

# Role of Iodine Deficiency in the Development of Menstrual Disorders in Young Females

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**The aim of the investigation** was to study the effect of iodine level in young females on the development of menstrual disorders.

**Materials and Methods.** We determined iodine content in urine by a potentiometric method using ion-selective electrodes to analyze iodide ions. Due to the high amplitude vibrations of individual iodine concentrations in urine (ioduria) to estimate the severity of iodine deficiency, we used a mean iodine concentration in urine — a median.

**Results.** The content of urinary iodine excretion in young females with menstrual function disorders ranged widely from 18 to 109 µg/L. The median of iodine excretion appeared to be lower than the existing standards, and was 74.8 µg/L.

We revealed the positive direct relations between ioduria and impaired menstrual function ( $r=0.46$ ). To assess the effectiveness of the program of iodine deficiency prevention of menstrual function in young girls 5–6 months after iodine administration, we re-evaluated their iodine level. The number of normal findings of urinary iodine excretions was found to have increased up to 70.6% cases, neither moderate nor severe iodine deficiencies being revealed. Moreover, most young females with menstrual disorders were found to have improved functioning of the reproductive system.

**Key words:** iodine deficiency disorders; menstrual disorders; iodine deficiency prevention.

Reproductive health of young people determines the nation health, and is of great importance for population reproduction. And having a direct impact on demographic processes it determines the future of society [1–3]. In current socio-economic environment reproductive health is characterized by an increasing prevalence of functional disturbances and chronic diseases.

Among the factors having a negative impact on reproductive health the higher priority belongs to stress and malnutrition. Etiopathogenetic role of nutrition under current conditions is considered as one of risk factors including iodine deficiency disorders. Malnutrition contributes to an increasing incidence of endocrine diseases, metabolic disorders, and causes the development of menstrual disorders. The monitoring of these conditions and iodine deficiency prevention are required in the population living in endemic areas [4–9]. Iodine deficiency during pregnancy results in high-risk pregnancy undermining fetal central nervous system. There has been studied the negative effect of iodine deficiency in childhood [10–17].

The formation and development of female reproductive

system is completed by the age of 16–19. Iodine deficiency leads to thyroid dysfunction and significantly governs the physiology of reproductive system. We decided to study the iodine level in young females, when their reproductive system development is completed.

**The aim of the investigation** was to study the effect of iodine level in young females on the development of menstrual disorders.

**Materials and Methods.** We studied two groups of female students: group 1 ( $n=34$ ) young females had menstrual disorders (algodismenorrhea, dysfunctional uterine bleedings, amenorrhea); group 2 ( $n=30$ ) included young females with a physiological menstrual cycle.

The study complies with the declaration of Helsinki (adopted in June, 1964 (Helsinki, Finland) and revised in October, 2000 (Edinburg, Scotland)) and was approved by the Ethics Committee of Chuvash State University named after I.N. Ulyanov. All patients gave their written informed consent.

Blood samples were taken in the morning in numbered disposable containers. We determined iodine content in urine by a potentiometric method using ion-selective

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electrodes to analyze iodide ions. Due to the high amplitude vibrations of individual iodine concentrations in urine (ioduria) to estimate the severity of iodine deficiency, we used a mean iodine concentration in urine — a median.

We determined an iodine level in urine on the base of a medical center “Otkrytie” (Cheboksary, Russia). To analyze iodine level we used mean urine iodine concentration scale recommended by the Ministry of Health of the Russian Federation in 1999 (norm >100 µg/L; slight deficiency: 50–100 µg/L; moderate deficiency: 20–50 µg/L; severe deficiency <20 µg/L).

The findings were statistically processed using Statistica (version 6.1) by parametric and non-parametric statistical methods (Student test, Mann–Whitney test).

**Results and Discussion.** Over 80% iodine is known to eliminate by kidneys, iodine concentration in urine fairly presents the iodine taken with food. To determine an iodine level in the groups of female students we analyzed urinary iodine excretion values.

Among females students with a physiological menstrual cycle, normal values (100 µg/L and more) were found in 86.7%, slight and moderated deficiency — in 13.3%, mean ioduria value (median) was 118.5 µg/L (See the Table).

Urinary iodine excretion values in female students with menstrual disorders varied in a wide range from

18 to 109 µg/L. Ioduria median was 74.8 µg/L and appeared to be lower than the norm. Normal values were found in 14.7%, slight deficiency — in 61.8%, moderate deficiency — in 17.3%, severe deficiency — in 5.8% females (See the Table). The patients with algodismenorrhea and dysfunctional uterine bleedings were revealed to have low and moderate iodine deficiency, while the cases with were found to have severe deficiency.

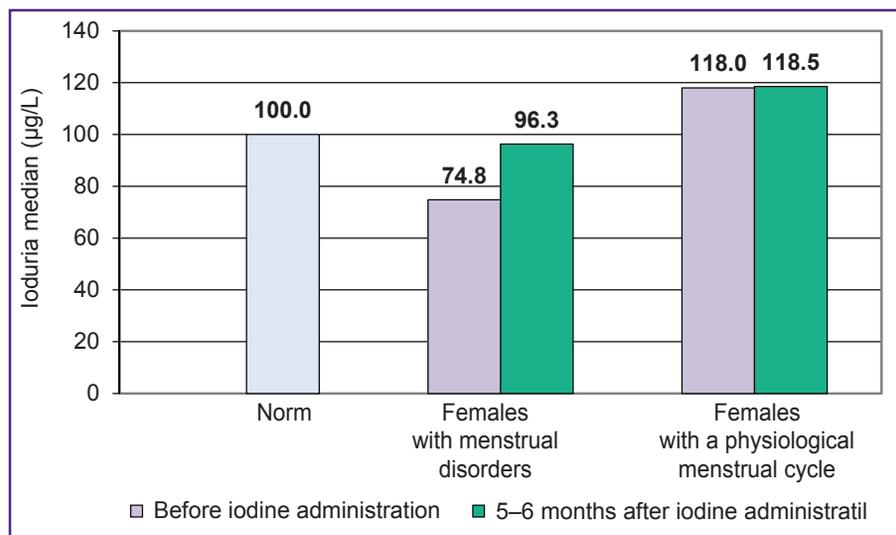
In order to reveal the dependence of menstrual dysfunction on iodine deficiency we carried out a correlation-regression analysis, and stated positive direct relations between ioduria and menstrual disorders ( $r=0.46$  if  $p<0.00001$ ).

To assess the efficiency of the program of iodine deficiency prevention of menstrual function we determine the iodine level in female students 5–6 months after iodine administration (See the Figure).

At the end of the period the number of normal urinary iodine excretion values in female students with menstrual disorders was found to increase being 70.6%, no moderate and severe deficiencies being revealed. Moreover, the female students with menstrual disorders noticed the improvement in reproductive system functioning: pain syndrome manifestations decreased significantly during periods, and in some patients algomenorrhea disappeared, patients with dysfunctional

Iodine level in female students according to ioduria values (%)

Groups	Iodine status				p
	Within normal limits	Slight deficiency	Moderate deficiency	Severe deficiency	
Females with physiological menstrual cycle	86.7	8.9	4.4	—	$\geq 0.02$
Females with menstrual disorders	14.7	61.8	17.3	5.8	$\geq 0.02$



Ioduria median in young females of the study groups

uterine bleedings mentioned the reduced number of bleeding events and decreased blood loss volume.

Thus, iodine deficiency prevention in females suffering from menstrual disorders has a positive effect on formation and physiological functioning of reproductive system.

**Conclusion.** One of the causes of menstrual dysfunction in young females can be iodine deficiency in diet. Control over iodine consumption and preventive measures for iodine recovery contribute to improved functioning of reproductive system.

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