

## Prevalence & risk factors of anaemia among women of reproductive age in Bursa, Turkey

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**Background & objectives:** The control of anaemia in women of childbearing age is essential to prevent low birth weight and perinatal and maternal mortality. The aim of this study was to determine the anaemia prevalence and risk factors in women of reproductive age group in Nilufer Public Health Training and Research Area, Bursa, Turkey.

**Methods:** In this cross-sectional study, 530 women were selected using stratified random sampling among 6,506 women in 15-49 age group and 488 women (92.1%) participated in the study. Pregnant women or women who were not sure of their pregnancy were not included in the study. The data collected were analysed by multivariate logistic regression analysis to determine the risk factors related to anaemia.

**Results:** The prevalence of anaemia was 32.8 per cent (haemoglobin level < 12 g/dl). Usage of more than 2 sanitary pads in a day during menstruation (OR=3.67, 95% CI 2.30-5.88;  $P=0.000$ ) and duration of menstrual bleeding more than 5 days (OR=3.01, 95% CI 1.94-4.66;  $P=0.000$ ) were found to be risk factors for anaemia.

**Interpretation & conclusions:** Approximately 1 of 3 women in the study area was diagnosed to be anaemic. These data indicated the necessity of a public health programme for prevention and early diagnosis of anaemia. Starting from adolescence, all non pregnant women should be screened for anaemia every 5-10 yr throughout their childbearing years during routine health examinations. The follow up service provided by midwives at the primary health care can be used as a suitable tool for anaemia prevention.

**Key words** Anaemia - prevalence - risk factors - Turkey - women of reproductive age

In Turkey, data on the anaemia prevalence and risk factors in women of reproductive age are limited. Only two surveys have been done in 1995 and 2002 and both of these provide provincial rather than country-wide data<sup>1,2</sup>. The latter survey was conducted at the south-east province of Turkey. The prevalence of anaemia was found to be 40.08 per cent for women in 19-40 yr age

group<sup>2</sup>. WHO classifies the countries with a prevalence of anaemia higher than 40 per cent as the countries where anaemia is a problem of public health significance<sup>3</sup>.

As anaemia is so prevalent in Turkey, screening for this condition should be one of the most common primary health care activities. Two basic approaches to

anaemia assessment exist: individual screening and population-based screening. Individual screening is usually done in a clinic setting as part of routine services to groups at risk. These services usually include antenatal care and well-child programmes, such as growth monitoring. Population-based screening usually takes place at a regional or a national level. Baseline and follow up surveys are usually done in the community<sup>4</sup>.

In Turkey, no national programme is implemented to decrease anaemia rates in women in reproductive age group, except during pregnancy. The iron support programme was started in 2005 by the Ministry of Health to prevent complications that anaemia may cause. The programme aims to provide iron support for all pregnant women without exception. Pregnant women who have health insurance are prescribed iron preparation, while others are given iron preparations by local sources<sup>5</sup>.

Bursa is the fourth greatest city of Turkey and is located in the western part of the country. Nilufer Public Health Training and Research Area (NPHTRA) was established with a protocol between the Municipality of Nilufer and Uludag University, in 2001. There are six Public Health Training and Research Centres (PHTRC) in the area (*Fethiye, İhsaniye, Ertugrul, Alaaddinbey, Ozluce, and Cumhuriyet*). PHTRCs have three functions: primary health care, education of last year medical students, and field research.

In NPHTRA women in reproductive age (15-49 yr) are visited in their homes by midwives every six months. These visits aim to inform women about family planning and to check whether the woman is pregnant or not. There is no information for anaemia on the check cards used by midwives on which the information gathered is recorded. In case of pregnancy detection the haemoglobin level of women is measured free of charge in the first trimester. If the woman is not pregnant and does not have a problem, no procedure is followed.

We therefore planned this study to determine anaemia prevalence and risk factors in women in reproductive age group in Nilufer Public Health Training and Research Area, in order to put a control programme into practice.

### Material & Methods

This cross-sectional study was conducted in NPHTRA in Bursa between June 2004 and June 2005.

The demographic characteristics of people living in NPHTRA were registered in a database. There were 23,587 people living in 6,037 households in 2004<sup>6</sup>.

*Study sample:* The study population consisted of 6,506 women in reproductive age (15-49 yr old) living in NPHTRA. Sample size was determined as 530 women using the formula  $[n=Nt^2pq / d^2(N-1)+t^2pq]$  ( $N=6,506$ ,  $p=0.4008$ ,  $q=0.5992$ ,  $t=1.96$  ( $\alpha=0.05$ ),  $d=0.04$ )<sup>2</sup>. Study participants were chosen from the NPHTRA population database, using stratified random sampling. They were visited in their homes and a questionnaire was applied. The questionnaire was developed by Uludag University Faculty of Medicine, Department of Public Health. There were 28 questions in the questionnaire and all questions answered by women with face to face interview. It was not validated. It was tested with a pilot study on a small group.

Pregnant women or women who were not sure of their pregnancy were not included. A total of 488 women agreed to participate; of these, 22 were pregnant and 20 women could not be reached even though they were called three times. None of the women refused to participate. As a result, 92.1 per cent of the sample was studied.

Thirty one women were in menopause, and were excluded from the study; 26 women were in lactating phase (mean durations of lactation were 6.2 months) and they were not receiving any iron therapy.

*Procedure:* A questionnaire composed of 28 questions was filled out with face-to-face interviews. The questions were related to the socio-demographic characteristics of women, their fertility information, family planning methods being used, if there was an anaemia diagnosis in the last year period, and menstrual information. In order to gather information on menstrual blood loss, women were asked how many sanitary pads they used in a day.

After the questionnaires were filled out, 2 ml of venous blood samples were collected into tubes with EDTA. All blood samples were collected by a research. Blood samples were transported in a container filled with ice to Fethiye Public Health Training and Research Centre, the largest PHTRC in NPHTRA. The samples were treated in an automatic blood count machine (Hycell Diagnostics, France) in the laboratory of the centre. Haemoglobin level was measured, and those having  $<12.0$  g/dl were grouped as anaemic<sup>7</sup>. An automatic blood count machine (Hycell Diagnostics,

France) was used for haemoglobin estimation in the laboratory of the research centre.

Height was measured to the nearest 0.5 cm, and the body mass index was calculated from the formula weight (kg)/height (m<sup>2</sup>).

**Ethical clearance:** The study protocol was cleared by the Ethical Committee of Uludag University Faculty of Medicine, Bursa. Anaemic women were provided health treatment in PHTRC.

**Statistics:** The data were evaluated by SPSS (Version 13.0) statistics software. Means and percentages were compared using student's t test and chi square.  $P < 0.05$  was considered significant. Multivariate logistic regression analysis was applied to determine the risk factors related to anaemia. Presence of anaemia was accepted as the dependent variable in the model; the independent variables were age, education, marital status, job, parity, body mass index, and menstruation characteristics (regularity of cycle, length of cycle, length of flow, sanitary pad usage).

**Limitations of the study:** The number of sanitary pads consumed during a menstruation cycle was used to grade menstrual blood loss. Because the consumption of sanitary pads depends much on the individual habits and the socio-economical class of the women, this is a limitation of the study.

## Results

The mean age of the women was 31.35 yr (95% CI 30.50-32.20). The prevalence of anaemia was 32.2 per cent; 2.5 per cent of these women (12 women) were classified as moderately anaemic (Hb 7-9 g/dl) and 0.2 per cent (only 1 woman) as severely anaemic (Hb <7 g/dl). The relation between various characteristics of women and anaemia and mean haemoglobin level is given at Table I.

Of the 457 women, 356 had experienced pregnancy at least once. Anaemia prevalence was 30.3 per cent for women with at least one pregnancy, and 36.4 per cent for women with no pregnancy.

Prevalence of anaemia was significantly ( $P < 0.001$ ) more in women having 6-10 days of flow during menstruation and those using more sanitary pads compared to women having less days of flow and using 1-2 pads (Table II).

The relation between family planning method use (N=373) and anaemia was also investigated; 30 of the married women were in menopause, 283 of the remaining used a family planning method (Table III).

**Table I.** Some characteristics of study participants related to anaemia and mean haemoglobin level

| Variables                                  | Sample | Anaemia |      | Mean haemoglobin level (95% CI) g/dl |
|--|--------|---------|------|--------------------------------------|
|  |        | Number  | %    |                                      |
| <i>Total age (Yr):</i>                     | 457    | 150     | 32.8 | 12.29 ( 12.15-12.41)                 |
| 15-34                                      | 300    | 96      | 32.0 | 12.33 (12.17-12.48)                  |
| 35-49                                      | 157    | 54      | 34.4 | 12.19 (11.95-12.43)                  |
| <i>Education:</i>                          |        |         |      |                                      |
| 0-8 yr                                     | 353    | 122     | 34.6 | 12.25 (12.10-12.39)                  |
| 9 yr and over                              | 104    | 28      | 26.9 | 12.39 (12.09-12.68)                  |
| <i>Marital status:</i>                     |        |         |      |                                      |
| Married                                    | 343    | 107     | 31.2 | 12.30 (12.16-12.45)                  |
| Others                                     | 114    | 43      | 37.7 | 12.21 (11.91-12.50)                  |
| <i>Occupation:</i>                         |        |         |      |                                      |
| Housewife                                  | 342    | 115     | 33.6 | 12.22 (12.07-12.37)                  |
| Others                                     | 115    | 35      | 30.4 | 12.47 (12.20-12.73)                  |
| <i>Health insurance:</i>                   |        |         |      |                                      |
| No   | 85     | 35      | 41.2 | 12.06 (11.75-12.37)                  |
| Yes  | 372    | 115     | 30.9 | 12.33 (12.19-12.47)                  |
| <i>Household members:</i>                  |        |         |      |                                      |
| 1-4  | 280    | 92      | 32.9 | 12.24 (12.07-12.41)                  |
| 5+   | 177    | 58      | 32.8 | 12.34 (12.14-12.55)                  |
| <i>Average monthly household income:</i>   |        |         |      |                                      |
| -500 Euro                                  | 334    | 110     | 32.9 | 12.27 (12.12-12.43)                  |
| 501+ Euro                                  | 123    | 40      | 32.5 | 12.29 (12.05-12.54)                  |
| <i>BMI (kg/m<sup>2</sup>):</i>             |        |         |      |                                      |
| < 25                                       | 232    | 84      | 36.2 | 12.12 (11.93-12.31)                  |
| > 25                                       | 225    | 66      | 29.3 | 12.44 (12.27-12.62)                  |
| <i>Anaemia diagnosis within last year:</i> |        |         |      |                                      |
| No   | 348    | 95      | 27.3 | 12.46 (12.32-12.60)                  |
| Yes  | 109    | 55      | 50.5 | 11.71 (11.43-11.99)                  |

**Table II.** Anaemia status and mean haemoglobin level according to various characteristics of menstruation

| Variables  | Sample | Anaemia |       | Mean haemoglobin level (95% CI) g/dl |
|--|--------|---------|-------|--------------------------------------|
|  |        | Number  | %     |                                      |
| <i>Total regularity of cycle:</i>                              | 457    | 150     | 32.8  | 12.28 (12.15-12.41)                  |
| Regular  | 358    | 118     | 33.0  | 12.28 (12.14-12.42)                  |
| Irregular  | 99     | 32      | 32.3  | 12.28 (11.95-12.62)                  |
| <i>Length of cycle (days):</i>                                 |        |         |       |                                      |
| < 28   | 56     | 21      | 37.5  | 11.97 (11.56-12.38)                  |
| > 28   | 401    | 129     | 32.2  | 12.32 (12.18-12.46)                  |
| <i>Length of flow (days):</i>                                  |        |         |       |                                      |
| 1-5  | 303    | 72      | 23.8  | 12.56 (12.43-12.70)                  |
| 6-10   | 154    | 78      | 50.6* | 11.72* (11.46-11.98)                 |
| <i>Number of sanitary pad usage for each menses (per day):</i> |        |         |       |                                      |
| 1-2  | 192    | 32      | 16.7  | 12.72 (12.54-12.89)                  |
| 3-5  | 265    | 118     | 44.5* | 11.96* (11.79-12.14)                 |

\* $P < 0.001$  compared to proceeding value

There was no difference in anaemia prevalence in the two groups.

While 171 of the women (60.42%) who used a family planning method, preferred a modern method, 112 (39.58%) used coitus interruptus. Anaemia prevalence of modern method users was 31.0 per cent while at in traditional method users was 29.5 per cent. Ninety modern method user women (52.63%) had an intrauterine device (IUD). Anaemia prevalence of IUD users was 38.9 per cent while the prevalence in other modern method users was 22.2 per cent ( $P<0.05$ ).

In multivariable logistic regression analysis, consumption of more than 2 sanitary pads during menstruation (OR=3.67, 95% CI 2.30-5.88;  $P<0.001$ ), and more than five days of menstrual bleeding (OR=3.01, 95% CI 1.94-4.66;  $P<0.001$ ) were found to be risk factors for anaemia. No independent relation was observed between anaemia and age, education,

marital status, job, parity, BMI, regularity of cycle and length of cycle (Table IV).

### Discussion

In this study, anaemia prevalence was found to be 32.8 per cent among non pregnant women of reproductive age, while earlier reported values were 38.9 per cent in Burkina Faso<sup>8</sup>, 49 per cent in Tanzania<sup>9</sup>, 49.5 per cent in India<sup>10</sup>, and 49.6 per cent in Egypt<sup>11</sup>. Anaemia prevalence of non pregnant women in non-industrialized countries varies between 30-60 per cent<sup>7</sup>. The prevalence found in this study was near to the lower limit of prevalence in non industrialized countries. Anaemia prevalence was 40.08 per cent for women in 19-40 yr age at a study conducted at Southeast Anatolia province in Turkey<sup>2</sup>. The lower value found in this study may be because of better socio-economical conditions of our province compared to Southeast Anatolia province.

According to WHO classification, average haemoglobin level was 13.28 g/dl and estimated anaemia prevalence was 10 per cent in women between age 15-44 yr at the Europe section (EUR-B) that includes Turkey<sup>12</sup>. The mean haemoglobin level in our study was lower (12.31 g/dl) and this explains the reason for higher prevalence at our province compared to the Europe section including Turkey.

No relationship between family planning usage and anaemia prevalence was found. However, the prevalence of anaemia was in women using IUD was higher compared to those using other modern family planning methods ( $P<0.05$ ). There are many studies revealing the relation between IUD usage and menstrual blood loss<sup>11,13,14</sup>. However, in this study any independent relation between IUD usage and menstrual blood loss could not be found.

It was found that 23.6 per cent (115/488) women were diagnosed as anaemic within last year, and 49.6 per cent of these women (57/115) were diagnosed anaemic again. This indicates in effective treatment of anaemia.

No association was found between the age, education, income, marital status, occupation, parity, body mass index, regularity of cycle and length of cycle, and anaemia in this study. The findings in various studies have shown variable results<sup>9-11,15,16</sup>.

Consumption of more than 2 sanitary pads during menstruation, more than five days of menstrual bleeding and to be diagnosed with anaemia within last year were found to be risk factors for anaemia. Long duration of menstruation and self-reported heavy bleeding at

**Table III.** The relationship between family planning method usage and anaemia (married women)

| Variables                        | Sample | Anaemia |      | Mean haemoglobin level (95% CI) g/dl |
|----------------------------------|--------|---------|------|--------------------------------------|
|                                  |        | Number  | %    |                                      |
| Total                            | 343    | 107     | 31.2 | 12.30 (12.16-12.45)                  |
| Using any family planning method |        |         |      |                                      |
| Yes                              | 283    | 86      | 30.4 | 12.32 (12.16-12.48)                  |
| No                               | 60     | 21      | 35.0 | 12.22 (11.87-12.56)                  |

**Table IV.** Results of multiple logistic regression model of the association between anaemia and risk factors

| Variables  | OR   | (95.0% C.I.) |
|--|------|--------------|
| Number of sanitary pad usage for each menses (per day) (1-2/3-5) | 3.67 | (2.30-5.88)* |
| Length of flow (days) (1-5/6-10)                                 | 3.01 | (1.94-4.66)* |
| Anaemia diagnosis within last year (no/yes)                      | 2.52 | (1.56-4.06)* |
| Age (15-34 / 35-49 yr)   | 1.14 | (0.75-1.74)  |
| Education (9 yr and over/0-8 yr)                                 | 0.59 | (0.32-1.07)  |
| Income (501+ Euro/-500 Euro)                                     | 0.87 | (0.55-1.37)  |
| Marital status (other/married)                                   | 1.35 | (0.92-1.99)  |
| Job (housewife/other)  | 0.82 | (0.47-1.45)  |
| Parity (mono / multiparous)                                      | 1.08 | (0.90-1.30)  |
| Body mass index (>25 kg/m <sup>2</sup> / <25 kg/m <sup>2</sup> ) | 0.89 | (0.55-1.46)  |
| Regularity of cycle (yes/no)                                     | 1.15 | (0.52-2.55)  |
| Length of cycle in days (28< / <28)                              | 0.86 | (0.36-2.04)  |
| IUD usage (no/yes)   | 1.51 | (0.86-2.66)  |
| Family planning method usage (no/yes)                            | 1.22 | (0.65-2.28)  |

\* $P<0.001$



women of reproductive age have been known to be risk factors for anaemia<sup>17,18</sup>.

Although anaemia has been recognized as a public health problem for many years, little progress has been made and the global prevalence of anaemia remains unacceptably high. WHO and UNICEF therefore reemphasize the urgent need to combat anaemia and stress the importance of recognizing its multifactorial aetiology for developing effective control programmes<sup>19</sup>.

Periodic screening for anaemia among adolescent girls and women of childbearing age is indicated. Starting in adolescence, all non pregnant women should be screened for anaemia every 5-10 yr throughout their childbearing years during routine health examinations. Annual screening for anaemia in women having risk factors for iron deficiency has been indicated<sup>20</sup>.

The follow up service provided by midwives at the primary health care can be used as a suitable tool for prevention and efficient treatment of anaemia at women of reproductive age. In Turkey, according to legal regulations, midwives visit these women at their homes once in every six months. The standard forms used at NPHTRA for following up of women at childbearing age may be modified. The three risk factors found in this study could be added in these forms. When a woman is found to be anaemic, she should be supported with free medicine and her haemoglobin level should be followed up for three months.

In conclusion, approximately 1 of every 3 women at the study area was diagnosed to be anaemic. This indicates the necessity of implementing a public health programme for prevention and early diagnosis of anaemia in women of child bearing age.

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