Housewives’ Obesity Determinant Factors in Iran; National Survey - Stepwise Approach to Surveillance

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Abstract

Background: Women suffer more from obesity than men in Iran do. In this study, we compared obesity risk and its contributors regarding the job categories as housewives (HWs) or employees to deeply explore the risk of obesity in housewives in Iran.

Methods: Based on WHO stepwise approach, in 2005, 33472 women aged 15 to 65 years old (excluding all men) were examined for the major risk factors for non-communicable diseases. Obesity was determined by Body Mass Index>30kgm⁻² in adults (>20 years) and by girl BMI percentiles according to WHO 2007 Growth Reference 5-19 years in adolescents. We modeled obesity by logistic regression and entered all the known/potential predictors, including job categories.

Results: The participation rate was more than 99%. The weighted prevalence of overweight and obesity in HWs were 34.5% and 24.5% respectively. Employed women were about 4% and 10% less overweight and obese than the HWs, respectively (P< 0.01). HWs vs. employed women had the adjusted OR 1.39 (CI95%, 1.18-1.63) for obesity. Older women, with higher educational level and socioeconomic status, lower physical activities and those living in urban areas were at risk of obesity. In comparison to HWs, working as an Official Clerk (OR=0.66) associated with a decrease in odds of obesity significantly, while others did not.

Conclusion: Being as HW is an independent significant factor for obesity in women. Preventive health care programs to reduce risk of obesity in women should be applied, considering their occupation for achieving more effectiveness.

Keywords: Women, Housewife, Occupation, Obesity, Overweight

Introduction

Obesity is a major public health problem and becomes an important epidemic in both developed and developing countries since an increase in the risky lifestyles (1, 2). Obesity is a global problem, affecting an estimated 300 million people worldwide (3) and its prevalence in the recent decade had a rapid increase (178%) (4). Obesity substantially increases the risk of several major cancers especially postmenopausal breast cancer and endometrial cancer (5). Moreover, studies indicated that overweight and obesity are associated with an increase in mortality and a considerable reduction in life expectancy (3, 5).

Obesity is a multi factorial phenomena and associates with age, gender, ethnicity, levels of leisure time, physical activity, education, parity, economical and marital statuses, smoking habits, alcohol consumption, family history of obesity and dietary habits in both men and women (2, 6-9). In compare to men, such determinant factors of obesity were frequently accumulated in women; the
findings of several studies have shown that the incidence and the prevalence of obesity in women in many countries are higher than men (10-12). Rashidi et al indicated that overweight and obesity are significant national public health problem especially among women in urban areas in Iran (13). In a large national survey carried out by the Ministry of Health in 1999, obesity was diagnosed in 28% and 15% of 40-69 yr women living in urban and rural areas, respectively (14). In 2003, the prevalence of obesity was reported as 10.4% to 14.2% in men and 27.1% to 29.1% in women, while it was indicated an increase in the trend of obesity in Iran (15, 16).

Surprisingly, studies indicated that obesity prevalence among women is about 10-15% higher than men at the same age specific group in Iran (17). Studies on women obesity regarding their job categories were conducted in some countries (11). Ersoy and Imamoglu showed that the prevalence of obesity was prominently higher in Turkish housewives (42.2%) than employed women (11.6%) (18). Women engaged in domestic duties are more often obese than employed women are, and this association persists after adjustment for age and other socio-economic variables (1).

Based on the national census reports in 2007, women included 49% of the Iranian population. Most of them living in urban areas and working as housewives (19). In this study, we explored the obesity risk of Iranian women regarding their job category as employed or housewives (HWs). In addition, we compared obesity risk of housewives with the employees according to age, dietary habits, marital status, socio-economic status, living place and physical activity to deeply explore the main characteristics of housewives as a big portion of women in Iran.

Materials and Methods

In a cross-sectional study in 2005, more than 89,000 individuals aged from 15 to 65 yr old were examined for the major risk factors for non-communicable diseases from all over Iran, included 28 provinces in Iran. This population based national survey with one stage cluster sampling was organized under the supervision of the Ministry of Health compatible with the WHO recommended Stepwise approach to conduct a surveillance for non-communicable diseases and their risk factors. The study was carried out in all subjects who completed the informed consents.

The main dataset had 89,229 records. After checking the consistency of the data, all men (n= 44944) were omitted. Women who were employed but retired in the time of study, students, unemployed (able/unable to work), other/undefined job categories (n= 7168) in addition to pregnant women (n= 865) were excluded. Finally, the remaining participants (n=36252) included; the housewives -33472 (92.3%) as the case group and all the others- Clerks 1663 (4.6%), Workers 268 (0.7%), Farmers 198 (0.5%) and Self-employed women 651 (1.8%) - as the control one.

The questionnaire about birth date, job category, marital status, educational level, lifestyle, and dietary habits of the subjects were filled in according to their self-reports, by face-to-face interview. Items such as owning a car, a house, the number of rooms of the house (>2) and the number of non-occupational travels during last year were interviewed. Each item was scored by one point. Socio-Economical Status (SES) score was calculated by adding all the above items and defined as very low (score = 0), low (score= 1), middle (score= 2), high (score= 3) and very high (score= 4) (6, 20). Based on governmental deviations of areas, we defined living areas as urban and rural.

The dietary section of the questionnaire included many questions about the frequency of food consumption during a routine week. Fast food and the type of oil consumed by the family were analyzed in this study.

Furthermore, body weight, height and waist circumference were measured in subjects by standard methods. After calculating body mass index (BMI), according to WHO categorization BMI was defined as underweight (BMI< 18.5 kg/m²), normal weight (18.5<BMI< 24.9 kg/m²), overweight (25<BMI< 29.9 kg/m²) and obese (BMI> 30 kg/m²) for adults (age>20 yr). According to WHO 2007 Growth Reference 5-19 yr, for ado-
Adolescents (age < 20 yr), girl BMI percentiles and the computed z-scores were calculated by STATA WHO do files (21). The following Cut-offs was applied:

- **Obesity:** >+2SD
- **Overweight:** >+1SD
- **Normal:** ≥-2SD AND ≤+1SD
- **Thinness (under weight):** <-2SD
- **Severe thinness (under weight):** <-3SD

**Statistical methods**

We got the estimated age group specific number of population in 2005 from the National Statistical Center of Iran (22) and weighted all the estimates according to this variable. We assigned provinces code as strata, clusters code as primary sampling units and run all the analysis with survey analysis packages in Stata v.8 se. The weighted estimates of categorical variables in housewives and employed group were compared by chi square test, while numerical variables were tested by unpaired t-test. We reported all data as point and confidence interval 95%. In order to define the most related factors to women obesity, we modeled obesity by logistic regression and entered all the predictors (including job category) one by one in the model for calculating the crude odds ratio. Those having P value <0.1 remained in the model for calculating the adjusted odds ratio for obesity.

**Results**

Data from 36252 individuals were analyzed. More than 92% were HW. All the demographic features of both HW and Employed group are reported in Table 1. In comparison with employed group, HWs were older about 3 yr (P< 0.001). Near 83% of HWs were married. In HWs the educational and SES level were significantly lower than the others were (P< 0.01). While most of the individuals were living in urban areas, employed group lived in urban areas about 15% more than HW group.

The overall weighted prevalence of overweight and obese women was 34.2% and 23.4% respectively; these figures in HWs were 34.5% and 24.4% respectively. In contrast, overweight and obese women were seen in 30.7% and 14.5% of employed women. HWs differed from Employed group regarding all obesity indices (BMI, BMI category and waist circumference) (P< 0.01). Physical activity in HWs was statistically about 9% less than employed group (P< 0.01). Employed women used to have fast foods more than HWs. In both groups the most oil preference was saturated one. Compared to employees, HWs used more saturated oil (Table 2).

The strength of association between obesity and predictors are shown in table 3. HWs experienced obesity about 1.9 times more than the employed women did (P< 0.001). Aging increased the odds of obesity by 50% for each 10 yr. Women obesity decreased significantly in higher educational status. Married and divorced/widow women were prone to develop obesity three to four times more than the singles. In comparison with very low SES, having low, middle and high socio-economic status increased the risk of obesity significantly with odds ratio 1.25, 1.33 and 1.43 respectively. Women living in urban areas had higher odds (OR 1.3) for obesity. Surprisingly, those who consumed fast foods more than two times a week had lower risk for obesity. Compared to those having saturated oil preference, olive oil consumption increased the odds of obesity about 20%. Physical activity was associated with obesity significantly (Table 3).

After adjusting the effect of other factors, job (OR 1.39), age group (OR 1.38), being married (OR 2.15) and divorced/widow (OR 1.66), having middle SES (OR 1.22) and high SES (OR 1.31), living in urban areas (OR 1.37), having fast food more than two times a week (OR 0.78) and olive oil preference (OR 1.20) remained significant in the model (Table 3).

When we considered employed women in four separated categories, the percentage of obesity was 13.4% (CI95%- 11.4, 15.73) in Clerks, 14.49% (CI95%-10.13, 20.3) in Workers, 14.94% (CI95%- 9.76, 22.3) in Farmers and 16.5% (CI95%- 12.9, 20.8) in self-employees. As you can see in Fig. 1, only Clerks, adjusted OR 0.66 (CI95%-0.53, 0.81), had the obesity percentage significantly lower than
Compared to HWs, the adjusted OR for obesity in Workers and Farmers were 0.66 and 0.61, respectively ($P > 0.05$). The odds of obesity in Self-employed group were equal to 0.91.

**Table 1:** Demographic variables according to women occupation status

| Age (yr) (M±SD) | Housewife (n=33,472) | Employed (n=2,780) |
|----------------|---------------------|---------------------|
| Single         | 35.80±0.08          | 32.73±0.29          |
| Married        | 82.37 [81.5,83.21]  | 63.54 [60.62,66.37] |
| Divorced + Widow| 4.23 [3.96,4.53]   | 3.987 [3.12,5.08]  |

**Marital status %**

| Single | 13.39 [12.6,14.22] | 32.47 [29.72,35.35] |
| Married | 82.37 [81.5,83.21] | 63.54 [60.62,66.37] |
| Divorced + Widow | 4.23 [3.96,4.53] | 3.987 [3.12,5.08] |

**Education %**

| No formal schooling | 22.65 [21.9,23.41] | 6.15 [5.15,7.31] |
| Primary School | 30.07 [29.18,30.98] | 10.56 [9.07,12.25] |
| Secondary School | 17.6 [16.8,18.43] | 8.44 [6.87,10.33] |
| High School | 26.22 [25.28,27.19] | 35.86 [32.99,38.83] |
| University degrees | 3.46 [3.02,3.96] | 38.99 [35.91,42.15] |

**Living Area %**

| Rural | 30.7 [29.22,32.32] | 15.19 [13.16,17.47] |
| Urban | 69.3 [67.77,70.78] | 84.81 [82.53,86.84] |

**Socioeconomic status %**

| Very Low | 9.40 [8.76,10.09] | 8.73 [7.10,10.69] |
| Low | 33.72 [32.7,34.75] | 27.4 [24.9,29.95] |
| Middle | 33.06 [32.19,33.95] | 30.1 [27.47,32.87] |
| High | 18.51 [17.69,19.37] | 25.41 [22.7,28.32] |
| Very High | 5.30 [4.81,5.84] | 8.35 [6.87,10.12] |

**BMI (M ± SD)**

| Under Weight % | 3.46 [3.09,3.87] | 4.05 [3.02,5.42] |
| Normal % | 37.37 [36.46,38.29] | 50.15 [47.24,53.07] |
| Overweight % | 34.59 [33.71,35.48] | 31.13 [28.58,33.80] |
| Obese % | 24.57 [23.72,25.44] | 14.66 [12.93,16.58] |

**Waist Circumference (M±SD)**

| 89.24 ± 0.16 | 84.82 ± 0.41 |

**Physical Activity %**

| No | 78.25 [77.29,79.19] | 69.52 [66.54,72.34] |
| Yes | 21.75 [20.81,22.71] | 30.48 [27.66,33.46] |

**Fast Food (per week)%**

| No time | 68.78 [67.77,69.78] | 60.67 [57.35,63.89] |
| Once | 19.86 [19.02,20.72] | 22.01 [19.23,25.07] |
| Twice | 7.502 [6.97,8.063] | 10.23 [8.43,12.35] |
| Three & more times | 3.857 [3.48,4.265] | 7.094 [5.49,9.115] |

**Oil %**

| Saturated vegetable | 80.97 [79.96,81.95] | 68.12 [65.05,71.04] |
| Unsaturated vegetable | 18.12 [17.18,19.09] | 31.02 [28.1,34.09] |
| Lard or suet | 0.8505 [0.706,1.024] | 0.8444 [0.4987,1.426] |
| Margarine | 0.0613 [0.0288,1.308] | 0.017 [0.0024,1.206] |

M-mean; SD-Standard Deviation; CI-Confidence Interval CI95% was represented in []. Categorical variables were compared by $\chi^2$, while numerics tested by t-test. The differences between housewives and employed group in all above characteristics were significant at 0.01 level.

**Table 2:** Obesity indices, physical activity, and dietary habits in both housewives and employed women

| BMI (M ± SD) | Housewife (n=33,472) | Employed (n=2,780) |
|--------------|---------------------|---------------------|
| Under Weight% | 3.46 [3.09,3.87] | 4.05 [3.02,5.42] |
| Normal % | 37.37 [36.46,38.29] | 50.15 [47.24,53.07] |
| Overweight% | 34.59 [33.71,35.48] | 31.13 [28.58,33.80] |
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| Unsaturated vegetable | 18.12 [17.18,19.09] | 31.02 [28.1,34.09] |
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| Margarine | 0.0613 [0.0288,1.308] | 0.017 [0.0024,1.206] |

M-mean; SD-Standard Deviation; CI-Confidence Interval CI95% was represented in []. Categorical variables were compared by $\chi^2$, while numerics tested by t-test. The differences between housewives and employed group regarding all above variables were significant at 0.01 level.
### Table 3: The association of different factors with obesity in women; a logistic regression model

|                        | Crude OR (CI 95%) | Adjusted OR (CI 95%) |
|------------------------|-------------------|----------------------|
| **Job**                |                   |                      |
| Employed¥              | 1                 | 1                    |
| Housewife              | 1.91 (1.65, 2.23)*| 1.39 (1.18, 1.63)*   |
| **Age group**          |                   |                      |
| 1.55 (1.51, 1.59)*     | 1.38 (1.33, 1.43)*|
| **Education**          |                   |                      |
| 0.76 (0.73, 0.79)*     | 0.87 (0.83, 0.91)*|
| **Marital Status**     |                   |                      |
| Single¥                | 1                 | 1                    |
| Married                | 3.59 (3.08, 4.19)*| 2.15 (1.84, 2.51)*   |
| Divorced + Widow       | 4.36 (3.44, 5.52)*| 1.66 (1.30, 2.13)*   |
| **Socioeconomic Status** |                 |                      |
| Very Low¥              | 1                 | 1                    |
| Low                    | 1.25 (1.06, 1.48)*| 1.13 (0.95, 1.33)    |
| Middle                 | 1.33 (1.11, 1.58)*| 1.22 (1.02, 1.45)*   |
| High                   | 1.43 (1.18, 1.72)*| 1.31 (1.08, 1.57)*   |
| Very High              | 1.29 (1.05, 1.58)  | 1.13 (0.92, 1.39)    |
| **Living Area**        |                   |                      |
| Rural¥                 | 1                 | 1                    |
| Urban                  | 1.30 (1.17, 1.45)*| 1.37 (1.21, 1.55)*   |
| **Fast food (per week)** |               |                      |
| No time ¥              | 1                 | 1                    |
| Once                   | 0.90 (0.81, 1.01) | 1.01 (0.90, 1.13)    |
| Twice                  | 0.91 (0.80, 1.04) | 1.07 (0.93, 1.23)    |
| Three & more times     | 0.61 (0.49, 0.75)*| 0.78 (0.63, 0.96)*   |
| **Oil**                |                   |                      |
| Saturated vegetable ¥  | 1                 | 1                    |
| Unsaturated vegetable  | 1.22 (1.09, 1.36)*| 1.20 (1.08, 1.34)*   |
| Lard or suet           | 0.84 (0.59, 1.19) | 0.74 (0.50, 1.08)    |
| Margarine              | 0.85 (0.17, 4.16) | 0.73 (0.15, 3.50)    |
| **Physical Activity**  |                   |                      |
| No¥                    | 1                 | 1                    |
| Yes                    | 0.86 (0.78, 0.94)*| 0.99 (0.89, 1.09)    |

OR-Odds Ratio; CI-Confidence Interval; ¥ Baseline group; * P< 0.01

Age group was entered in the model with 10 years interval from 15 to 65 years old. Education varies in five ordinal categories from illiterate to university degree.

All the variables were entered in the model to calculate the adjusted odds ratio.
Discussion

Based on findings, the weighted prevalence of overweight and obesity among HWs was 34.5% and 24.5%, respectively. Both overweight and obesity prevalence were about 4% and 10% less common among employed women than HWs. After adjustment for the potential confounders such as age, physical activity, and other unhealthy lifestyles, living as a housewife remains a significant independent risk factor for obesity among women. Recent studies indicated that overweight prevalence among women is varied from 32.3% to 69.7% (1, 17) and obesity from 10% to 46.4% (5, 12, 23) in different countries worldwide. In comparison to mentioned studies, Iranian women are at high risk for developing obesity. This could be partly explained by the fact that a big portion of women living in Iran is unemployed as house-keeper/housewife.

Lower educational level and socioeconomic status were reported to be risk factors for women’s obesity in different studies (1, 6, 12, 20). Similar to other studies, we found that HWs had lower educational level and socioeconomic status than the employed group. Educational level is inversely related with unhealthy dietary habits and physical activities (18). This could partly explain the higher risk of obesity in HWs. Surprisingly in comparison with lower SES, we found women at middle to high SES level, experienced an increased the risk of obesity. SES is a complex multidimensional indicator. There are many methods for calculating SES and they mostly should be adapted for local settings before being applied. As mentioned in details in the material method, we have calculated the SES according to some basic variables from the database. To check its predictability, we have examined the SES against living areas and educational level and found it a valid predictor. However, the relationship between SES and the obesity is not easy to be explained since it is much related to educational level and lifestyle.

Regarding healthy diets, employed women reported more fast food consumptions during a week. It

Fig. 1: The point estimation and confidence interval 95% of adjusted OR for obesity. Housewife was reserved as the baseline group (OR=1). Adjustment was performed regarding all the significant factors reported in Table 3.
can be a part of their specific life style with more hours being outdoors and having limited time to serve domestic prepared foods. This was reported also by other studies (18). We found that more fast food consumption related with lower risk of obesity. It could be explained by reverse causality, which could be happened in all cross-sectional studies. Furthermore, Iranian domestic foods are mostly consisting of rice and bread (24). The high caloric carbohydrate foods that are served by housewives at home, increase the risk of obesity. As an alternative explanation of such findings, the underreporting of the food consumption in obese/overweight people was more than the normal group. This misclassification of the exposure has been reported in other nutritional epidemiological studies (25, 26).

In our study, more than 80% of HWs cooked foods with saturated vegetable oil while this percentage decreased to 68% in employed women. It could be the effect of the higher educational level in employed women and their positive attitudes towards oil preference. In general population, mostly in Iranian ancient families, it is mostly believed that solid oils are much better than the liquid ones (27). Although the mass media in Iran has tried hard to change this misconception, the results indicated that more effective preventive programs are still required. Unexpectedly, we found that those unsaturated vegetable oil consumers were at higher risk of obesity. With the available data, we could not explain it completely. However, many people believe that unsaturated vegetable oils not only are safe for cardio-vascular disease but also they would not increase the risk of obesity. Consequently, they use it without limitation. In similar to findings from other countries, adults’ knowledge on fat consumption is not effective and mostly they underestimate their fat consumption (28). However, this miss understanding on such kind of oils and other potential relevant factors should be deeply explored in further studies.

We found that even after adjusting for main contributors such as SES, educational level, physical activities and even dietary status, living in urban areas increased the risk of obesity in both HWs and employed women. Urbanization was reported as a very important factor for many non-communicable disease such as diabetes, coronary heart disease and obesity (20). It is mainly because of the transition from a traditional lifestyle (with more physical activities and healthier diets) to modern/westernized lifestyle in Iran that happened during these decades especially in urban areas. Therefore, women especially HWs in urban areas needed behavioral interventions for preventing obesity.

Compare to other factors, marriage had the greatest association with obesity. The effect of marriage on obesity considerably confounded with other factors such as age, educational level, and SES. In line with findings from other studies, married or divorced/widow women had an increased risk of obesity (18).

When we divided employed groups into four subgroups, only clerks had a lower risk of obesity in compare to HWs. Although workers, farmers and Self-employed women had lower risk of obesity, but the difference was not statistically significant. It is mostly because of the sample size in sub-groups. Further confirmatory studies, focusing on these subgroups are recommended.

Since we have acquired an existing national database on NCD risk factors, our analysis was restricted to the variables, which have been collected in the survey. We were not able to explore the effect of menopause on the prevalence and risk pattern of our study. Moreover, as like of other cross-sectional surveys, reverse causality threats our findings. There is possibility that none obese women have a higher chance of being recruited; although we do not think it could be very popular act in Iran with our context.

In conclusion, the HWs’ lifestyle is a potential risk factor for obesity in women. Being as HW is accompanying with several lifestyle related factors, which can be explained completely by routine obesity determinant factors. To have effective public interventions, this fact should be taken into account. Other related factors of obesity in HWs are aging, being married, living in urban areas, having less educational level and physical activity, although the whole risk is not complained all by these factors.
More exploratory behavioral analysis should be done among this high-risk group for obesity in Iran.

**Ethical Considerations**

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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