Article published online: 2023-04-17

Association between Acculturation and Obesity among Female Migrants in the United Arab Emirates: A Population-Based Study

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Ibnosina J Med Biomed Sci 2023;15:79–87.

Abstract

Introduction Emerging evidence suggests that the "healthy migrant effect" may diminish over time with increasing years of residency in the host country. However, few studies have documented the duration of residence associated with the prevalence of obesity among female migrants. This study examined the hypothesis that acculturation is associated with an increased prevalence of obesity among female migrants in the United Arab Emirates (UAE).

Results The mean ± standard deviation (SD) of the age of participants was 34.0 ± 9.9 years. The overall prevalence of overweight, obesity, and central adiposity was 30.0, 16.8, and 43.2%, respectively. The prevalence of overweight, obesity, and central adiposity varied across nationalities, with 28.6, 6.9, and 30.3% among Filipinos; 30.1, 37.5, and 66.9% among Arabs; and 33.1, 17.3, and 72.4% among South Asians, respectively. After controlling for age, female migrants with ≥5 years of residence in the UAE were twice as likely to be overweight or obese (adjusted odds ratio [aOR]: 2.12 [95%confidence interval (CI): 1.05–4.27]) and having a central adiposity (aOR: 2.05 [95%CI: 1.09–3.84]) as compared with those with fewer years of residence. Female migrants who reported walking for ≤30 min/d were less likely to be overweight or obese (aOR: 0.41 [95%CI: 0.17–0.97]) or exhibit central adiposity (aOR: 0.21 [95%CI: 0.08, 0.59]).

Conclusion The findings of the study suggest that duration of residence among female migrants in the UAE is an indicator of acculturation and is associated with unfavorable changes in body composition. Public health programs should focus on promoting healthy lifestyle choices and physical activity among females in the UAE.

Keywords
- acculturation
- obesity
- prevalence
- migrants
- Filipino
- South Asians
- Arabs

article published online
April 17, 2023

DOI https://doi.org/10.1055/s-0043-1761961.
ISSN 1947-489X.

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

Introduction

Migration is an important determinant of health as it influences health status and health outcomes. It promotes acculturation by adaptation to new sociocultural circumstances toward a social and cultural system that is different from their own. The process of acculturation is characterized by a complex, gradual exchange of immigrants' original attitudes and behaviors toward the predominant behaviors in the host culture.[1] Various measures, including language proficiency of the host country, have been used to capture this process of acculturation; however, the duration of residence is one of the most common and strongest indicators for this process.[2] Migration to the United Arab Emirates (UAE) started in 1973–1974 after the oil boom and it is closely tied to employment status, since most migrants ultimately return to their home country when they finish a work contract or retire.[3,4] Nowadays, the expatriate population accounts for ~80% of the UAE population.[5] The explosive population growth in the UAE over the past 40 years is the result of a unique improvement in the quality of life and job opportunities that attract immigrants from all over the world.[4] The population pyramid of the country clearly shows the imbalance of 3:1 male-to-female ratio in the active working age groups. Males are mainly recruited for construction and retail industries, but females are also a significant proportion of this migrant population, and it includes women from Arab countries, South Asia, and the Philippines that typically work as domestic aid staff, health care workers, and retail staff.[6]

Previous research has documented a positive relationship of acculturation on obesity, particularly among men, while the relationship between acculturation and female body mass index (BMI) had mixed findings.[1] There are many factors that may influence the risk of obesity associated with migration including the genetic background of individuals, lifestyle factors, and other determinants of health including education, occupation, and changes associated with the length of residence in the host country.[7] Studies in developed countries have shown that subgroups of populations, such as immigrants, often have a lower prevalence of overweight and obesity upon arrival in the host country, a phenomenon called the "healthy migrant effect."[8] Emerging evidence suggests that the "healthy migrant effect" may diminish over a period of time with increasing years of residency in the host country. Migrants show a shift in obesogenic behaviors, including changes in diet, levels of physical activity, and lifestyle in general, which may lead to an increase in the prevalence of overweight and obesity.[1,9] A cross-sectional study of over 250,000 people from the six largest Asian ethnic groups residing in the United States found U.S.-born men were four times more likely to be obese than migrant men and U.S.-born women were 3.5 times more likely to be obese than migrant women supporting the observation that newly arrived migrants have a greater prevalence of healthy weight.[10] This phenomenon was also reported in a study among migrant men in the UAE where the prevalence of obesity (BMI $\geq$27.5 kg/m^2) and central obesity (waist-to-hip ratio [WHR] $\geq$0.90) increased from 13.9 to 26.2% and from 52.5 to 70.8%, respectively, among recent migrants (<5 years) in the UAE.[11] A positive relationship between duration of residency and prevalence of overweight and obesity was also supported in a population-based study of South Asian male migrants living in the United States.[9] However, there are no data on whether the duration of residence in the UAE is associated with obesity prevalence in female migrants. The objective of our study was to examine the prevalence of obesity among female migrants as well as the hypothesis that acculturation (proxy measure by residency duration) was associated with an increased prevalence of obesity and central obesity after controlling for the age in female migrants from Arabs and South Asian countries (India, Pakistan, Bangladesh, and Philippines) residing in the UAE.

Participants and Methods

Study Design

The study was conducted in Al Ain, in the emirate of Abu Dhabi, UAE, using a cross-sectional study design.

Participants

All migrant workers (males and females) seeking employment in the UAE are required by law to undergo health and communicable disease screening at a government "visa screening center" before they can receive a residency permit. Migrants are also required to undergo screening when they renew their visa, which is every year for domestic workers, every 2 years for private workers, and every 3 years for public workers. The sampling frame in our study included a list of all female migrant workers (aged $\geq$18 years) who were enrolled for examination at the screening center in Al Ain. We used the formula for binomial distribution ($n = Z^2p\ (1–p)d2$) to estimate the sample size ($n = 500$) to identify the prevalence of obesity. The exclusion criteria included female UAE citizens, those who were not from South Asia, Arab countries, and Philippines, and females not providing written informed consent. Arab countries included Egypt, Jordan, Palestine, Lebanon, and Yemen. South Asian countries included India, Bangladesh, and Pakistan. We invited every third person on this list to participate in the study. Data collection for this study took place between November 1, 2012 and May 31, 2013. The data collected were described in detail elsewhere but not for the female migrants.[12,13]

Measures

We used an adapted version of the questionnaire used in the "STEPwise approach to Surveillance" (STEPS) developed by the World Health Organization (WHO) for the measurement and surveillance of noncommunicable disease (NCD) risk factors in populations.[14,15] Due to the anticipated low literacy levels, the questionnaire was interviewer administered, and the interviews were conducted in different languages, such as Urdu, Bengali (India, Pakistan, and Bangladesh), Tagalog (Philippines), and Arabic, by a native research assistant from these countries who had received

appropriate training. Data included demographic characteristics, lifestyle factors (e.g., physical activity), and social context indicators including home country residence setting (rural, urban, semiurban), occupation, monthly salary, and current type of accommodation. Our main exposure variable was the duration of residence in the UAE (years) as a marker for acculturation.[5] A dichotomous variable was used for the duration of time residing in the UAE (<5 and ≥5 years).

The outcome of interest in our study was overweight and obesity evaluated by different measures. Body weight was measured to the nearest 0.1 kg using a calibrated electronic scale. We used mounted stadiometer to measure height to the nearest 0.1 cm (SECA, Hamburg, Germany). We completed measurements with the participant wearing light clothing without shoes and standing motionless. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2). The WHO cutoff points for BMI for adults were used to classify underweight (BMI <18.5 kg/m^2), normal weight (BMI = 18.5–24.9 kg/m^2), overweight (BMI = 25.0–29.9 kg/m^2), and obese (BMI ≥ 30.0 kg/m^2).[16] We measured the waist and hip circumference using a flexible, nonstretchable nylon tape measure (SECA) while the subjects were lightly dressed. The waist circumference was measured midway between the lower rib margin and the top of the iliac crest, in centimeters (cm) to the nearest 0.1 cm, and the hip circumference was measured at the point of maximal protrusion of the gluteal muscles to the nearest 0.1 cm. We used a WHR of ≥0.85 to define the central adiposity.[16]

Information on physical activity was obtained using the International Physical Activity Questionnaire (IPAQ-short version).[14] This tool measures the frequency (days per week) and duration (minutes per day) of moderate- and vigorous-intensity physical activity in a period of 7 days prior to the survey. Two variables were computed from the IPAQ data: (1) the number of participants who reported walking for ≥30 minutes per day and (2) proportion of participants reporting moderate-intensity physical activity for a minimum of 30 minutes on 5 days each week or vigorous-intensity physical activity for a minimum of 20 minutes on 3 days each week.

Statistical Analysis

Data were entered into Microsoft Access before importation into Stata version 14.0 (StataCorp LP, College Station, TX) for statistical analyses. Continuous variables were presented as means and standard deviations (SD) and categorical variables as counts and percentages. In the bivariable analyses, we examined the association of our main variable of interest (duration of residency) with the main outcome variables, that is, overall overweight and obesity and central adiposity. Age was included as a continuous variable in our final multivariable logistic regression model. In addition, we tested for interaction between the duration of residence and age. Monthly income, occupation, educational level, and nationality were also included as potential confounding factors in our final model.

Results

Of the 800 eligible participants, 599 (75% participation rate) agreed to participate. One quarter (24.4%) of eligible participants were prevented from taking part in the study due to the time demands of the visa screening process. Of the 599 who initially participated, 553 (92.6%) were from three geographical areas, namely, South-East Asia (Philippines, $n = 290$), Arab countries ($n = 136$), and South Asia ($n = 127$). The mean (±SD) age of the participants was 34.1 ± 9.5 years and the majority (54.3%) came from urban areas within their home countries. With respect to accommodation arrangements, 43.8% lived with their family in the UAE, 35.4% lived with their sponsor (employer), 11.4% shared accommodation with nonrelatives, and 9.4% had single accommodation. Fifty-seven percent were married with, on average, three children. In ►**Table 1**, we present the selected individuals and the social characteristics of the study participants in association with the duration of residence in the UAE. The overall prevalence of overweight, obesity, and central adiposity was 30.1, 16.9, and 49.2%, respectively. The prevalence of overweight or obesity and central adiposity was 35.5, and 31.0% for Filipinos, 67.6 and 66.9% for Arabs, and 50.4 and 72.4% for South Asians, respectively. In ►**Fig. 1**, we compare the BMI categories among female expatriates by the duration of residence in the UAE. The prevalence of underweight decreased from 7.6 to 3.4% as the duration of residence increased from <5 to ≥5 years. Prevalence of overweight and obesity, as well as central adiposity, increased among those who resided in UAE for ≥5 years.

In ►**Table 2**, we present the prevalence of overweight and obesity and central adiposity in association with different individual and social characteristics of the study population using separate bivariable logistic regression models. Having achieved higher educational level, as well as participating in regular physical activity (walking for at least 30 minutes per day, engaged with moderate or vigorous physical activity), had a negative association with the prevalence of obesity. On the contrary, factors positively associated with a higher prevalence of obesity were older age, having lived in the UAE for ≥5 years, Arab and South Asian nationalities, higher monthly income, working as the homemaker, being a white collar professional, being married, living with family, and originating from a rural area of the original country.

Multivariable adjusted associations are presented in ►**Table 3**. After adjusting for age, nationality, marital status, educational level, monthly income, occupation, housing arrangement, and physical activity levels, female migrants who had lived in the UAE for ≥5years were significantly twice as likely to be overweight and obese or to have central adiposity compared with female migrants with <5 years of residence in the UAE. Walking regularly for at least 30 minutes a day also retained its statistically significant negative relationship in the multivariable adjusted model. Specifically, female migrants who reported walking regularly were 60% less likely to be overweight or obese and 80% less likely to have central adiposity.

Table 1 Characteristics of female migrants by duration of residence in Al Ain and Abu Dhabi, United Arab Emirates ($n = 553$)

Population characteristics		All	Duration of UAE residence		*p* value
			<5 y	≥5 y	
Age (mean ± SD) in years		34.1 ± 9.6	31.8 ± 7.8	35.7 ± 10.4	<0.001
Ethnicity (%)	Philippines	290 (52.6)	72.1	40.3	<0.001
	Arab	136 (24.5)	14.5	31.1	
	South Asian	127 (22.9)	13.4	28.6	
Marital status (%)	Single	194 (36.4)	46.1	28.9	<0.001
	Married	306 (57.4)	47.8	64.4	
	Separated or widowed	33 (6.2)	6.1	6.7	
Education (%)	Primary or middle	39 (7.1)	7.1	7.9	0,019
	Secondary	205 (37.5)	43.5	30.8	
	College or university	303 (55.4)	49.4	61.3	
Monthly income in UAE dirham, median		1,000	900	2,200	<0.001
Occupation (%)	Housemaid	214 (41.0)	61.4	26.2	<0.001
	Housewife	122 (23.4)	16.8	25.9	
	Professional	119 (22.8)	11.2	33.2	
	Administrator/supervisor	44 (8.4)	5.5	10.6	
	Other	23 (4.4)	5.1	4.1	
Home residence	Urban	263 (52.8)	54.3	54.5	0.968
	Rural	235 (47.2)	45.7	45.5	
Housing (%)	Live with family	234 (43.8)	26.1	57.7	<0.001
	Live with sponsor	189 (35.4)	52.7	23.6	
	Live with others	61 (11.4)	16.8	7.8	
	Single accommodation	50 (9.4)	4.4	10.9	
Weight, height, BMI (mean ± SD)	Height (cm)	155.6 ± 6.7	154.8 ± 5.9	156.2 ± 6.7	0.022
	Weight (kg)	62.4 ± 14.9	58.5 ± 14.6	64.9 ±	<0.001
	BMI (kg/m^2)	25.7 ± 5.8	24.3 ± 5.5	26.6 ± 5.6	<0.001
BMI categories (%)	<18.5 kg/m^2	4.7	7.6	3.4	<0.001
	18.5–24.9 kg/m^2	48.3	58.7	41.1	
	25.0–29.9 kg/m^2	30.1	22.3	33.9	
	≥30.0 kg/m^2	16.9	11.4	21.6	
Regional adiposity	Waist (cm), mean ± SD	85.7 ± 13.3	82.4 ± 13.1	88.1 ± 13.3	<0.001
	Hip (cm), mean ± SD	97.9 ± 12.7	94.9 ± 13.2	99.8 ± 12.3	<0.001
	WHR (mean ± SD)	0.88 ± 0.10	0.87 ± 0.11	0.88 ± 10	0.181
	Central adiposity	49.2	38.2	58.1	<0.001
BP (mm Hg) mean ± SD)	Systolic BP	118.9 ± 18.6	114.7 ± 13.8	121.7 ± 21.2	<0.001
	Diastolic BP	75.8 ± 12.7	74.5 ± 10.6	76.9 ± 14.1	0.043
	BP ≥140/90 on treatment (%)	14.4	7.1	20.5	<0.001
Physical activity	Walk ≥30 min/d (%)	24.4	32.3	17.4	0.002
	Moderate/vigorous activity weekly (%)	53.7	62.8	49.2	0.006

Abbreviations: BMI, body mass index; BP, blood pressure; SD, standard deviation; WHR, waist-to-hip ratio.

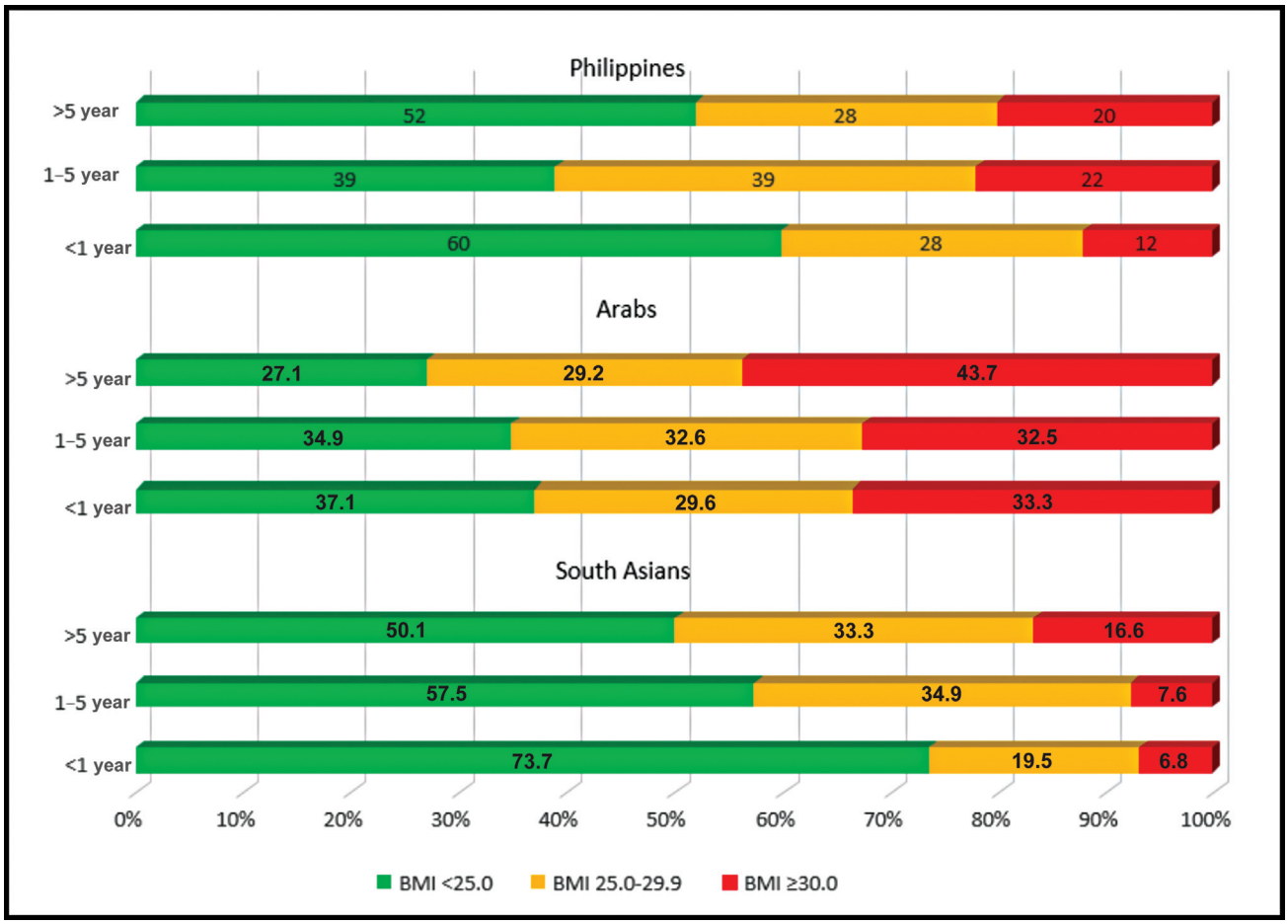

Fig. 1 Impact of ethnicity and duration of residency in UAE on body mass index.

Discussion

This study found that female migrants who had lived for ≥5 years in the UAE were significantly two times more likely to have obesity and central adiposity in comparison with those who had lived for a shorter period, even after adjustment for several individual and social characteristics. To our knowledge, this is the first study to describe noncommunicable disease conditions and explore the association between acculturation and an unhealthy body size among female migrants in the UAE. We found a very high prevalence of obesity among South Asian (72.4%) and Arab female migrants (66.9%). The levels of BMI-derived overweight/obesity estimates were similar to central adiposity estimates in this study population as estimated by the WHR, with those living in the UAE for less than 5 years documented at 33.7 and 38.2% and those living in the UAE for ≥5 years documented at 55.5 and 58.1%, respectively. The results of our study among female migrants in the UAE highlight that duration of residence in the host country represents a strong and statistically significant indicator of acculturation and may be associated with unfavorable health conditions.

The UAE is a unique country in that the vast majority of its residents are migrants whose residency is closely linked to employment status and income. At the same time, the UAE is perceived in labor source countries as a land of opportunities.[4] In the present study, the South Asian population were five times more likely to develop central adiposity and 63% more likely to be overweight/obese, suggesting a shift toward an obesogenic lifestyle. It is currently unclear whether income is a contributing factor as the overall median income in this study was 1,000 AED and those living for ≥5 years earning 2,200 AED. These findings suggest that there is a tradeoff between adhering to one's ethnic identity after migration and assimilating to benefit from the resulting improved economic status. Furthermore, our study corroborates previous findings on the negative relationship with an unhealthy body size among female migrants residing in the United States.[7] Studies in developed countries have shown that South Asian migrants increased their consumption of processed foods and that their meals had more calories and a higher percentage of carbohydrates, which may be mirrored among the local female migrants, although this explanation is beyond the objectives of this study.[17] However, the UAE has been previously described as an obesogenic environment due to an accelerated nutrition transition moving away from the traditional "healthy" foods to an abundance of "unhealthy" energy-dense foods.[18] Moreover, living in the UAE may not be the only explanation for this outcome, as noted with lower levels of obesity among local Filipinos, but it may suggest that social, cultural, and other

Table 2 Prevalence and crude odds ratios (OR) of different characteristics in association with overweight/obesity and central adiposity, in female migrants from Al Ain and Abu Dhabi, UAE ($n = 552$)

	All	BMI $\geq$ 25.0 kg/m^2, *n* (%)	Crude OR (95% CI)	*p* value	Central adiposity, *n* (%)	Crude OR, (95% CI)	*p* value
Nationality							
Philippines	290	103 (35.5)	Ref.		90 (31.0)	Ref.	0.028
Arab	136	92 (67.6)	3.79 (2.46–5.84)	<0.001	91 (66.9)	4.49 (2.91–6.94)	<0.001
South Asian (India, Pakistan, and Bangladesh)	127	64 (50.4)	1.84 (1.21–2.81)	0.005	92 (72.4)	5.84 (3.68–9.27)	<0.001
Age group, *n* (%)							
18–35 y	186	61 (32.8)	Ref.		82 (37.1)	Ref.	
36–45 y	171	80 (46.8)	1.85 (1.25–2.73)	0.002	109 (53.7)	1.96 (1.33–2.89)	<0.001
46+ y	191	116 (60.7)	3.48 (2.19–5.52)	<0.001	80 (65.0)	3.15 (1.99–4.99)	<0.001
Marital status, *n* (%)							
Single	194	67 (34.5)	Ref.		64 (32.9)	Ref.	
Married	306	165 (53.9)	2.22 (1.53–3.22)	<0.001	188 (61.4)	3.24 (2.22–4.72)	<0.001
Divorced, separated or widowed	33	22 (66.7)	3.79 (1.73–8.29)	<0.001	16 (48.5)	1.91 (0.91–4.03)	0.088
Education, *n* (%)							
Primary or middle	39	21 (53.8)	Ref.		25 (64.1)	Ref.	
Secondary or high school	203	98 (48.3)	0.41 (0.20–0.83)	0.014	86 (42.4)	0.41 (0.20–0.84)	0.014
College or university	303	139 (45.9)	0.62 (0.31–1.25)	0.186	160 (52.8)	0.62 (0.31–1.25)	0.186
Monthly income in UAE dirhams (AED), *n* (%)							
Lowest tertile	133	49 (36.8)	Ref.		43 (32.3)	Ref.	
Middle tertile	85	38 (44.7)	1.38 (0.79–2.41)	0.248	33 (38.8)	1.33 (0.75–2.34)	0.327
Highest tertile	104	51 (49.0)	1.64 (0.97–2.77)	0.060	63 (60.6)	3.21 (1.88–5.49)	<0.001
Occupation, *n* (%)							
Housemaid	212	74 (34.9)	Ref.		73 (34.4)	Ref.	
Housewife	122	76 (62.3)	3.08 (1.94–4.89)	<0.001	90 (73.8)	5.35 (3.27–8.77)	<0.001
Professional	119	65 (54.6)	2.24 (1.42–3.55)	<0.001)	70 (58.8)	2.72 (1.71–4.32)	<0.001
Administrator, supervisor	44	17 (38.6)	1.17 (0.60–2.29)	0.638	18 (40.9)	1.32 (0.68–2.56)	0.415
Other	23	11 (47.8)	1.71 (0.72–4.06)	0.225	8 (34.8)	1.02 (0.41–2.51)	0.973
Residence in home country, *n* (%)							
Urban	263	122 (46.4)	Ref.		147 (55.9)	Ref.	
Rural	235	115 (48.9)	1.11 (0.77–1.57)	0.570	103 (43.8)	0.61 (0.43–0.88)	0.007
Housing, *n* (%)							
Live with family	234	138 (58.9)	2.44 (1.65–3.62)	<0.001	151 (64.5)	0.24 (0.13–0.45)	<0.001
Live with sponsor	189	70 (37.0)	Ref.		70 (37.0)	0.32 (0.21–0.48)	<0.001
Live with others	61	24 (39.3)	1.10 (0.61–1.99)	0.746	19 (31.2)	Ref.	
Single accommodation	50	21 (42.0)	1.23 (0.65–2.32)	0.521	27 (54.0)	0.64 (0.35–1.19)	0.164)
Duration of residence in UAE, *n* (%)							
<5 y	185	62 (33.5)	Ref.		71 (38.4)	Ref.	
$\geq$5 y	293	162 (55.3)	2.45 (1.67–3.59)	<0.001	170 (58.0)	2.22 (1.52–3.23)	<0.001
Hypertension (BP $\geq$140/90 mm Hg)							
No	456	194 (42.5)	Ref.		210 (46.1)	Ref.	
Yes	96	65 (67.7)	2.83 (1.77–4.51)	<0.001	62 (64.6)	2.83 (1.35–3.37)	<0.001
Walk for at least 30 min daily, *n* (%)							
No	285	137 (48.1)	Ref.		147 (51.6)	Ref.	
Yes	91	29 (31.1)	0.50 (0.30–0.83)	0.007	26 (28.6)	0.37 (0.22–0.62)	<0.001

Table 2 (*Continued*)

	All	BMI $\geq$ 25.0 kg/m^2, *n* (%)	Crude OR (95% CI)	*p* value	Central adiposity, *n* (%)	Crude OR, (95% CI)	*p* value
Moderate or vigorous physical activity $\geq$5 d/wk, *n* (%)							
No	415	210 (50.6)	1.95 (1.22–3.12)	0.005	223 (53.7)	2.21 (1.38–3.54)	$<$0.001
Yes	93	32 (34.4)	Ref.		32 (34.4)	Ref.	

Abbreviation: CI, confidence interval.

Table 3 Multivariable adjusted odds ratios (OR) for the duration of residence and other factors in association with overweight/obesity and central adiposity in female migrants from Al Ain and Abu Dhabi, UAE ($n = 552$)

Characteristic	Overweight/obesity OR (95% CI)	*p* value	Central adiposity OR (95% CI)	*p* value
Duration of residence in UAE				
Less than 5 y	Ref.		Ref.	
$\geq$5 y	2.12 (1.05–4.27)	0.035	2.05 (1.09–3.84)	0.025
Age of study participant in years	1.04 (1.02–1.08)	0.017	1.04 (1.00–1.08)	0.020
Nationality				
Philippines	Ref.			
Arab	1.41 (0.43–4.62)	0.570	1.32 (0.39–4.45)	0.645
South Asian (India, Pakistan, and Bangladesh)	1.63 (0.64–4.20)	0.306	4.68 (1.51–14.57)	0.008
Marital status				
Single	Ref.		Ref.	
Married	1.15 (0.57–2.34)	0.686	1.44 (0.67–3.07)	0.344
Divorced, separated, or widowed	1.46 (0.48–4.38)	0.499	0.87 (0.28–2.73)	0.824
Education				
Primary or middle	Ref.		Ref.	
Secondary or high school	4.18 (0.53–33.00)	0.175	2.68 (0.37–19.63)	0.329
College or university	2.64 (0.34–20.38)	0.350	2.53 (0.33, 19.15)	0.367
Monthly income in UAE dirhams	1.00 (0.99–1.01)	0.399	1.00 (0.99, 1.01	0.640
Occupation				
Housemaid	Ref.			
Housewife	1.95 (0.53–7.19)	0.316	1.84 (0.61–5.46)	0.272
Professional	1.97 (0.41–9.62)	0.397	1.02 (034–3.03)	0.960
Administrator/supervisor	1.93 (0.50–7.44)	0.335	0.61 (0.18,1.99)	0.414
Other	1.89 (0,32–11.24)	0.484	0.15 (0.02–1.01)	0.051
Residence in home country (rural vs. urban)	1.06 (0.55–2.03)	0.859	1.28 (0.38–4.31)	0.685
Housing				
Live with family	1.84 (0.69–4.88)	0.215	1.71 (0.55–5.33)	0.354
Live with sponsor	Ref.		1.51 (0.39–5.79)	0.550
Live with others	1.72 (0.64–4.57)	0.274	Ref.	
Single accommodation	1.28 (0.34–4.77)	0.709	0.44 (0.08–2.30)	0.337
Hypertension (BP $\geq$140/90 mm Hg)	1.49 (0.59–3.76)	0.396	1.48 (0.54–4.09)	0.442
Walk for at least 30 min/d	0.41 (0.17–0.97)	0.043	0.21 (0.08–0.59)	0.003
Moderate or vigorous physical activity $\geq$5 d/wk	1.37 (0.67–2.82)	0.384	0.81 (0.39–1.68)	0.574

Abbreviation: BP, blood pressure; CI, confidence interval.

contextual factors may play an additional role in the process of acculturation in general and for obesity in particular in the UAE.

Despite the health benefits of physical activity, this study found that those doing less physical activity were twice as likely to develop obesity and central adiposity (before adjusting for several individual and social characteristics) compared with those residing for more than 5 years being much less physically active. Several studies have corroborated our findings that a decline in physical activity was noted among migrants.[19–21] Sixty-six percent of African migrant women in Madrid[22] and 72% of them in Israel[23] did not exercise regularly, with 49% in Israel walking for less than 30 minutes a day.[23] In the UAE, barriers such as weather and cultural and religious factors play a role in women's ability to exercise, particularly women from a predominantly Muslim background. These barriers are noted in previous studies.[24,25] Some of the barriers described particularly for Muslim women include the traditional clothing consisting of a hijab, which does not allow for free movement and the mixing of men and women in public sports facilities.[24] Unfortunately, low levels of physical activity is not only a migrant health issue; global data on physical inactivity indicate that 27.5% of adults are not physically active.[26]

Migrant workers represent the largest proportion of the UAE population whose health needs still need to be fully understood. Spencer and Cooper reported that the health of migrants is an indicator of some degree of integration within host communities, alongside employment, education, and housing.[27] It is known that migrants may arrive in new countries with a health advantage including generally a healthier body weight as noted by our findings. However, to lower the obesity rates among migrants, we may need culturally sensitive public health messages that address the specific needs of the migrant population with respect to promoting healthy lifestyles, and this could be the subject of future research particularly among specific occupational populations.

Although our study is based on a cross-sectional study design with its associated limitations, it does provide valuable and novel data on the burden of obesity among female migrants in the UAE. Moreover, it contributes to a small, but growing body of evidence on the health needs of migrants in the UAE and the Arabian Gulf. Although our data were not collected in a prospective fashion, the strong association between the duration of residence of female migrants in the UAE and obesity implies a temporal and possibly causal association, which requires using longitudinal designs to verify the potential underlying etiological pathways. Our study was focused on a relatively small sample of female migrants; however, it highlights the important need to document the health status of migrant workers when they first emigrate to the UAE and track their health throughout their residency. Such longitudinal data will allow us to better understand their unique health needs.

Conclusion

The results of our study among female migrants in the UAE highlight that duration of residence in the host country represents a strong and statistically significant indicator of acculturation associated with obesity and other risk factors that may contribute to adverse health outcomes. Findings from this study have important implications for policy on healthy lifestyles and health promotion. The health promotion messages may need to be simple and easy to understand.

Authors' Contribution

All named authors have contributed to the conception and conduct of the study, data analysis, and drafting and revising of the manuscript.

Compliance with Ethical Principles

Ethical approval was obtained from the Al Ain Medical District Human Research Ethics Committee (AAMDHREC 10.21). Written informed consent was obtained from all participants.

Data Availability Statement

Data will be shared upon reasonable request from the primary author.

Funding and Sponsorship

This study was supported by College of Medicine and Health Sciences United Arab Emirates University Individual Faculty Grant (No NP09–30) entitled "Chronic Diseases Prevention in Immigrants: Putting Cardiovascular Disease Risk Factors in Surveillance Screen." The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Conflict of Interest

None declared.

Acknowledgments

The authors are grateful to the participants who were a part of this study.

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