

Original article

Physical Activity Insufficiency and Perceived Barriers among Libyan Adults during Ramadan: A Community-Based Cross-Sectional Study

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Correspondence email: drsana04@yahoo.com**Abstract**

Regular physical activity is essential for maintaining health. During Ramadan, fasting and daily routine changes may influence physical activity engagement. This study describes physical activity levels and perceived barriers to physical activity during Ramadan among Libyan adults. It also examines the contribution of perceived barriers to insufficient physical activity, after adjusting for selected sociodemographic and clinical characteristics. A community-based cross-sectional study was conducted in Tripoli, Libya, using a self-reported structured questionnaire developed as a part of a broader study on health-related behaviors during Ramadan. For this paper, physical activity was assessed using the International Physical Activity Questionnaire (IPAQ). Data analyzed using SPSS. A total of 113 responses were included in this analysis. The median age of the respondents was 28.00 years (IQR: 23.00- 36.00), and 60.2% were females. More than half of the respondents (56.1%) had insufficient physical activity during Ramadan. Median vigorous and moderate intensity activity were both 0 MET-min/week (IQR:0-240 and 0-480, respectively), while walking was the main contributor to total activity (Median=297 MET-min/week, IQR: 0-693). The most commonly reported barriers to physical activity were time constraints due to family and work commitments (68.2%), and fatigue during Ramadan daytime (64.5%). None of the studied variables showed a statistically significant contribution to insufficient physical activity. In conclusion, insufficient physical activity was considerable among Libyan adults during Ramadan, which may have adverse impacts on their health. Targeted interventions to promote physical activity during Ramadan are needed. Further research is recommended to identify the predictors of insufficient physical activity during this month.

Keywords. Ramadan fasting, Physical activity, Perceived Barriers, IPAQ, Libya, Exercise, Sedentary behavior.

Introduction

Physical activity has a well-established role in maintaining cardiometabolic and mental health. Sufficient physical activity is important for the prevention as well as control of several chronic diseases like type 2 diabetes (1, 2), and hypertension (3-5). Regular physical activity also promotes mental well-being, and its impact on the prevention and management of many mental disorders is well documented (6, 7). Beyond its direct clinical benefits in chronic disease prevention and control, regular exercise shows a consistent association with both overall quality of life and health-related quality of life (8, 9). On the other hand, physical inactivity is recognized as having profound adverse impacts on health through the progression of chronic diseases, and is associated with reduced life expectancy (10, 11). For instance, physical inactivity has been reported to have a clear link with increased all-cause and cardiac mortality in patients with heart failure (12).

Despite the well-established benefits of physical activity, global levels of insufficient physical activity remain considerable and continue to rise. The estimated global prevalence of physical inactivity among adults increased from 23.4% in 2000 to 31.3% in 2022 (13). Moreover, the prevalence of insufficient physical activity was higher in the Eastern Mediterranean Region, including Libya, reaching 40%, which is well above the global average of 31.3% (13).

The burden of physical inactivity may be further impacted during Ramadan, as fasting may alter daily routine, sleep-awake cycle, and energy hydration level. However, studies have shown inconsistent or even conflicting evidence regarding the impact of Ramadan fasting on physical activity levels. Several studies (14, 15) and a recent review on the impact of the intermittent fasting on physical performance (16) have reported a significant decline in physical activity among fasting individuals during Ramadan. Nevertheless, other evidence points in the opposite direction. A Malaysian study found no significant difference in physical activity level before, during and after Ramadan (17), a more recent Saudi study likewise found no significant difference in physical activity level before and during Ramadan (18), and a meta-analysis similarly reported no significant change in physical activity between before and during Ramadan (19).

Sustaining sufficient physical activity levels during Ramadan may be challenged by several factors. Age and sex have been shown to influence changes in physical activity during and outside Ramadan in some populations (20). Changes in daily schedules during Ramadan, including the reallocation of time toward work, religious and social activities have been reported to influence how much time individuals devote to physical activity (17). Time constraints, particularly among specific occupational groups such as healthcare providers (21), as well as fatigue and low energy levels, have also been commonly reported barriers (22). Recognizing and addressing these barriers is important, as even short periods of physical inactivity can adversely affect health. For instance, a study among healthy individuals found that just one day of sitting markedly reduced insulin action by up to 39%, which could profoundly impact metabolic health (23).

The conflicting evidence regarding the effect of Ramadan fasting on physical activity levels, together with the evidence on that even a short-term reduction in physical activity can have measurable adverse health effects, highlights the need to examine physical activity levels among fasting individuals in Ramadan. To date, limited research has examined physical activity during Ramadan among the Libyan population. Moreover, few studies have examined physical activity levels and

their predictors during Ramadan while accounting for sociodemographic and clinical characteristics. Given the likelihood that Libyans may face unique barriers distinct from those reported in other populations, a locally based study is warranted. Therefore, this study aims to describe physical activity levels and perceived barriers to physical activity during Ramadan among Libyan adults. It also examines the contribution of perceived barriers to insufficient physical activity, after adjusting for selected sociodemographic and clinical characteristics.

Methods

This study represents a sub-analysis of data collected as part of a larger community-based cross-sectional study conducted in Tripoli, Libya during Ramadan (March 2025). This paper focuses specifically on physical activity levels and associated barriers among fasting individuals during Ramadan.

A total of 117 adults were invited to participate in the main study using a non-probability convenience sampling approach. Adults aged 18 and above who voluntarily agreed to participate in the study were included. Non fasting individuals as due to medical exemptions or other reasons were not eligible.

A structured questionnaire was developed for the broad community-based study, of which two parts were utilized for the purpose of the present paper. The first part covers sociodemographic characteristics (e.g., age, sex) and clinical characteristics, including presence of chronic disease and smoking status. The second part addressed physical activity and comprised two components: (I) the official Arabic Short Form of the International Physical Activity Questionnaire (IPAQ-SF) (24, 25), which has been used previously in studies among Arabic speaking adult population (26, 27), used to assess physical activity. The PAQ-SF measures the frequency (days/week) and duration (minutes per day) of vigorous intensity activity, moderate intensity activity and walking over the preceding seven days. (II) A scale assessing perceived barriers to physical activity, consisting of 6 items (e.g., time constraints due to family and work commitments, fatigue during Ramadan daytime), with responses rated on a 5-point Likert agreement scale ranging from strongly disagree to strongly agree.

Physical activity level was categorized as low, moderate and high based on standard IPAQ scoring criteria, which combine reported days and duration of vigorous, moderate and walking activity with total MET-minutes/ week. Where respondent met criteria for more than one level simultaneously, the higher activity level was assigned, consistent with IPQ classification hierarchy. Respondents who recorded zero days, or who did not report a duration for a given activity domain, were coded as zero for that particular domain. Consistent with IPAQ scoring guidelines, any reported activity duration exceeding 180 minutes per session was reset at 180 minutes prior to calculation of MET-minute/ week. For bivariate and multivariate analysis, physical activity was defined as the binary variable physical activity sufficiency status: sufficiently active (Combining the moderate and high categories), which denotes health-enhancing physical activity (HEPA), versus insufficiently active (Low category) as per IPAQ scoring protocol. (28). Responses to each perceived barrier to physical activity were dichotomized into Agree (Agree and Strongly agree) and Do not agree (Neutral, Disagree, Strongly Disagree).

Data were analyzed using SPSS version 26. Out of the 117 returned questionnaires, four were largely incomplete and were excluded from this analysis. Data of 113 respondents were thoroughly examined prior to the main analysis. A few missing values were found on income (n=6), marital status (n=1), and smoking status (n=2), and were treated using listwise deletion in the bivariate and multivariable analysis. For physical activity, two cases across the physical activity items (one in moderate domain and one in walking domain) reported zero days but a non-zero duration; these durations were recoded to zero to ensure logical consistency. Additionally, three values on the moderate intensity item, and three on the walking item exceeded 180 minutes per session and were capped at 180 minutes as per IPAQ scale instructions. Duration data were missing despite non-zero reported days in 6 cases (5.3%) for vigorous activity, 15 cases (13.3%) for moderate activity, and 23 cases (20.4%) for walking activity. These were excluded from the respective activity domain and total MET-minute calculations using listwise deletion. The IPAQ sitting-time item had a substantially high proportion of missing values (55.4%) and was therefore managed using listwise deletion during data analysis.

Descriptive statistics were reported as appropriate to the type and distribution of the data. In bivariate analysis, the Chi-square test, Fisher's Exact test, and the Mann-Whitney U test were used as appropriate to assess the association between the study variables and physical activity sufficiency status. Variables showing a significant ($p < 0.05$), or nearly significant ($p < 0.25$) crude association with the outcome variable were considered in multivariate analysis, using a logistic regression model to identify predictors of insufficient physical activity in Ramadan.

Results

The median age of the respondents was 28.00 years (IQR: 23.00-36.00), and females represented 60.2% of the sample. More than half of the respondents were unmarried (68.8%), and the majority have university level of education or higher (83.2%). Just over half of the respondents were unemployed (56.6%). Only 12.4% have chronic disease, and 17.1% were smokers (Table 1).

Table 1 Sociodemographic and clinical characteristics of the respondents (n=113)

Sociodemographic characteristics	f	(%)
Age (Years), Median (IQR)	28.00	(23.00- 36.00)
Sex		
Male	45	(39.8)
Female	68	(60.2)
Educational level		
Secondary schooling or less	19	(16.8)
University or higher	94	(83.2)
Marital status (n=112)		
Unmarried	77	(68.8)
Married	35	(31.3)
Employment		
Employed	49	(43.4)
Unemployed	64	(56.6)
Income (n=107)		
< 2000 LD	40	(37.4)
2000-3999 LD	43	(40.2)
≥4000 LD	24	(22.4)
Chronic diseases		
No	99	(87.6)
Yes	14	(12.4)
Smoking status (n=111)		
No	92	(82.9)
Yes	19	(17.1)

Table 2 summarizes physical activity and sitting time findings in Ramadan as measured by the IPAQ-SF. Both the median vigorous -intensity activity and the median moderate intensity activity MET-Min/week were zero, indicating that more than half of the respondents reported no vigorous or moderate activity. Walking activity showed a median MET-Min/week of 297.00, representing the main contributing activity to the total MET-Min/week. Regarding sitting time during Ramadan, data were only available for 51 respondents, and the median sitting time for them was 300 minutes/day (IQR: 180-360), which is equivalent to a median of 5 hours (IQR:3-6).

Table 2: Physical activity and sitting time in Ramadan (n=107)

Variable	Median	(IQR)
Vigorous activity, MET-Min/week (n= 107)	0.00	(0.00-240.00)
Moderate activity, MET-Min/week (n= 98)	0.00	(0.00-480.00)
Walking activity, MET-Min/week (n= 90)	297.00	(0.00-693.00)
Total MET-Min/week (n= 82)	643.50	(134.25-2483.25)
Sitting time (n=51) *	5	(3-6)
Variable	f	(%)
Physical activity level (n=82)		
Low	46	56.1
Moderate	19	23.2
High	17	20.7
Physical activity sufficiency(n=82)		
Insufficient	46	56.1
Sufficient	36	43.9

* Raw values recorded in minutes and converted to hours for presentation

Table 3 describes the perceived barriers to physical activity during Ramadan. The two most common barriers were time constraints due to family or work commitments, reported by 68.2% of the respondents and fatigue during Ramadan daytime, reported by 64.5% of the respondents. Cost of gym membership or facilities and social and cultural norms were the least perceived barriers to physical activity, and were expressed only by 17.3 % and 10.9%, respectively.

Table 3: Perceived barriers to physical activity during Ramadan (n=110)

Perceived barrier	Agree		Do not agree	
	f	(%)	f	(%)
Time constraints due to family or work commitments	75	(68.2)	35	(31.8)
Fatigue during Ramadan daytime	71	(64.5)	39	(35.5)
Lack of suitable place to exercise	42	(38.2)	68	(61.8)
Health problem (e.g., joint pain)	36	(32.7)	74	(67.3)
Cost of gym membership or facilities	19	(17.3)	91	(82.7)
Social and cultural norms	12	(10.9)	98	(89.1)

Table 4 presents the examination of the unadjusted association between physical activity sufficiency status and sociodemographic and clinical characteristics, and perceived barriers to physical activity, using bivariate analysis. The percentage of insufficient physical activity was higher among those who agree with time constraints, fatigue during daytime, and the presence of a health problem as barriers to physical activity than among those who do not agree with these barriers. On the other hand, against theoretical expectations, the percentage of insufficient activity was lower among those who agreed with the lack of a suitable place, the cost of gym membership, and sociocultural norms as barriers. However, none of the study variables showed a statistically significant association with physical activity sufficiency status.

Table 4: Bivariate association between physical activity sufficiency and sociodemographic and clinical characteristics, and perceived barriers to physical activity during Ramadan

Variables	Physical activity sufficiency status				p
	Insufficient		Sufficient		
	f	(%)	f	(%)	
Sociodemographic and clinical factors					
Age	28.50	(25.75-43.75)	27.00	(22.50-35.00)	0.423 ^a
Sex					
Male	18	(52.9)	18	(47.1)	0.628
Female	28	(58.3)	20	(41.7)	
Educational level					
Secondary schooling or less	10	(76.9)	3	(23.1)	0.099
University or higher	36	(52.2)	33	(47.8)	
Marital status					
Married	18	(66.7)	9	(33.3)	0.155
Unmarried	27	(50.0)	27	(50.0)	
Employment					
Employed	22	(59.5)	15	(40.5)	0.578
Unemployed	24	(53.3)	21	(46.7)	
Income 3					
< 2000 LD	18	(58.1)	13	(41.9)	0.752
2000-3999 LD	18	(56.3)	14	(43.8)	
≥4000 LD	8	(47.1)	9	(52.9)	
Chronic diseases					
No	37	(52.1)	34	(47.9)	0.102 ^b
Yes	9	(81.8)	2	(18.2)	
Smoking status					
No	34	(55.6)	28	(44.4)	0.848
Yes	9	(52.9)	8	(47.1)	
Perceived barrier					
Time constraints due to family or work commitments					
Agree	34	(60.7)	22	(39.3)	0.219
Do not agree	11	(45.8)	13	(54.2)	
Fatigue during Ramadan daytime					
Agree	31	(63.3)	18	(36.7)	0.112
Do not agree	14	(45.2)	17	(54.8)	
Lack of a suitable place to exercise					
Agree	16	(51.6)	15	(48.4)	0.506
Do not agree	29	(59.2)	20	(40.8)	
Health problem (e.g., joint pain)					

Agree	14	(60.9)	9	(39.1)	0.597
Do not agree	31	(54.4)	26	(45.6)	
Cost of gym membership or facilities					
Agree	7	(53.8)	6	(46.2)	0.849
Do not agree	38	(56.7)	29	(43.3)	
Social and cultural norms					
Agree	3	(33.3)	6	(66.7)	0.169 ^b
Do not agree	42	(59.2)	29	(40.8)	

^a p value based on the Mann-Whitney Test, ^b p value based on Fisher's Exact Test

In the multivariate analysis, a binary logistic regression model was built with all variables that showed a nearly significant association with the physical activity sufficiency level in the earlier bivariate analysis. The obtained model showed a good fit of the included variables as indicated by the nonsignificant Hosmer Lemeshow test ($P=0.680$). Based on Nagelkerke R^2 , this model explains 20.7% of the variance in insufficient physical activity. However, none of the included variables displayed an independent, statistically significant contribution to the variance of insufficient physical activity in Ramadan (Table 5).

Table 5: Multiple regression model of Insufficient physical activity predictors

Variable	B	Wald	P	Adj. OR (95% CI)
Education: ≤ Secondary vs University or higher	1.131	2.065	0.151	3.097 (0.663-14.477)
Marital status: Married vs Unmarried	0.443	0.638	0.424	1.558(0.525-4.622)
Chronic disease: Yes, vs No	0.966	1.125	0.289	2.626 (0.441-15.639)
Time constraints: Agree vs Do not agree	0.439	0.681	0.409	1.551 (0.547-4.397)
Fatigue during daytime: Agree vs Do not agree	0.769	2.137	0.144	2.157 (0.770-6.047)
Social and cultural norms: Agree vs Do not agree	-1.766	3.727	0.054	0.171 (0.028-1.027)
Constant	-0.770	2.053	0.154	0.463

Discussion

The study revealed a considerable level of physical inactivity among Libyan adults in Ramadan, with more than half of the sample reporting insufficient physical activity. This was also reflected by the zero median MET-min/week for both vigorous and moderate activity. Walking represented the main component of the total activity among respondents. This pattern is consistent with several previous studies. A study among healthy adults compared physical activity during Ramadan to before and after Ramadan found that total physical activity, including vigorous and moderate activities, was significantly lower during Ramadan, while walking activity showed no significant change (29). Interestingly, a study among non-fasting adults with type 1 diabetes also reported a significant drop in physical activity during Ramadan compared with outside Ramadan despite being not fasting (20). A cohort study in Qatar used step counts as an objective measure for physical activity during Ramadan (14). It found a significant decrease in physical activity among fasting individuals, which further supports the overall pattern of reduced physical activity reported in the current study. However, this differs from the current study in that walking remained the main activity practiced. The Qatari study also contrasts with the above-cited study (20) as Qatar study found a significant increase in steps among non-fasting individuals, while that study reported a significant decrease in physical activity among non-fasting.

The maintenance of walking as the main activity in Ramadan in the current study may be partially explained by the nightly Tarawih prayers, which is a common practice in Libya for both males and females during Ramadan. This involves nightly walking to and from the Mosque, besides the prolonged standing, repeated bowing, and prostration performed during the prayers that usually last for about one hour. The reported relatively long median sitting time in the current study further supports the predominance of physical inactivity outside walking. Moreover, the reported prevalence of physical inactivity could actually be higher, considering underreporting due to social desirability.

The top two most commonly reported perceived barriers to physical activity in this study were time constraints due to family or work commitments and fatigue during daytime in Ramadan. Both of these barriers were reported by more than half of the respondents. This is consistent with the findings from other studies. For instance, a study in Saudi Arabia reported time restriction as the most common barrier to exercise among healthcare professionals in Ramadan (23), and a Malaysian study reported that more time spent on religious activities in Ramadan, which reflects that less time is devoted to physical activity (17). In addition, lack of time and fatigue have also been frequently identified as the most prevalent barriers to physical activity even outside Ramadan (30, 31). Further support of the lack of time as one of the most common barriers to physical activity comes from a systematic review of studies in the Middle East and North Africa Region (MENA), which includes Libya, even though the review did not focus specifically on studies conducted during Ramadan (32). In the current study, social and cultural norms were not commonly reported barriers, which is inconsistent with the findings of this systematic review. Having a health problem was also not frequently reported barrier to physical activity. This may be explained by the relatively young median age and low prevalence of chronic diseases in the study sample.

However, none of the perceived barriers, sociodemographic characteristics, or clinical characteristics contributed significantly to insufficient physical activity, even in the adjust analysis. This is in contrast to other studies that identified

significant sociodemographic and clinical predictors of physical activity, though not within Ramadan-specific context. For example, older age, lower education, unemployment, and having chronic disease such as diabetes or hypertension were identified as significant predictors of physical inactivity among adults in Tehran (33). Similarly, low income and male sex were predictors of physical inactivity among Malaysian adults (34). Aside from the different context and settings, the absence of significant contribution of any of the studied variables to insufficient physical activity in the current study may be due to the low statistical power secondary to the small sample included in the multivariate analysis after list wise deletion of respondents with incomplete IPAQ data. Direct comparison with previous studies conducted within the Ramadan context was not possible as no studies were identified that evaluated the independent contribution of perceived barriers to insufficient physical activity during Ramadan. Most identified studies conducted during Ramadan reported only descriptive findings or unadjusted associations.

This study has several limitations that should be considered when interpreting its findings. The use of a convenience sampling method limits the generalizability of the findings to the Libyan adult population. Additionally, incomplete responses to some IPAQ domains reduced the sample available for total physical activity classification, resulting in a relatively small sample size for bivariate and multivariable analysis, which may have limited the power needed to detect existing associations. The use of a self-reported tool to assess physical activity may be subject to recall bias and social desirability bias, which could lead to overestimation of activity levels. Nevertheless, the study has notable strengths, including the rigorous statistical handling of data and the use of multivariable analysis to adjust for potential confounders.

Conclusion

In conclusion, this study revealed a considerable level of insufficient physical activity among Libyan adults during Ramadan, with walking as the main contributing activity. Further research using larger samples and probability sampling is recommended to better assess insufficient physical activity and identify its predictors. Given the health risks associated with prolonged sitting and physical inactivity even for shorter periods, targeted health promotion efforts to enhance awareness of the importance of physical activity are warranted.

Conflict of interest. Nil

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