# EFFECTS OF GENERAL HEALTH AND NUTRITIONAL STATUS OF PREGNANT ADOLESCENTS ON NEWBORN HEALTH

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## SUMMARY

***Objective:*** *Adolescent pregnancy is considered a high risk for both the mother and infant. The aim of this study was to determine general health and nutritional status of adolescent pregnants and to search the effects of these on newborn.*

***Material and methods:*** *Anthropometric measurements, biochemical findings, and nutritional status of 220 adolescent pregnants were examined. Mothers complete a face-to-face questionnaire. Participants were asked for nutritional status and pregnancy history. Weight controls and laboratory findings were repeated by providing monthly, physician examination for these pregnants and food consumptions were examined in each control. Pregnancy outcomes were measured and records by the investigator himself. Pregnancy outcomes were obtained from the 168 birth records. General health status and anthropometric measurements to birth of infants were examined in this study*

***Results:*** *The mean age of 17.4 ± 0.73 years for women, average age of marriage and first pregnancy 16.40 ± 09 and 16.8 ± 05 years, respectively. In these pregnants, premature birth and still birth is 3.1%, infants who dead after birth is 3.2%, abortion and curettage is 10.6%. Children born to mothers with multiple pregnancies, 46.6% percent have died. In this study it was determined that women, 40% of whom was anemic, consumed only 41.6% of iron amount recommanded. Their energy, protein and vitamin A consumptions were also below recommendation amount. Average weight gain were 10.95±4.89 kg for all pregnant. 10.1% of pregnant women delivered ≤ 36 weeks, 80.9% of them delivered between 37-40 weeks , and various health problems were observed 32.7% of the infants.*

***Conclusion:*** *Nutrition is more important for adolescent pregnant due to the growth of both lives. When assessed in terms of mother and child health services, society should be continuously informed about adequate and balanced nutrition.*

***Key words:*** *adolescent pregnancy, low birth weight, nutrition problems of adolescent pregnancy.*

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# ADÖLESAN GEBELERİN GENEL SAĞLIK VE BESLENME DURUMLARININ YENİDOĞAN SAĞLIĞI ÜZERİNE ETKİLERİ

## ÖZET

***Amaç:*** *Adölesan gebelik anne ve bebeğin her ikisi içinde ciddi risk faktörüdür. Bu araştırmanın amacı adölesan gebelerin genel sağlık ve beslenme durumlarını saptamak ve bunun yeni doğan üzerindeki etkilerini araştırmaktır.*

***Gereç ve yöntemler:*** *220 adölesan gebenin, gebeliğe ilişkin sorunları saptanarak antropometrik ölçümleri, biyokimyasal bulguları ve beslenme durumları incelenmiştir. Tüm gebelere araştırmacı tarafından anket yapılarak, gebelik sorunları ve beslenme durumları kaydedilmiştir. Her ay ağırlık kontrolleri ve laboratuar bulguları tekrarlanmış ve her kontrolde besin tüketimleri incelenmiştir. Doğum sonrası bebeğe ait bulgular her gebenin doğum yaptığı yere gidilerek araştırmacı tarafından*

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*ölçülmüştür. Bu çalışmada 168 bebeğin doğumuna ilişkin genel sağlık durumları ve antropometrik ölçümleri incelenmiştir.*
***Bulgular:*** *Yaş ortalaması 17.4 ±0.73 yıl olan kadınların evlilik ve ilk gebelik yaş ortalaması sırası ile 16.40±09 ve 16.8±05 yıldır. Bu gebelerde erken ve ölü doğum %3.1, doğup ölenler %3.2, düşük ve kürtaj ise %10.6'dır. Çoğul gebeliği olan annelerden doğan çocukların %46.6'sı ölmüştür. Araştırmada %40'ı anemik olan kadınların önerilen demir miktarının ancak %41.6'sını tükettikleri saptanmıştır. Enerji, protein, vitamin A tüketimleri de önerilenin altındadır. Ortalama ağırlık kazanımı tüm gebeler için 10.95±4.89 kg olup gebelerin %10.1'i ≤36 haftada, %80.9'u 37- 40 haftada doğum yapmışlar ve %32.7 bebekte çeşitli sağlık sorunları izlenmiştir.*
***Sonuç:*** *Beslenme adölesan gebelerde her iki canlının da büyümesi nedeniyle daha da önem taşımaktadır. Bu araştırma anne ve çocuk sağlığı hizmetleri açısından değerlendirildiğinde adölesan gebeliğin hala bir sorun olarak devam ettiği, toplumun adölesan gebeliğin sorunları hakkında ve adölesan döneminde yeterli ve dengeli beslenme konusunda sürekli bilgilendirmek gerektiğini göstermiştir.*

***Anahtar kelimeler:*** *adölesan gebelik, düşük doğum ağırlığı adölesan gebeliğin beslenme sorunları.*
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## INTRODUCTION

Adolescence refers to the period of transition from childhood to adulthood. The World Health Organization (WHO) defines adolescence as the period between the ages of 10 and 19[1]. Growth and development may be adversely influenced by inadequate and unbalanced nutrition. Common problems related to the nutrition of young people are insufficient intakes of iron, calcium, and some minerals. Eating disorders are seen more frequently in girls than in boys; in addition, due to pregnancy and childbearing in adolescence, girls and their babies suffer from health problems[2]. Throughout adolescence body weight of girls increases an average of 16 kg and height increases an average of 15 cm (8-18 cm)[3]. For underweight (<19.8 kg/m2) or adolescent pregnant women, weight gain of 12.5-18 kg is recommended[2].

Adolescent pregnancy rate depends on socioeconomic factors as well as cultural values. Adolescent pregnancy is also a problem in the developed countries, although not as common as in the developing countries[4]. Although there is not a certain opinion about the best age for first birth, the psychogenically, obstetrically and physiologically ideal age may be accepted as the ages between 18 and 30. Weight changes, toxemia, anemia, personality changes, preterm birth and perinatal mortality are more frequently seen in adolescent pregnancy than in adult pregnancy[5]. There is insufficient data on adolescent pregnancy in Turkey. According to the results of Turkey Demographic and Health Survey 2008 (TDHS-2008), 6% of adolescent women begin to give birth and it is more common in rural areas (9%) than in urban areas (5%)[6]. It was reported that one-quarter of maternal deaths occurred in adolescent pregnancy[7,8]. Gokce et al. indicated the adolescent pregnancy rate in Turkey was 46 per thousand[9]. In their study, Zeteroglu et al. reported that the adolescent pregnancy rate between 1999 and 2003 was 1.89% in Van while it was 7.91 in Ankara[10]. Edirne et al. discovered that the adolescent birth rate in Van was 1.89% between 1999 and 2003 and 1.30% between 2004 and 2008[11]. Adolescent pregnancy is similar to European countries, it was reported that almost 14 million adolescent women of 15-19 years old gave birth every year between 1995 and 2000 [12,13].

The present research was planned and carried out to investigate the effects of problems and nutritional status of pregnant adolescents, who are still at the stage of growth and development, on newborn babies.

## MATERIAL AND METHODS

The study sample consists of 220 pregnant adolescents (≤18 years of age) admitted to Ankara Zekai Tahir Burak Women's Health Research and Education Hospital and health centers affiliated with the Ministry of Health. Their regular controls were followed up every month after being recruited in the study. All the pregnant women were informed about the study and asked for their approval. In addition to the survey conducted to detect problems related to pregnancy, the height and weight of the participating women were measured, they were examined by physicians, and the blood and urine test results (glucose, hemoglobin, and hematocrit) were

evaluated. Food consumptions frequencies and food consumption of all the pregnant women were recorded as in every control in such a way as to be 3 days a week. Their intakes of protein, carbohydrates, and some vitamins and minerals were calculated using food compositions. It was tried to follow all the pregnant women regularly every month; and every women were monitored at least twice. In the first monitoring process, a survey was administered, and then their age, age at first marriage, age at menarche, age at first birth, pregnancy information, miscarriage or abortion status of previous pregnancy, anthropometric measurements, food consumption behavior, etc. were evaluated. For the next follow-ups their height and weight measurements and food consumptions were re-evaluated. The number of pregnant women reached in this way is 220 and the findings about pregnancy were evaluated on these women. 44 of these pregnant women could not be reached at the birth for several reasons (change of address, unwillingness to be followed up, etc.). In 8 of the remaining 176 pregnant women, the pregnancy was terminated due to abortion, stillbirth or miscarriage. However, the birthing of the other 168 women were monitored by the researcher who personally went to the hospital of the birth. The findings related to the babies after the birth were recorded. The height, weight and arm circumference measurements of the babies were taken and their nutritional status were established and compared with the standards[14-16].

Statistical data analysis was performed in SPSS 17.0 by computing mean (X) and standard deviation (SD). The present research also evaluated the eating information and habits of the pregnant women and (the significance of the difference between two means were evaluated using Chi-square (x2) test and Fisher's exact test) the significance level was accepted as $p<0.05$. However, this evaluation was not included here, as it is the subject of other studies.

## RESULTS

When pre-pregnancy weight of 220 pregnant adolescents constituting the sample is evaluated according to BMI reference ($kg/m^2$) for adolescent girls, the ratios of the underweight, slightly overweight and overweight women are 21.1%, 10.8%, and 2.1%, respectively (Table I). The mean age of the pregnant women was 17.4 ± 0.73 years and the mean age of marriage and first pregnancy was 16.40±09 and 16.8±05 years, respectively. The ratio of the women who become mother at 13-15 years of age is 6.9%. 27.3% of the pregnant women became mother at 16 and 41.3% at 17. The age of motherhood is under 18 in the majority (75.5%) of the pregnant women. 14.6% of the women aged between 17 and 18 are in their subsequent pregnancy (84.3% in second pregnancy, 12.6% third, and 3.1% fifth) (Table I).

***Table I:*** *Data on the pregnant adolescents.*

| Status | n | X±SD | s | % |
|---|---|---|---|---|
| **Age (years)** | **220** | **17,44±0,73** | | |
| 15 | | | 4 | 1,8 |
| 16 | | | 20 | 9,1 |
| 17 | | | 72 | 32,7 |
| 18 | | | 124 | 56,4 |
| **Height (cm)** | **220** | **159,71±5,69** | | |
| **Pre-pregnancy weight(kg)** | **194** | **55,56±7,82** | | |
| **BMI (kg/m2)** | **194** | **21,75±2,97** | | |
| ≤19,5 (underweight) | | | 41 | 21,2 |
| 19,51-24,5 (normal) | | | 128 | 65,9 |
| 24,51-29,9 (slightly overweight) | | | 21 | 10,8 |
| ≥29,9 (overweight) | | | 4 | 2,1 |
| **Age at menarche (years)** | **218** | **13,12±1,15** | | |
| **Age at marriage (years)** | **220** | **16,40±0,99** | | |
| **Age at first pregnancy (years)** | **220** | **16,83±0,5** | | |
| 13 | | | 1 | **0,5** |
| 15 | | | 14 | **6,4** |
| 16 | | | 60 | **27,3** |
| 17 | | | 91 | **41,3** |
| 18 | | | 54 | 24,5 |
| **Total number of pregnancies** | **220** | **1,8±0,49** | | |
| 1 | | | 188 | 85,4 |
| 2 | | | 27 | 12,3 |
| 3 | | | 4 | 1,8 |
| 5 | | | 1 | 0,5 |
| **Age at subsequent pregnancy (years)** | **32** | **17,59±0,49** | | |
| 2nd pregnancy 17-18 years of age | | | 27 | 84,3 |
| 3rd pregnancy 17-18 years of age | | | 4 | 12,6 |
| 5th pregnancy 18 years of age | | | 1 | 3,1 |
| **Marriage age at subsequent pregnancies (years)** | **32** | **15,7±1,05** | | |
| **Interval between two pregnancies (years)** | **31** | **6,7±6,73** | | |
| **Weight gain at this pregnancy (kg)** | **149** | **10,95±4,89** | | |

85.4% of the pregnant adolescents evaluated are pregnant with their first baby, 14.1% with their second baby and 0.52% with their fifth baby. When the age of 32 women (14.6%) pregnant with their subsequent babies is considered, 59.4% of them were 18 years old and 40.6% were 17 during the present research. The mean age of

marriage is 15.7±1.05 years and it was learned that 75% of the women married at the ages between 13 and 16. The mean interval between the prior and the subsequent pregnancies is 6.70±6.73 months (Table I).

**Pregnancy Problems:** Although more problems related to adolescent pregnancy are experienced in subsequent pregnancies, the stillbirth rate was found 3.1%, the neonatal mortality rate was 3.2%, the miscarriage and abortion rate was 10.6% when all the women pregnant with their first baby were evaluated together in the present study (Table II).

***Table II:*** *Pregnancy and birth problems of pregnant adolescent.*

| Status | n | % |
|---|---|---|
| **Number of miscarriage (n=220)** | | |
| None | 203 | 92,3 |
| One | 15 | 6,8 |
| Two | 2 | 0,9 |
| **Number of stillbirth** | | |
| Previous pregnancy (n=220) | 3 | 1,4 |
| Evaluated pregnancy (n=176) | 3 | 1,7 |
| **Neonatal Deaths** | | |
| Previous pregnancy (n=220) | 7 | 3,2 |
| **Miscarriage-abortion** | | |
| Previous pregnancy (n=220) | 17 | 7,7 |
| Evaluated pregnancy (n=176) | 5 | 2,9 |
| **Pregnancy-related problems (n=220)** | | |
| Edema | 62 | 28,2 |
| Nausea-vomiting | 99 | 45 |
| Albumin in the urine | 8 | 3,6 |
| Parasites in the stool | 3 | 1,4 |
| Burning sensation in the stomach | 109 | 49,5 |
| Constipation | 48 | 21,8 |
| Hermorrhoid | 27 | 12,3 |
| Upper respiratory tract infections | 41 | 18.6 |
| Urinary tract infection | 55 | 25 |
| Cardiovascular disease | 4 | 1,8 |
| **Hemoglobin (gr/dl )** | | |
| 8-10.9 | 90 | 40,9 |
| 11 and ↑ | 130 | 59,1 |
| **Hematocrit (%)** | | |
| 34 and ↓ | 94 | 42.7 |
| 35 and ↑ | 126 | 57,3 |
| **Peripheral smear** | | |
| Normocytic-normochromic | 129 | 58,6 |
| Microcytic-hypochromic | 88 | 40,0 |
| Megaloblastic | 3 | 1,4 |
| **Blood pressure** | | |
| Normotensive | 112 | 50,9 |
| Hypertensive | 42 | 19,1 |
| Hypotensive | 66 | 30.0 |

Maternal health problems of all the pregnant adolescents during pregnancy were evaluated. The primary problems were burning sensation in the stomach (49.5%) and nausea-vomiting (45%). They were followed by urinary tract infection (25%) and upper respiratory tract infection (18.6%). As one of the common pregnancy problems, edema was seen 28.2% of the women in the present study; albumin was found in the urine of 3.6 of these women, and 40% were diagnosed with microcytic-hypochromic anemia and 1.4% were diagnosed with megaloblastic anemia. As one of the clinical sings of preeclampsia in pregnancy, hypertension was observed in 19.1 of all the pregnant women in the present study, however, none had preeclampsia (Table II).

149 of the pregnant women who were monitored at birth knew their pre-pregnancy weight gained most of the weight (5.25±2.3) in the third Trimester (Table III). The mean weight gain during pregnancy is 10.95±4.89 for all the pregnant women.

***Table III:*** *The mean weight gain of pregnant adolescent in first, second and third trimesters.*

| Stages of Pregnancy | n | The mean weight gain (kg) X±SD |
|---|---|---|
| First Trimester | 34 | 1.03±4.03 |
| Second Trimester | 35 | 3.74±1.93 |
| Third Trimester | 80 | 5.25±2.3 |

**Nutritional Problems:** Considering the energy and nutrient consumptions of the pregnant adolescents in the present study, they consumed all the nutrients below the recommended amount, except vitamin C. They consumed 77.1% of the recommended energy requirement, 35.2% of calcium, 41.6% of iron, 63.2% of vitamin A, 93.8% of riboflavin, 93.3% of thiamine, 60% of niacin, and 54% of zinc (Table IVa). The present study discovered that the pregnant adolescent meet a large part of their energy needs from bread and fatty foods (Table IVb).

***Table IVa:*** *The mean energy and nutrient consumption of pregnant adolescents and their comparison with the recommended amounts (n=220).*

| Nutrients | Recommended amounts* | Average daily consumed amounts | Consumption percentage by the recommended amounts(%) |
|---|---|---|---|
| Energy (kcal) | 2500 | 1927±46 | 77,1 |
| Protein (g) | 60 | 61,9±17 | 103,2 |
| Calcium (mg) | 1600 | 563±66 | 35,2 |
| Iron (mg) | 30 | 12,5±3,9 | 41,6 |
| Vitamin A (IU) | 6000 | 3792±24 | 63,2 |
| Vitamin $B_1$ | 1,5 | 1,4±0,4 | 93,3 |
| Vitamin $B_2$ | 1,6 | 1,5±0,3 | 93,8 |
| Niasin (mg) | 20 | 12±4 | 60,0 |
| Vitamin C (mg) | 70 | 127,5±101,8 | 182 |
| Zinc (mg) | 15 | 8,1±9,2 | 54,0 |

**reference no:15*

***Table IV b:*** *The average daily food consumption values of pregnant adolescents (g/day).*

| Foods (g/day) | Recommended amounts | Consumption X±SD | Consumption by the recommended amounts % |
|---|---|---|---|
| All types of meat | 60 | 26,7±26,3 | 44.5 |
| Milk-yogurt | 400 | 219,9±188,7 | 54,9 |
| Cheese | 60 | 33,8±23,6 | 56,3 |
| Egg | 100 | 25,3±20,4 | 25,3 |
| Legumes | 60 | 21,6±19,5 | 36 |
| Bread | 75-175 | 314±136,8 | 418,9-179,5 |
| Other cereals | 0-60 | 66,3±34,1 | 0-110,5 |
| Vegetable-fruit | 400-600 | 445,0±225,9 | 111,3-74,2 |
| Sugar | 20 | 33,7±28,6 | 168,5 |
| Honey-jam-molasses | - | 13,4±21,4 | - |
| Olive | - | 8,9±9,6 | - |
| Fat | 10-15 | 73,8±23,9 | 738-492 |

90.3 of the pregnant adolescents had vaginal birth and 5.1% gave birth by Caesarean section.1.7% of the women had stillbirth (as one unborn baby was disabled, it was born 5 months early and died, one was stillborn at 7 months, and the last was stillborn at 9 months). 2.9% of the women had miscarriage or abortion (Table V).

***Table V:*** *Findings concerning childbirths.*

| Status | N | s | % |
|---|---|---|---|
| **Type of childbirth** | **176** | | |
| Vaginal | | 159 | 90,3 |
| Caesarean | | 9 | 5,1 |
| Preterm birth-Stillbirth | | 3 | 1,7 |
| Miscarriage-Abortion | | 5 | 2,9 |
| **Birth Time** | **168** | | |
| Preterm (premature, ≤36 ) | | 17 | 10,1 |
| Full-term (37-40) | | 136 | 80,9 |
| Post-term (≥41) | | 15 | 9,0 |
| **General Health Status*** | **168** | | |
| **a-Full-term, Normal weight (n=152)** | | **152** | **90,5** |
| No problem (n=109) | | 109 | 64,9 |
| Problem (n=43) | | 43 | 25,6 |
| Organ dysfunction | | 16 | 9,5 |
| Meconium aspiration syndrome, | | 1 | 0,6 |
| Hypoglycemia | | 19 | 11,3 |
| Late sucking reflex | | 9 | 5,4 |
| Jaundice | | 2 | 1,2 |
| Fever | | 9 | 5,3 |
| **b- Problematic premature (<36, ≤ 2500 g)** | | **3** | **1,8** |
| **c- LBW ( ≤ 2500 g)** | | **4** | **2,4** |
| **d- Birth weight (4001 g ↑)** | | | |

** The evaluation was made according to n= 168 and more than one problems in the same baby changed the percentage.*

***Table VI:*** *The comparison of newborn height, weight, head and arm circumference measurements (17) with the standards according to the maternal age (n=168).*

| Percentile | 15 years (n=2) | | 16 years (n=14) | | 17 years (n=57) | | 18 years (n=95) | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | s | % | s | % | s | % | s | % | s | % |
| **Height(cm)** | | | | | | | | | | |
| 5-10 | - | 0,0 | 2 | 13,3 | 6 | 40,0 | 7 | 46,7 | 15 | 9,0 |
| 11-25 | - | 0,0 | 1 | 4,2 | 14 | 58,3 | 9 | 37,5 | 24 | 14,3 |
| 26-50 | 2 | 4,3 | 5 | 7,4 | 19 | 27,9 | 44 | 64,7 | 68 | 40,4 |
| 51-75 | - | 0,0 | 5 | 10,6 | 12 | 25,5 | 28 | 64,7 | 47 | 27,9 |
| 76-95 | - | 0,0 | 1 | 14,3 | 2 | 28,6 | 4 | 57,1 | 7 | 4,2 |
| >95 | - | 0,0 | - | 0,0 | 4 | 57,1 | 3 | 42,9 | 7 | 4,2 |
| **Weight (kg)** | | | | | | | | | | |
| 5-10 | - | 0,0 | 5 | 17,2 | 10 | 34,5 | 14 | 48,3 | 29 | 17,2 |
| 11-25 | 1 | 1,9 | 4 | 7,8 | 17 | 33,4 | 29 | 56,9 | 51 | 30,4 |
| 26-50 | - | 0,0 | 2 | 5,5 | 15 | 41,7 | 19 | 52,8 | 36 | 21,4 |
| 51-75 | 1 | 2,6 | 3 | 7,9 | 9 | 23,7 | 25 | 65,8 | 38 | 22,6 |
| 76-95 | - | 0,0 | - | 0,0 | 6 | 42,9 | 8 | 57,1 | 14 | 8,4 |
| **Head circumference (cm)** | | | | | | | | | | |
| 51-75 | - | 0,0 | 1 | 12,5 | 4 | 50,0 | 3 | 37,5 | 8 | 4,8 |
| 76-95 | - | 0,0 | 13 | 8,1 | 53 | 33,1 | 92 | 57,5 | 160 | 95,2 |
| **Mid-upper arm circum. (cm)** | | | | | | | | | | |
| % 115 | 1 | 1,1 | 5 | 5,2 | 34 | 35,4 | 56 | 58,3 | 96 | 57,2 |
| %115-85 | 1 | 2,1 | 4 | 8,5 | 13 | 27,7 | 29 | 61,7 | 47 | 27,9 |
| %85 ↓ | - | 0,0 | 5 | 20,0 | 10 | 40,0 | 10 | 40,0 | 25 | 14,9 |
| **Head circum./arm circum.** | | | | | | | | | | |
| 0.31 | - | | 1 | 7,1 | 14 | 24,5 | 25 | 26,4 | 40 | 23,8 |
| 0.31-0.28 | ↓ | | 8 | 57,2 | 31 | 54,4 | 56 | 58,9 | 97 | 57,7 |
| 0.27-0.25 | - | | 4 | 28,6 | 11 | 19,3 | 12 | 12,6 | 27 | 16,1 |
| 0.25↓ | - | | 1 | 7,1 | 11 | 1,8 | 2 | 2,1 | 4 | 2,4 |

**Newborn Problems:** In the present study, 10.1% of the pregnant adolescents gave birth at 36 weeks, 80.9% between 37 and 40 weeks, and 9% at ≥41 weeks. The ratio of preterm birth is 5.3% and the birth weight of the premature baby with health problems ≤2500 (Table V).

When health problems of the babies born to adolescent mothers were examined, the sucking reflex in 11.3 of the babies was late, 9.5% suffered meconium aspiration syndrome, 5.4% had jaundice, 5.3% had problematic prematurity, 1.8% had low birth weight (LBW), 1.2% had fever, and 0.6% had hypoglycemia (Table V). When anthropometric measurements were assessed according to the National Health and Nutrition Examination Survey (NHANES), the height of 68% of the babies and the weight of 44% were between the 26$^{th}$ and 75$^{th}$ percentiles. The height of 23.3% of the babies and the weight of 47.6% were below the 25$^{th}$ percentile (Table VI).

## DISCUSSION

Adolescence pregnancy and motherhood is a major public health problem in all countries around the world not only for the young mothers who have not yet reached sufficient physical and hormonal maturity but also for newborn babies[1,6-8,18-23]. In accordance with the results of the present research, the short interval between marriage and first birth indicates, the young women became pregnant immediately after marriage. The fact that 14.5% of the mothers at 17-18 years of age had subsequent pregnancies is becoming more important in terms of the problems both mothers and their babies may face.

Examining newborn problems, the present study including the pregnant adolescents discovered that the women with subsequent pregnancies faced more newborn problems than the women pregnant with their first babies. As newborn problems, the stillbirth, neonatal deaths and miscarriage-abortion rates are higher in the women with prior pregnancies than those pregnant with their first babies in the present study. It shows that young mothers suffer more newborn problems when they have subsequent pregnancies. One of the adolescent mothers who had subsequent pregnancies (32 women) had one miscarriage and 3 liveborn babies, two of whom later died. Another mother had one miscarriage and one liveborn baby who later died. Subsequent pregnancies with short intervals increase maternal and infant problems.

In addition to the preterm births and LBW births of the pregnant women monitored at the birth, 28.3% of the babies had health problems (hypoglycemia, jaundice, etc.) although they were born on due date and had normal weight. Adolescent pregnancy have been reported to be a high risk to preterm birth[11,20,24], miscarriage[11,20,24] and eclampsia[20] in many studies. For newborn infants to successfully complete their physical and mental development, maternal nutrition and health during pregnancy gains more importance for all pregnant women as well as pregnant adolescent. In addition to such problems as miscarriage, stillbirth, LBW, pregnancy infections, toxemia, preeclampsia and anemia, retardation of growth and development is also observed in pregnant adolescents who have not yet fully grown or developed[8,10,22,23].

As an indication of the physical growth, the mean height was 159.71±5.69 in the present study. Height measurements were taken at the beginning and the end of the pregnancy; however no change was observed. When it was evaluated by the height-for-age standards developed for Turkey[17], the mean height was 160.5 for the women aged between 15 and 18. The pregnant adolescents had 99.5% of the required height. However, the average annual height growth for adolescent girls was 8 cm[2,3,25]. As already stated in the previous studies[26-28], the physical growth may have been suppressed since the consumed nutrients were primary used for the weight gain of the mother and baby. There may also be height growth even at the minimum level; however, it could not have been detected due to measurement errors (the adolescents used head scarf and veil and refused to remove).

Due to neural and hormonal changes during pregnancy, the gastrointestinal system activity as well as the amount of total acid and hydrochloric in the stomach diminishes. As the pregnancy progresses, the stomach pushes itself outwards from its normal position. All these factors may cause burning sensation in the stomach, nausea and vomiting. Hormonal changes during pregnancy also reduce intestinal motility and cause constipation and increasing pelvic venous congestion leads to hemorrhoids[29]. The primary problem of the pregnant women in the present study is burning sensation in the stomach and it is followed by nausea and vomiting.

As pregnancy problems, constipation and hemorrhoid are the third and fifth most common problems, respectively. Increased abdominal pressure in pregnancy reduces urine flow which leads to infection[29]. Urinary tract infection is the fourth most common problem in the present study. Other major health problems observed are upper respiratory tract infection, edema and urinary albumin excretion, respectively.

As one of the pregnancy problems, anemia was seen in 40.9% of the pregnant women. In Turkey, approximately half of the non-pregnant women and two-thirds of the pregnant women suffer iron-deficiency anemia. Inadequate consumption of iron increases the incidence of anemia despite the increased needs due to the pregnancy, development and growth. Pregnant adolescents are still growing and have not yet reached physical maturity. Thus, their nutritional needs are higher than adult women. Maternal nutrition is also important for the growth of the prenatal fetus [8,22,25,26]. Many studies have reported the opinion that there is a competition between the adolescent mother and baby for nutrients and growth requirements[30-34]. The normal weight gain in non-pregnant adolescents (15 and 15 years old) is 3 kg per year. Although proper weight gains were recommended to the adolescent women according to the pre-pregnancy Body Mass Index (BMI), it was reported that pregnant adolescents had to gain at least 4 kg more in order to deliver baby with similar birth weight with those born to adult women[30-34]. A woman at a healthy weight before pregnancy (BMI: 19.8-26.0 kg/m$^2$) should gain 11.5 to 16 kg; if pre-pregnancy BMI is higher than 26.0-29 kg/m$^2$, the weight gain should be between 7 and 11.5 kg; and if she is overweight (BMI: >29.0 kg/m$^2$), weight gain should be less than 7 kg[2]. In the present study, the adolescent women could not reach the adequate weight during pregnancy. As intrauterine nutrition is poor in the babies of pregnant adolescent weighing less than required before pregnancy, it may lead low birth weight[22,23,25,30-32]. Insufficient weight gain less than expected during pregnancy indicates that increasing nutritional needs of pregnant adolescents are not met, and the maternal body reserves are intensively used for the development of the fetus.

When the energy and nutrient consumption of the pregnant adolescents is viewed, it is seen that they consumed nutrients fewer than the recommended amount, except for vitamin C and protein. They could not meet even their needs for growth and development due to the insufficient intake of energy. The less consumed nutrient was calcium. According to the daily food consumption of the pregnant women (Table IV), the average daily amount of consumed milk-yogurt and cheese just meets the amounts required to be additionally consumed during pregnancy. As mothers under the age of 18 are still growing, calcium needs increase for the development of both mother and baby. Although the absorption of calcium doubles during pregnancy, if the required amount of calcium is not consumed, the calcium required for the fetus is met by the mobilization of maternal reserves[35]. It predisposes mothers to such health problems as osteomalacia and osteoporosis.

The second lest consumed nutrient was iron. Only 0.9% of the pregnant adolescents could have the recommended daily intake of iron (±30 mg) during pregnancy. 99.1% of the pregnant women consumed iron less than 20% of the recommended amount. It also gave rise to anemia in the pregnant women. Only 19.1% of the pregnant adolescents consumed Vitamin C, which plays an important role in the absorption of iron, less than 20% of the recommended amount. The mean consumption of Vitamin C is above the recommended amount. In the present study, the mean consumption of vegetables and fruits was higher than other foods.

Zinc was the third lest consumed nutrient. Deficiency of zinc which is important for the fetus for its role in cell division and differentiation zinc may lead to intrauterine growth restriction (IUGR), preterm births, miscarriage and vaginal bleeding. The best indicator of zinc status is leukocyte zinc. Mothers with low levels of leukocyte zinc have small for gestational age (SGA) babies[35]. The present research did not examine the status of leukocyte zinc; however, 10.1% of the babies monitored at the birth are SGA babies. It may have been resulted from the insufficient zinc intake during pregnancy, as the growth and development stage had not be completed in these pregnant adolescent who had problems such as preterm birth, miscarriage and bleeding during pregnancy. The consumption of foods of animal origin and legumes (which are rich in zinc) less than the recommended amount may also be a sign of zinc deficiency.

Vitamin A is the fourth lest consumed nutrient. The pregnant adolescents consumed only 63.2% of the

recommended amount of Vitamin A.

Previous studies on the relationship between adolescent pregnancy and low birth weight emphasized the importance of not only gestational age but also such factors as pregnancy care, nutrition and number of pregnancies[6,11,24,36,37]. Births before 37 weeks are more common in pregnant adolescents than in pregnant adults[6,22,23]. In the present study, 10% of the pregnant women gave birth at or before 36 weeks. The birth weight of the premature babies (5.3% problematic premature) who were also SGA babies was ≤2500. Imir et al.[20]. reported that 26.4% of the babies born to adolescent mothers had low birth weight.

In the present study, health problems of the newborns were also examined. Such problems as late sucking reflex, meconium aspiration syndrome, organ dysfunction, jaundice, problematic premature, low birth weight, fever and hypoglycemia were observed in 32.7% of the babies. It indicates the size of the problems they themselves or their babies face.

The ratios of babies below the 25$^{th}$ percentile for height and weight are 23.3% and 47.6%, respectively. When an evaluation is made according to maternal age, 61.3 of the babies born to the mothers aged between 17 and 18 are between 26$^{th}$ and 75$^{th}$ percentiles for height, and 40.65% between 26$^{th}$ and 75$^{th}$ percentiles for weight. It indicates that maternal age may be important for infant height and weight. The maternal age of 62.5% of the babies below the 25$^{th}$ percentile for weight is between 15 and 16. There was no baby below the 25$^{th}$ percentile for head circumference. When mid-upper arm circumference is evaluated, 14.9% of the babies have mid-upper arm circumference 85% less than normal. The maternal age is between 17 and 18 for the 78% 6 of the babies who have arm circumference above 85%.

The arm circumference/head circumference ratio recently used is an important indicator of infant health[7]. The maternal age is between 17 and 18 for 97.5% of the babies whose arm circumference/head circumference ratio is 0.31 and greater. According to the mean arm circumference/head circumference ratio, it is safe to say that babies in general (57.7%) have mild protein-energy malnutrition. These findings are associated with the fact that 47.8% the babies are below the 5$^{th}$ percentile for weight. Thus, it may indicate the importance of the maternal age for intrauterine growth and development.

## CONCLUSION

Nutrition is important at every stage of life; however, it has greater importance in pregnant adolescents due to the growth of both mother and baby. Considering both pregnant adolescents themselves and requirements of the fetus, they should be given recommendations about required food consumptions and it should be ensured that pregnant adolescents gain sufficient weight during pregnancy. If adolescent pregnancy cannot be prevented, it is necessary to raise public awareness of family planning, adequate and balanced diet, etc.

## REFERENCES


1. Adolescent pregnancy. Issues in Adolescent Health and Development. Department of Child and Adolescent Health and development, WHO, Geneva, 2005.
2. Pekcan AG, Aslan P. Anne Çocuk Beslenmesi. Edt; Bayrak C; Eskişehir, Eylül 2011.
3. T.C.Sağlık Bakanlığı Sağlık Hizmetlerinde Okul Sağlığı Kitabı; T.C Sağlık Bakanlığı Refik Saydam Hıfzıssıhha Merkezi Başkanlığı, Hıfzıssıhha Mektebi Müdürlüğü 2008; 9.
4. Imamura M, Tucker J, Hannaford P, Da Silva MO, Astin M, Wyness L et al. Factors associated with teenage pregnancy in the European Union countries: a systematic review. Eur J Public Health 2007;17(6):630-6.
5. Madazlı R. Adolesan sağlığı II, İ.Ü. Cerrahpaşa Tıp Fakültesi Sürekli Tıp Eğitimi Etkinlikleri, Sempozyum Dizisi 2008;63: 51-2.
6. Türkiye Nüfus ve Sağlık Araştırması 2008. Hacettepe Üniversitesi Nüfus Etüdleri Enstitüsü. Sağlık Bakanlığı Ana Çocuk Sağlığı ve Aile Planlaması Genel Müdürlüğü, Devlet Planlama Teşkilatı ve Türkiye Bilimsel ve Teknolojik Araştırma Kurumu Ankara, Türkiye, 2008.
7. The World Health Report 1998. Life in the21. Century: a visionforall. Geneva: WHO, 1998; 97.
8. Murdock NH. Teenage pregnancy. J Natl Med Assoc1998; 90(3):135-6.
9. Gokce B, Ozsahin A, Zencir M. Determinant of adolescent pregnancy in an urban area in Turkey: a population-based case-control study. J Biosoc Sci 2007; 39(2):301-11.
10. Zeteroglu S, Sahin I, Gol K. Cesarean delivery rates in adolescent pregnancy. Eur J Contracept Reprod Health Care 2005;10(2):119-22.
11. Edirne T, Can M, Kolusari A, Yildizhan R, Adali E, Akdag

B. Trends, characteristics, and outcomes of adolescent pregnancy in eastern Turkey. Int J Gynaecol Obst 2010;110(2):105-8.

12. Turkyilmaz AS, Koc I, Schumacher R, Maeve O,Campbell R. The Turkey national maternal mortality study. Eur J Contracept Reprod Health Care 2009;14(1):75-82.
13. World Health Organization Statistical Information System (WHOSIS), World Health Statistics Available at: h http://www.who.int/whosis/en/ 2008.
14. Gibson RS. Atropometric Assessement of Body Composition, Principles of Nutritional Assessement, Oxford Unv. Pres, Oxford, 1990.
15. Reccommended dietary allowances, National Academy Pres, Washington D.C. National Research Council, 1989.
16. Pekcan G. Şişmanlık ve saptama yöntemleri çeşitli hastalıklarla etkileşimi ve diyet tedavisinde bilimsel uygulamalar. TDD Yayını 1993;4.
17. Baysal A, Aksoy M, Besler T. Diyet El Kitabı. Hatipoğlu yayınları, Ankara 2011;587-617.
18. Demirgöz M, Canbulat N. Adölesan gebelik. Turkiye Klinikleri J Med Sci 2008;28:947-52.
19. Trivedi SS, Pasrija S. Teenage pregnancies and their obstetric outcomes. Trop Doct 2007;37(2):85-8.
20. İmir GA, Çetin M, Balta Ö, Büyükayhan D, Çetin A. Perinatal outcomes of adolescent pregnancies at a university hospital in Turkey. J Turkish-German Gynecol Assoc, Vol 2008;9:70-5.
21. Darroch JE. Adolescent pregnancy trends and demographics. Curr Womens Health Rep 2001;1(2):102-10.
22. Beyerlein A, Schiessl B, Lack N, von Kries R. Associations of gestational weight loss with birth-related outcome: a retrospective cohort study. BJOG 2011;118(1):55-61.
23. Roth J, Hendrickson J, Schilling M, Stowell DW. The risk of teen mothers having low birth weight babies: implications of recent medical research for school health personnel. J Sch Health 1998;68(7):271-5.
24. Keskinoglu P, Bilgic N, Picakciefe M, Giray H, Karakus N, Gunay T. Perinatal outcomes and risk factors of Turkish adolescent mothers. J Pediatr Adolesc Gynecol 2007; 20(1):19-24.
25. Tanner JM. Issues and advances in adolescent growth and development. J Adolesc Health Care 1987;8(6):470-8.
26. Jacob JA, Nair MK. Protein and micronutrient supplementation in complementing pubertal growth. Indian J Pediatr 2012;79 Suppl;S84-91.
27. Graff M, Yount KM, Ramakrıshnan U, Martorell R, and Steın AD. Childhood nutrition and later fertility: pathways through education and pre-pregnant nutritional status. Demography 2010;47(1):125-44.
28. Kramer KL, Greaves RD. Synchrony between growth and reproductive patterns in human females: Early investment in growth among Pumé foragers. Am J Phys Anthropol 2010;141(2): 235-44.
29. Baron TH, Ramirez B, Richter JE.Gastrointestinal motility disorders during pregnancy. Ann Intern Med 199;118(5):366-75.
30. Harper LM, Chang JJ, Macones GA. Adolescent pregnancy and gestational weight gain: do the Institute of Medicine recommendations apply? Am J Obstet Gynecol 2011;205(2): 140.e1-8.
31. Scholl TO, Hediger ML, Schall JI, Ances IG, Smith WK. Gestational weight gain, pregnancy outcome and postpartum weight retention. Obstet Gynecol 1995;86(3):423-7.
32. Butte NF, Ellis KJ, Wong WW, Hopkinson JM, Smith EO. Composition of gestational weight gain impacts maternal fat retention and infant birth weight. Am J Obstet Gynecol 2003; 189(5):1423-32.
33. Institute of Medicine. Weight gain during pregnancy: reexamining the guidelines. Washington, DC: The National Academies Press; 2009.
34. DeVader SR, Neeley HL, Myles TD, Leet TL. Evaluation of gestational weight gain guidelines for women with normal prepregnancy body mass index. Obstet Gynecol 2007;110(4): 745-51.
35. Giddens JB, Krug SK, Tsang RC, Guo S, Miodovnik M, Prada JA. Pregnant adolescent and adult women have similarly low intakes of selected nutrients. J Am Diet Assoc 2000;100 (11): 1334-40.
36. Elfenbein DS, Felice ME. Adolescent pregnancy. Pediatr Clin North Am 2003;50(4):781-800.
37. Agudelo AC, Belizan JM, Lammers C. Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: Cross-sectional study. Am J Obstet Gynecol 2005;192(2):342-9.