone Mineral Density

As shown in table 2, PA was positively correlated with BMD T-value, and there was a significant correlation ($R = 0.649$, $P < 0.01$). High intensity of physical activity is likely to cause severe joint wear and tear, resulting in other bone diseases that affect life. Moderate physical activity can effectively promote T value and improve bone structure.

Table 2 Correlation between Pa and Bone Mineral Density

		PA	BMD T
	correlation coefficient	1.000	0.649
PA	Sig (bilateral)		0.000 ^{**}
	n	103	103

Note: ^{**}Indicates significant correlation at the level of 0.01 (bilateral).

3.2 Effects of Different Levels of Pa on the Risk of Cardiovascular Chronic Disease

The results of arteriosclerosis test include: decreased vascular elasticity, moderately decreased vascular elasticity, slightly weakened vascular elasticity, decreased vascular elasticity trend, and your vascular elasticity is good compared with the healthy people of the same age. Where the data processing, the data is divided into two parts, normal and abnormal, As shown in table 3, The risk of atherosclerosis was higher in group L, and there was no significant difference between group H and group M.

Table 3 Blood Pressure At Different Pa Levels

Group	Abnormal	The proportion
Hg(n=19)	3	15.7%
Mg(n=47)	7	14.8%
Lg(n=37)	8	21.6%

3.2.1 The Comparison of Blood Pressure At Different Pa Levels

As shown in table 4, there is no significant effect of PA on blood pressure.

Table 4 The comparison of blood pressure at different PA levels		
Group	Systolic blood pressure(mmHg)	Diastolic blood pressure (mmHg)
Hg(n=19)	125.16+17.11	84.21+15.19
Mg(n=47)	121.36+13.62	80.57+10.45
Lg(n=37)	120.62+16.03	78.97+11.34

3.2.2 The Comparison of High/Low Density Lipoprotein At Different Pa Levels

High density lipoprotein (HDL) of the body can be transported to the body organs, to improve the body immunity, prevent the occurrence of hardening of the arteries, and low density lipoprotein (LDL) is a kind of carrier of cholesterol into peripheral tissue lipoprotein particles, when the low density lipoprotein, excessive, it carries cholesterol accumulation in arterial walls, for a long time easy to cause hardening of the arteries.

As shown in table 5, In terms of HDL, both group M and group H are significantly higher than group L ($P \leq 0.01$), while there is no significant difference between group M and H, indicating that PA can reduce the risk of atherosclerosis. In terms of LDL, there is no significant difference between group M and H, and group M was significantly lower than group L ($P \leq 0.01$), indicating that appropriate moderate physical activity has a more benign effect on the risk of atherosclerosis. However, further studies are needed to reveal the difference between high intensity and moderate intensity on HDL/ LDL.

Table 5 the Comparison Of Hdl/Ldl At Different Pa Levels

Group	HDL	LDL
Hg(n=19)	1.54+0.2**	2.48+0.43
Mg(n=47)	1.71+0.06**	2.35+0.32**
Lg(n=37)	1.25+0.32	2.65+0.3

Note: ** Indicates that compared with group L, there is a very significant difference, $P < 0.01$

4. Discussion

4.1 Effects of Different Pa Levels on the Risk of Osteoporosis in Middle-Aged Teachers of Local Universities

Osteoporosis risk is an important factor leading to bone disease and an important basis for predicting fracture risk. Bone status is usually evaluated by the BMDT. When the T-value is between -1 and 1, bone mass is normal; when the T-value is below -1, bone mass is decreased, with the risk of osteoporosis. research by Lin Yipeng reveals that Physical activity level has a significant impact on bone mineral density in menopausal women, with a lower probability of abnormal bone mineral density at medium and high physical activity levels, and a positive correlation between physical activity level and bone mineral density level ($r=0.37, P<0.01$). Physical activity deficiency is more likely to lead to bone mineral density reduction, increasing the incidence of osteoporosis^[8]. Sun yao et al. found that physical activity has a significant correlation with rheumatoid arthritis in the elderly, and total physical activity and self-efficacy have a significant impact on physical function ($P<0.05$). Scientific and appropriate physical activity can improve the risk of rheumatoid arthritis in the elderly and improve their quality of life^[9]. According to the results of this study, physical activity is positively correlated with bone mineral density ($R=0.649, P<0.01$), indicating that physical activity can increase bone T value, improve bone state and reduce the risk of osteoporosis, which is also consistent with the results of mainstream studies in this period.

In terms of the impact of physical activity intensity on health benefits, li yingying et al. found that the time, intensity and frequency of physical activity could improve the physical conditions of elderly diabetic patients^[10]. Li Xiandu et al. found that physical activity can enrich the quantity of muscle fibers and increase the body area, and the level of physical activity is positively correlated with the delay of muscle decay. Physical activity of a certain intensity has a significant effect on improving skeletal muscle mass in the elderly^[11]. Kong Cunqing etc. through the investigation of female college students' physical activity levels and bone mineral density in southeast Asia association study found that the level of physical activity on bone to its bone quality T Z values have obvious effect, different physical activity level, high strength and physical activity levels have significant difference effect on bone mineral density of college students, can effectively improve bone mineral density^[12]. Notable is, this study reveals that moderate levels of PA on bone mass effect is better than that of the high level of PA. It can be concluded that moderate activity which not less than 3 days a week, every time not less than 20 min acuteness activity, or not less than five days a week, no less than 30 min a day of not less than 600 met - min/week can bring better health to middle age. It also suggests we should pay attention to sports, sports load and intensity, high level of physical activity would not necessarily bring middle-aged people are better are positive health benefits, scientific and moderate physical activity of moderate intensity to improve the content of bone density, and improve the bone structure, reduce the risk of osteoporosis and other bone disease is very important.

4.2 Effects of Different Pa Levels on the Risk of Cardiovascular Chronic Disease in Middle-Aged and Elderly People of Local Universities

With the improvement of living standards, the prevalence of cardiovascular diseases is increasing all over the world. Current studies reveal that the prevalence of cardiovascular diseases in China is not only increasing rapidly, but also tends to be younger^[13], There is growing evidence that physical activity is negatively correlated with the risk of cardiovascular disease/coronary heart disease and hypertension^[14], So there is a growing body of research on the effects of physical activity levels on the risk of CVD in middle-aged people.

This study reveals that middle aged and elderly teachers in universities with low physical activity level had a more significant effect on atherosclerosis, and moderate physical activity and appropriate physical activity had a better effect on atherosclerosis. Although different levels of PA had no significant effect on blood pressure in this study, moderate and high levels of physical activity significantly increased HDL, and moderate levels of physical activity effectively controlled the abnormal rise of LDL, especially the best level of physical activity. Physical activity levels are important for the prevention and mitigation of slow-moving disease, and are consistent with recent ACSM-AHA updates on physical activity and the recommended levels of activity^[15].

5. Conclusions and Suggestions

1) People of Low Pa Level Are Vulnerable to Osteoporosis, Cardiovascular Disease and Other Chronic Diseases.

2) Moderate Pa Level is the Best Choice for Maintaining Normal Bone Mass and Improving Indicators of Cardiovascular Chronic Disease.

3) High level of PA has a certain improvement effect on bone mass and cardiovascular disease in middle-aged people, but the effect is not as good as the moderate level of physical activity. Long-term high intensity physical activity is not recommended for most middle-aged people.

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