

**Related factors with Women's Body Mass Index (BMI) in Isfahan***M. Noroozi\**, *Sh. Davazdah Emami\*\**, *N. Bashardoost\*\*\****Abstract**

**BACKGROUND:** Today prevalence of overweight and obesity is increasing in most parts of the world. Obesity plays an important role in creating health poverty in women and decreasing life span. The most common formula to assess physical health is body mass index (BMI). The present research was conducted to determine related factors (personal and reproductive characteristics) with women's BMI.

**METHODS:** This was a descriptive-analytic study in which data were collected cross-sectional. The samples were 384 people in Isfahan. They were selected by cluster sampling and referred to 10 health centers in the city. In this research, the evaluation instruments were a questionnaire and the tools of measuring height and weight which were standard and unique. Collected data were analyzed by SPSS software and descriptive-analytic statistical methods.

**RESULTS:** The results showed that there was significant statistical relation between age, education level, family economic situation, menarche age, the number of pregnancies and deliveries, OCP (LD) use of LO contraceptives and history of deliveries with less than two years interval and BMI ( $P < 0.05$ ).

**CONCLUSIONS:** Acquainting the women with the related factors with BMI (Age, menarche age, etc), creating a situation for women to continue their education in different levels, training the women to limit pregnancy and delivery numbers and preventing deliveries with less than a two-year interval through mass media can be helpful to prevent overweight and obesity in women.

**KEY WORDS:** Body mass index, factors associated with BMI, obesity, overweight

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Today prevalence of overweight and obesity is increasing in most parts of the world. Obesity and overweight are dangerous reasons for different kinds of the disease such as cardiac disease, diabetes, hypertension, hyperlipidemia, osteoarthritis and cancers (breast, endometrium and ...).

On the other hand, low weight and thinness can cause a decrease in bone density and increase in bone breaking danger and osteoporosis especially in menopause women. Moreover, thinness can be problematic for psychological health<sup>(1)</sup> and can also put into disorders on the hypothalamus operation which will result in menstruation cycles without ovulation and pregnancy disorders<sup>(2)</sup>. The

most common formula for the evaluation of body health and calculation the body weight is Body Mass Index (BMI) which is calculated by dividing the subject's weight in kilograms by the square of his/her height in meters<sup>(3)</sup>. In this case, we categorize people according to their scores as follow; index below 18.5 (kg/m<sup>2</sup>) is under normal weight, index between 18.5 to 24.9 is normal, 25-29.9 is overweight, 30-39.9 is obesity and index 40 and over is considered as severely obese<sup>(1)</sup>.

Different researches have shown that women with low BMI face the danger of having low birth weight infants<sup>(4)</sup>, premature delivery, intra uterine growth retardation and decrease in the score of infants' APGAR more

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than others. In contrast, women with high BMI face with the danger of microseism infants, nervous tube defect and some other disorders such as hypertension, pregnancy diabetes, increasing in the cesarean section rate, the dangers related to anesthesia and ... more than others (4). As a whole, about 1/3 individual differences in body fat derived from genetic factors which are scaled by BMI. However, MBI is related to various factors such as age, sex, socio-economic situation, level of education, race, nationality, physical activities and pattern of diet. In this respect, Hegal and his colleagues (1997) discovered that the opportunity of women's over weight and obesity is raised by increasing in the age of women (1). Moreover, different researches in different developing countries have shown that there is a positive relation between BMI and the economical-social socio-economic situation while BMI has a strong reversed relation with the socio-economic situation in developed countries (1).

Various researches were done in different parts of the world about BMI and its relation with some factors such as menarche age, the age at the time of the first pregnancy, the number of pregnancies and deliveries, the use of contraceptives and ... which had similar or contradictory results, as we can mention the findings of the research by Franchini and his colleagues (1995) reported that the use of contraceptives have not caused noticeable changes in body weight (5). While, the findings of the study by Reubinoff et al (1995) showed that the use of contraceptives can increase the weight and BMI through raising the amount of body fat (6). Nowadays, because of the increasing rate of obesity in the world, more attention is paid to determine some related factors to women BMI. This research was conducted to determine the effective factors on women BMI.

## Methods

This was an analytical cross sectional study. The samples (precision 0.4 and reliability 95 percent) were 384 women of Isfahan who had

at least one pregnancy and delivery. They were selected by cluster sampling and referred to 10 health centers in the city (They were selected randomly). The criteria of exclusion in this study were pregnant breast-feeding or menopause women, professional athlete or body builder, non-Iranian women, women on diet for increasing or decreasing weight, having abortion on the last pregnancy, mole hydatiform or ectopic pregnancy, systematic therapy with drugs such as levothyroxine, methimazol, steroids combination, propyl thiouracil, Danazol, strogenic and prostrogenic combination (except for pregnancy preventing progestins), the existence of any kinds of noticable skeletal disease affecting height in different ways such as side deviation of spinal column, increasing of natural convexity of the spinal column (hunchback) and paralysis of the lower parts of the body, having recognized and psychological disorders, recognized diseases like diabetes, Hypothyroidism, gastric ulcer, duodenal ulcer and cancers. In this study, the data collecting instrument was questionnaire that its reliability was measured by test re-test method.

To collect data, five expert obstetrics using the identified head clusters' addresses (randomly) went to the identified houses as interviewer from December to January 2002. Besides explaining the study, they asked them to refer to the closest health and treatment center to answer the questionnaire and to have their height and weight measured. The next families were selected with a two house interval respectively and finally in each cluster about 39 families were examined. In this research, data was analyzed by using descriptive (mean, standard deviation, minimum and maximum) and inferred (Pearson related coefficient, independent t-test and analyze of a one way ANOVA) statistical methods. The SPSS soft ware was used in this research.

## Results

The results of the research in relation to the characteristics of fertility showed that there is a significant statistical relation between men-

arche age ( $P < 0.001$ ), the number of pregnancies ( $P < 0.001$ ), the number of deliveries ( $P < 0.001$ ), usage of LD contraceptives after the last pregnancy ( $P < 0.01$ ) and history of deliveries with less than two interval ( $P < 0.001$ ) and BMI. Using independent t-test and Pearson correlation coefficient, women with low menarche age (under 12 years of age) had higher BMI (mean: 26.2 kg/m<sup>2</sup>) in comparison to 12 years of age or higher, (mean: 26.2 kg/m<sup>2</sup>) ( $P < 0.05$ ) while in women with 2 or more pregnancies and deliveries in comparison to those with a history of one pregnancy, the BMI was higher ( $P < 0.05$ ).

Moreover, in women using LD contraceptives the mean BMI was more than non users (mean: 27.21 kg/m<sup>2</sup> in contrast to 25.88 kg/m<sup>2</sup>). Considering history of less than two year interval between deliveries, the research findings showed that women with the history of this condition had a higher BMI in comparison to others (mean: 28.17 kg/m<sup>2</sup> in contrast to 26.37 kg/m<sup>2</sup>). According to the individual's situation, a statistically significant correlation was found between age ( $P < 0.001$ ), family economical situation ( $P = 0.03$ ), level of education ( $P = 0.01$ ) with BMI using independent t-test, one-way variance and Pearson correlation coefficient, so that it was shown that women with 25 years or more had a higher BMI in comparison to women below 25 years (mean: 26.2 kg/m<sup>2</sup> or more? in contrast to 26.2 kg/m<sup>2</sup>). While in women with a higher educational level (high school or more in contrast to illiterate women) and unsuitable economical status (identified by using criteria like house possession, family monthly income and the number of family members) the mean of BMI is less than women with a lower educational level and a good economical status (mean: 26.12 kg/m<sup>2</sup> in contrast to 28.10 kg/m<sup>2</sup> and 26.42 kg/m<sup>2</sup> in contrast to 27.24 kg/m<sup>2</sup> respectively).

No significant statistical relation was found between BMI and other factors including job, age of first pregnancy, interval between menarche and the first pregnancy, duration time of using LD contraceptives, the number of deliv-

eries with less than two year interval, interval between recent and previous delivery, duration time of breast feeding (generally) and time of limited breast feeding ( $P > 0.05$ ). There was not opportunity of using statistical tests to analyze relation between using of HD, Triphasic contraceptives, progestin ampoules (DMPA) and Norplant capsule after the last delivery with BMI because of the low number of users of these methods.

## Discussion

With regard to the matter that BMI is cheaper and easier to use by the patients at home or by the health experts, it is also easier to compute and measure weight and height than other methods so it is suggested as a precise instrument to measure all body fat (7). It is better that BMI be determined for all help seekers by the personnel of the health and treatment centers and in necessary cases they would be referred to the feeding and diet therapy experts.

In this study, the relation between low age at the time of menarche (below 12 years of age) and an increasing in BMI was observed. Laitinen et al (2001) have also shown that premature menarche was related to the increase of BMI and obesity in adulthood age (8). Therefore, it seems that we can present necessary information in this case through educational programs by television or face to face training by health and treatment personnel, to perform necessary instructions for avoiding or preventing over weighting and obesity that may be appear in these cases (menarche in low age). In relation to pregnancy and delivery, we should point out that pregnancy basically is a main factor in increasing the prevalence of obesity in women comparing to men (9).

Kanadys, after a research on 16-41 years old polish women has reported that pregnancy is a dangerous factor in obtaining weight after delivery, an increase in BMI, overweighting and obesity (10). In Bray's and Ryan's belief (2000), multiple deliveries are one of the most important factors in over weighting and obesity and it should be considered in the clinical evaluation of over-

weight patients <sup>(11)</sup>. It seems that noting the relation between number of pregnancies and deliveries and BMI in the present research, we can provide necessary training to limit the number of pregnancies and deliveries through television programs, newspapers and all mass media and also at the time of presenting cares in pregnancy period. Using this method, we can follow the policies of controlling population in the country and prevent the increasing of BMI, repeated deliveries, overweighting, and obesity after pregnancy. Reubinoff et al (1995) in a study in Israel found that using LD contraceptives can increase weight by increasing body fat <sup>(6)</sup>. The present research has also determined the relation between using these combinations and an increase in the mean BMI. Therefore, it is better to measure weight and determine BMI in the users of these products and if needed to use the preventing and treating instructions. Noting the obtained relation between age, history of less than two years interval between deliveries and BMI in this study, we can present necessary information to help women by personnel and encourage them to follow the necessary instructions.

Another factor that its relation with BMI was obtained in this research was the level of education, meaning that women with higher education have less BMI than others. According to the findings of Pietinen's et al in Finland, there was a significant statistical relation between level of education and BMI. BY increasing the level of education, BMI will

decrease <sup>(12)</sup>. Therefore, more opportunities should be considered by authorities to increase women's level of education in different stages such as university education. Considering the relation between family economical status and BMI in this research, it was determined that the mean of BMI in the individuals' with suitable economical status is more than others.

In a research, Reubinoff et al (2001) in Brazil concluded that the obesity of women has a direct strong relationship with the level of family income in less developed regions of Brazil (north- eastern regions). They believed the level of family income in societies is a risk factor of obesity <sup>(13)</sup>. However, in developed countries weight and BMI have a strong reversed relationship with socio-economic status <sup>(1)</sup>. It seems that, in these cases we should pay more attention to individuals with suitable economical status for training them to prevent obesity and over weighting.

Considering low numbers of HD users, Triphasic contraceptives, progestin ampoules and Norplant capsules in this study, we could not apply statistical tests for them. It seems that women have fewer tendencies to use harmonic methods than other methods in the prevention of pregnancy. Of course, we should mention that Norplant capsules do not exist in drug stores and health and treatment service centers. However, to study the relation of these factors with BMI we should do other researches and compare BMI in users and non users of these combinations.

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