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Prevalence and predictors of physical activity among community-dwelling older adults in Mansoura, Egypt

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ABSTRACT

Introduction: Older people represent a growing proportion of the population who often suffer from multiple diseases and disabilities. Hence, physical activity is required to maintain body function and strength.

Aims: This study aims to describe the pattern of physical activity of community-dwelling older adults (60 years and more) and its associated factors in Mansoura, Egypt.

Methods: A cross-sectional population-based study was carried out in both urban and rural areas of Mansoura District, Egypt. Self-reported data were collected from a representative sample of 671 participants at their homes. International Physical Activity Questionnaire short form was used to assess physical activity. Logistic regression was used to determine independent predictors of physical activity. $p \leq 0.05$ was considered statistically significant.

Results: Results showed that 71.2% of participants had low physical activity level. Higher physical activity level was associated with male gender; normal weight; younger age; and current work with Adjusted Odds Ratio (95% Confidence Interval)[AOR (95% CI)] of 4.2 (2.3–7.6); 3.1 (1.8–5.3); 2.4 (1.4–4.4); 2.8 (1.8–4.2), respectively. The use of assistive devices, the presence of cardiac disease, or musculoskeletal disease were associated with lower physical activity level with AOR (95% CI) of 0.3 (0.2–0.5), 0.3 (0.2–0.6), and 0.3 (0.2–0.5), respectively.

Conclusions: These findings draw attention of decision makers to the magnitude of the problem and might help them develop a tailored intervention to tackle physical inactivity in elderly.

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Community; healthy aging; IPAQ; older adults; physical activity; risk factors

Introduction

Worldwide, the average total life expectancy has increased by 5 years between 2000 and 2016 [1], leading to a dramatic shift in the distribution of the population to older ages. This demographic shift prevails in the whole world, with the most affected populations, in developing countries. It is expected that by 2050, 80% of older people will be in low-/middle-income countries [2]. Although this shift indicates lifestyle and medical advances and carries good opportunities to societies and communities, it brings unintended social, economic, and health challenges [3].

It is well-known that aging is associated with a progressive decline in physical and mental functioning [3]. Healthy aging is a short term for a wider concept that implies allowing people to live healthy and active lives. Early interventions to promote healthy aging can reduce the prevalence of age-related disability and frailty. Promotion of physical activity (PA) is one of the five priority interventions proposed by the World Health Organization

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(WHO) to improve healthy aging rates [4]. It had been argued that PA is a medicine for older adults [5] and there is good evidence that physical activity promotes healthy aging [6]. WHO recommends that older adults engage in moderate-intensity aerobic PA for at least 150 minute/week, or vigorous-intensity aerobic PA for at least 75 minute/week [7].

Physical activity is a multifaceted construct, with no ideal tool to measure all aspects of PA [8]. The current measures of PA differ in their intended aims, suitability for different populations, and ability to assess key aspects of PA [i.e., frequency, intensity, time, and type (FITT) in older adults][9].

Indirect PA measurements depend on self-report and are cost-efficient, practical, well accepted, and feasible on the application for large groups. Also, they relatively interfere little with the habits of the individual. However, inaccurate recall makes them prone to either over or under-estimation [10,11]. Additionally, many indirect tools fail to measure the lower end of the PA range [12] and are liable to variations in health status, medical conditions, and cognitive problems [13,14].

On the other hand, direct PA measurements evaluate energy expenditure [10] or actual movement [15]. They are often used to validate indirect measures of PA as they are more accurate, not prone to response, and recall biases. However, they place a higher degree of burden on both the participant and the researcher, being more expensive, time-consuming [16,17]. Moreover, individuals may change their behavior because they know it is being evaluated [10]. Some measures (e.g., accelerometers, pedometers) offer very inadequate data about the type of activity [13] and are not appropriate for measuring some types of PA (e.g., swimming, resistance exercise, upper body movements) [10,18].

Although PA is well-known for its highly publicized benefits, low physical activity levels were reported among many populations [19–23]. Evidence suggests that programs aimed at increasing PA level among older adults, although heterogeneous, were generally effective in improving PA level and general wellbeing. However, there is uncertainty about the most effective components of these programs [24]. It is recommended that interventions should be tailored to meet the needs of the elderly and should consider social and environmental factors. The presence of multiple co-morbidities should also be considered [22,24].

In Egypt, elderly people aged ≥60 years represents 6.9% of the population, with a total life expectancy of 72.9 years for females and 70.1 for males, in 2016. There is some form of governmental care of geriatric people, including specialized geriatric centers at University hospitals, elderly houses, and clubs mainly concentrated in the capital (Cairo), in addition to some form of social security [25]. However, policymakers and the government have not yet recognized the importance of adoption of an initiative to improve physical activity levels among elderly people. Part of the problem is that researchers have not given priority to the research in that area to provide evidence-based data for decision-making. Actually, this is the case in most low/middle income countries [6,22]. A recent systematic review was conducted to evaluate physical activity levels in Arab countries. It included 172 studies, only two of them were conducted in Egypt, and neither of these two studies approached the geriatric population [26]. So, there is a dearth of knowledge about the pattern of physical activity of older adults in Egypt. This study aimed to describe the pattern of physical activity of community-dwelling older adults and its associated factors in Mansoura, Egypt.

Methods

Study design and locality

This cross-sectional descriptive population-based study was carried out in both urban and rural areas of Mansoura District, Egypt during the period from September 1 to December 31, 2018. Rural areas in Egypt are defined as the areas in which the majority of people work in agriculture, herding, or fishing. On the other hand, urban areas constitute cities and towns where the majority of the population is working in industry [27].

Target population

Older adults aged 60 years or more, able to move unsupported or with the help of assistive devices, and mentally aware.

Sample size

Sample size was calculated using Medcalc 15.8 (https://www.medcalc.org/). The primary outcome of interest was the prevalence of moderate/high physical activity among older adults. A previous study found that 30% of community rural older adults had moderate/high physical activity [28]. With an alpha error of 5%, study power of 80%, and 5% precision, the sample size was 610. Ten percent

was added to compensate for non-responders, thus the final sample size was 671 older adults.

Sampling method

Sample was distributed proportionally between the 49 family health units according to the total population. In each health unit, family files were sorted to identify families with elderly persons from which a systematic sample was selected depending on the sample required and number of total family files. A total of 678 elderly were approached and 635 of them completed the questionnaire (response rate of 93.7%).

In Egypt, PHC services are provided to family members through family health units offering both preventive and curative services. Permission was obtained from the responsible local health authority to access paper files available at each unit for nearly all families.

Data collection

Data were collected during an interview with older adults (self-reported) at their homes on a mutually agreed day and time as arranged by nurses affiliated to the local health facility. Study questionnaire covered the socio-demographic data of the elderly and their families, smoking history, medical history of chronic diseases, and International Physical Activity Questionnaire (IPAQ) (short form). Age was classified into five-year subgroups in order to have adequate number of persons in each category. The socio-economic scale of El-Gilany et al. [29] was used to assess the socio-economic status of the family.

Definition of variables

Smoking index (SI)

It was calculated according to Indrayan [30] that incorporates age at initiation of smoking, duration of smoking, quantity of smoking, type of tobacco consumption including passive smoking, number of cigarettes (or others) smoked per day, and number of years elapsed since quitting. SI was classified into three categories 0, <20, and ≥20 [30].

International Physical Activity Questionnaire (short form) (IPAQ-S)

Physical activity was calculated using (IPAQ-S). The Arabic version is available at (*http://www.ipaq.ki.se).* (IPAQ-S) evaluates physical activity undertaken across a comprehensive set of domains including; leisure time physical activity, domestic and gardening (yard) activities, work-related physical activity, and transport-related physical activity. IPAQ-S provides separate scores on walking, moderate-intensity activities, and vigorous-intensity activities. Calculation of the total score for (IPAQ-S) requires the summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity activities, and vigorous-intensity activities so that activity can be classified into three different grades (low, moderate, and high) according to specific formulates [31]. Both categorical and continuous indicators of PA are possible from both IPAQ forms. However, energy expenditure in many populations follows non-normal distribution, so it is recommended that the continuous indicator be presented as median minute/week or median MET–minute/week rather than means (for example, mean minute/week or mean MET-minute/week). METs are multiples of the resting metabolic rate and a MET-minute is calculated by multiplying the MET score of an activity by the minutes performed [28]. Based on their level of PA, individuals can fall in one of three categories; low, moderate, and high.

1. Category 1 (Low PA) involves individuals who do not meet criteria for Categories 2 or 3.
2. Category 2 (Moderate PA) involves individuals who meet any of the following criteria; (a) 3 or more days of vigorous-intensity activity of at least 20 minutes per day, OR (b) 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day, OR (c) 5 or more days of any combination of walking, moderate-intensity activities, or vigorous-intensity activities achieving a minimum Total PA of at least 600 MET-minute/week.
3. Category 3 (High PA) involves individuals who meet one of two criteria; (a) vigorous-intensity activity on at least 3 days achieving a minimum Total PA of at least 1,500 MET-minute/week, OR (b) 7 or more days of any combination of walking, moderate-intensity activities, or vigorous-intensity activities achieving a minimum Total PA of at least 3,000 MET-minute/week [32].

Body mass index

It is defined as "the weight in kilograms divided by the square of height in meters (kg/m^2)". Overweight means BMI ≥ 25, while obesity means BMI ≥ 30 [33].

Data analysis

Data were analyzed using SPSS (Statistical Package for Social Sciences) version 16. Variables were presented as number and percent. MET of physical activity was presented as median (minimum–maximum). Chi square was used to test the significance in bivariate analysis and crude odds ratios (COR) and their 95% CI were calculated. Variables significantly associated with PA in bivariate analysis were entered into a multivariate logistic regression model using the Stepwise Forward Wald method. Adjusted OR and their 95% CI were calculated. $p \leq 0.05$ was considered statistically significant.

Results

The current study included 635 participants aged 60–86 years, with a mean of 66.1 ± 5.3. About 44% of participants were women, around 65% were rural, 55% were still working, and 67% were still married. Nearly, half of the participants were illiterate and had low/very low socioeconomic standard.

PA profile of participants showed that the average (median) MET value for walking was 330 MET-minute/week. The average (median) total physical activity score was 346.5 MET-minute/week. Around 71% of participants were classified as low physical activity group, while only 8.8% had high physical activity level (Table 1).

The association between moderate/high physical activity and socio-demographic characteristics is displayed in Table 2. The moderate/high PA was nearly three and two times higher among age groups (60–<65 years, and 65–<70 years) compared to age group ≥70 [COR (95%CI): 2.7 (1.6–4.6), 1.9 (1.1–3.3), respectively]. Similarly, it was two times higher among men compared to women, and rural participants compared to urban ones [COR (95%CI): 2.0 (1.4–2.9), 1.9 (1.3–2.8), respectively]. Low educational level and very low/low socioeconomic standard were associated with around two times higher moderate/high PA compared to high education level and high socioeconomic standard [COR (95%CI): 2.7 (1.5–4.8), 2.4 (1.4–4.1), respectively]. The working situation of participants significantly predicts their moderate/high PA, as being currently working increased PA nearly three times [COR (95%CI): 2.8 (2.0–4.0)]. Also, working as an employee before retirement was significantly associated with lower PA [COR (95%CI): 0.6 (0.3–0.98)].

Table 1. Physical activity profile of 635 older adults in Mansoura, Egypt, 2018.

Items*	Mean (SD)	Median (Min–max)	*N* (%)
MET walking	348.95(261.42)	330.0(0–1386.0)	
MET moderate	111.43(434.33)	0(0–3360.0)	
MET vigorous	74.83(520.17)	0(0–6720.0)	
MET total	535.22(745.7)	346.5(0–7066.5)	
Physical activity level:			
Low (<600 MET)			452 (71.2)
Moderate (600-2,999.9 MET)			127 (20.0)
High (≥3,000 MET)			56 (8.8)

*Measure in (MET-minute/week).

The moderate/high PA was more than two times higher in normal weight participants and in non-smokers compared to obese ones and heavy smokers [COR (95%CI): 2.3 (1.5–3.5), 2.2 (1.01–4.8), respectively] (Table 3). The use of assistive devices was associated with a significant decrease in moderate/high PA level [COR (95%CI): 0.3(0.2–0.5)]. Apart from hypertension, renal diseases, and diabetes mellitus, most of the studied chronic diseases were associated with significant decreases in moderate/high PA level (i.e., cardiac disease (COR (95%CI): 0.4(0.2–0.8)], respiratory diseases [COR (95%CI): 0.4(0.2–0.8)], liver disease [COR (95%CI): 0.5(0.3–0.8)], and musculoskeletal disease [COR (95%CI): 0.3(0.2-0.5)]).

Multiple regression analysis showed that among socio-demographic characteristics, age, gender, and being currently working are significant independent predictors of moderate/high PA level (Table 4). The role of gender in the prediction was doubled with Adjusted Odds Ratio (95% Confidence Interval) [AOR: 95%CI, 4.2(2.3–7.6)]. BMI and the use of assistive devices are significant independent predictors. Being of normal weight, older adults are more likely to perform moderate/high physical activity [AOR (95%CI): 3.1(1.8–5.3)]. The presence of cardiac disease and musculoskeletal diseases as well as not using assistive devices predict lower moderate/high PA [AOR (95%CI): 0.3(0.2–0.6), 0.3(0.2–0.5), and 0.3(0.2–0.5), respectively].

Discussion

The study revealed that the level of physical activity among older adults in Mansoura, Egypt is not higher than many other elderly populations. More

Table 2. Prevalence of moderate/high physical activity (PA) and its variation with socio-demographic characteristics of older adults, Mansoura, Egypt, 2018.

Socio-demographic characteristics		Total *N*	Moderate/high PA *N* (%)	*p*	COR (95%CI)
Overall		635	183 (28.8)		**(25.3–32.4)**
Age (years)	60–	289	102 (35.3)	≤0.001	**2.7 (1.6–4.6)**
	65–	214	59 (27.6)	0.02	**1.9 (1.1–3.3)**
	70 +	132	22 (16.7)		**1(*r*)**
Gender	Women	282	104 (36.9)	≤0.001	**2.0 (1.4–2.9)**
	Men	353	79 (22.4)		**1(*r*)**
Marital status	Married	426	131 (30.8)	0.1	**1.3 (0.9–2.0)**
	Widow/Divorced/single	209	52 (24.9)		**1 (*r*)**
Residence	Rural	412	137 (33.3)	≤0.001	**1.9 (1.3–2.8)**
	Urban	223	46 (20.6)		**1 (*r*)**
Education level	Illiterate	305	104 (34.1)	≤0.001	**2.7 (1.5–4.8)**
	Less than secondary	153	43 (28.1)	0.03	**2.0 (1.1–3.8)**
	Secondary	70	20 (25.6)	0.052	**2.1 (0.98–4.3)**
	University	99	16 (16.2)		**1 (*r*)**
Income	Enough	367	110 (30.0)	0.8	**1.1 (0.7–1.6)**
	More than enough	88	21 (23.9)	0.4	**0.8 (0.4–1.4)**
	Not enough	180	52 (28.9)	0.8	**1 (*r*)**
Socio-economic status	Very low/low	305	104 (34.1)	≤0.001	**2.4 (1.4–4.1)**
	Middle	205	57 (27.8)	0.04	**1.8 (1.04–3.1)**
	High	125	22 (17.6)		**1 (*r*)**
Previous occupation	Employee	303	69 (23.4)	0.04	**0.6 (0.3–0.98)**
	Housewife	193	61 (31.6)	0.6	**0.9 (0.5–1.6)**
	Farmer/ manual worker	73	30 (41.1)	0.4	**1.3 (0.7–2.6)**
	Others	66	23 (34.8)		**1 (*r*)**
Living condition	Alone	224	61 (27.2)	0.5	**0.9 (0.6–1.3)**
	With family	411	122 (29.7)		**1 (*r*)**
Currently working	No	282	114 (40.4)	≤0.001	**2.8 (2.0–4.0)**
	Yes	353	69 (19.5)		**1 (r)**
Social activities participation	Yes	157	68 (43.3)	≤0.001	**2.4 (1.7–3.5)**
	No	478	115 (24.1)		**1 (*r*)**

COR = crude odds ratio CI = Confidence interval, *r* = reference group *r*-reference category.

than 70% of the elderly had a low PA level, while around 8% only had a high PA level. This result showed that the median of MET moderate PA and MET vigorous PA was (0 MET-min/week), compared to walking (330 MET-minute/week). This agrees with a clinic-based previous study in Fayoum governorate, Egypt, that indicated 57% of the elderly did not meet the WHO recommendations of PA for the elderly [34]. Low level of PA in Egypt was reported by one small-scale study on older adults resident in elderly homes [35].

The low PA level is a common finding reported by many studies. Only a quarter of people aged more than 65 in England meet the recommended PA to maintain health [3]. Hong reported that 70% of Korean older adults were never physically active, and only 12.5% perform the recommended amount of PA [36]. Also, more than half of Thai rural elderly people were physically inactive [19]. Ramires et al. [23] reported a low level of physical activity from a population-based sample of older adults in a Southern city of Brazil, using triaxial accelerometry data in the assessment of PA level.

PA level was significantly associated with many of the socio-demographic factors. There is a significant negative association between age and PA. The

Table 3. Prevalence of moderate/high physical activity (PA) and its variation with clinical parameters of older adults, Mansoura, Egypt, 2018.

Clinical parameter	Total	Total	Moderate/high PA *N* (%)	*p*	COR (95% CI)
BMI	Normal	230	87 (36.9)	≤0.001	**2.3 (1.5–3.5)**
	Overweight	203	56 (27.6)	0.1	**1.5 (0.9–2.4)**
	Obese	196	40 (20.4)		**1 (*r*)**
Smoking index	Zero/non-smoker	485	157 (32.4)	≤0.001	**2.2 (1.01–4.8)**
	<20	105	18 (17.1)	0.9	**0.9 (0.4–2.4)**
	20 & more	45	8 (17.8)		**1 (*r*)**
Use assisted devices	Yes	220	33 (15.0)	≤0.001	**0.3 (0.2–0.5)**
	No	415	150 (36.1)		**1 (*r*)**
Cardiac disease	Yes	93	15 (16.1)	0.003	**0.4 (0.2–0.8)**
	No	542	168 (31.0)		**1 (*r*)**
Respiratory disease	Yes	65	10 (15.4)	0.01	**0.4 (0.2–0.8)**
	No	570	173 (30.4)		**1 (*r*)**
Liver disease	Yes	113	21 (18.6)	0.008	**0.5 (0.3–0.8)**
	No	522	162 (31.0)		**1 (*r*)**
Musculoskeletal disease	Yes	285	47 (16.5)	≤0.001	**0.3 (0.2–0.5)**
	No	350	136 (38.9)		**1 (*r*)**
Hypertension	Yes	309	79 (25.6)	0.08	**0.7 (0.5–1.0)**
	No	326	104 (31.9)		**1 (*r*)**
Renal disease	Yes	22	4 (18.2)	0.3	**0.6 (0.2–1.6)**
	No	613	179 (29.2)		**1 (*r*)**
Diabetes mellitus	Yes	206	53 (25.7)	0.2	**0.7 (0.5–1.2)**
	No	**429**	**130 (30.3)**		**1 (*r*)**

BMI = Body mass index, COR = crude odds ratio, CI = Confidence interval, *r* = reference group.

same association was reported by many studies [3,23,37] among which a population-based, nationwide, cohort study in Germany [37] and a study conducted using objective assessment [23]. Less physical functioning, perceiving PA as inappropriate or even harmful in older age, partly explain this negative association. Also, self-efficacy and mobility may have their role in limiting PA in the elderly [23]. However, a borderline significant association was found among Korean men, but not in women [36]. Also, no significant association was observed among elderly people in Thailand.

The association of gender and PA was evident in the bivariate analysis and more evident with regression analysis, which showed that men were four times higher than women. Similarly, Hong reported that PA activity was significantly higher among men especially with regard to vigorous activity [36]. On the other hand, Ethisan reported a higher activity level among rural women in Thailand (OR: 95% CI, 2.98:1.70–5.23) [19]. In Germany, Manz et al. [37] found no association in a cohort, nationwide study. A recent systematic review concluded that the association of PA with gender is inconsistent and it needs to be studied within specific domains of PA, having different profiles of PA among men and women [38]. While more work-related PA, PA for transportation, and vigorous PA were reported among men, more light PA and house-related PA were reported by women [23,38].

The rural participants were more physically active than the urban. The effect of residence on PA among elderly varies widely between studies depending on each community's characteristics, prevailing work, and leisure-activity culture. Also, the social and physical environments modify, promote, or suppress PA. For example, Muntner et al. [39] reported a higher PA level among rural Chinese older adults (52.7%) compared with urban counterparts (9.8%), and most of this PA is work-related. Rural American older women were more sedentary than urban ones, with special reference to leisure time activity. Care giving was the most cited barrier [40]. In Poland, the PA level was higher among older adults residing in

Table 4. Multivariate logistic regression analysis of independent predictors of moderate/high physical activity among older adults, Mansoura, Egypt, 2018.

Predictors		*B*	*p*	AOR (95% CI)
Age (years)	60–64	0.9	0.003	**2.4 (1.4–4.4)**
	65–69	0.4	0.2	**1.5 (0.8–2.9)**
	≥70	-		**1 (*r*)**
Gender	Men	1.4	≤0.001	**4.2 (2.3–7.6)**
	Women	-		**1 (*r*)**
Currently working	No	1.0	≤0.001	**2.8 (1.8–4.2)**
	Yes	-		**1 (*r*)**
BMI	Normal	1.1	≤0.001	**3.1 (1.8–5.3)**
	Overweight	0.4	0.1	**1.5 (0.9–2.6)**
	Obese	-		**1 (*r*)**
Use assisted devices	Yes	−1.2	≤0.001	**0.3 (0.2–0.5)**
	No	-		**1 (*r*)**
Cardiac disease	Yes	−1.2	0.001	**0.3 (0.2–0.6)**
	No	-		**1 (*r*)**
Musculoskeletal disease	Yes	−1.1	≤0.001	**0.3 (0.2–0.5)**
	No	-		**1 (*r*)**
Constant		**−2.54**		
Model χ^2		**183.5, 0.001**		
% correctly predicted		**77.8**		

BMI = Body mass index, AOR = Adjusted odds ratio, CI = Confidence interval, *r* = reference category.
#The model included (age, gender, residence, education level, socioeconomic status, previous occupation, current working, social activities participation, BMI, smoking index, use of assisted devices, cardiac disease, respiratory disease, liver disease, and musculoskeletal disease) which were the significant predictors in bivariate analysis.

urban areas. Most of the difference was referred to education level and professional achievement which increase awareness to spend time in activities other than watching television. Also, access to leisure, sports, and social facilities available in urban areas plays another important role [41].

The study showed that physical activity level was significantly lower among participants with higher education and socioeconomic standard (SES), while income was not associated with PA. All these variables were non-significant after adjusting for other variables. Similarly, Ramires et al. [23] found the same negative association in their study which used objective assessment of PA. On the other hand, Manz et al. reported that higher PA level was observed among older adults of middle and high SES than others in Germany [37]. Notthoff et al. [38] found inconsistent association between education and total PA score. A clue to clarify the association was the study conducted by Kolbe-Alexander et al. who found that high SES individuals experience significantly higher leisure-time PA, and less transport PA compared to lower SES individuals. The Low SES people tend to walk, cycle, and use transport [42]. While countries like Germany have appropriate social and material resources and more PA friendly neighborhoods, a country like Egypt does not, which may partly explain the lower activity level among older adults with a higher SES.

Our study indicated that having a spouse or not, living alone or not, did not affect the PA level among the elderly. The same non-significant association of marriage with PA was found in 11 studies as reported by Notthoff et al. [38]. On the other hand, Ramires et al. [23] reported a higher PA level among married women, but this association was insignificant for men. Similarly, Manz, et al. [37] found a significant higher PA level among older adults with social support, but no association between PA and being married.

The current working status was a highly significant predictor of PA level, even after adjusting for the effect of other variables. The same significant association was found by Ramires et al. [23] in their study in which an objective assessment of PA was used. Retirement from work significantly reduces PA level [3], and this association can explain why participants who worked as employees had the lowest PA level, in our study. That is because, in Egypt, employees are the sector who retires at the age of 60 years, while others (e.g., manual workers or farmers) may continue to work after 60 years of age. Similarly, the elderly who participated in social activities showed two times higher PA level compared to others who did not.

Obesity is one of the problems that limit PA among people of any age and especially among the elderly. Even after adjusting for other variables, participants with normal weight were three times more active than obese participants. Similarly, some studies reported no association between obesity and PA [23,37]. The association of obesity and physical activity can run in two opposite directions. Obesity may result from physical inactivity and can act as a stimulator for more PA to improve obesity. This makes it difficult to assess the relationship [37]. Smoking was a non-significant independent predictor of PA, although PA was two times higher among nonsmokers compared to those with a smoking index of 20 or more. Similarly, participants suffering a respiratory disease showed a lower

PA level, although this effect did not persist after adjusting for other variables. Similarly, Manz et al. [37] reported that smoking was not associated with aerobic PA ≥1 day/week in their cohort study.

Use of an assistive device is a coping strategy that helps older adults overcome limitations in self-care and mobility activities. However, their use of these devices may force them to publicly admit their limitations, bringing disability stigma [43]. In this study, the use of assistive devices was associated with a significant reduction in moderate/high PA level. Similarly, activity limitation significantly reduces PA in Korean women [36].

Chronic diseases may act as a barrier or a trigger of PA, being a part of therapy, which may blur the association of chronic disease and PA [37]. Only the presence of cardiac disease was an independent predictor of lower PA level. Patients of chronic cardiac disease should be enrolled in a rehabilitation program, with the main core is closely monitored physical activity. After that, they should be encouraged to adopt an active lifestyle. Unsubstantiated considerations related to safety may be the reason for under-prescription of physical activity to cardiac patients [44]. In addition, low PA among participants with cardiac co-morbidity may be due to self-perceived poor health [23,38]. One of the important diseases that limit mobility and, of course, physical activity is arthritis [45]. However, not all studies, supported this finding [36]. Interventions to promote exercise among patients were found effective in improving the physical, mental, and social domains of health. The challenge is to maintain this activity level after any intervention [45]. All other chronic diseases were not predictors of PA level. The same results were found by some studies [36,37].

Study limitations

This study is cross-sectional, in which temporality cannot be determined. The self-reported levels of physical activity are subjective and liable to recall bias, especially with older ages. No devices as accelerometers or pedometers were used to measure PA due to their unavailability and non-feasibility in this community-based study. Also, the results cannot be generalized.

Recommendation

The level of PA was low among the studied population. Each community has its unique profile that predicts the PA level among the elderly people. Therefore, a successful intervention to tackle physical inactivity should be tailored for each community according to predetermined associated factors. Innovative collaborative work is urgently needed to reduce physical inactivity among older adults, to decrease the effects of non-communicable diseases, and preserve their muscle strength. Community interventions have been found to be effective to some extent in improving activity level. Promotion of physical activity through the primary health care system is another direction to devote efforts to. Counseling through a primary care physician could be effective, especially with older adults who have chronic diseases.

Ethics

Research was conducted in compliance with the principles of the declaration of Helsinki. Privacy and confidentiality were considered. Informed written consents were obtained from literate participants in the study, and in case of illiteracy, informed oral consents were obtained. The study was approved by the Institutional Research Board of Mansoura University (Code Number:R.19.01.412)

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Conflict of interest

The authors declared that they have no conflict of interest.

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