

# Does Working in Agricultural Area Affect Menstrual Cycle? A Cross Sectional Study from Turkey

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## ABSTRACT

**Background:** Living and working in this adverse environment can negatively affect the reproductive health of young female seasonal agricultural workers in particular and may increase menstrual cycle problems.

**Objective:** The study was carried out to determine the menstrual cycle problems of young seasonal agricultural workers and factors affecting these problems.

**Methods:** This cross-sectional study was performed on 330 young female seasonal agricultural workers.

**Results:** It was found out in the research that young seasonal agricultural workers were having more menstrual cycle problems, abnormal and irregular bleeding problems during the period when they work at agricultural area. Non-shaded area for resting in the agricultural setting and chronic illness state are the most important factors that cause the menstrual cycle problems in young seasonal agricultural workers at agricultural area.

**Conclusions:** Young women experience more menstrual cycle problems when working in agriculture area.

**Key words:** Seasonal agricultural worker, young, menstrual cycle, menstrual cycle problems, agricultural area, risk factors.

## BACKGROUND

The World Health Organization defines the ages of 10-19 as the "Adolescence Period" and the ages of 15-24 as the "Youth Period".<sup>[1]</sup> Today, 1.8 billion of the world population and 16.5% of the Turkish population are young people.<sup>[2]</sup> Many changes occur in physical, mental and social characteristics during the period of adolescence. The initiation of the menstrual cycle (MC) is one of the most important physiological changes seen in this period. The MC is the period of physiological events that occur regularly every month in females in order for normal reproductive function to continue.<sup>[3,4]</sup>

Research shows that the MC is affected by many factors, such as lifestyle,

psychological stress and work stress,<sup>[5]</sup> nutrition,<sup>[6]</sup> exercise, low or high BMI,<sup>[7]</sup> caffeine consumption, tobacco use and alcohol consumption,<sup>[8-10]</sup> exposure to pesticides,<sup>[11,12]</sup> the presence of physical or psychological illnesses and age at menarche,<sup>[13]</sup> ethnicity,<sup>[14]</sup> socio-economic status and residence,<sup>[15]</sup> exposure to artificial and natural light and high temperatures and humidity. The fact that sometimes ovulation does not fully occur, especially in young women, causes the cycle to be more affected by external factors.<sup>[16]</sup> In studies, it has been indicated that a poor lifestyle and working environment affect reproductive health negative.<sup>[17,18]</sup> One of the groups with poor living conditions is young seasonal agricultural workers (SAWs).<sup>[17]</sup>

A SAW is a permanent or traveling seasonal employee who is a citizen of or an immigrant to the country where she/he works and who works at any stage of agricultural production (sowing, raising, spraying or harvesting crops) on her/his own or other's agricultural land, being paid casually or through payment in kind, and with or without a contract. [19] Of 1.1 billion agricultural workers worldwide, [20] about 450 million people are SAWs. 22.1% of those in employment in Turkey work in the agricultural sector, according to the Turkish Statistical Institute (TURKSTAT) Household Labor Force Statistics, August 2014. It is estimated that half of this number is composed of seasonal agricultural workers. [21]

SAWs are a group of people who experience a high number of illnesses and premature death for reasons including inadequate and poor living and housing conditions, adverse climatic conditions, inadequate/unbalanced nutrition, frequent accidents and injuries, the effect of pesticides and a lack of access to health care. [17] Living and working in this adverse environment can negatively affect the reproductive health of young female SAWs in particular and may increase menstrual cycle problems (MCP). [18] The identification of MCP and risk factors in young SAWs will be helpful in developing practices and health policies for early diagnosis of these health problems.

The study was carried out to determine the MCP of young SAWs and factors affecting these problems in Sanliurfa in Turkey.

## **MATERIALS AND METHODS**

### ***Setting and Sample***

This cross-sectional study was carried out between February and March 2014 in Sanliurfa, a city in the Southeastern Anatolia region of Turkey. In a study conducted by the State Planning Organization, Sanliurfa was ranked 73rd out of 81 cities in terms of its socioeconomic development. [21]

The research was carried out in the HayatiHarrani and Yenice districts in Sanliurfa city center. These neighborhoods are the places where seasonal agricultural workers live most densely and it is estimated that about 70% of the population are agricultural workers. These people work as agricultural workers for around 3 to 8 months during which they live in sheds or tents located in the agricultural lands. When the agricultural season ends, they go back to their permanent house in city centers. The population of the study was young women, aged between 15-24 years, who were not married and were SAWs.

The sample size was calculated as 369 people with a 95.0% confidence level for a frequency of MC problem of 40.0 [14] and a margin of error of 5%. It was planned that 100 people from the Yenice neighborhood and 269 people from the HayatiHarrani district would participate in the investigation by stratification according to the population of the district. In both neighborhoods, 369 households were selected by the simple random method from the list of houses inhabited by agricultural workers. However, 330 people participated in the research and the participation rate was 89.2%.

Only one person was interviewed in every house. When there was more than one person in a house that met the selection criteria, the person to be interviewed was determined using the Kish method. [22]

### ***The Ethical Dimension of the Research***

The written permission of the Ethics Committee of Harran University and the verbal permission of participants were obtained for the research.

### ***Data Collection Tools***

The study data were collected via face-to-face interviews using Menstrual Cycle Information Form.

The Menstrual Cycle Information Form consisted of 21 questions, 5 about socio-demographic characteristics (age, educational status, health insurance, language spoken at home, economic status of the family), 5 about seasonal agricultural

labor (years of work in agriculture work (years), working time in agricultural area in one season (month/one year), daily working time in agricultural area (hour), availability of shade for resting while working, the use of agricultural pesticides in the workplace or place of residence), 6 about characteristics of the MC (age at first menstruation, regulation of menstruation, time of menstruation, amount of bleeding, pain during menstruation, most uncomfortable problems during menstruation) and 5 about factors related to the MC (chronic illnesses, medication used regularly, body mass index, tobacco use, unhappiness/sadness caused by a specific event in the previous year).

Data regarding MCP was obtained for two different time period; before going to the agricultural area and after returning home from the agricultural area.

#### **Variables**

Dependent variables of the study are "Having any menstrual cycle problems at home" and "Having any menstrual cycle problem at agricultural area". The independent variables are socio-demographic characteristics, characteristics related to seasonal agricultural labor and factors related to the MC.

#### **Definitions**

**The Economic Situation:** This was assessed according to the participants' own statements.

**Menstrual Cycle Problems (MCP):** These were defined as consisting of at least one of the following: a period of bleeding less than 2 days or more than 8 days, an abnormal amount of bleeding, an irregular MC, pain during menstruation.

**Menstrual Cycle Problems at Home:** The MCP occurred when individuals reside in their permanent house in city centers.

**Menstrual Cycle Problems at Agricultural Area:** The MCP occurred when individuals reside and work in agricultural lands during agricultural season.

**Presence of Chronic Illness:** This was any chronic illness diagnosed by the doctor in the previous year.

**Regular Use of Medication:** A condition requiring the use of medication prescribed by a doctor for any chronic illness.

**Experiencing a Sad/Unhappy Event:** The experience of a sad/unhappy event affecting daily life in the previous year.

**Body Mass Index (BMI):** The limits recommended by the World Health Organization (WHO) were used in the evaluation.

#### **Data Analysis**

The research data were analyzed using the Statistical Package for Social Sciences (SPSS) statistical program for Windows 11.5. Descriptive statistics, the Mann-Whitney u test, and chi-square test were used in the analysis of the data.

McNemar's test was used to show the variation in MCP between those experienced in agricultural lands and at home.

The variables which affect MCP at the agricultural lands on univariate analyses were used for logistic regression models. The logistic regression model was conducted by the backward stepwise method. The logistic regression model for the MCP in the agricultural setting included "Shaded area for resting in the agricultural setting" (categorical), and chronic illness state (categorical) variables.

The level of significance in the evaluations was taken as  $p < 0.05$ .

## **RESULTS**

The mean age of the young women was  $17.6 \pm 2.4$  (Table 1). 76.4% of the young women were in the 15-19 years old age group. 40.0% of the young women did not finish school at the primary level. 14.2% of the participants had no health insurance. 25.2% of the young women reported their economic situation as "bad". The language which 84.9% of the participants speak at home was Kurdish or Arabic. The mean BMI of the young farm workers was  $22.7 \pm 3.7$  (Table 1). According to the BMI, 11.8% of young women were too slim and 21.8% were overweight. 3.0% of the participants were smokers. 16.1% of the

young women had chronic illnesses and 4.5% of them took medicine regularly because of their illness. 24.8% of the young women stated that they had experienced a sad/unhappy event in the previous year.

The average time a young SAW had worked in agriculture was 6.9±3.2 years, the

mean working time in a season was 5.8±1.8 months and the mean daily working time was 11.9±2.5 hours (Table 1). 31.2% of agriculture workers were obliged to rest in non-shaded areas while working and 23.6% of them stated that agricultural pesticide was used in the workplace or place of residence.

| Variables  | N   | Mean | SD  | Median | Minimum | Maximum |
|--|-----|------|-----|--------|---------|---------|
| Age  | 330 | 17.6 | 2.4 | 17.0   | 15.0    | 24.0    |
| Menarche age                                     | 313 | 13.1 | 1.2 | 13.0   | 10.0    | 18.0    |
| Body mass index                                  | 330 | 22.7 | 3.7 | 22.2   | 15.6    | 45.2    |
| Time employed in agriculture (years)             | 330 | 6.9  | 3.2 | 7.0    | 1.0     | 17.0    |
| Time employed agriculture in one season (months) | 330 | 5.8  | 1.8 | 6.0    | 1.0     | 11.0    |
| Daily working time in agriculture(hours)         | 330 | 11.9 | 2.5 | 12.0   | 1.0     | 24.0    |

\*Standard deviation

The mean age of menarche of the young SAWs was 13.0±1.2 years (Table 1). In general, the rate of young women experiencing MCP in agricultural area increased to 59.7% (p<0.05), while 42.7% of the young women stated that they had MCP at home. Abnormal bleeding was 30.0% at home and this increased to 44.8% during agricultural work (p<0.05).

|                                       |                                       | At Home                      |              |       | X <sup>2</sup> <sub>McNemar</sub> | P    |        |
|---------------------------------------|---------------------------------------|------------------------------|--------------|-------|-----------------------------------|------|--------|
|                                       |                                       | Period of Blood Discharge    |              |       |                                   |      |        |
|                                       |                                       | 2 - 8 days                   | <2 or>8 days |       |                                   |      |        |
| of                                    | Period<br>Blood<br>Discharge          | n                            | n            | Total |                                   |      |        |
|                                       |                                       | 2 - 8 days                   | 318          | 4     | 322                               | *    | 1.00   |
|                                       |                                       | <2 or>8 days                 | 5            | 3     | 8                                 |      |        |
|                                       |                                       | Total                        | 323          | 7     | 330                               |      |        |
|                                       |                                       | Amount of Bleeding           |              |       |                                   |      |        |
| of                                    | Amount<br>Bleeding                    | Normal                       | Abnormal     |       |                                   |      |        |
|                                       |                                       | n                            | n            |       |                                   |      |        |
|                                       |                                       | Normal                       | 176          | 6     | 182                               | 37.7 | <0.001 |
|                                       |                                       | Abnormal                     | 55           | 93    | 148                               |      |        |
|                                       | Total                                 | 231                          | 99           | 330   |                                   |      |        |
|                                       |                                       | Menstrual Cycle Regulation   |              |       |                                   |      |        |
| Menstrual<br>Cycle<br>Regulation      | Menstrual<br>Cycle<br>Regulation      | Regular                      | Irregular    |       |                                   |      |        |
|                                       |                                       | n                            | n            |       |                                   |      |        |
|                                       |                                       | Regular                      | 192          | 7     | 199                               | 48.9 | <0.001 |
|                                       |                                       | Irregular                    | 69           | 62    | 131                               |      |        |
|                                       | Total                                 | 261                          | 69           | 330   |                                   |      |        |
|                                       |                                       | Pain During Menstrual Period |              |       |                                   |      |        |
| Pain<br>During<br>Menstrual<br>Period | Pain<br>During<br>Menstrual<br>Period | Yes                          | No           |       |                                   |      |        |
|                                       |                                       | n                            | n            |       |                                   |      |        |
|                                       |                                       | Yes                          | 260          | 24    | 284                               | 1.2  | 0.26   |
|                                       |                                       | No                           | 16           | 30    | 46                                |      |        |
|                                       | Total                                 | 276                          | 54           | 330   |                                   |      |        |
|                                       |                                       | Menstrual Cycle Problems     |              |       |                                   |      |        |
| Menstrual<br>Cycle<br>Problems        | Menstrual<br>Cycle<br>Problems        | Yes                          | No           |       |                                   |      |        |
|                                       |                                       | n                            | n            |       |                                   |      |        |
|                                       |                                       | Yes                          | 132          | 65    | 197                               | 40.8 | <0.001 |
|                                       |                                       | No                           | 9            | 124   | 133                               |      |        |
|                                       | Total                                 | 141                          | 189          | 330   |                                   |      |        |

\*Unable to determine

| Characteristics                                    | Menstrual Cycle Problems | Median (Min- Max) | MW-U    | P    |
|--|--------------------------|-------------------|---------|------|
| Age  | Yes                      | 17.0(15.0-24.0)   | 12257.0 | 0.31 |
|  | No                       | 17.0(15.0-24.0)   |         |      |
| Menarche age                                       | Yes                      | 13.0(10.0-17.0)   | 10909.5 | 0.30 |
|  | No                       | 13.0(10.0-18.0)   |         |      |
| BMI  | Yes                      | 22.3(15.6-33.7)   | 11836.0 | 0.13 |
|  | No                       | 21.8(16.1-45.2)   |         |      |
| Time working in agriculture (years)                | Yes                      | 7.0(1.0-17.0)     | 11555.0 | 0.06 |
|  | No                       | 6.0(1.0-15.0)     |         |      |
| Time working in agriculture in one season (months) | Yes                      | 6.0(1.0-10.0)     | 12698.0 | 0.62 |
|  | No                       | 6.0(1.0-11.0)     |         |      |
| Daily working time in agriculture (hours)          | Yes                      | 12.0(1.0-17.0)    | 12649.0 | 0.55 |
|  | No                       | 12.0(1.0-24.0)    |         |      |

|                         | Menstrual Cycle Problems |      |     |      |      | X <sup>2</sup> | P     |
|-------------------------|--------------------------|------|-----|------|------|----------------|-------|
|                         | Yes                      |      | No  |      | %**  |                |       |
|                         | n                        | %*   | n   | %*   |      |                |       |
| Educational Status      |                          |      |     |      |      | 4.50           | 0.34  |
| Illiterate              | 59                       | 62.1 | 36  | 37.9 | 28.8 |                |       |
| Literate                | 19                       | 51.4 | 18  | 48.6 | 11.2 |                |       |
| Primary level           | 65                       | 59.1 | 45  | 40.9 | 33.3 |                |       |
| Secondary level         | 37                       | 56.1 | 29  | 43.9 | 20.0 |                |       |
| High school and above   | 17                       | 77.3 | 5   | 22.7 | 6.7  |                |       |
| Language Spoken at Home |                          |      |     |      |      |                |       |
| Turkish                 | 4                        | 20.0 | 16  | 80.0 | 6.0  | 5.93           | 0.051 |
| Arabic                  | 58                       | 46.8 | 66  | 53.2 | 37.6 |                |       |
| Kurdish                 | 71                       | 38.2 | 115 | 61.8 | 56.4 |                |       |
| Health Insurance        |                          |      |     |      |      |                |       |
| Yes                     | 164                      | 58.0 | 119 | 42.0 | 85.8 | 2.51           | 0.11  |
| No                      | 33                       | 70.2 | 14  | 29.8 | 14.2 |                |       |
| Economic Status         |                          |      |     |      |      |                |       |
| Good/Moderate           | 153                      | 61.9 | 94  | 38.1 | 74.8 | 2.06           | 0.15  |
| Bad                     | 44                       | 53.0 | 39  | 47.0 | 25.2 |                |       |

\* Row percentage, \*\* column percentage

MC irregularity was 20.9% at home and this increased to 39.7% during agricultural work (p<0.05). However, there was no change in the frequency of the MC and frequency of pain during the MC between time spent farming and time spent at home (p>0.05) (Table 2).

|  | Menstrual Cycle Problems |      |     |      |      | X <sup>2</sup> | P    |
|--|--------------------------|------|-----|------|------|----------------|------|
|  | Yes                      |      | No  |      | %**  |                |      |
|  | n                        | %*   | n   | %*   |      |                |      |
| Shaded area for rest in the agricultural area                      |                          |      |     |      |      |                |      |
| Yes  | 53                       | 51.5 | 50  | 48.5 | 31.2 | 4.22           | 0.04 |
| No   | 144                      | 63.4 | 83  | 36.6 | 68.8 |                |      |
| Use of agricultural pesticides at work place or place of residence |                          |      |     |      |      |                |      |
| Yes  | 46                       | 59.0 | 32  | 41.0 | 23.6 | 0.02           | 0.88 |
| No   | 151                      | 59.9 | 101 | 40.1 | 76.4 |                |      |
| Tobacco use  |                          |      |     |      |      |                |      |
| Yes  | 7                        | 70.0 | 3   | 30.0 | 3.0  | 1.78           | 0.18 |
| No   | 190                      | 59.4 | 130 | 40.6 | 97.0 |                |      |
| Chronic illness  |                          |      |     |      |      |                |      |
| Yes  | 39                       | 73.6 | 14  | 26.4 | 16.1 | 5.06           | 0.02 |
| No   | 158                      | 57.0 | 119 | 43.0 | 83.9 |                |      |
| Regular medication   |                          |      |     |      |      |                |      |
| Yes  | 10                       | 66.7 | 5   | 33.3 | 4.5  | 0.31           | 0.57 |
| No   | 187                      | 59.4 | 128 | 40.6 | 95.5 |                |      |
| Experiencing any sad/unhappy event                                 |                          |      |     |      |      |                |      |
| Yes  | 52                       | 63.4 | 30  | 36.6 | 24.8 | 0.62           | 0.42 |
| No   | 145                      | 58.5 | 103 | 41.5 | 75.2 |                |      |

\* Row percentage, \*\* column percentage

Many factors that were believed to cause menstrual cycle problems at the agricultural area were analyzed (Table 3-5). More MCP were determined in those who were only able to take a break in non-shaded areas in agricultural area and who had chronic illnesses ( $p < 0.05$ ) (Table 5).

There were no differences in terms of other variables (socio-demographic characteristics, characteristics related to seasonal agricultural labor and factors related to the MC) between those who had

and who did not have MCP in the period when they were in agricultural area ( $p > 0.05$ ) (Table 3-5).

Using the shaded area and chronic illness variables that cause significant difference in univariate analyses, the logistic regression model was created. According to the logistic regression analysis, having a chronic illness doubles the risk of MCP in the field and non-shaded in the resting areas causes a 1.6-fold increase in the MCP in the field (Table 6).

| Variables  | B     | P    | OR   | %95 CI    |
|--|-------|------|------|-----------|
| Chronic illness (yes)                              | 0.73  | 0.02 | 2.0  | 1.07-4.01 |
| Shaded area for rest in the agricultural area (no) | 0.48  | 0.04 | 1.6  | 1.01-2.61 |
| Constant   | -0.45 | 0.82 | 0.95 |           |

## DISCUSSION

Young agricultural workers have a poor economic status and very low education level. The numbers of those who have not received even a basic primary education and who are illiterate are very high. In Turkey, the rate of illiteracy is 3.1% among those aged 15-19, [23] while it is 28.8% among young SAWs. This dramatic picture is also similar to the educational status of agricultural workers in the same age group in Sanliurfa and Adiyaman in 2011. [18,24] Given the time from which these young people are first employed as agricultural workers and their membership of the agricultural workforce, they have not had the opportunity to attend or continue school from a young age. [24]

Since one in six of these young people had a chronic illness, and one in three of them had an undesirable BMI, it can be said that the general health status of young SAWs is also not good. Similarly, the frequency of high chronic illness and use of medication in this group has been emphasized in research conducted on women working in agriculture in the SAP region. [25] Considering the fact that young SAWs have low socioeconomic status and harsh living and working conditions, much more chronic illnesses are actually anticipated.

In studies, it is reported that the mean age at menarche decreased with the improvement of nutrition, increased urbanization and better general health. [26,27] The age at menarche was reported to be 12.3 in a national study in the United States [28] and 11.5 in Turkey. [29] In this study, the mean age at menarche was 13.3, which is higher than these values. The higher mean age at menarche could be the result of the low socioeconomic level of young SAWs, the uncomfortable and difficult living conditions they face in agricultural area, the chronic illnesses they suffer from, and the treatment they have received for these illnesses.

Young SAWs have more MCP during the times they are working in agriculture than when they are at home. Factors such as excessive fatigue, poor harboring and uncomfortable living conditions, poor nutrition, extreme heat and cold exposure may lead to MC disorders in female agricultural workers. [18] As a matter of fact, having chronic illnesses and not having a shade while resting in the agricultural lands were determined as prominent factors that increase MCP during the period when SAWs work in agricultural areas.

Irregularity in the MC and an abnormal amount of bleeding are observed

more frequently in agricultural area. Similarly, in another study, approximately 34.0% of young female SAWs living in Sanliurfa and Adiyaman provincial centers reported that they had encountered problems with menstrual irregularity in agricultural area and had worried about it. [30] However, in studies conducted on adolescents who were not agricultural workers, it was found that MC irregularities were at a lower level, ranging between 9.0% and 31.2%. [31-33]

In other studies, social status, residence status, overexposure to natural light, etc., affect the length, regularity and duration of the cycle. [15,16,34] It is known that the MC is affected by physical, social and behavioral changes and physical or psychological disorders. [16] It is also known that the quality of life of female adolescents working in agricultural fields is lower than that of males. [24] In fact, young SAWs work for at least 9 hours a day, reside in tents and sheds and spend more than 6 months at a time in agricultural area. Allsworth et al. found that long working hours increased menstrual irregularity and cycle length. [35]

## CONCLUSION AND SUGGESTIONS

Most young SAWs are poorly educated and live in poor economic conditions. Further education of these young people should be supported and encouraged. Health education programs should be provided in order to enhance young people's knowledge on the literacy of the public health. The agricultural working and living conditions of young SAWs are uncomfortable. Better living and working conditions should be provided by employers.

Young people working in agriculture experiencing MCP more frequently and, non-shaded area for resting in the agricultural setting and chronic illness state are the most important factors that cause the MCP in young SAWs at agricultural area.

Healthcare services should be offered to agricultural workers by mobile medical teams at the agricultural areas. In the regions where this service is offered, the

scope of the service should be expanded, MCP and chronic illnesses in young women should be sensitively taken into consideration and necessary counseling and care services should be provided regarding these matters. Legislative steps should be taken regarding the creation of shaded areas for resting at agricultural areas by employers.

## REFERENCES

1. World Health Organization (WHO). The Health of Young People: a challenge and a Promise. Geneva, 1993. p11.
2. Turkish Statistical Institute. Youth With Statistics, 2014. Number: 18625. Available from:<http://www.tuik.gov.tr/PreHaberBultenleri.do?id=18625>.
3. Christie D, Viner R. Adolescent development. *BMJ*. 2005;330:301-304.
4. Farage MA, Neill S, MacLean AB. Physiological changes associated with the menstrual cycle: a review. *Obstet Gynecol Surv*. 2009;64:58-72.
5. Fenster L, Waller K, Chen J, et al. Psychological stress in the workplace and menstrual function. *Am J Epidemiol*. 1999;149:127-134.
6. Wade GN, Jones JE. Neuroendocrinology of nutritional infertility. *American journal of Physiology*. 2004;287: R1277-R1296.
7. Barr SI, Prior JC, Vigna YM. Restrained eating and ovulatory disturbances: possible implications for bone health. *The American Journal of Clinical Nutrition*. 1994;59:92-97.
8. Lyngso J, Toft G, Hoyer BB, Guldbrandsen K, Olsen J, Ramlau-Hansen CH. Moderate alcohol intake and menstrual cycle characteristics. *Human Reproduction*. 2014;29:351-358.
9. Windham GC, Elkin EP, Swan SH, Waller KO, Fenster L. Cigarette smoking and effects on menstrual function. *Obstetrics and Gynecology*. 1999;93:59-65.
10. Sakai H, Ohashi K. Association of menstrual phase with smoking behavior, mood and menstrual phase-associated symptoms among young Japanese women smokers. *BMC Women's Health*. 2013;13:10.
11. Buck Louis GM, Rios LI, McLain A, Cooney MA, Kostyniak PJ, Sundaram R. Persistent organochlorine pollutants and

- menstrual cycle characteristics. *Chemosphere*.2011;85:1742-1748.
12. Farr SL, Cooper GS, Cai J, Savitz DA, Sandler DP. Pesticide use and menstrual cycle characteristics among premenopausal women in the agricultural health study. *American Journal of Epidemiology*.2004;160:1194-1204.
  13. Rowland AS, Baird DD, Long S, et al. Influence of medical conditions and lifestyle factors on the menstrual cycle. *Epidemiology*.2002;13:668-674.
  14. Harlow SD, Campbell B, Lin X, Raz J. Ethnic differences in the length of the menstrual cycle during the postmenarcheal period. *American Journal of Epidemiology*. 1997;146:572-580.
  15. Ray S, Mishra SK, Roy AG, Das BM. Menstrual characteristics: a study of the adolescents of rural and urban West Bengal, India. *Annals of Human Biology*. 2010; 37:668-681.
  16. Danilenko KV, Sergeeva OY, Verevkin EG. Menstrual cycles are influenced by sunshine. *Gynecological Endocrinology*. 2011;27:711-716.
  17. Hurst TP, Karl M. Agricultural workers and their contribution to sustainable agriculture and rural development 2007. International Labour Organization, Food and Agriculture Organization, International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations. Available from:[http://www.faoilo.org/fileadmin/user\\_upload/fao\\_ilo/pdf/engl\\_agricultur eC4163.pdf](http://www.faoilo.org/fileadmin/user_upload/fao_ilo/pdf/engl_agricultur eC4163.pdf)
  18. Şimşek Z. Seasonal Agricultural Workers And Determination Of The Needs Of Families Research, 2011. Ankara, Damla Matbaacılık Ltd. Şti.2012;16-94.
  19. Topsak, F. Research Center of The Grand National Assembly of Turkey seasonal agricultural workers research report 2015. Available from:[http://www.cs.gb.gov.tr/cs.gbPortal/ShowProperty/WLP%20Repository/isggm/dosyalar/TarimdaISG3\\_](http://www.cs.gb.gov.tr/cs.gbPortal/ShowProperty/WLP%20Repository/isggm/dosyalar/TarimdaISG3_)
  20. International Labor Office (ILO). Global employment trends 2011. Available from:[http://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms\\_150440.pdf](http://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_150440.pdf).
  21. Republic of Turkey Ministry of Development. Provinces and Regions Socio-Economics Development Ranking Research, 2011. Available from:<http://www.undp.org.tr/Gozlem3.aspx?Web page no=3946>.
  22. Kish L. A procedure for objective respondent selection within the household. *Journal of the American Statistical Association*.1949;44:380-387.
  23. Turkey Demographic and Health Survey 2013. Hacettepe University Institute of Population Studies Ankara, Turkey November 2014 Publication No: IPS-HU.14.02 ISBN 978-975-491-389-7. Available from:[http://www.hips.hacettepe.edu.tr/eng/TDHS\\_2013\\_main.report.pdf](http://www.hips.hacettepe.edu.tr/eng/TDHS_2013_main.report.pdf).
  24. Havlioğlu S, Koruk İ. The quality of life and problematic behaviors among adolescent migrant seasonal farm workers. *Turkish Journal of Public Health*. 2013;11:11-22.
  25. HÜTİSvGUvA: Southeastern Anatolia Project health survey of employees in agriculture 2013. Sembol Ofset Matbaacılık San. ve Tic. Ltd. Şti.Şanlıurfa, 2013.
  26. Adanu RM, Hill AG, Seffah JD, Darko R, Anarfi JK, Duda RB. Secular trends in menarcheal age among Ghanaian women in Accra. *Journal of Obstetrics Gynaecology*. 2006;26:550-554.
  27. Gumanga S, Kwame-Aryee R. Menstrual characteristics in some adolescent girls in Accra, Ghana. *Ghana Medical Journal*. 2012;46:1-7.
  28. Anderson SE, Must A. Interpreting the continued decline in the average age at menarche: results from two nationally representative surveys of US girls studied 10 years apart. *The Journal of Pediatrics*. 2005;147:753-760.
  29. Güler Ç, Akın L. Public Health Basic Information 1. volume. 2nd edition, Hacettepe University Publications, Ankara. 2015;486-489.
  30. Şimşek Z, Kara B, Yaşar G, Yıldırım kaya G. Seasonal agricultural youth workers' concerns on development - growth in adolescence period and utilization of health services. *TAF Preventive Medicine Bulletin*. 2015;14:189.
  31. Çakır M, Mungan İ, Karakaş T, Girişken I, Ökten A. Menstrual pattern and common menstrual disorders among university students in Turkey. *Pediatrics International*. 2007;49:938-942.
  32. Dars S, Sayed K, Yousufzai Z. Relationship of menstrual irregularities to BMI and nutritional status in adolescent girls.



- Pakistan Journal of Medical Sciences*.2014;30:141-144.
33. Rigon F, De Sanctis V, Bernasconi S, et al. Menstrual pattern and menstrual disorders among adolescents: an update of the Italian data. *Italian Journal of Pediatrics*. 2012;38:38.
34. Harlow SD, Campbell OM. Epidemiology of menstrual disorders in developing countries: a systematic review. *An International Journal of Obstetrics and Gynaecology*. 2004;111:6-16.
35. Allsward JE, Clarce J, Peipert J, Hebert MR, Cooper A, Boardman LA. The influence of stress on the menstrual cycle among newly incarcerated women. *Womens Health Issues*. 2007;17:202-209.

How to cite this article: Yaşar G, Koruk F. Does working in agricultural area affect menstrual cycle? A cross sectional study from Turkey. *Int J Health Sci Res*. 2018; 8(12):66-74.

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