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A cross-sectional study on the correlation between physical activity levels and health-related quality of life in community-dwelling middle-aged and older adults

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Abstract

This study aimed to evaluate the association between physical activity level and health-related quality of life in community-dwelling middle aged and older adults in Egypt. Between May and August 2017, a cross-sectional study of 184 middle-aged and older adults between the ages of 55 and 64 years old (129 males and 55 females) with a mean age of 58 ± 4.3 years old participated in this study. Study participants were classified into 3 groups based on their level of physical activity (walking duration); low level of physical activity (<150 minutes/week), moderate level of physical activity (150–300 minutes/week), and high level of physical activity (>300 minutes/week). The health-related quality of life (HRQoL) was calculated using the Euro-Quality of life-5dimensions-3 levels scale questionnaire (EuroQol-5D-3L). Spearman's correlation coefficient was performed to determine the correlation between the physical activity level and HRQoL scores in community-dwelling middle-aged and older adults. The results showed a significant correlation between the physical activity levels and HRQoL dimensions. Significant differences were observed in the HRQoL scores between high, moderate and low-physical activity groups ($P < .05$). The moderate and high-physical activity groups had significantly higher HRQoL scores in all dimensions than low-physical activity group. The low-physical activity group showed a high predominance of the chronic disease compared to the high and moderate physical activity groups. It was concluded that high and moderate levels of physical activity have a great positive relationship with the HRQoL in community-dwelling middle-aged and older adults in Egypt. Recommendations should be dedicated to supporting the active lifestyle among the different population, particularly middle-aged and older adults.

Abbreviations: EQ-5D-3L = Euro-quality of life -5dimensions-3levels, EQ-VAS = EuroQol-visual analogue scale, EuroQol = Euro-quality of life, HRQoL = health-related quality of life, PA-SCAQ = physical activity - socio-cultural adapted questionnaire, WHO = world health organization.

Keywords: EuroQol, HRQoL, older adults, physical activity

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1. Introduction

Physical activity plays an important role in enhancing health-related quality of life (HRQoL) among elderly and improve aging health.[1,2] The HRQoL is a health condition symptom of the people everywhere and it can be required for various contexts such as experimental researches, health care restriction assessments, or population health surveys.[3] Many different approaches have been developed to evaluate HRQoL in various populations.[3,4] The Quality of life (QoL) was defined as the measure appointed for the life period, which adjusted with the deteriorations, conditions of function, intuitions, and possibility socially that are affected through illness, injuries, handling, or treatment and guidelines.[4] Many theories and conceptual models have been recommended to identify the critical dimensions of HRQoL and the causal relationships throughout the recent years.[5,6]

The HRQoL model comprises many dimensions, including overall quality of life, general health, symptom, biological, and functional statuses, not only the mentioned 5 dimensions but also include environmental and individual dimensions. Every dimension affects directly the subsequent variable (function status is affected by symptom status and this affected by biological variables). But the environmental and individual variables affect directly the measure of all dimensions except biological dimension.[5]

The HRQoL is one of many domains of conceptualization that view social, mental, and physical outlooks.[2,7] The HRQoL

evaluation is a critical constituent of physical and mental health assessment.[8] Several implements were matured to evaluate HRQoL in various communities. Many important factors are associated with clinical and demographic characteristics, comprising patient age, medical status, language, and culture of the community are vital information to use a related reliable and valid measure of HRQoL.[8,9]

Physical activity seems to be related to improving functional performance and HRQoL.[10,11] Physical activity may assist older adults to repossess or sustain the health of aging people.[12] Regular leisure time of physical activity can lead to high level of HRQoL in elderly people.[13,14] Also, regularity of physical activity may proportionately assist elderly people to improve HRQoL and enhance the enjoyment of their life.[15] Because of these important determinants that support better elderly health, evaluating the association between physical activity level and HRQoL scores in community-dwelling older adults became greater needed, especially compared to the development of the older adults number in the world.

The correlation between physical activity levels and HRQoL dimension scores has been addressed in developed countries including, the United States, Japan, Germany, Canada. Elderly people who were active had more self-dependency, which was associated with a higher HRQoL scores and greater satisfaction with life.[16] Also, a recent study approved that subjects with higher physical activity levels had greater scores in all HRQoL dimensions.[17] The outcomes of previous researches confirm the critical role of physical activity in improving HRQoL.[16,17] But, these researches have only conducted in developed countries, whereas a small number of studies were performed in developing countries. In addition, very limited data in Egypt have addressed the relationship between physical activity and HRQoL in middle-aged and older adult population. Therefore, assessment of physical activity in middle-aged and older adult population in developing countries is required to identify the association between physical activity levels and HRQoL.

Given the aging worldwide, particularly the Egyptian population, it is necessary to identify how to decrease the disease risks and improve expectancy of the life. It is also important to incorporate physical activity in the life of middle-aged and older adult individuals as a means to improve quality of life. Hence, the current study was conducted to evaluate the correlation between physical activity levels and HRQoL scores among community-dwelling middle-aged and older adult males and females Egyptian population with the aim of studying whether the level of physical activity has any effect on HRQoL dimensions or no. This study hypothesized that middle-aged and older adults population who had a high physical activity level would have high scores in HRQoL with no difference between the 2 genders.

2. Methods

2.1. Participants

A cross-sectional study was conducted at the outpatient physical therapy clinic, Kasr Al-Aini, Cairo University Hospitals between May and August 2017. From 201 participants, 184 middle-aged and older adults (129 males, 55 females) with a mean age (58 ± 4.3) were recruited in this study. All participants were independently walking.[10,11] Subjects were excluded if they had severe, life-limiting illness, orthopaedic limitations, cognitive disorders (unable to respond well to the examiner's questions about their name, age, or childhood), or unable to walk at least

6 minutes without any walking aids. The participants were classified into 3 groups according to their walking duration per week into 3 groups, low level of physical activity (walking duration <150 minutes/week), moderate level of physical activity (walking duration 150– 300 minutes/week) and high level of physical activity (walking duration >300 minutes/week). Participants were asked to report how many minutes they walk per week.[10]

This study was approved by the research ethics committee, Department of Physical Therapy, Kasr Al-Aini Hospitals, Cairo University (NO PTA. REC/017/002821) according to the declaration of Helsinki principles. Each participant was informed about the purposes and procedure of the study and signed a written informed consent before starting the study. The flow diagram showing the older adults participating in the study is shown in Figure 1.

2.2. Data collection and outcome measures

Assessment procedures were done using 2 tools in their validated Arabic versions. Physical activity was evaluated using the physical activity socio-cultural adapted questionnaire (PA-SCAQ) [18,19] whereas, HRQoL was assessed using the Euro-Qol-5 dimensions-3 levels scale (EQ-5D-3L) [20–23] as the following:

1. *Baseline clinical characteristics*: All the subjects were interviewed personally for 10 minutes and the set of questionnaires were given to fill and the data were collected by trained physiotherapists. No open answer questions were included. Any question required a frequency answer, was answered in a numerical form. The family members or caregivers were allowed when desired by the participants as they may have felt more confident. Baseline clinical characteristics included; age, gender, work, past medical history, medications, habits, and motor or sensory dysfunctions. Also, weight and height were recorded to calculate the body mass index (BMI) by dividing the weight in kilograms on the square of the height in meters (Kg/m^2) using (Weighing scale with height and weight-Bar type, Philippine).

2. *Physical activity measure*: Physical activity socio-cultural adapted questionnaire (PA-SCAQ) was applied to measure the level of physical activity for each participant. The PA-SCAQ contained these questions; How do you walk? What the duration of walking? What is your home activities (such as walking or gardening)? The structure of the questionnaire regarding the domains of physical activity; duration, and frequency were according to the recommendations of the World Health Organization (WHO)[1] considering some appropriate variables of the valid physical activity measures for elderly subjects.[18,19] Based on WHO recommendations, the variables of physical activity were classified into walking, home activities, and outdoor activities. To calculate duration and frequency of the activities, the time expended in the week (minutes/week) to do these activities were arrogated. The participants were classified into 3 levels of physical activity according to their waking duration throughout the week: low-physical activity (<150 minutes/week), moderate physical activity (150–300 minutes/week), and high physical activity (>300 minutes/week).[1]

3. The HRQoL questionnaire was administered by a physical therapist using an Arabic version of the EuroQol-5dimensions-3levels scale (EQ-5D-3L). The EQ-5D comprises 5
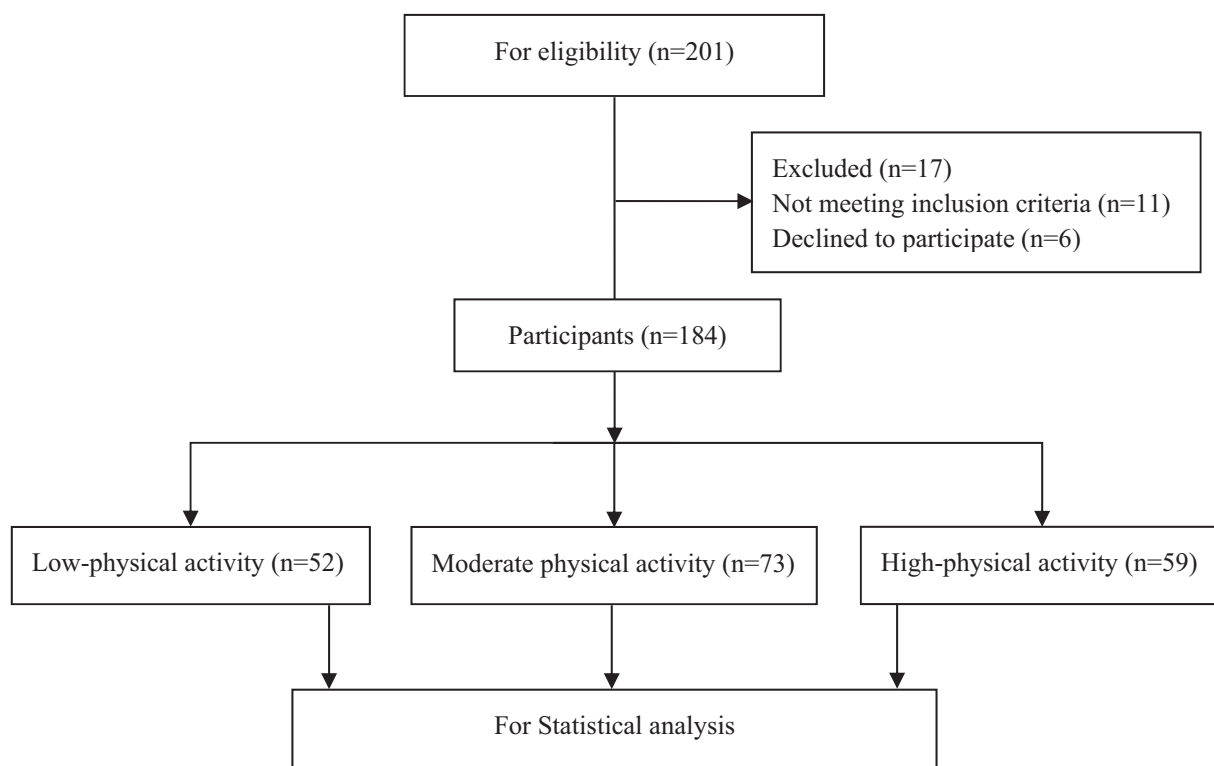
Figure 1. Flow diagram showing the middle-aged and older adults participating in the study.

dimensions, including; mobility, self-care, usual activities, pain/discomfort, and anxiety/depression with 0 to 100 rating scale, 0 is the worst imaginable health state and 100 is the best imaginable health state. It is a standardized instrument for measuring outcomes of health. It is well validated, reliable, and does not require a lot of time or effort to be completed and has been documented in many previous studies to measure HRQoL in a wide range of health conditions.[20–22] It includes descriptive system (5 dimensions) and EuroQol-visual ana-logue scale (EQ-VAS).

The EuroQoL group approved the validated Arabic version of the EQ-5D questionnaire to assess elderly's quality of life.[23] Each dimension consists of 3 levels (no problems, slight/moderate problems, and severe/extreme problems). EQ-VAS assess the HRQoL with 0 to 100 endpoints, 0 is the lowest imagine health and 100 is the highest imagine health state.

2.3. Data analysis

Descriptive statistics were done in the form of mean and standard deviation to assess the sample based on their physical activity and HRQoL. The normality of the dependent variable's data was screened using the Shapiro–Wilks test. Mann–Whitney test was used to assess the arranged measures of EQ-5D-3L. Kruskal–Wallis tests were applied to the ordinal variables of the physical activity groups to determine changes between the 3 groups according to each group variable including; sex, BMI, and the medical diagnosis. The differences of HRQoL measures between the 2 genders were assessed using Fisher exact probability test. Including all subjects from the 3 groups together, the Spearman correlation coefficient was used to measure the strength and direction of the relationship between the physical activity and HRQoL. All analysis was done using

SPSS version 18.0 (SPSS, Chicago, IL, USA) with statistical significance at P value $< .05$.

3. Results

One hundred eightyfour older adult people (129 males and 55 females) participated in this study. Their mean age was (58 ± 4.3). 61.4% of the participants were diagnosed clinically with chronic disease as the following; 23.4% diabetes mellitus, 26.1% hypertension, 11.9% cardiovascular disease. About 12% of the participants were smoking. Sleep quality was good in 71% of subjects and bad in 29% of subjects.

28.3% of the participants were low-physical activity (walking duration <150 minutes/week), 39.7% were moderate physical activity (walking duration $= 150$–300 minutes/week), and 32% of them were high-physical activity (walking duration >300 minutes/week). Demographic data and baseline characteristics of all participating middle-aged and older adults are presented in Table 1. Also, clinical features in the low, moderate, and high level of physical activity were demonstrated in Table 2.

As described in Table 2, body mass index (BMI) measures showed higher value in low-physical activity than moderate physical activity than high-physical activity (29.5, 28.2, and 26.3 respectively).

The outcome measures showed that chronic disease was a higher in the low-physical activity group than moderate physical activity group than high-physical activity group (94.2%, 70%, and 22% respectively). In addition, the number of smokers was more in low-physical activity group (23%) when compared with moderate physical activity group (11%) and high-physical activity group (3.4%) as presented in Table 2.

As demonstrated in Table 3, the finding measures of HRQoL using EQ-5D-3L reported that the group of low-physical activity

Table 1

Demographic data and baseline characteristics of all participants.

Characteristics	n (%)
Sex	
Males n (%)	129 (70.1)
Females n (%)	55 (29.9)
Age mean±SD	58±4.3
Height (cm) mean±SD	170±5.2
Weight (kg) mean±SD	81±6.3
BMI (kg/m^2) mean±SD	28±2.2
Medical diagnosed chronic disease	
Yes/No n (%)	113 (61.4)/71 (38.6)
Diabetes Mellitus	43 (23.4)
Hypertension	48 (26.1)
Cardiovascular disease	22 (11.9)
Smoking habits (yes/no)	22 (12)/162 (88)
Sleep quality (good/bad)	131 (71)/53 (29)
Walking duration n (%)	
Less than 150 min/week	52 (28.3)
From 150 to 300 min/week	73 (39.7)
More than 300 min/week	59 (32)

BMI = body mass index, n = number, SD = standard deviation.

level recorded walking problems ranging from slight/moderate to severe/extreme level as (81%, 56%, 71%, 79%, 87%) of the participants in mobility, self-care, usual activities, pain/discomfort, and anxiety/depression dimensions respectively. While the group of moderate physical activity level suffered walking problems started from slight/moderate to severe/extreme level as (44%, 32%, 53.5%, 60.3%, 57.5%) and the group of high-physical activity level recorded waking problems only in slight/moderate level as (33.9%, 19%, 30.5%, 55.9%, 50.9%) of the older adult people in the 5 dimensions respectively.

No participant suffered any walking problems in severe/extreme level in all dimensions in the high-physical activity group. Using Kruskal–Wallis tests, the results showed statistically significant differences between the 3 groups; high, moderate, and low-physical activity groups ($P < .05$). Moderate and high-physical activity groups showed higher HRQoL scores more than low-physical activity group in all 5 dimensions. On EQ-VAS measure, the high-level group showed higher scores more than the moderate level group more than the low-level group ($P < .05$) as illustrated in Table 3.

Descriptive measures of the physical activity parameters showed that the percentage of females in low-physical activity

Table 2

Clinical features in the 3 groups; low, moderate, and high level of physical activity.

Items	Low physical activity (n=52)	Moderate physical activity (n=73)	High physical activity (n=59)	P-value
Sex (male/female) n (%)	34 (26.4)/18 (32.7)	48 (37.2)/25 (45.5)	47 (36.4)/12 (21.8)	.014
BMI (kg/m^2)	29.5±2.5	28.2±3.2	26.3±1.8	<.001
Chronic disease n (%)	49 (94.2)	51 (70)	13 (22)	.019
Diabetes mellitus n (%)	17 (32.7)	19 (26)	7 (11.8)	<.001
Hypertension n (%)	22 (42.3)	23 (31.5)	3 (5.1)	<.001
Cardiovascular disease n (%)	10 (19.2)	9 (12.5)	3 (5.1)	<.001
Smoking habits (yes/no) n (%)	12 (23)/40 (77)	8 (11)/65 (89)	2 (3.4)/57 (96.6)	<.001

A significance level of $P < .05$.
BMI = body mass index, n = number of participants.

Table 3

HRQoL measures in low, moderate, and high physical activity levels.

HRQoL variables	Low physical activity (n=52)	Moderate physical activity (n=73)	High physical activity (n=59)	P-value
Mobility n (%)				
No problems	10 (19)	41 (56)	39 (66.1)	<.001
Slight/Moderate problems	36 (69)	32 (44)	20 (33.9)	
Severe/Extreme problems	6 (12)	0	0	
Self-care n (%)				
No problems	23 (44)	50 (68)	48 (81)	<.001
Slight/Moderate problems	24 (46)	23 (32)	11 (19)	
Severe/Extreme problems	5 (10)	0	0	
Usual activities				
No problems	15 (29)	34 (46.5)	41 (69.5)	<.001
Slight/Moderate problems	25 (48)	38 (52.1)	18 (30.5)	
Severe/Extreme problems	12 (23)	1 (1.4)	0	
Pain/discomfort n (%)				
No problems	11 (21)	29 (39.7)	26 (44.1)	<.001
Slight/Moderate problems	27 (52)	43 (58.9)	33 (55.9)	
Severe/Extreme problems	14 (27)	1 (1.4)	0	
Anxiety/depression n (%)				
No problems	7 (13)	31 (42.5)	29 (49.1)	<.001
Slight/Moderate problems	28 (54)	39 (53.4)	30 (50.9)	
Severe/Extreme problems	17 (33)	3 (4.1)	0	
EQ-VAS (Mean±SD)	64±12.2	71±10.3	84±7.8	<.001

A significance level of $P < .05$.
EQ-VAS = EuroQol-visual analogue scale, HRQoL = health-related quality of life, n = number, SD = standard deviation.

Table 4

Differences of HRQoL measures in the 2 genders.

HRQoL variables	Males (n = 129)	Females (n = 55)	*P*-value
Mobility n (%)			
No problems	69 (54)	21 (38.2)	.0383
Slight/Moderate problems	58 (44.5)	30 (54.5)	
Severe/Extreme problems	2 (1.5)	4 (7.3)	
Self-care n (%)			
No problems	86 (66.7)	35 (63.5)	.3679
Slight/Moderate problems	41 (31.8)	17 (31)	
Severe/Extreme problems	2 (1.5)	3 (5.5)	
Usual activities			
No problems	65 (50.4)	25 (45.5)	.1466
Slight/Moderate problems	58 (45)	23 (41.8)	
Severe/Extreme problems	6 (4.6)	7 (12.7)	
Pain/discomfort n (%)			
No problems	45 (34.9)	21 (38.2)	.0776
Slight/Moderate problems	77 (59.7)	26 (47.3)	
Severe/Extreme problems	7 (5.4)	8 (14.5)	
Anxiety/depression n (%)			
No problems	48 (37.2)	19 (34.5)	.1119
Slight/Moderate problems	71 (55)	26 (47.3)	
Severe/Extreme problems	10 (7.8)	10 (18.2)	

A significance level of $P < .05$.
n = number, HRQoL = health-related quality of life.

group was more than males while the percentage of males was more than females in the high-physical activity group. 32.7% of the females and 26.4% of the males were low level of physical activity, 45.5% of the females and 37.2% of the males were moderate physical activity, and 21.8% of the females and 36.4% were high-physical activity (Table 2).

According to the report of Fisher exact probability test, the measures between genders using EQ-5D-3L in HRQoL showed non-significant differences between males and females in the all dimensions ($P > .05$) except the significant difference on the mobility dimension ($P = .038$). Males had walking problems, ranging from slight/moderate to severe/extreme level as (46%, 23.3%, 49.6%, 65.1%, 62.8%) in mobility, self-care, usual activities, pain/discomfort, and anxiety/depression dimensions respectively whereas the females had walking problems, ranging from slight/moderate to severe/extreme level as (61.8%, 36.5%, 54.5%, 61.8%, 65.5%) in the 5 dimensions respectively (Table 4).

Using Spearman correlation coefficient, there was a strong positive correlation occurred in this study between the 5 dimensions of the EQ-5D-3L and physical activity level in term of walking minutes as illustrated in Table 5.

Table 5

The Spearman' correlation coefficient between HRQoL dimensions and Physical activity level.

HRQoL items	95% confidence interval		r_s
	Lower value	Higher value	
Mobility scores	0.67	0.40	0.60
Self-care scores	0.56	0.37	0.53
Usual activity scores	0.63	0.39	0.51
Pain/discomfort scores	0.43	0.15	0.54
Anxiety/depression scores	0.46	0.18	0.37
EQ-VAS score	0.47	0.75	0.67

EQ-VAS = EuroQol-visual analogue scale, HRQoL = health-related quality of life, r_s = Spearman's correlation coefficient.

4. Discussion

The current study aimed to evaluate the correlation between physical activity levels and HRQoL in dwelling middle-aged and older adult males and females Egyptian population, hypothesizing that the individuals who had a high physical activity level would have high scores in HRQoL with no differences between the 2 genders. Our main findings showed the positive correlation between physical activity levels and HRQoL and explained that physical activity was significantly correlated with functional and subjective dimensions of HRQoL. This positive correlation suggests that physical activity promotion may help middle-aged and older adult individuals to achieve the desired health benefits. Also, no significant difference was observed between genders, except the significant difference on the mobility domain in favor to males.

According to our study outcomes, the middle-aged and older adult people comprised 28.3% of the low-physical activity and the greater number of the older adult documented as they were diagnosed with minimum 1 disease. The middle-aged and older adults with low-physical activity (<150 minutes/week) were reported more commonly of lasting illness as, diabetes, hypertension, and cardiovascular disease. On the other hand, the middle-aged, and older adults with high physical activity level (>300 minutes/week) had higher scores of HRQoL and lower levels of disabilities.

In agreement with our study results, Beitz, and Doren approved that light sports and walking have positive impacts to control cardiovascular disease in postmenopausal women.[24] Also, a previous study on community-dwelling elderly people, found a strong associations between higher physical activity levels and all dimensions of HRQoL.[10] Engaging in functionally independent older people with normal cognitive status were associated with a better HRQoL.[20]

Several studies approved that regular physical activity has a significant improvement in health variables and controlling the disease.[10,11,20] High level of physical activity in aged people seemed an international preference.[1]

The participants with high activity level were the highest scores of all EuroQoL dimensions. Functioning evaluation domain showed higher records of mobility dimension in a high physical activity group than moderate physical activity more than low-physical activity group. This result supports the high correlation between physical activity and HRQoL. Similar results were reported by Abdelbasset and Nambi that higher-physical activity has a better HRQoL than low-physical activity in elderly people.[11] Furthermore, in line with our results, Halaweh et al found non-significant differences according to genders on all HRQoL dimensions except on the mobility dimension.[10]

The current study included a group of functionally independent middle-aged and older adults without cognitive disorders. Individuals with cognitive disorders were excluded because this disorder could influence the capability for supporting correct answers. Previous studies have taken the same conclusion.[25,26] The enrollment of subjects with dependence[25] influences the HRQoL assessment, as the functional status could affect it. In the current study, HRQoL was evaluated in the independent subjects without cognitive disorders. Therefore, this study was contributed to supply high comprehensive awareness of what factors more functionally distant are related to HRQoL in the middle aged and older adults. The outcomes of this study may be beneficial in the knowledge of the efficient assessment procedures to support the ideal lifestyle of the middle aged and older adult people.

Walking duration had seemed to be directly associated with the positive strength of leg muscles and physical capacity in elderly subjects.[27] The physical activity was concluded and determined through the waking duration in the present study as the walking is the usual physical activity in the older adult people and can comfortably be adapted without effort in daily life.[28]

EuroQoL-5D-3L included 2 functioning and subjective well-being dimensions that concern the HRQoL assessment in this current study. The functioning evaluation was assessed through mobility, self-care, and usual activities dimensions. While pain/discomfort and anxiety/depression dimensions were used to assess subjective well-being evaluation. Using of the Arabic version of the EuroQoL was approved to be an easy and valid measure for elderly Quality of life.[29]

Also, individuals with high-level of physical activity showed high scores of self-care and usual activities dimensions which mentioned in EuroQoL. These 2 dimensions helped to improve the level of independence and physical activity promotes a reduction of disability risks in aged people.[30] So, the present study investigated the relationship between the level of physical activity and functioning domain variables.

In subjective well-being evaluation domain using pain/discomfort and anxiety/depression dimensions, most of all participants in this study showed slight pain/discomfort and slight anxiety/depression. There were significant differences in subjective well-being variables in high and moderate levels of physical activity compared with low-physical activity level. In consistent with previous studies, the present study approved beneficial effects of physical activity on depression status and pain in middle-aged and older adult people.[11,24,31,32]

5. Limitations

This cross-sectional study aiming to evaluate the association between physical activity level and health-related quality of life in independent middle aged and older adult Egyptian population however, our study has some limitations. First limitation was the correlation test; no cause and effect can be recognized in correlational research as its not certain that one variable caused another to happen. However, this type of researches is very important to identify which variables have an impact on health and to create theories for future studies.[33] The second limitation was the small size of the studied middle-aged and older adult Egyptian population ($n = 184$). Thus, future studies have to include a large sample and have to examine the association between HRQoL and physical activity in specific chronic disease in the community-dwelling middle-aged and older adults. To draw a definitive conclusion, further researches are still needed.

6. Conclusions

It was concluded that the high and moderate levels of physical activity have a positive effect on HRQoL in Egyptian middle-aged and older adults. It is likely to have been the driving force behind the positive effects of physical activity on HRQoL to recommend the active lifestyle among different population particularly middle-aged and older adult people.

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