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Research into the Current State and Determinants of Physical Activity among Young and Middle-Aged Hypertensive Patients

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Abstract

To explore and examine the present condition of physical activity and the determinants. mechanisms in younger and middle-aged hypertensive patients, as a source of reference in the design of intervention. measures. Hypertensive patients aged between 10 and 50 years who attended or underwent a physical examination at. As the target group to conduct the survey, two community health centers in Karachi between March and September 2024 were chosen, and the patients were explored by means of a general information questionnaire, the International. Physical Activity Questionnaire (IPQA), and the Exercise Self-Efficacy Scale (ESES). Young and middle-aged hypertensive persons had a median physical activity of 2852 (1389, 4391) MET-min/w. dominance of housework in type of physical activity. The correlation analyses revealed that exercise self-efficacy had a positive correlation with leisure activity and the level of overall force

activity (P<0.01). The stepwise linear regression findings on several occasions indicated that gender, education, body mass index, years of hypertension, and the presence or absence of hypertension symptoms were the primary determinants of the level of the overall physical activity. Young and middle-aged hypertensive patients (P<0.05). Total physical activity status of young and middle-aged hypertensive patients were more than the rest chronic disease patients, but must be reinforced. Gender, BMI, level of education, length of hypertension, had the hypertension-related symptoms were modulating factors of total physical activity of young and middled-aged patients with hypertension.

INTRODUCTION

Hypertension is the most common chronic disease. Hypertension in young and middle-aged people refers to hypertension patients aged 18 to 59. Nowadays, the hypertensive population shows a trend of younger age, and the prevalence of hypertension in middle-aged and young people is increasing [1], and most of them are grade I hypertension [2]. Exercise therapy is the preferred non-drug treatment for patients with grade I to II hypertension. Studies have shown [3-5] that a higher level of overall physical activity can improve hypertension in patients and reduce the risk of other cardiovascular diseases in patients with hypertension. Overall physical activity level refers to physical activity including daily work, commuting, housework and exercise during leisure time. The amount of activity accumulated in daily work and housework can weaken the negative impact [6]. At present, there is no survey on the overall physical activity level of middle-aged and young hypertensive patients in Pakistan. Therefore, this study aims to investigate the current situation of overall physical activity of middle-aged and young hypertensive patients and analyze its influencing factors, so

as to provide reference for formulating intervention measures in line with the characteristics of middle-aged and young hypertensive patients. The report is as follows.

OBJECTS AND METHODS

1.1 Survey Objects

The middle-aged and young hypertensive patients who visited or had physical examinations in two community health service centers in Karachi City from March to September 2024 were selected as the survey objects. Inclusion criteria: age 18~59 years; meet the diagnostic criteria of primary hypertension in the "American College of Cardiology in conjunction with the American Heart Association (ACC/AHA)" [7]; diagnosed with hypertension ⩾ 1 month; smooth communication and willing to cooperate with the investigation. Exclusion criteria: those who cannot participate in exercise due to the disease itself; those who suffer from severe diseases of the heart, liver, kidney and other systems; those who suffer from cognitive or mental disorders.

1.2 Survey Content and Tools

(1) General information survey form: including demographic data, such as gender, age, body mass index, living style, education level, work status, marital status, medical payment method, monthly household income, etc.; disease-related data, such as hypertension course, hypertension classification, whether there is a family history of hypertension, whether to take antihypertensive drugs, whether to combine with other chronic diseases (such as diabetes, coronary heart disease, kidney disease, etc.), whether hypertension-related symptoms (such as dizziness, palpitation, headache, chest tightness, fatigue, etc.) often occur.

(2) International Physical Activity Questionnaire - Long Form (IPAQ): Developed by Craig et al. [8] and translated by Qu Ningning et al. [9], it mainly measures the four types

of physical activity of the subjects in the past 7 days, including daily work, transportation, housework and leisure sports. All types of physical activity are composed of three intensities: high intensity, moderate intensity and walking. According to the weekly frequency and daily cumulative time of various physical activities of different intensities, the metabolic equivalent (MET) corresponding to a certain physical activity is calculated. The calculation formula is: MET = metabolic equivalent value corresponding to the physical activity × weekly frequency (d/w) × daily time (min/d) [10].

(3) Exercise Self-Efficacy Scale: compiled by Bandura [11] and translated into Chinese by Tung et al. [12], it is mainly used for patients with chronic diseases to evaluate the patients' participation in exercise, the degree of effort in exercise, and the ability to overcome difficulties in exercise, with good reliability and validity. The scale contains 18 items [12], with each item scored from 0 to 100. A score of 100 indicates complete confidence, 50 indicates half confidence, and 0 indicates no confidence. The total score is the sum of the scores of each item divided by the total number of items. The higher the score, the higher the level of exercise self-efficacy.

1.3 Survey Method

The questionnaire survey method was adopted. The researchers who had received unified training distributed the survey questionnaires to the middle-aged and young hypertensive patients who had been diagnosed with hypertension and voluntarily participated in this study. The purpose was explained to the patients before the survey, and the informed consent was signed. A total of 288 questionnaires were distributed in this study. Some invalid questionnaires were excluded in the process of calculating

the level of physical activity. A total of 273 valid questionnaires were collected, and the effective recovery rate was 94.8%.

1.4 Data Analysis Method

The SPSS 26.0 statistical software was used for statistical analysis of the data.

Physical activity level did not conform to normal distribution, and was described by "median (P25, P75)"; counting data was described by frequency and rate. The Mann-Whitney U test was used to compare the median between two groups, and the Kruskal-Wallis H test was used to compare the median between multiple groups. Spearman correlation analysis was used to analyze the correlation between factors. Multivariate stepwise linear regression analysis was used to analyze the influencing factors of physical activity level [13]. $P<0.05$ was considered statistically significant.

2 RESULTS

2.1 Physical activity and exercise self-efficacy levels of middle-aged and young hypertensive patients. A total of 273 patients were included in this study, including 117 males and 156 females, with an average age of 51.32±7.06 years. The total physical activity was low in 45 cases (16.5%), moderate in 101 cases (37.0%), and high in 127 cases (46.5%). The metabolic equivalent of various types of activities and different intensities of physical activity is shown in

TABLE 1: *PHYSICAL ACTIVITY LEVEL OF MIDDLE-AGED AND YOUNG HYPERTENSIVE PATIENTS (N=273)*

Project	Classification	Minimum value	Maximum value	Metabolic equivalent (MET-min/week)
Type of physical activity	Work energy consumption	0	14238	0 (0, 743)
	Transportation energy consumption	0	3969	0 (0,456)
	Housework energy consumption	0	5070	750 (0,2288)
	Energy consumption of leisure sports	0	6132	297 (0, 1287)
	Total energy expenditure of physical activity	0	21133	2852 (1389, 4391)
Physical activity intensity	Walk	0	4851	660 (0, 1584)
	medium intensity	0	6585	1110 (0, 2660)
	High strength	0	6720	0 (0, 200)

2.2 Comparison of Overall Physical Activity Levels among Young and Middle-Aged Hypertensive Patients with Different Characteristics

The results showed no statistically significant differences in overall physical activity levels among patients of different ages, marital status, average monthly household income, medical expenditure patterns, living arrangements, family history, hypertension classification, and medication status ($P>0.05$). However, statistically significant

differences in overall physical activity levels were observed between young and middle-aged adults according to gender, BMI classification, educational level, employment status, duration of hypertension, presence of other chronic diseases, and frequent hypertension-related symptoms (P<0.05). See **Table 2.**

TABLE 2: *COMPARISON OF OVERALL PHYSICAL ACTIVITY LEVELS AMONG PATIENTS WITH DIFFERENT CHARACTERISTICS (N=273)*

Analysis factors	Category	Number of examples	Total metabolic equivalent (MET-min/week)	Statistical test value	P value
gender	male	117	1872 (834，3432)	-5.155*	0.000
	female	156	3316 (1997，4902)		
Age (years):	18~	46	2172 (990，3301)	-1.934*	0.053
	45~59	227	2953 (1544，4518)		
BMI	＜23.9	85	4032 (2965，5628)	68.848**	0.000
	24~	142	2664 (1386，3873)		
	28~	46	563 (9240，2352)		
Marital status	Married	246	2748 (1386，4323)	3.771**	0.287
	unmarried	5	4626 (4158，6058)		
	Divorced	18	3415 (2660，4401)		
	Widowed	4	2147 (1133，4348)		
Education level	Junior high school and	135	1848 (670，3065)	55.201**	0.000

	below				
	High school or technical secondary school	84	3635 (2761，4866)		
	College degree or above	54	4426 92079，6027)		
work situation	On the job	148	3124 (1565，4785)	-1.985*	0.047
	Not employed	125	2709 (1386，3990)		
Average monthly household income	＜3000	19	1878 (513，3229)	5.883**	0.117
Enter (former)	3000~	85	2965 (1680，4372)		
	6000~	109	3105 (1530，4631)		
	＞10 000	60	2356 (990，3821)		
medical expenses	rural medical insurance	93	3330 (1872，4866)	6.473**	0.091
Way	urban medical insurance	173	2694 91236，4013)		
	Public expense	6	2574 (900，4626)		
	At own expense	1	-		
Living style	Not living alone	246	2769 (1392，4158)	-1.871*	0.061
	Living alone	27	4107		

			91398, 5313）		
course of hypertension (Year)	＜1	39	834 (329, 1779）	65.777**	0.000
	1~	93	2310 (1200, 3567）		
	＞3	141	3661 92400, 5481）		
family history of hypertension	no	83	3213 (1389, 4618）	-1.122*	0.262
	yes	190	2723 (1410, 3996）		
High blood pressure grade	Level I	200	2879 (1530, 4290）	0.372**	0.830
	Level II	54	3065 (1200, 4410）		
	Level III	19	2366 (957, 4518）		
Medication status	Take medicine regularly as prescribed by your doctor	169	2731 (1557, 4032）	1.060**	0.588
	Intermittent medication	69	2852 (1188, 4410）		
	not taking medicine	35	3228 (1333, 4935）		
Combined with other diseases	yes	88	3500 (1878, 4949）	-2.843*	0.004
	no	185	2660 (1236, 3962）		
Often with hypertension Related symptoms	yes	118	1461 (540, 3138）		
	no	155	3612 (2400, 5170）		

Note: BMI is body mass index, * is Mann-Whitney U test, ** is Kruskal-Wallis H test.

2.3 Correlation Analysis between Exercise Self-Efficacy and Different Types of Physical Activities

The median of exercise self-efficacy score of middle-aged and young hypertensive patients was 14.0, the minimum value was 0, the maximum value was 100, and the interquartile range was (1.0, 53.5). The Spearman correlation analysis of exercise self-efficacy and different types of physical activity showed that the exercise self-efficacy score was negatively correlated with the energy consumption of housework ($P<0.05$), and positively correlated with the energy consumption of leisure sports and the total energy consumption of physical activity ($P<0.01$). There was no correlation with the energy consumption of daily work and transportation, as shown in **Table 3.**

TABLE 3: *CORRELATION ANALYSIS OF EXERCISE SELF-EFFICACY AND DIFFERENT TYPES OF PHYSICAL ACTIVITY IN MIDDLE-AGED AND YOUNG HYPERTENSIVE PATIENTS*

Project	Exercise self-efficacy	Daily work energy consumption	Transportation energy consumption	Energy consumption of household chores	Energy consumption of leisure sports	Total energy expenditure of physical activity
Exercise self-efficacy	1.000					
Daily work energy consumption	-0.090	1.000				
Transportation energy consumption	0.000	-0.017	1.000			
Energy consumption of household chores	0.129*	-0.035	0.208**	1.000		

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Energy consumption of leisure sports	0.924**	-0.105	0.015	-0.138*	1.000	
Total energy expenditure of physical activity	0.253**	0.460**	0.341**	0.555**	0.278**	1.000

Note: *P<0.05, **P<0.01.

TABLE 4: *MULTIVARIATE STEPWISE REGRESSION ANALYSIS OF FACTORS AFFECTING PHYSICAL ACTIVITY IN YOUNG AND MIDDLE-AGED PATIENTS WITH HYPERTENSION (N = 273)*

Independent variable	*β*	*SE*	standardization *β*	*t value*	*P value*
constant	2381.519	738.247	-	3.226	0.001
gender	-792.057	257.432	-0.150	-3.077	0.002
BMI	-782.465	206.731	-0.203	-3.785	0.000
Do you often experience symptoms related to hypertension?	-977.330	275.619	-0.185	-3.546	0.000
course of hypertension	928.723	185.795	0.256	4.999	0.000
High school or technical secondary school	1128.355	300.448	0.199	3.756	0.000
College or	1367.272	358.358	0.209	3.815	0.000

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undergraduate

Note: R2=0.423, adjusted R2=0.408, F=27.783, P<0.001.

2.4 Multivariate Analysis of Factors Influencing Physical Activity in Middle-Aged and Young Hypertensive Patients

Multivariate stepwise linear regression analysis was performed with total physical activity energy consumption as the dependent variable and variables with statistical significance in univariate analysis and correlation analysis as independent variables (independent variable assignment is shown in **Table 4**). The results showed that gender, BMI, education level, hypertension duration, and whether hypertension-related symptoms often occurred were the influencing factors of the overall physical activity level of middle-aged and young hypertensive patients (P<0.05), as shown in **Table 4.**

3 DISCUSSION

3.1 Current Status of Physical Activity in Middle-Aged and Young Hypertensive Patients

The results of this study showed that 46.5% of middle-aged and young hypertensive patients were at a high level of physical activity, 37.0% were at a medium level, and 16.5% were at a low level. The median total physical activity level was 2852 MET-min/w, which was higher than 2079 MET-min/w in patients with type 2 diabetes [14], 1584 MET-min/w in patients after PCI [15], and 1677 MET-min/w in patients with chronic kidney disease [16]. The reason why the total physical activity level of middle-aged and young hypertensive patients is higher than that of these chronic disease patients may be because the elderly accounted for a large proportion of the study subjects included in the above studies, while this study mainly focused on middle-aged and young hypertensive patients, who are the main force of society and family, and have a large amount of activity energy consumption in housework and daily work. Zhou et al. [5] also

found that the higher the overall physical activity level, the younger the age. In addition, their study also showed that the overall physical activity energy consumption of hypertensive patients should be at least 2940 MET-min/w to benefit patients. Therefore, although the overall physical activity level of middle-aged and young hypertensive patients is higher than that of other chronic disease patients, it still needs to be further strengthened.

3.2 Analysis of Influencing Factors of Physical Activity in Middle-Aged and Young Hypertensive Patients

3.2.1 Gender

The results of this study showed that the physical activity of female middle-aged and young hypertensive patients was higher than that of male patients. Previous studies [17-18] also showed that the physical activity level of female patients was generally higher than that of male patients. This may be because housework was more often done by women, and the main type of physical activity in this study was housework, so the physical activity level of women was higher than that of men. Therefore, male middle-aged and young hypertensive patients should be the focus of health education.

3.2.2 Education Level

The results of this study showed that patients with higher education levels had higher overall physical activity levels, which was inconsistent with the study of Mbambo et al. [19]. In this study, patients with lower education levels had higher physical activity levels than patients with higher education levels, which may be because the participants with lower education levels in this study were mainly engaged in physical labor, and the intensity was generally higher. However, in this study, the energy consumption of exercise during leisure time was the main type of activity other than housework. The

results of Forechi et al. [20] showed that patients with higher education levels generally had higher self-management compliance, and they would obtain some disease-related knowledge from more channels such as popular science public accounts, books, short videos, etc., so as to improve their own health-related behaviors. Therefore, when health care workers carry out health education, they should first understand the patient's cultural level, pay more attention to patients with low cultural level, and give knowledge that meets the patient's acceptance level according to the patient's situation, so as to improve the effectiveness of health education.

3.2.3 BMI

The results of this study showed that the physical activity level of overweight or obese patients was lower than that of patients with normal or thin body shape. This is similar to the research results of Bai Pengyun et al. [21] and Ma Chunhua et al. [22]. The higher the BMI, the lower the physical activity level. Patients with higher physical activity levels are more likely to maintain a more ideal BMI. Patients with hypertension who are overweight or obese are generally more difficult to maintain healthy living habits.

3.2.4 Disease Course and Disease-Related Symptoms

This study found that patients with a longer course of hypertension had a higher overall level of physical activity. Zhang Ke et al. [23] found that patients with a longer course of disease had better self-management. They had a deeper understanding of drug and non-drug treatment of hypertension in long-term medical activities, and also received more relevant knowledge about the benefits of exercise for hypertension from the Internet or medical staff. Therefore, they may be more willing to establish a healthy lifestyle and increase their physical activity. Patients who frequently experience hypertension-related symptoms such as dizziness, nausea, and palpitations also have

relatively low levels of physical activity. Forechi et al. [20] pointed out that people may have strong negative psychology towards exercise when they are in poor health. Patients who often experience corresponding symptoms are mostly because their blood pressure is not well controlled. Therefore, health education for this group of patients should be strengthened, and they should be informed of the effect of physical activity of appropriate intensity on reducing blood pressure and relieving symptoms.

3.2.5 Exercise

self-efficacy Exercise self-efficacy refers to the expectation of whether an individual can continue to adhere to exercise in the face of various obstacles, and is the degree of confidence of an individual in his or her regular exercise [24]. This study found that exercise self-efficacy was positively correlated with leisure-time exercise and overall physical activity levels, but not with other types of physical activity. This is similar to the results of previous studies [25-26]. A higher level of exercise self-efficacy can mainly improve the physical activity of patients in their leisure time and enhance their confidence in regular exercise. In addition, in this study, exercise self-efficacy was negatively correlated with housework. The reason for this may be that housework is a major obstacle to exercise for middle-aged and young people, and the higher the exercise self-efficacy, the more capable the individual is to overcome obstacles and adhere to regular exercise. Therefore, patients with high self-efficacy have lower levels of housework. The exercise self-efficacy of middle-aged and young hypertensive patients is at a low level. It is necessary for medical staff in primary medical institutions to strengthen the assessment of exercise self-efficacy of middle-aged and young hypertensive patients, assist in formulating individualized exercise programs according to patients' habits, set short-term exercise goals, and follow up regularly. Encourage

patients to enhance their confidence in exercise and improve their sense of exercise self-efficacy.

CONCLUSION

The overall physical activity level of middle-aged and young hypertensive patients needs to be improved. The overall physical activity level is affected by the patient's gender, education level, BMI, hypertension course, and whether hypertension-related symptoms often occur. Medical staff need to combine the specific situation of the patient and take measures to improve the patient's exercise self-efficacy, provide patients with individualized health education, and promote the improvement of the overall physical activity level of patients. However, this study has some shortcomings, such as short observation time and small sample size. In the future, the sample size should be expanded and the observation time should be prolonged for further research.

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