

# Role of Thyroid Hormone and Serum Prolactin in Patients of Polycystic Ovary Syndrome, Abnormal Uterine Bleeding and Dysmenorrhea

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## ABSTRACT

**Background:** Each month, women during the reproductive age undergo menstrual cycle or menstruation. Menstruation is known as the process of losing blood from the uterus each month during reproductive age. The prevalence of menstrual morbidity in developing countries is comparable to that observed in developed countries and menstrual dysfunction represents a problem for women in developing countries.

**Aim:** The present study was planned to assess the serum Triiodothyronine, Thyroxine and Thyroid stimulating hormone (serum T<sub>3</sub>, T<sub>4</sub>, TSH) and Prolactin (PRL) in menstrual disorders patients as compared to healthy subjects.

**Materials & Methods:** Total 100 females suffering from menstrual disorders, age 18 to 45 years, and 50 age matched healthy control were enrolled for the study. Patients were further sub grouped based on menstrual disorders that are abnormal uterine bleeding (AUB), Polycystic ovarian syndrome (PCOS), and Dysmenorrhea. Blood samples were collected using standard aseptic technique and analyzed for Serum T<sub>3</sub>, T<sub>4</sub>, and TSH and Prolactin on VITROS ECI. Results obtained were presented as mean  $\pm$  SD for the case and control groups.

**Results:** T<sub>3</sub> and T<sub>4</sub> levels in all three groups were significantly lower. Mean serum TSH levels and PRL levels were significantly higher ( $P < 0.0001$ ) in all three groups as compare to healthy control group.

**Conclusion:** The study indicates a relation between thyroid levels and PRL in different menstrual disorders including AUB, PCOS and Dysmenorrhea. The study suggests a high rate of thyroid dysfunction especially hypothyroidism. Thus, it may be considered as beneficial to screen menstrual disorder patients for thyroid dysfunction.

**Keywords:** AUB, PCOS, Dysmenorrhea, Menstrual Disorders, Hypothyroidism, Prolactin.

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## INTRODUCTION

Each month, women during the reproductive age undergo menstrual cycle or menstruation. Menstruation is known as the process of losing blood from the uterus each month during reproductive age. The onset of menses at puberty is called menarche. Menes stops at the age of 40-50 yrs under the influence of certain hormones, this is referred to as menopause.<sup>1,2</sup> The prevalence of menstrual morbidity in developing countries is comparable to that observed in developed countries and menstrual dysfunction represents a problem for women in developing countries. In developing countries, abnormal uterine bleeding appears to affect about 5-15% of women of reproductive age and probably a higher percentage of women in older age groups.<sup>3</sup>

Excessive bleeding during the menstrual cycle is defined as abnormal uterine bleeding (AUB). Normal menstrual cycle flow lasts 3-7 days with the majority of blood loss occurring within the first three day.<sup>4</sup> AUB is a common problem among women in the reproductive age. It may be accompanied by pain and discomfort, cause significant social embarrassment, and have a substantial effect on health-related quality of life.

Descriptive terms that have been used to characterize AUB patterns include menorrhagia, poly-menorrhoea, dysfunctional uterine bleeding, and heavy menstrual bleeding.<sup>5</sup>

Polycystic ovarian syndrome (PCOS) is characterized by various menstrual and hormonal irregularities culminating in anovulation, infertility, and hyperandrogenism.<sup>6</sup>

Dysmenorrhea may be defined as pain during menstruation.<sup>7</sup> Dysmenorrhea is chronic, cyclic pelvic pain associated with menstruation. Typically it is cramping, lower abdominal pain occurring just before and during menstruation, usually commencing soon after menarche once regular ovulation is established. Dysmenorrhea affects nearly 90% of menstruating women. Dysmenorrhea is common in women with premenstrual syndrome (PMS). Dysmenorrhea is not a serious problem but may affect a person's daily life, social disabilities. Psychological problems such as anxiety, depression, family and marital disharmony, drug and alcohol abuse, physical and sexual abuse, and sexual dysfunction may manifest as physical pain.<sup>5</sup>

Thyroid dysfunction can interfere in multiple metabolic and physiological processes including the menstrual cycle. It also interferes with numerous aspects of reproduction and pregnancy and an association of hyperthyroidism or hypothyroidism with menstrual disturbance, an ovulatory cycles, decreased fecundity and increased morbidity during pregnancy has been observed.<sup>8</sup> The thyroid gland secretes three hormones: T<sub>4</sub> and T<sub>3</sub> (both of which are iodinated derivatives of tyrosine) and calcitonin, a polypeptide hormone. T<sub>4</sub> and T<sub>3</sub> are produced by the follicular cells while calcitonin is secreted by the C (parafollicular) cells, which are of separate embryological origin. Calcitonin is functionally unrelated to the other thyroid hormones. It has a major role in calcium homeostasis.<sup>9</sup>

The prevalence of the spontaneous hypothyroidism ranges from 1 to 2%. It is more common in older women and ten times more frequent in women than in men. In areas with iodine sufficiency the most common causes of hypothyroidism are: chronic autoimmune thyroiditis or destructive therapy of hyperthyroidism.<sup>10</sup> Thyroid hormones play an important role in normal reproductive physiology through direct effects on the ovaries and indirectly by interacting with sex hormone-binding globulin. Thyroid dysfunction can lead to menstrual irregularities and infertility.

Hypothyroidism is associated with a wide spectrum of reproductive disorders ranging from abnormal sexual development, menstrual irregularities, and infertility.<sup>11</sup>

Prolactin (PRL) hormone is a pituitary hormone which plays a crucial role in the female body for breast development, lactation, and milk secretion. Besides this, Prolactin works with other female hormones for the development of females like the soft body and the beauty of the body.<sup>12</sup>

**MATERIALS AND METHODS**

Total 100 females suffering from menstrual disorders, age 18 to 45 years, and 50 age matched healthy control were enrolled in the study after informed and written consent. Patients were further sub grouped based on menstrual disorders that are AUB, PCOS, and Dysmenorrhea.

Patients with drugs or hormone therapy, pregnant women, and IUCD (intrauterine contraceptive device) were known to have cervical or uterine malignancy; fibromyoma were excluded from the study group.

Blood samples were collected using standard aseptic technique and analyzed for Serum T<sub>3</sub>, T<sub>4</sub>, and TSH and Prolactin on VITROS ECI.

The study was conducted in the Department of Biochemistry in association with the Department of Obstetrics and Gynaecology of Mahatma Gandhi Medical College & Hospital, Jaipur. Approval from the Institutional Ethics Committee was also obtained.

Results obtained were presented as mean± SD for the case and control groups and compared statistically using SPSS software.

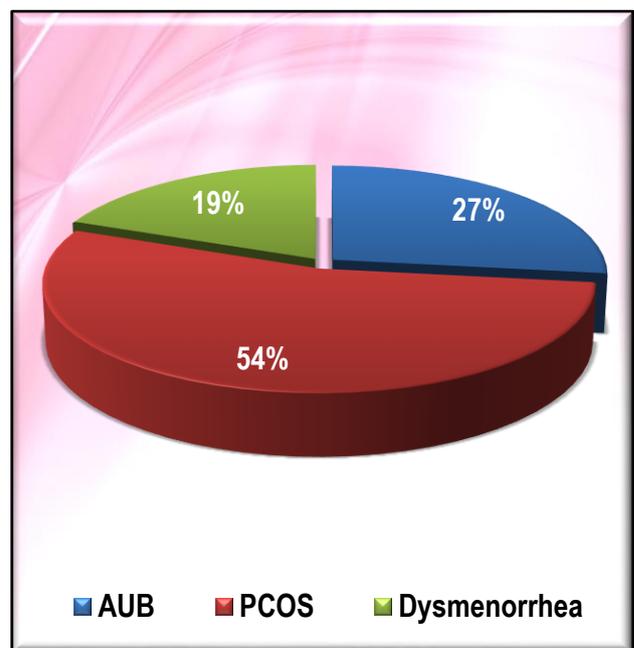


Figure 1: Distribution of the subjects based on menstrual disorders

Table 1: Comparison of Thyroid Profile and Prolactin of the AUB group

Groups	Control (n=50)	AUB (n=27)	t-value	P-value
T <sub>3</sub> (ng/ml)	1.30±0.25	1.17±0.36	1.859	0.067
T <sub>4</sub> (µg/dl)	8.44±1.50	7.13±2.49	2.883	0.005
TSH (µIU/ml)	2.65±1.09	5.21±3.54	-4.737	<0.0001
PRL (ng/ml)	10.70±3.72	19.43±10.50	-5.317	<0.0001

Table 2: Comparison of Thyroid Profile and Prolactin of the PCOS group

Groups	Control (n=50)	PCOS (n=54)	t-value	P-value
T <sub>3</sub> (ng/ml)	1.30±0.25	1.24±0.34	1.019	0.311
T <sub>4</sub> (µg/dl)	8.44±1.50	8.24±2.58	0.478	0.633
TSH (µIU/ml)	2.65±1.09	4.24±5.29	-2.084	0.040
PRL (ng/ml)	10.70±3.72	22.12±18.66	-4.249	<0.0001

**Table 3: Comparison of Thyroid Profile and Prolactin of the Dysmenorrhea group**

Groups	Control (n=50)	Dysmenorrhea (n=19)	t-value	P-value
T <sub>3</sub> (ng/ml)	1.30±0.25	1.24±0.36	0.785	0.435
T <sub>4</sub> (µg/dl)	8.44±1.50	7.21±2.41	2.549	0.013
TSH (µIU/ml)	2.65±1.09	6.04±5.83	-3.978	<0.0001
PRL (ng/ml)	10.70±3.72	22.24±11.84	-6.195	<0.0001

## RESULTS

Out of total 100 menstrual disorders patients, 27% patients from abnormal uterine bleeding (AUB), 54% patient's polycystic ovary syndrome (PCOS) and 19% patients had Dysmenorrhea (Figure 1). The distribution of hormone assay between AUB patients and control group are presented in (Table 1). T<sub>3</sub> and T<sub>4</sub> levels in AUB patients were significantly lower. The mean TSH level of AUB patients was as high as 5.21±3.54 µIU/ml. Mean PRL levels were significantly higher (P<0.0001) in AUB patient (19.43±10.50 ng/ml) as compare to healthy control group (10.70±3.72 ng/ml).

T<sub>3</sub> and T<sub>4</sub> levels in PCOS patients were significantly lower. Mean serum TSH levels were higher in PCOS patient's 4.24±5.29 µIU/ml. Mean PRL levels were significantly higher (P<0.0001) in PCOS patient (22.12±18.66 ng/ml) as compare to healthy control group (10.70±3.72 ng/ml) (Table 2).

Mean serum TSH levels were higher in Dysmenorrhea patient's 6.04±5.83µIU/ml. Mean PRL levels were significantly higher (P<0.0001) in Dysmenorrhea patient (22.24±11.84 ng/ml) as compare to healthy control group (10.70±3.72 ng/ml) (Table 3).

## DISCUSSION

T<sub>3</sub> and T<sub>4</sub> levels in AUB group were significantly lower. TSH and PRL levels in AUB group were significantly higher as compare to healthy control group. Pahwa S et al. 2013, reported that in their study that out of 100 AUB patient, 22 were found to be hypothyroid, 2 hyperthyroid and the rest of the patient were euthyroid.<sup>13</sup> Verhelst J et al., 2003, reported that 25% of gynecologic surgeries involved abnormal uterine bleeding. Elevated serum PRL level is observed in women with abnormal reproductive function.<sup>14</sup> Seeri O et al., 2003, reported that the prevalence of hyper prolactinemia is 15-20% in women with AUB.<sup>15</sup>

TSH and PRL levels in PCOS group were significantly higher as compare to healthy control group. Blackwell RE et al., 1986, reported that deficiency of thyroid hormones has many profound end organ effects, which also include those in the reproductive system of the human female. Hypothyroidism can interfere gonadotropin secretion by increasing serum prolactin level.<sup>16</sup> Kakuno Y et al. 2010, reported that thyroid dysfunction has been found to be associated with menstrual disturbances, however there are findings showing both high and low frequency of menstrual disorders in thyroid dysfunction.<sup>17</sup> Dahiya K et al., 2012 also found raised levels of TSH in PCOS patients.<sup>18</sup> Janssen OE et al., 2004 reported that a very high percentage of thyroid dysfunction in PCOS cases.<sup>19</sup>

TSH and PRL levels in Dysmenorrhea group were significantly higher as compare to healthy control group. Kumar P et al., 2008, reported that hypothyroidism is associated with an increase in thyrotrophin releasing hormone which in turn may be associated with a raised PRL level and hence amenorrhea.<sup>20</sup>

## CONCLUSION

The study was undertaken to determine the levels of hormones assay in patients of menstrual disorders and its comparison with healthy control.

The study indicates a relation between thyroid levels and PRL in different menstrual disorders including AUB, PCOS and Dysmenorrhea. It was observed that there is an increase in serum TSH and PRL in patient of AUB, PCOS, and dysmenorrhea. Whereas serum T<sub>3</sub> and T<sub>4</sub> level decreases in females suffering from these disorders. This suggests a high rate of thyroid dysfunction especially hypothyroidism. Thus it may be considered as beneficial to screen menstrual disorder patients for thyroid dysfunction.

The study suggests that, evaluation of PRL and thyroid hormones levels helps to identify the possible etiology of menstrual disorders and thus the best treatment approach.

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