

Body image and body mass index of pregnant women do not affect the growth indicators of newborns. A Cross-Sectional Study

Prikaz tijela i indeks tjelesne mase trudnica ne utječu na pokazatelje rasta novorođenčadi. Presječna studija

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Summary

Aims: The aim of the study is to investigate the relationship between the body image and body mass index (BMI) of pregnant women with newborn growth indicators in selected hospitals of Shiraz University of Medical Sciences.

Methods: A cross-sectional study was conducted on 420 pregnant women over 17 years old, who were selected by consumptive sampling method, in the hospitals affiliated to Shiraz University of Medical Sciences. The research questionnaire was conducted through the multidimensional questionnaire of a person's attitude towards her body image (MBSRQ). Due to the large number of sample size, Pearson's inferential test was used and $P < 0.05$ was considered statistically significant.

Results: The mean age of the women was 29.52 ± 6.04 year, mean BMI was 24.66 ± 3.96 kg/m², and mean score of body image was 249.86 ± 22.27 . The body image score was not significantly associated with newborn growth indicators (birthweight $p = 0.222$, length $p = 0.534$, head circumference $p = 0.537$). Also, the women's BMI was not significantly related to the newborn growth indicators (birthweight $p = 0.180$, length $p = 0.577$, head circumference $p = 0.720$). The BMI was inversely related to satisfaction with different body parts ($p < 0.001$), individual's attitude towards weight ($p < 0.001$) and total score of women's body image ($p < 0.001$).

Conclusions: the body image in pregnancy had a significant relationship with the women's BMI. However, more comprehensive prospective studies are recommended to carefully examine the effects of pregnant women's body image on newborns growth (both term and preterm), because studies in this area are very limited..

Key words: birthweight, body image, body mass index, growth, infant, mental health

Sažetak

Ciljevi: Cilj istraživanja je istražiti odnos između prikaza tijela i indeksa tjelesne mase (BMI) trudnica s pokazateljima rasta novorođenčeta u odabranim bolnicama Sveučilišta medicinskih znanosti u Shirazu.

Metode: Presječna studija provedena je na 420 trudnica starijih od 17 godina, koje su odabrane metodom konzumnog uzorkovanja, u bolnicama pridruženim Sveučilištu medicinskih znanosti u Shirazu. Istraživanje je provedeno putem višedimenzionalnog upitnika stava osobe prema prikazu tijela (MBSRQ). Zbog velikog broja veličina uzorka korišten je Pearsonov inferencijalni test i $P < 0,05$ se smatrao statistički značajnim.

Rezultati: Prosječna dob žena bila je $29,52 \pm 6,04$ godine, srednji BMI bio je $24,66 \pm 3,96$ kg/m², a srednja ocjena prikaza tijela bila je $249,86 \pm 22,27$. Rezultat slike tijela nije značajno povezan s pokazateljima rasta novorođenčadi (porođajna težina $p = 0,222$, duljina $p = 0,534$, opseg glave $p = 0,537$). Također, BMI žene nije

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Received/Priljeno 2022-04-29; Revised/Ispravljeno 2022-10-05; Accepted/Prihvaćeno 2022-11-07

bio značajno povezan s pokazateljima rasta novorođenčeta (porođajna težina $p=0,180$, duljina $p=0,577$, opseg glave $p=0,720$). BMI je obrnuto proporcionalan sa zadovoljstvom različitim dijelovima tijela ($p<0,001$), odnosom pojedinca prema težini ($p<0,001$) i ukupnim rezultatom prikaza ženskog tijela ($p<0,001$).

Zaključci: prikaz tijela u trudnoći imao je značajan odnos s BMI žene. Međutim, preporučuju se sveobuhvatnije prospektivne studije kako bi se pažljivo ispitali učinci tjelesnog prikaza trudnice na rast novorođenčadi (i terminske i nedonoščadi), budući da su studije u ovom području vrlo ograničene.

Ključne riječi: težina kod poroda, slika tijela, indeks tjelesne mase, rast, dojenče, mentalno zdravlje

Med Jad 2022;52(4): 257-264

Introduction

Psychological changes in pregnancy may occur from the beginning to the end of pregnancy and even after delivery. In the first pregnancy, these changes can be a powerful and important experience.^{1,2} The physical and appearance changes during pregnancy affect a woman's social performance and mental health also.^{1,3,4} The body image has a multidimensional structure. In fact, the body image is a psychological representation of the individual's body, which includes the cognitive, attitudes, and behavioral aspects of the individual's appearance and is formed from biological, psychological, and social influences.^{2,5-9} The woman's rapid physical changes during pregnancy may create a negative image of the body in her mind.³ Body dissatisfaction can lead to adverse mental disorders or unhealthy behaviors such as obesity or severe weight loss as a result of eating disorders that have serious negative consequences on women's health, especially fetal and newborns growth and development.^{5, 10-13} Body image is effective in a woman's weight gain during pregnancy.¹⁴ In a cohort study of Sui, women who were dissatisfied with their body size and shape were more likely to gain excess weight during pregnancy.¹⁵ In addition to increasing the risk of obesity in women, excessive weight gain during pregnancy is also associated with adverse obstetric and neonatal consequences.¹⁶ The previous studies have shown that high BMI in women can have effects on the newborn, such as macrosomia, large for gestational age (LGA), and a low Apgar score.^{14, 17-22} According to the limitation of studies and in order to find out the relationship between pregnant women's body image and BMI with the newborn growth indicators, we decided to do this study.

The aim was to investigate the relationship between body image and BMI of pregnant women

with growth indicators of the newborns in selected hospitals of Shiraz University of Medical Sciences.

Methods

A cross-sectional analytical study included 420 pregnant women who referred to the delivery departments of selected hospitals affiliated to Shiraz University of Medical Sciences, namely Hafez, Hazrat Zeinab and Shoushtari hospitals in 2019. The convenience sampling method was used. In this method, if the selected person did not have the conditions to enter the study, the next person was replaced. Half of the women had given birth by cesarean section and the other half by vaginal delivery.

According to Esmaily et al.'s study²³ (based on Table 6 of the article), and considering $\alpha=0.05$ and $\beta-1=0.90$, the number of 411 women was determined as the sample size. Considering the possible limited loss of 420 pregnant women from the study, the final sample size was selected ($r=0.159$). The study inclusion criteria were: healthy Iranian married women, over 17 years of age, with term and singleton pregnancy, who were not addicted to cigarettes, alcohol and drugs and completed informed consent. Exclusion criteria were reluctance of the pregnant woman to continue the study, the surgery of newborns or hospitalization in neonatal intensive care unit, or congenital anomalies, and the newborn's lack of physical health. To eliminate the effect of depression on body image as a confounding factor, before filling out the questionnaires, the Edinburgh Postnatal Depression Scale (EPDS) questionnaire was first completed by sample individuals, and those who were not depressed entered the study.

The instrument used for data collection included four questionnaires:

1. Demographic questionnaire in which information such as age, marriage, length and weight before pregnancy, medications and diseases before and during pregnancy, gestational age at delivery, etc. completed before labor began.

2. Multidimensional Body Self Relation Questionnaire (MBSRQ) including 69 items and three subscales of individual's attitude towards body image, satisfaction with different body parts, and scale of individual's attitude towards weight. The questions are graded based on the Likert scale from 1 to 5. Therefore, the minimum score for a person was 69 and the maximum score 345. The higher a person's score, meant the better her body image. The validity and reliability of the components with a confidence interval of 0.77 to 0.91 for men and 0.73 to 0.89 for women were reported by Cash. Also, the reliability of this questionnaire and its subscales has been confirmed in various other studies.^{24,25} This questionnaire was evaluated by Sareh Zarshenas in Iran and its reliability was 0.75.²⁶

3. The checklist for assessing newborn growth indicators included the birthweight, newborn's length, and head circumference.

4. Edinburgh Questionnaire (EPDS): This questionnaire, was prepared by Cox et al. (1897), measuring depression during pregnancy and childbirth. This questionnaire has 10 four-choice questions and with a score between 0 and 30 in which a score below 12 is considered as depression.²⁷⁻²⁹ Its validity and reliability in Iran were calculated by Kheirabadi et al., and Cronbach's alpha was reported to be 0.79.³⁰ This questionnaire has also been used in other studies in Iran.³¹

Statistical Analysis

The data has been analyzed using descriptive and inferential statistics tests using SPSS version 25 software. Central and dispersion indices (mean and standard deviation) were used to describe the characteristics of the sample population. Due to the size of the study and the large number of samples, Pearson's inferential test was used, and a 95% confidence interval was considered for significance level.

Ethical considerations

This research project was approved by the local Ethics Committee of Shiraz University of Medical Sciences and written informed consents were obtained from all the participants. The Ethic code: IR.SUMS.REC.1397.1244 was financially supported by Shiraz University of Medical Sciences.

Results

In this study, 420 women and their newborns were examined at the time of delivery. According to the data, 57.9% of women were between 25 and 35 years of age, 43.1% had an educational level lower than diploma and 94.8% were housewives. The mean age of the women was 29.52 ± 6.04 year, the mean women's BMI was 24.66 ± 3.96 kg/m², the mean women's body image score was 249.86 ± 22.27 The newborn's mean weight, length and head circumference were 3372.83 ± 387.87 g, 50.75 ± 3.11 cm, 34.40 ± 1.10 cm, respectively (Table 1).

The results showed that there was no statistically significant relationship ($p > 0.05$) between the three scales of the individual's attitude towards body image, satisfaction with different body parts, the individual's attitude towards weight or the total score of the body image with birthweight, length and head circumference of the newborn.

There was a significant inverse relationship between women's BMI and satisfaction with different body parts, individual's attitude towards weight and the total score of the women's body image. In fact, the higher women's BMI was related with the lower satisfaction with various parts of her body, worse attitude towards her weight, and worse towards her body image. The relationship between body image and maternal body mass index was not the aim of our study. Rather, this result is presented as a finding during the study (Table 2).

According to the results, the women's BMI was positively correlated with birthweight and newborn's head circumference and was inversely related to the newborn's length. But the p-value in all three cases was greater than 0.05 and this relationship was not statistically significant (weight p-value = 0.180, length p-value = 0.577, head circumference p-value = 0.720). Therefore, there was no significant relationship between the women's BMI and newborn growth indicators (Table 3).

Table 1 Newborn growth indicators, pregnant women's body image and BMI

Tablica 1. Pokazatelji rasta novorođenčadi, i slika ženskog tijela trudnice i slika tjelesne mase

	Descriptive Statistics				
	N	Opisna statistika			Std. Deviation Standardna devijacija
Minimum		Maximum	Mean Srednje		
Birthweight (g) <i>Težina kod poroda</i>	420	2300.00	4300.00	3372.83	387.87
Length (cm) <i>Dužina</i>	420	20.00	57.00	50.75	3.11
Head (cm) circumference <i>Opseg glave</i>	420	31.00	37.50	34.40	1.10
Women's age (y) <i>Starost žena</i>	420	17.00	48.00	29.52	6.04
Women's BMI (kg/m ²) <i>Slika tjelesne mase žena</i>	420	16.94	37.32	24.66	3.96
Women's Body image (score) <i>Slika ženskog tijela (rezultat)</i>	420	137.00	306.00	249.86	22.27

Table 2 Pearson correlation coefficient of body image score and BMI with g newborn growth indicators

Tablica 2. Pearsonov koeficijent korelacije rezultata slike tijela i indeksa tjelesne mase s g pokazateljima rasta novorođenčadi

Variable <i>Varijabla</i>	N	Birthweight <i>Težina kod poroda</i>		Length <i>Dužina</i>		Head circumference <i>Opseg glave</i>		Mother's BMI <i>Slika tjelesne mase majke</i>	
		r	p	r	p	r	p	r	p
individual's attitude towards body image <i>stav pojedinca prema slici tijela</i>	420	0.054	0.268	0.008	0.865	0.010	0.835	-0.066	0.180
Satisfaction with different body parts <i>Zadovoljstvo različitim dijelovima tijela</i>	420	0.086	0.080	0.099	0.042	0.090	0.066	-0.249	0.0001
Individual's attitude towards weight <i>stav pojedinca prema težini</i>	420	-0.049	0.312	-0.002	0.975	-0.019	0.704	-0.440	0.0001
Mother's body image <i>Majčina slika tijela</i>	420	0.060	0.222	0.030	0.534	0.030	0.537	-0.183	0.0001

N – number of individuals, P – level of significance, r – correlation coefficient, BMI – body mass index

N - broj pojedinaca, P – razina značajnosti, r – koeficijent korelacije, BMI – indeks tjelesne mase

Table 3 Pearson correlation coefficient of pregnant women's BMI with newborn growth indicators

Tablica 3. Pearsonov koeficijent korelacije indeksa tjelesne mase trudnice s pokazateljima rasta novorođenčadi

Variable <i>Varijabla</i>	N	Weight <i>Težina</i>		Length <i>Dužina</i>		Head circumference <i>Opseg glave</i>	
		r	p	r	p	r	p
Mother's BMI <i>Slika tjelesne mase majke</i>	420	0.065	0.180	-0.027	0.577	0.018	0.720

N – number of individuals, P – level of significance, r – correlation coefficient, BMI – body mass index

N - broj pojedinaca, P - razina značajnosti, r - koeficijent korelacije, BMI - indeks tjelesne mase

Discussion

In general, there was no significant relationship between the women's body image and its subscales including the individual's attitude towards body image, satisfaction with different body parts and the individual's attitude towards weight, with the variables of birthweight, newborn's length and head circumference. It should be noted that among the studies conducted in Iran as well as international articles, no study has investigated the relationship between the body image of pregnant women and newborn growth indicators. Most studies have examined body image or growth indicators separately or with other subjects.³²⁻³⁵

However, there are studies that have examined the relation between some maternal psychological factors and some newborn outcomes. For example, in the study by Witt et al. the poorer the mother's mental health is associated with the higher the chance of having a low birthweight newborn.³⁶ Hassan Janzadeh et al.'s study showed that as women's depression, stress and anxiety decreased, the newborn's length, weight, head circumference and Apgar increased.³⁷ Also, Baibazarova's study showed that higher mother's stress and anxiety is associated with lower newborn's weight.³⁸

The common feature of these studies with the present study is that they also examined the mental state of pregnant women. Body image is an important aspect of women's mental health⁶, so it can be expected that the consequences of body image and other psychological factors are similar. But no study was found that specifically examined body image with birth outcomes. In the study of Brown et al. mothers who had a negative body image during pregnancy had a shorter duration of breastfeeding.³³

According to other studies, the more women's mental health problems, the worse and poorer the newborn outcomes were, but the current study did not show this relationship regarding body image. It seems that there are stronger factors during pregnancy that make the effect of the body image on the health of

pregnant woman and the baby fade. One of these things can be maybe the feeling of becoming a mother.^{39,40}

Studies have proven that depression and body image have a strong mutual influence.⁴¹⁻⁴³ In the current study, many women who had acute mental image problems were excluded from the study, because the aim was to investigate the effect of body image specifically and to exclude depression as a confounding factor.

The results showed that there was no significant relationship between the women's BMI and the newborn growth indicators, which is the opposite of others. Alizadeh et al.'s study showed that there was a significant relationship between the birthweight and the women's BMI ($P < 0.05$ and $r = 1$). But there was no significant relationship between the newborn's length and head circumference and the women's BMI.⁴⁴ The findings of this study regarding the relationship between the women's BMI and newborn's length and head circumference were similar, and regarding the birthweight, were contrary to the results of the current study.

The focus of most of the studies is birthweight, and limited studies have measured the newborn's length and head circumference with the women's BMI. Nowak et al.'s retrospective cohort study showed that there was a significant relationship between the groups of women's BMI and the average birthweight.⁴⁵ The study of Ovesen⁴⁶, Athukorala⁴⁷, Sharifzadeh⁴⁸, Li⁴⁹, etc. also showed a significant relationship between the birthweight and the pregnant women's BMI, which does not match the results of the current research. The difference in the results of the studies can be due to the fact that in the current study, the BMI at the beginning of pregnancy was taken into consideration and attention was not paid to the women's weight gain during pregnancy. In the present study, newborns who were admitted to intensive care units (NICU) were excluded from the study. Therefore, a large percentage of newborns with abnormal length, weight, and head circumference may have been excluded from the study and may

have affected the results of the study. This can be a strength of the study, because the influence of confounding factors has been prevented.

Conclusion

The results showed that there was no significant relationship between the body image or women's BMI with the newborn growth indicators. Our suggestion is that in order to clarify the issue possible necessary interventions need to be carried out, more specific studies should be conducted on the importance and impact of women's body image on the growth indicators of the fetus and newborn (both term and preterm), because the studies in this field are very limited.

Study limitations

1. In this study, only newborns with no health problems were examined, this limitation caused many newborns to be excluded from the study.

2. Due to the selection of the sample among the women hospitalized in the delivery department, many women did not want to participate in the study due to pain.

Suggestions

Regarding the relationship between body image and BMI, it is recommended to develop and implement body image support programs in health care centers during pregnancy. Group and prospective studies are also recommended to examine the neonatal and maternal consequences associated with body image.

Acknowledgments

This article is a part of Ms. Maryam Keshavars thesis (grant Number: 17412. Ethic code: IR.SUMS.REC.1397.1244), which was approved and sponsored by Shiraz University of Medical Sciences. The authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran and Center for Development of Clinical Research of Nemazee Hospital that helped in the data analysis.

Funding information

This study was funded by the Research Deputy of Shiraz University of Medical Sciences (grant Number: 17412).

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