ORIGINAL ARTICLE

Association between Body Mass Index, Physical Activity and Quality of Life amongst Older People in Malaysia during COVID-19: A Cross-Sectional Analysis

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ABSTRACT

Introduction: COVID-19 is a disease caused by a new strain of coronavirus spreading rapidly over the globe, and the older population has had a larger impact as the fatality rate increases with age. This pandemic caused them to reduce their physical activity (PA). COVID-19 also resulted in food supply disruption and led to unhealthy dietary changes, which are usually associated with weight gain and affecting the body mass index (BMI). PA and BMI can influence the quality of life (QoL) of the older people. Therefore, this study aimed to determine the association between PA, BMI, and QoL amongst the older people in Malaysia during COVID-19. **Methods:** A cross-sectional study was conducted amongst community-dwelling older people from all states in Malaysia. An online survey consisting of self-reported anthropometry, Global Physical Activity Questionnaire- Malay version (GPAQ-M) and Short Form-36 Health (SF-36) Survey were collected. Statistical analysis chi-square test was used to identify the association between BMI, PA, and QoL. **Results:** This study included data from 180 individuals with a median age of 64.0 ± 9.8 years. The results showed that participants aged 60-69 years were significantly associated with better QoL, meanwhile, those who practice low PA levels were significantly associated with poor QoL. **Conclusion:** The findings revealed that age and PA were associated with QoL. Thus, the healthcare profession must emphasise regular PA to accomplish a better QoL amongst older people in the future.
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INTRODUCTION

In December 2019, the city of Wuhan (China) became the centre of an outbreak of unknown pneumonia. It has been rapidly spreading all over the world, prompting the World Health Organisation (WHO) to designate it as a global pandemic. This novel Coronavirus (COVID-19) pandemic profoundly impacted older adults and caused fear and suffering in all aspects of life (1). In order to control the outbreak, the government has established a Movement Control Order (MCO). Besides movement restrictions, the government also implemented social distancing and banned mass gatherings because of the effectiveness in breaking the chain of transmission. However, this implementation may impact the quality of life amongst all populations, especially older people who needs to be more investigated.

Although all population groups were affected by the COVID-19 pandemic, older people had a more significant impact as the case fatality rate increased with age. One of the main factors contributing to the high number of COVID-19 deaths was due to the weakened immune systems among these older people (2). When a person ages, the immune systems grow weaker, making them unable to retaliate against the assault of bacteria or viruses, which are pathogens in all diseases (2). The COVID-19 crisis has resulted in many other issues, some of which were not directly connected to the disease but to the lockdown measures implemented globally. Although a lockdown was required to contain the spread

of disease, its physical and psychological implications have already been detected. Early research suggested that the extended lockdown and crisis's psychological impacts include elevated stress, anxiety, depression, and sadness (3,4). In addition, an online survey conducted by Yamada et al. (2020) in Japan showed that physical activity during COVID-19 amongst older people was significantly lower than before COVID-19 (5). They also suggested that this finding may trigger the risk or incidence of disability amongst the older people in the near future. Most people, especially older people, are challenged by the requirement to spend more time at home, temporary cessation of employment, and other activities. This pandemic does not only affect the mental health of the older people but also leads them to lack physical activity (PA), especially for those who usually spend their time exercising outdoors. Being physically inactive may be due to insecurities and fear of going out as their population is more vulnerable to these infectious diseases.

A low level of physical exercise is closely linked to an increased risk of developing certain diseases like depression, cancer, diabetes mellitus, coronary vascular disease, and mortality (6). Despite that, due to the mandatory restriction, all sports and physical activities will be reduced. However, regular PA is needed to maintain good physical and mental health amongst older people, especially during this pandemic. Previous studies found that low levels of physical and cognitive, being overweight or obese body mass index (BMI), and also physically inactive were related to poor quality of life (QoL) amongst home-dwelling older people (7–10). Meanwhile, concomitant diseases played an essential role in determining QoL status amongst institutionalised older people (11).

In addition, this outbreak has also resulted in food supply disruptions and a lack of necessary materials such as medicines, supplements, and healthy foods, causing older people to be malnourished and consume unhealthy foods. Unhealthy diet and lifestyle were found to be factors contributing to an increased screening time and decreased PA level, which will lead to weight gain (12). Various studies in other countries have also reported the consequences of this pandemic on the QoL amongst older people, and some of them have negative changes through PA and BMI (12,13). Age and chronic diseases are also some factors that may impact the QoL amongst the older people (14,15). Studies involving QoL amongst the older people were considered compulsory and vital since they can assess the effectiveness of health intervention, welfare programmes, health care, and the well-being of the older population (16). However, lack of research in determining the QoL and its associated factors amongst older people in Malaysia during the COVID-19 pandemic. Therefore, this study focused on the association between BMI, PA, and QoL amongst older people in Malaysia during the COVID-19 pandemic.

MATERIALS AND METHODS

Study Design and Sample Collection

A cross-sectional study was conducted amongst older people living in all states in Malaysia from February 2021 to July 2021. A total of 180 participants were recruited through the distribution of an online survey using social media networks including e-mail invitations, sharing on official pages, Facebook, Instagram, and WhatsApp. This study included participants aged 60 years and above, living in Malaysia, and having a good memory. Exclusion criteria included those who could not answer the questionnaire due to severe dementia, physical function impairment, mental retardation, and Down Syndrome. An Elderly Cognitive Assessment Questionnaire (ECAQ) translated into Malay was used to assess participants for dementia. ECAQ originated in Singapore. The maximum score of this tool is ten points, which assesses memory and information orientation as two aspects of cognitive function. According to the validation conducted in Singapore, the ECAQ has an ideal cut-off score of 5 and below that optimally recognized dementia with a sensitivity of 85.3%, specificity of 91.5%, and positive predictive value of 82.8% (17). This study was conducted and approved by the Human Research and Ethics Committee (UniSZA/UHREC/2021/222). The participants gave their informed consent to participate in this anonymous survey by electronically completing and submitting the questionnaires in Google Docs. Participants were cross-examined by using a standardised online questionnaire on several parameters such as age, ethnicity, and chronic diseases. This online questionnaire consisted of information on socio-demographics, Global Physical Activity Questionnaire-Malay (GPAQ-M), and Short Form-36 Health Survey (SF-36). In order to boost the number of people who receive the invitation to the study and increase the number of participants, the researchers also invited the participants to share the study link. The participants were selected using a snowball sampling method. If an older person was illiterate and unable to access the internet or smartphone, which prevented them from responding, their caregiver assisted them in conducting the online survey.

Sample size calculation

The sample size was calculated by using a comparing two means formula by considering 10% dropout of a selected variable amongst older people from previous studies. The researcher took the largest sample size for the present study. Jasvindar Kaur and colleagues (2015) reported that the prevalence of physical activity amongst older people was 12% (18). The estimated sample size was 180 participants.

Anthropometric measurements

The self-administered questionnaire included the self-reported weight and height of the participants, which were used to calculate the BMI of each participant.

This self-reported weight and height were usually more prone to be biased because participants tend to underestimate their weight and overestimate their height. Despite that, several studies have been carried out to prove the validity of self-reported questionnaires for anthropometry. Firstly, a study in France compared a web-based self-reported weight, height, and BMI to standardised clinical measurements to test their validity. This study showed that the validity of web-based reports was high as compared to clinical data, as the intraclass correlation coefficient (ICC) ranged from 0.94 for height to 0.99 for weight. Therefore, self-reported is considered a valid procedure for collecting anthropometric data (19). This finding was supported by Pursey et al. (2014), stating that self-reported and measured anthropometric data showed a moderate to high reliability (20).

Assessment of body mass index (BMI)

The WHO used BMI to measure if a person is of a healthy weight for their height. This study classified BMI using a cut-off as suggested by Nutrition Screening Initiative (NSI) (21). They were classified as underweight if BMI < 22.0 kg/m^2, normal if 22.0-27.0 kg/m^2, and overweight if > 27.0 kg/m2. This BMI classification was also used in a study by Suzana et al. (2017) that was conducted among Malaysian older people aged 60 years and above (22). The higher BMI cut-off value for older persons was chosen since several longitudinal studies showed that older people who have higher BMIs and less muscle will have higher mortality rates (23).

Assessment of physical activity (PA)

The researcher accessed the PA level by using the Global Physical Activity Questionnaire-Malay (GPAQ-M). The validity and reliability of this GPAQ-M were evaluated by comparing it to the International Physical Activity Questionnaire- short version (IPAQ-S) in a study conducted by Soo et al. (2015) (24). Findings showed a strong association between GPAQ-M and IPAQ-S for various intensities of physical activity (rs = .309-.466, P < 0.01). The participants were asked to report how much time they spent doing moderate-intensity and vigorous-intensity PA within each PA domain. The total for PA level METs-minutes/ week was calculated by using an equation from WHO: Total PA MET-minutes/ week = [(P2 * P3 * 8) + (P5 *P6 * 4) + (P8 * P9 * 4) + (P11 * P12 * 8) + (P14 * P15* 4)]. Generally, those with lower PA took < 600 MET-min/week; those with moderate PA took 600–2999 MET-min/week, and those with higher PA took > 3000 MET-min/week (25).

Quality of life (QoL) assessment

SF-36 was used to determine QoL. Physical functioning (PF), role limitations due to physical problems (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health (MH) were amongst the 36 items included in this questionnaire. These eight subscales were then separated into two summaries: physical component summary (21 items: PF, RP, BP, GH) and mental component summary (14 items: VT, SF, RE, MH). Each item had scored on a zero to hundred-point scale. A higher score in SF-36 indicated greater health in QoL. However, the calibration of scores makes 50 the mean or norm. Only the fact that a lower score indicates poorer health is mentioned in certain studies (6,26). Score 50 has reportedly been used in several studies to draw a line between lower and higher well-being scores 27. All eight SF-36 health survey domains have Cronbach's alpha coefficients that meet the minimum requirement of 0.70, with values ranging from 0.70 to 0.98 28.

Statistical analysis

The statistical data analysis was performed by using the International Business Machines Corporation-Statistical Package for Social Science program (IBM-SPSS) version 21.0. Normality test was applied by using Kolmogorov-Smirnov test. The socio-demographic details were tested by using descriptive statistics to determine their frequency. Mann-Whitney test was used to measure the mean differences. In addition, the Chi-square test or Fisher's exact test was used to assess the association between each of the variables and the participants' QoL. The statistical significance of all tests was set at $p < 0.05$, and the researcher did each test according to the objectives of the study.

RESULTS

Socio-demographic data

A total of 180 participants were involved in this study. Most participants were females (55%), Malay (95%), Islam (95.6%) and were married (60.6%) (Table I). More than half (51.7%) of the participants came from Terengganu, and only 0.9% from Sabah. Around 45.6% of the participants reported having no current chronic diseases; the highest number was four diseases in one participant.

Anthropometry, body mass index (BMI) and physical activity (PA)

Table II presents the results of the weight, height, BMI, and PA category of the participants. The median (IQR) height and weight for females and males were 154 (6.00) cm and 165 (12.50) cm, 58.0 (12.00) kg and 70.7 (18.00) kg, respectively. For the BMI category, 27.3% of females and 17.3% of males were underweight; 23.2% of females and 38.3% of males were overweight. There were significant differences in height, weight, and BMI between genders ($p < 0.05$). The majority of them engaged in low-level PA, which was 46.5% females and 34.6% males, followed by moderate level (31.3% females and 29.6% males), and high level (22.2% females and 35.8% males). Overall, there was a significant difference in the total score of PA between females and males ($p < 0.05$).

Table I: Sociodemographic characteristics of participants (n= 180)

Sociodemographic characteristics	Female (n= 99)	Male (n= 81)	Total (n= 180)	P-value[a]
Age, n (%)				
Mean (SD)	65.00 (12.00)	63.00 (6.00)	64.00 (9.80)	0.004*
60-69	62 (62.6)	67 (82.7)	129 (71.7)	
70-79	21 (21.2)	9 (11.1)	30 (16.7)	
80-89	11 (11.1)	4 (4.9)	15 (8.3)	
90-99	5 (5.1)	1 (1.2)	6 (3.3)	
Ethnicity, n (%)				
Malay	95 (96.0)	76 (93.8)	171 (95.0)	
Chinese	4 (4.0)	3 (3.7)	7 (3.9)	
Indian	0 (0.0)	1 (1.2)	1 (0.6)	
Dusun	0 (0.0)	1 (1.2)	1 (0.6)	
Marital Status, n (%)				
Single	10 (10.1)	9 (11.1)	19(10.6)	
Married	42 (42.4)	67 (82.7)	109 (60.6)	
Divorced	1 (1.0)	4 (4.9)	5 (2.8)	
Widowed	46 (46.5)	1 (1.2)	47 (26.1)	
Religion, n (%)				
Islam	95 (96.0)	77 (95.1)	172 (95.6)	
Hindu	0 (0.0)	1 (1.2)	1 (0.6)	
Christianity	4 (4.0)	3 (3.7)	7 (3.9)	
States, n (%)				
Johor	5 (5.1)	1 (1.2)	6 (3.3)	
Kedah	11 (11.1)	3 (3.7)	14 (7.8)	
Kelantan	7 (7.1)	4 (4.9)	11 (6.1)	
Melaka	3 (3.0)	2 (2.5)	5 (2.8)	
Negeri Sembilan	2 (2.0)	0 (0.0)	2 (1.1)	
Pahang	2 (2.0)	7 (8.6)	9 (5.0)	
Perak	4 (4.0)	5 (6.2)	9 (5.0)	
Perlis	2 (2.0)	3 (3.7)	5 (2.8)	
Pulau Pinang	2 (2.0)	2 (2.5)	4 (2.2)	
Sabah	0 (0.0)	1 (1.2)	1 (0.6)	
Selangor	8 (8.1)	8 (9.9)	16 (8.9)	
Terengganu	51 (51.5)	42 (51.9)	93 (51.7)	
Wilayah Persekutuan	2 (2.0)	3 (3.7)	5 (2.8)	
Chronic Diseases, n (%)				
No disease	44 (44.4)	38 (46.9)	82 (45.6)	
1 disease	37 (37.4)	30 (37.0)	67 (37.2)	
2 diseases	13 (13.1)	9 (11.1)	22 (12.2)	
3 diseases	5 (5.1)	3 (3.7)	8 (4.4)	
4 diseases	0 (0.0)	1 (1.2)	1 (0.6)	

[a] Mann-Whitney Test was applied * Significant at P <0.05

Quality of life (QoL)

The median score of overall QoL was 61.05 ± 27.90, indicating a good QoL amongst the participants. In addition, the three highest medians amongst the eight domains were 'Social Functioning' followed by 'Mental Health' and 'Bodily Pain' as shown in Table III which were 75.00 (37.50), 70.00 (35.00) and 67.50 (34.40), respectively. The PCS, MCS, and total scores of QoL between females and males were statistically significant ($p < 0.05$). In addition, PCS and MCS scores also indicated that males reported a good QoL as compared to females.

Association of sociodemographic characteristics, body mass index (BMI), physical activity (PA), and quality of life (QoL)

The majority (71.7%) of participants were aged between 60 and 69 years and had chronic diseases (54.4%). Table IV compares the participants' age and presence of chronic diseases between the QoL. The findings showed significant associations between age and QoL amongst the participants (p=0.02). Those aged between 60 and 69 years have a better quality of life as compared to other age groups. However, there was no significant association between the presence of chronic diseases and QoL (p=0.139).

Most participants (47.2%) had a normal BMI and practiced a low PA level (41.1%). There was no significant association between BMI and QoL (p=0.405). In contrast, QoL was significantly associated with PA (p=0.004). Participants who were physically inactive or practiced a low level of PA (59.6%) had poorer QoL compared to those practicing moderate and high PA levels (Table V).

DISCUSSION

The aim of this current study is to determine the association between the level of physical activity and

Table II Anthropometric, BMI and physical activity of participants (n= 180)

	Female (n= 99)		Male (n= 81)		Total (n= 180)		p-value[a]
	n (%)	Median (IqR)	n (%)	Median (IqR)	n (%)	Median (IqR)	
Anthropometry Data							
Height (cm)	-	154.00 (6.00)	-	165.00 (12.50)	-	90.25 (12.00)	<0.001*
Weight (kg)	-	58.00 (12.00)	-	70.70 (18.00)	-	62.00 (19.00)	<0.001*
Body Mass Index	-	24.77 (5.60)	-	25.91 (4.80)	-	25.99 (5.50)	0.038*
Underweight	27 (27.3)	20.00 (3.00)	14 (17.3)	20.30 (2.43)	41 (22.8)	20.00 (3.00)	0.483
Normal	49 (49.5)	25.00 (2.90)	36 (44.4)	25.05 (2.05)	85 (47.2)	25.00 (2.45)	0.719
Overweight	23 (23.2)	31.10 (6.50)	31 (38.3)	29.40 (4.30)	54 (30.0)	30.10 (5.78)	0.106
METs							
Low	46 (46.5)	40.50 (245.00)	28 (34.6)	70.00 (350.00)	74 (41.1)	70.00 (275.00)	0.884
Moderate	31 (31.3)	1760.00 (1120.00)	24 (29.6)	1640.00 (1207.75)	55 (30.6)	1680.00 (1120.00)	0.966
High	22 (22.2)	5550.00 (2820.00)	29 (35.8)	5760.00 (4940.00)	51 (28.3)	5640.00 (3728.00)	0.746
Total METs	99 (100.0)	880.06 (2400.00)	81 (100.0)	1680.08 (4190.00)	180 (100.0)	1180.33 (3410.00)	0.047*

[a] Mann-Whitney Test was applied
* Significant at p <0.05
Cut off-point BMI according to NSI:
Underweight (<22), Normal (22.0-27.0), Overweight (>27.0)
Cut-off point METs according to Lingesh et al:
Low (<600), Moderate (≥ 600 – 2999), High (≥ 3000)
Abbreviations: BMI, Body Mass Index; cm, centimeters; kg, kilograms; METs, Metabolic Equivalent of Task

Table III: Quality of life (QoL) of participants (n= 180)

	Female Median (IqR)	Male Median (IqR)	Total Median (IqR)	P-value[a]
Physical component summary (PCS)	53.10 (26.90)	66.30 (27.50)	59.25 (29.40)	0.002*
Physical functioning	55.00 (40.00)	70.00 (35.00)	55.00 (40.00)	0.003*
Physical role	50.00 (37.50)	50.00 (50.00)	50.00 (50.00)	0.085
Bodily pain	57.50 (32.50)	77.50 (45.00)	67.50 (34.40)	0.002*
General health perception	60.00 (20.00)	60.00 (25.00)	60.00 (25.00)	0.192
Mental component summary (MCS)	56.60 (28.00)	64.60 (29.40)	62.85 (31.50)	0.027*
Vitality	50.00 (18.80)	56.25 (25.00)	56.25 (18.80)	0.006*
Social functioning	75.00 (37.50)	75.00 (37.50)	75.00 (37.50)	0.023*
Emotional role	50.00 (50.00)	50.00 (70.80)	50.00 (58.30)	0.147
Mental health	65.00 (30.00)	70.00 (30.00)	70.00 (35.00)	0.131
Total QoL	54.40 (22.50)	64.30 (24.90)	61.05 (27.90)	0.003*

[a] Mann-Whitney was applied * Significant difference at p <0.05
Abbreviations: QoL, Quality of Life; PCS, Physical Component Summary; MCS, Mental Component Summary

Table IV: Association between gender, age, presence of chronic disease and Quality of Life (QoL)

Variables	N (%)			X^2 statistic (df)	p-value
	Total	Poor QoL (n=52)	Good QoL (n=128)		
Gender				5.983	0.02[b*]
Male	81 (45.0)	16 (30.8)	65 (50.8)		
Female	99 (55.0)	36 (69.2)	63 (49.2)		
Age (years)				9.345	0.02[a*]
60-69	129 (71.7)	30 (57.7)	99 (77.3)		
70-79	30 (16.7)	15 (28.8)	15 (11.7)		
80-89	15 (8.3)	6 (11.5)	9 (7.0)		
90-99	6 (3.3)	1 (1.9)	5 (3.9)		
Chronic disease				2.397	0.139[b]
No	82 (45.6)	19 (36.5)	63 (49.2)		
Yes	98 (54.4)	33 (63.5)	65 (50.8)		

[a] Chi-square Test, [b] Fisher's exact test was applied
* Significant at p <0.05
Abbreviations: QoL, Quality of Life

Table V: Association between BMI, physical activity and Quality of Life

Variables	N (%)			χ^2 statistic (df)	p-value
	Total	Poor QoL	Good QoL		
Body Mass Index (BMI)				1.809	0.405[a]
Underweight	41 (22.8)	15 (28.8)	26 (20.3)		
Normal	85 (47.2)	24 (46.2)	61 (47.7)		
Overweight	54 (30.0)	13 (25.0)	41 (32.0)		
Physical Activity				11.156	0.004[a*]
Low	74 (41.1)	31 (59.6)	43 (33.6)		
Moderate	55 (30.6)	13 (25.0)	42 (32.8)		
High	51 (28.3)	8 (15.4)	43 (33.6)		

[a] Chi-square Test, [b] Fisher's exact test was applied
* Significant at p <0.05
Abbreviations: BMI, Body Mass Index; QoL, Quality of Life

BMI towards the QoL amongst the older people. Findings showed that those older people aged 60-69 years had better QoL, and participants who practice low PA levels had significantly poor QoL. However, there were no association between BMI and QoL amongst these older population.

In this study, almost half of the respondents had normal BMI as compared to those underweight and overweight. There were also significant differences in weight, height, and BMI between genders. This result was supported by a previous studies conducted amongst older people in Iran where almost half of their participants had normal weight compared to other categories (10). Similar to our findings, a study conducted during the COVID-19 pandemic showed that majority of the participants had normal BMI as compared to other BMI categories (12).

This study showed a significant difference in total scores of PA between genders. However, majority of the participants reported a low level of PA. During COVID-19, the older people lack PA because they might fear exercising outdoors. This finding was supported by an online survey conducted in Japan where total PA amongst the older people in Japan during COVID-19 was significantly lower as compared to before the pandemic (5). In addition, the French National Observatory for Physical Activity and Sedentary Behaviours also conducted a national survey to evaluate how confinement during COVID-19 affected PA. They also concluded that 39.2% of older people had reduced their PA level (29). Based on this study, males engaged in higher PA levels than females (median MET-hr/week was 1680.0 in males and 880.1 in females, p=0.047). This study was supported by an Iranian study showing that men were more inclined to engage in physical activity as compared to women. This practice may reflect the reality whereby women were usually involved in household activities considered low-level PA and insufficient for adequate energy expenditure amongst them (30). Regular PA is vital due to its benefits in health promotion, prevention, and protection from diseases. Therefore, public health authorities should assist the elderly and promote suitable indoor exercises to ensure they are physically active even during the COVID-19 pandemic.

This study revealed a significant difference in PCS, MCS, and total scores of QoL between both genders. Furthermore, males reported a good QoL as compared to females (median of total QoL was 64.30 for males and 54.40 for females). According to Kvamme et al. (2011), these differences amongst gender might be due to females being more likely to report their health issues than males, and older female also have high expectations of physical and mental well-being (31). These findings were also supported by Cheraghi et al. (2016), where they concluded that males had higher scores for SF-36 as compared to older females (32). According to Arab-Zozani et al. (2020), these gender differences may possibly result from the fact that females were more worried about COVID-19 and were less prepared to deal with this situation (14). However, a study conducted during the COVID-19 pandemic revealed that the QoL amongst the older people was significantly decreased throughout the pandemic as compared to the prior year pre- COVID-19 pandemic (33). This may be due to the significant effect of social isolation and loneliness during the lockdown leading to poor QoL.

The current study concluded that QoL had significantly improved in young older people aged 60-69 years. The ageing process played an essential role in QoL since lower QoL scores were associated with a high rate of comorbidity amongst the older people (34). According to previous studies, health problems become more ordinary amongst them as their age increased (35,36). Then, the chances of losing their partners also increased with advancing age (36). Thus, both physical and psychological QoL reduces as age increase. Many studies reported a negative association result between age and QoL. Findings revealed that the older age group had lower scores of QoL than the other age groups, indicating poor QoL amongst the older people (33,34,36,37). It was also reported that the older people had higher anxiety levels because they were at risk during this COVID-19 pandemic (38).

Older people with chronic diseases may suffer from various illnesses that can limit their movement and restrain them from doing many activities. They might feel worried about themselves, which can lead to emotional distress and negative thoughts and feelings. A study from Korea summarised that at least one of the chronic diseases is associated with lower scores of QoL than those with no chronic diseases (39,40). People with chronic conditions may have poor QoL because they usually require medical attention or treatment follow-up; however, due to the lockdown, all these were restricted (40). Additionally, in Morocco, the COVID-19 pandemic negatively affects the QoL and well-being of people with chronic diseases (38). This might be due to the difficulties in assessing healthcare services. However, this present study found no association between the presence of chronic diseases and QoL. Similarly, a study amongst Thailand older people showed no link or association between chronic diseases and QoL (41). This may be because QoL itself may not be determined by chronic illness only, but other factors, such as illness acceptance, may also play a role.

This study observed no association between BMI and QoL. Similar to a study from Korea that found no significant association between BMI and QoL in the Korean older people (26). Unfortunately, many previous findings contradicted the current result, possibly due to using different BMI categories. One of them was a study by Rambod et al. (2020), where they concluded

that BMI had a negative association with QoL; and thus, overweight (25 kg/m^2 ≥BMI≤ 29.9 kg/m^2) and obese (BMI≥30 kg/m^2) older people had poor QoL as compared to normal-weight older people (18.5 kg/m2 ≥BMI≤ 24.9 kg/m^2) (10). Besides that, a study in the United States stated that underweight (BMI≤18.5 kg/m^2), obese class I and II (30 kg/m^2 ≥BMI≤39.9 kg/m^2), and morbidly obese (BMI≥40 kg/m^2) categories are negatively associated with QoL (42). In general, being overweight and obese are usually associated with bad outcomes. However, some research showed that the older people being overweight (23 kg/m^2 ≥BMI≤ 24.9 kg/m^2) or moderately obese, especially class 1 obese (25 kg/m^2 ≥BMI≤ 29.9 kg/m^2), was associated with longer life and better response to the treatment (8). This is called an "obesity paradox" when the researchers concluded that obese older people were associated with higher QoL on the SF-36 mental scales compared to those with normal weight. Thus, any interventions developed must emphasise weight management to enhance their QoL.

This study showed a significant association between PA and QoL amongst these older people, whereby those who practice low PA levels had poorer QoL. Many studies reported similar results as this study. Abdelbasset et al. (2019) concluded that older people in Egypt who practice a moderate or high level of PA had a higher QoL score than those that engaged in a low level of PA (9). Another study also found that higher levels of PA were positively linked to better long-term QoL amongst the older people (6). This can be explained by the link between practicing high physical activity with the improvement in physical functioning, physical role, vitality, social functioning and mental health (6). Unfortunately, the COVID-19 pandemic makes them lack PA, especially for those who usually exercise outdoors because they might fear going outside as their population is more vulnerable to these infectious diseases (43). Many studies have reported the beneficial effects of PA on QoL outside the confinement period. Unfortunately, few studies have looked into the association between PA and QoL during confinement periods, such as during this COVID-19 quarantine (13).

Strength, Limitations and recommendation

This study used a well-validated GPAQ-M and SF-36 to assess the PA and QoL amongst the participants. According to Amarantos et al. (2001), the SF-36 questionnaire is more comprehensive and has a more extensive evidence base (44). Scientific literature has increasingly reported on the SF-36 Total/Global/Overall Score, a global indicator of health-related quality of life (45). Numerous research that used this measure was released in prestigious publications.

However, there were a few limitations that require consideration in this study. Firstly, majority of the participants were from Terengganu, Malaysia, so this study sample may not represent the community-dwelling older people in the country. Secondly, since this was an online data collection, the researcher had to depend on the person's response and their relatives. This may lead to under or over-reporting of information. The ability of older people to comprehend and complete the questionnaire accurately may be quite poor, which can reduce the reliability of the QoL assessment. Thirdly, the self-reported weight and height might introduce a differential misclassification bias. The association between BMI, PA, and QoL in this study did not include obesity in the BMI classification. Therefore, further research should consider including the obese BMI category to gain a deeper understanding on the relationship between BMI and QoL amongst older people.

CONCLUSION

In conclusion, this study found a significant association between age and PA on the QoL amongst older people during the COVID-19 pandemic. Results showed that younger old participants aged 60-69 years were associated with better QoL, meanwhile, those who practice low PA levels were associated with poor QoL. However, no association was observed between BMI and QoL. Thus, this study may provide the basis for further research to improve the health and well-being of older people living in this country. Even though this study showed no association between BMI and QoL, weight management is essential. It must be emphasised to achieve a better quality of life amongst the older people. In addition, it is vital to highlight the need for PA amongst the older people, especially during the COVID-19 pandemic, because engaging in regular PA is crucial for health promotion, prevention, and protection from certain diseases. Therefore, healthcare professionals can advocate healthy lifestyle approaches such as weight management and exercise as BMI and PA are two variables related to QoL.

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