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Clinical evaluation of occurrence of endocrine abnormalities with menstrual disorders in adolescents girls from Bihar region

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Abstract
World Health Organization has defined 'adolescence' as a period between 10-19 years. In Indian context, adolescents constitute over 21.4% of the total population and this age group needs special attention because this period is very crucial since these are the formative years in the life of an individual when major physical, psychological and behavioural changes take place and additional roles and responsibilities are expected from them. In many societies puberty onset is celebration time, it announces acquisition of fertility. However physiological social, cultural forces make it stressful, difficult transition for many. In India very little attention is paid to reproductive health of adolescent girls comprising 22% females. Reasons for neglect are ignorance, indifference, reluctance of parents & girls to consult a Doctor. Hence the present study was planned to evaluate the endocrine abnormalities in adolescents with menstrual disorders.

The present study was planned in Department of obstetrics and Gynaecology, Darbhanga medical college and hospital (DMCH), Darbhanga, Bihar, India. The study was conducted from November 2017 to June 2018. Total 50 school going Adolescent girls aged from age 10 years to 19 years were enrolled in the present study. These were divided in the two study groups as Group I and Group II. Group I consists of case and Group II consists of control girls.

The available literature indicates, majority of these student population experiences menstrual related symptoms and disorders of various degrees. These symptoms can have unbearable effects on student quality of life and daily activities. However, race, ethnicity and culture may influence expression of menstrual symptoms and their severity. The data generated from the present study concludes that majority of adolescents with menstrual disorders in their study had menorrhagia, short cycles or prolonged menstruation. Less frequently they had secondary amenorrhea, dysmenorrhea, oligomenorrhea, and primary amenorrhea. They suggested that long-term follow up and management is necessary for adolescents with menstrual disorders.

Keywords: endocrine abnormalities, adolescents, school going girls, menstrual disorders, etc

Introduction

Other endocrine disorders can be seen in young girls. In childhood, an underactive thyroid often becomes apparent with failure to grow normally. It can also cause fatigue, poor concentration and difficulty with learning, constipation, muscle pains or weakness, and intolerance to the cold. In girls, thyroid disease can cause failure to menstruate, early onset of menses, or irregular menses. Congenital hypothyroidism is usually caused by improper development or actual absence of the gland. This is a very serious condition, which can lead to mental retardation. Fortunately, all babies in the US have a test for thyroid disease when they are born and parents are notified immediately if there is a problem. Prompt treatment with thyroid pills will allow perfectly normal growth and development. Overactivity of the thyroid can cause weight loss, irritability and poor school performance, change in sleep habits, shakiness, muscle weakness, menstrual problems and palpitations. A goiter or enlargement of the thyroid may or may not be present when the thyroid does not work correctly. Since thyroid disease is often hereditary, children in families with a high frequency of thyroid disease should be checked with a simple blood test as should all children with any of the symptoms listed above. Also, keep in mind that thyroid malfunction is 5-10 times more likely in females than males [1].

In adolescents, disorders of menstruation may present as abnormal uterine bleeding (AUB). Broadly understood, AUB includes the following:

- Absence of bleeding
- Irregular bleeding
- Abnormally heavy bleeding
- Bleeding in between periods

Amenorrhea, or absent menstruation, can be either primary or secondary. Primary amenorrhea is defined as either (a) the lack of menstruation by the age of 15 years (or within 3 years of thelarche) with otherwise normal pubertal development or (b) the lack of secondary sexual characteristics by the age of 13 years [2]. Secondary amenorrhea is defined as the lack of menses for 6 months, though it is uncommon even in adolescents to lack menses for more than 3 months.

AUB, according to the International Federation of Gynecology and Obstetrics (FIGO) system, is determined on the basis of four parameters: frequency, regularity,

duration, and volume. The 2018 revision of this system includes intermenstrual bleeding. Causes of AUB can be classified according to the PALM-COEIN system, in which the acronym PALM represents structural causes (polyp, adenomyosis, leiomyoma, malignancy and hyperplasia) and the acronym COEIN represents nonstructural causes (coagulopathy, ovulatory dysfunction, endometrial, iatrogenic, and not otherwise classified) [3].

Once a woman has begun menarche, there are multiple menstrual disorders that can occur. These presentations may also be associated with painful menses, known as dysmenorrhea. Menstrual disorders in adolescents do mirror some common menstrual disorders in adults, but amenorrhea, systemic bleeding disorders, abnormal bleeding due to exogenous hormones, and sexually transmitted infections (STIs) are more common in this population. Using a systematic approach to evaluating this population will help the general practitioner diagnose and treat most of the common causative conditions. Consultation with a specialist may be necessary for complex cases or unusual disorders that are not regularly treated in a general practice.

To determine what constitutes a disorder of menstruation, one must first have a clear understanding of normal menstruation. Puberty involves the maturation of the neuroendocrine system and requires multiple steps to achieve completion. The hypothalamus begins to secrete gonadotropin-releasing hormone (GnRH), and as secretion continues, the pituitary gonadotropins (luteinizing hormone [LH] and follicle-stimulating hormone [FSH]) and ovarian follicles become more sensitive to stimulation. Increases in GnRH pulsatility lead to gonadotropin secretion, eventually leading to selection of a dominant follicle. As the follicle grows, it produces estrogen, which in turn provides positive feedback on the gonadotropins to cause an LH surge and thus ovulation. In regard to the endometrium, during ovulatory menstrual cycles, the dominant follicle secretes estradiol, which causes the endometrium to proliferate, and prepare for potential implantation.

After ovulation, a corpus luteum develops as the granulosa cells become luteinized. The corpus luteum secretes progesterone, which transitions the endometrium into a more stable environment for possible implantation. Without implantation of an embryo, the corpus luteum involutes; this involution leads to falling progesterone and estradiol levels and thus to shedding of the endometrium as it loses its blood supply. If any of the above steps is disrupted, menarche and the menstrual cycle may not occur or may occur irregularly and result in absent or abnormal menses.

In the United States, the median age of menarche is 12.43 years, with only 10% of females menstruating at 11 years and 90% by 13.75 years [4]. Non-Hispanic blacks demonstrate an earlier median age of menarche, 12.06 years, compared with 12.55 years for non-Hispanic whites. Menarche usually occurs when females have Tanner stage IV breast and pubic hair development [5]: the average interval from the development of breast buds to the onset of menarche is 2-3 years. In the first years after menarche, anovulatory cycles are more common and may constitute 50% of cycles. Nevertheless, most cycles are still between 21 and 45 days and last between 2 and 7 days (mean, 5 days) [6, 7].

The age of menarche is associated with the length of time needed to achieve regular ovulatory cycles. A younger age of menarche is associated with more than 50% ovulatory cycles after 1 year, whereas a later onset of menarche is not associated with fully ovulatory cycles for 8-12 years [8]. Finally, in a normal menstrual cycle, a female will lose about 30-40 mL of blood or use approximately three to six pads or tampons each day [2]. Loss of more than 80 mL of blood or bleeding that persists for longer than 7 days is an indication of abnormal menstrual flow [9].

It is recommended to start an evaluation for primary amenorrhea if a female with normal secondary sexual characteristics has failed to menstruate by the age of 15 years or within 3 years of breast budding (thelarche) [2]. Another indication of delayed puberty, and cause for workup, is lack of breast development by the age of 13 years.

The evaluation should start with a thorough history to assess for any history of vaginal bleeding, development of other secondary sexual characteristics, or evidence of excess androgens, such as hirsutism or increased muscle mass. A review of systems should include any changes in weight, stress or activity level, headaches, visual disturbances, or milk production.

The past medical history should include questions about childhood health or chronic illness, as well as use of any medications, including metoclopramide and antipsychotic agents. The family history should include any history of delayed puberty or premature ovarian failure. Evaluation of abnormal uterine bleeding (AUB) should commence with a thorough history that includes, including age of menarche, menstrual bleeding patterns (eg, number of cycles over the past 12 months), duration and severity of menstrual flow, and pelvic pain associated with the cycle.

Some adolescents may find the creation of a menstrual calendar or diary helpful for identifying menstrual patterns [10]. Because every woman changes her pad or tampon differently, it may be difficult at times to establish the presence of heavy menstrual flow; in such cases, it may be helpful to ask about use of overflow pads or multiple pads or about disruption of daily activity as a result of menstrual flow. A history of current or previous sexual activity should be elicited, as well as a history of any previous sexually transmitted infections (STIs) and any current vaginal discharge or dysuria. These questions should be posed in a nonthreatening, nonaccusatory manner. Relating the identification of the menstrual disorder to a possible infection may place the adolescent at ease.

All chronic medical conditions and all medications or herbal supplements should be identified. Specific inquiries should be made about the use of anticoagulants, antipsychotics, nonsteroidal anti-inflammatory drugs (NSAIDs), and hormonal contraceptives, which can all cause irregular menses. All previous surgical procedures should be noted, and any complications (eg, postoperative bleeding) should be detailed. Another important component of the history includes a thorough family history for bleeding disorders, especially von Willebrand disease. If a patient is taking any short-acting exogenous hormones, especially if she is doing so for contraception, it is important to ensure that these agents are being taken appropriately and consistently. Dysmenorrhea can occur with regular bleeding patterns or can be associated with AUB. Primary dysmenorrhea presents with painful menses and occasionally is accompanied by nausea, vomiting, diarrhea, fatigue, and headache [10]. In secondary dysmenorrhea, the pain often precedes the onset of menses.

Endometriosis may be asymptomatic but can also cause cyclic and acyclic pelvic pain, painful menses, dysuria, dyschezia and infertility. It may be present in as many as 70% of adolescents who present with dysmenorrhea [11]. Pelvic inflammatory disease (PID) can present with painful, irregular uterine bleeding or vaginal discharge.

World Health Organization has defined 'adolescence' as a period between 10-19 years. In Indian context, adolescents constitute over 21.4% of the total population and this age group needs special attention because this period is very crucial since these are the formative years in the life of an individual when major physical, psychological and behavioural changes take place and additional roles and responsibilities are expected from them [12, 13]. In many societies puberty onset is celebration time, it announces acquisition of fertility. However physiological social, cultural forces make it stressful, difficult transition for many. In India very little attention is paid to reproductive health of adolescent girls comprising 22% females. Reasons for neglect are ignorance, indifference, reluctance of parents & girls to consult a Doctor. Hence the present study was planned to evaluate the endocrine abnormalities in adolescents with menstrual disorders.

Methodology

The present study was planned in Department of obstetrics and Gynaecology, Darbhanga medical college and hospital (DMCH), Darbhanga, Bihar, India. The study was conducted from November 2017 to June 2018. Total 50 school going Adolescent girls aged from age 10 years to 19 years were enrolled in the present study. These were divided in the two study groups as Group I and Group II. Group I consists of case and Group II consists of control girls.

The Adolescent girls with menstrual disorders, namely primary amenorrhea, secondary amenorrhea, oligomenorrhea, polymenorrhea, hypomenorrhea, menorrhagia, metropathia and irregular bleeding were included in the present study. The girls taking medications [OCP > 3years, steroids etc] that may interfere with hypothalamus-pituitary-ovary axis and any medical or surgical disease were excluded from the present study.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Results and Discussion

Adolescence is a period of great change physiologically, psychologically and socially. During puberty, the body achieves its maximum potential in terms of fitness, physical strength and reproductive capacity. Guiding adolescents through this period is a challenge for parents as well as clinicians. This has increased the public health interest in health promotion, early detection and preventive health care for adolescents.

There are many types of menstrual disorders such as oligomenorrhea, hypomenorrhea, menorrhagia, metrorrhagia, dysmenorrhea, pre-menstrual syndrome (PMS), amenorrhea and polymenorrhea. Common menstrual disorders include heavy flow (menorrhagia), unusually light (hypomenorrhea), unusually frequent (polymenorrhea), unusually infrequent (oligomenorrhea) and unusually painful (dysmenorrhea) [14]. The most prevalent menstrual disorders among adolescents are excessive uterine bleeding, dysmenorrheal and premenstrual syndrome. Premenstrual syndrome greatly affects daily life activity of young women especially the student population. These disorders may cause significant anxiety [15].

An abnormally heavy and prolonged menstrual period at regular intervals is known as menorrhagia. It may be due to abnormal blood clotting, disruption of normal hormonal regulation of periods or disorders of endometrial lining of the uterus. The absence or suppression of a menstrual period in a woman of reproductive age either temporary or on a permanent basis is known as amenorrhea. It is classified into primary and secondary amenorrhea. Primary amenorrhea is defined as no menarche by 16 years of age and secondary amenorrhea is the absence of menses for 6 months [16].

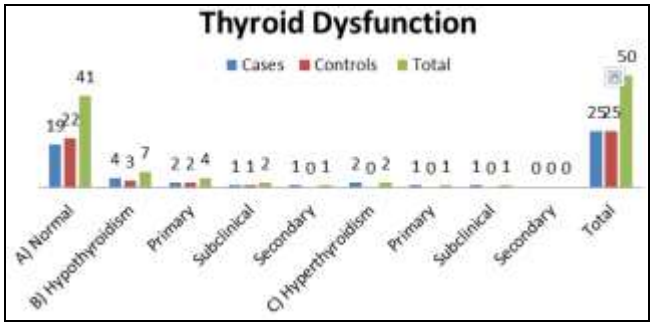

Fig 1: Prevalence of thyroid dysfunction in the study groups

Amaza *et al* [17]. conducted a self-descriptive cross-sectional study among medical students in Nigeria to determine the patterns of menstrual cycles; prevalence of menstrual disorders; and the effect of menstrual pain on social activities. The questionnaire included data such as age of menarche, menstrual pattern, severity of pain, marital status, effects of exercise, Body mass index (BMI) and diet. The minimum age at menarche was reported as 9 years while the maximum was 17 years. The authors reported that results for irregular menstrual cycle was found in peak in the age group of 17-19 years and irregular menstrual cycle length was higher in age group of 20-22 years. The authors also reported that the prevalence of dysmenorrhea was very high among the respondents, who suffered mild, moderate or severe grades of pain. Other common disorders reported in the study were abnormal menstrual flow, abnormal duration of flow followed by irregular length of cycle. They concluded that changes in normal menstrual pattern of women may affect their physical as well as mental well-being.

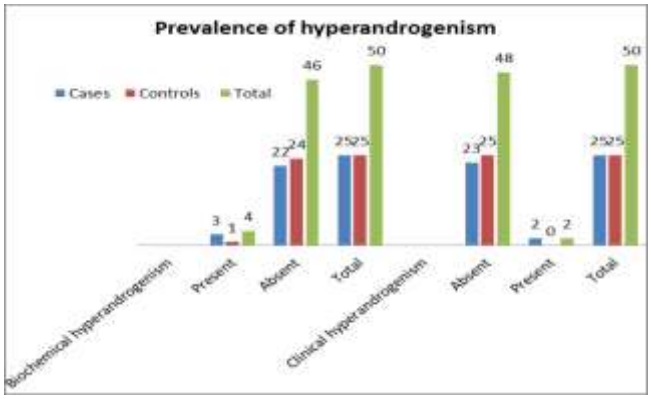

Fig 2: Prevalence of hyperandrogenism in the study population

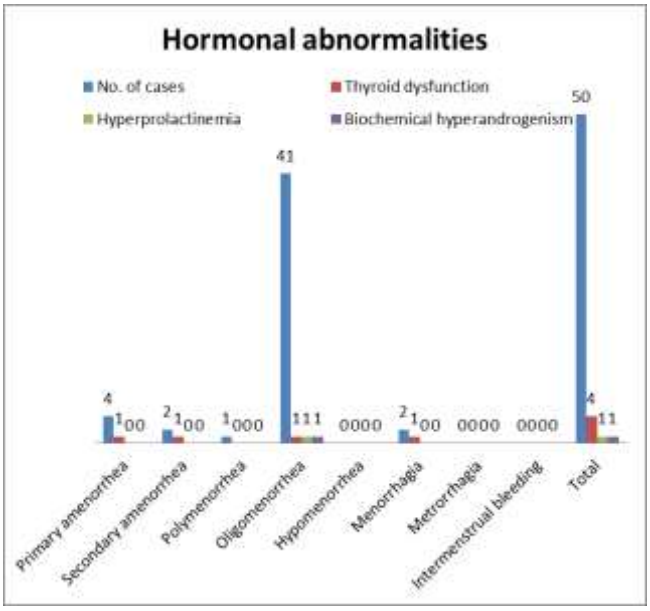

Fig 3: Hormonal abnormalities in Cases Group

Fekr *et al*. [18] conducted a study to compare the frequency of menstrual disorders among female athlete and non-athlete university students using questionnaire which was designed on the history of menstruation and subject's sport background. The phenomenon of women sport and their participation in competitive and recreational activities is increasingly developed recently. However, one of the most important issues related to the participation of women in sport activities is their menstrual cycle. They also reported that the incidence of PMS in non-athletes was higher than athletes but the difference was not statistically significant. They concluded that in presence of negligible amount out of amenorrhea / oligomenorrhea among athlete/non-athlete students, exercise can cause to decrease/ cut the menstruation level and hence it is necessary for all coaches and physical activity teachers to warn their students about the correct nutritional conditions especially at their high intensity exercise periods. The authors also reported that sport can cause to the remedy of PMS and it is crucial for all students to follow many recommendations which could bring the joy ness of their physical activities.

Sood *et al*. [19] studied the correlation between menstrual patterns and stress among undergraduate medical students. All subjects were trained to maintain a menstrual diary once every month for six months in which they recorded date of onset, number of bleeding days, and associated problems. They were also guided for completing a menstrual questionnaire evaluating detailed aspects of their menses at baseline, three and six months. The authors reported that medical students are at high risk for developing menstrual irregularities due to lifestyle with less sleep, irregular food and exercise habits. Menstrual irregularity over prolonged periods of time can lead to development of infertility, endometrial hyperplasia and problems due to prolonged anovulation, besides the deterioration in the quality of life. The authors concluded that there is no significant association between stress levels and menstrual changes among preclinical medical students. However, stress if present tends to decrease with time.

Shabnam and Khyrunnisa [20] conducted a study to determine the patterns of menstrual cycles and its related problems, discomfort and working ability of girls during the periods among female students studying in various degree levels from undergraduate and postgraduate institutions in Mysore, India. The study also inferred the extent of awareness and sources for information regarding menstruation possessed by Indian girls before attaining puberty. The participants were requested to complete the questionnaires to elicit information relating to demographic features, menarche age, and menstrual pattern. Severity of dysmenorrhea was measured using the Visual Analogue Scale. Impact of menstrual disorder on working ability, the source of knowledge about menarche, and menstruation was also obtained using a pretested questionnaire developed for the purpose. Information regarding menstrual bleeding was obtained by interview method using a pictorial chart. The authors reported that the mean age of participants in their study was 20.6 ±1.32 years and the mean age of menarche was 13.36 ± 1.25 years; which was inconsistent with studies reported from other parts of India. Prevalence of dysmenorrhea among the selected group was 78.2%, and it was associated to early menarche age. The authors also found an extremely significant association between cycle length and frequency of irregularity and irregular menstrual cycles were frequent among girls who had cycle length >35 days. Although occurrence of dysmenorrhea was independent to cycle length, all those who had cycle length >35 days were dysmenorrheic. Their study results exhibited a small effect of age on severity of pain; however, it was statistically not significant. Immobility due to pain during menstrual period was seen in 7.3% of the dysmenorrheic girls including the various intensity of dysmenorrhea. 68.8% of the participants mentioned that their working ability was affected to moderate extent, the association between severities of pain limited work ability was statistically significant. Sixty percent of participants were aware of menstruation before attaining menarche. The source for information were from mothers, friends, television, magazines, and newspaper, nevertheless, the major sources were mothers and friends. The authors concluded that dysmenorrhea and menstrual irregularity were more prevalent among young females. Common symptoms of dysmenorrhea are tiredness, anger, and backache; the pain that is characteristic to dysmenorrhea varies in intensity. Those females who experienced severe pain suffered with abdominal cramps, vomiting, and loss of appetite including immobility. The authors suggested that a comprehensive school education program on menarche and menstrual problems may help girls to cope better and seek proper medical assistance.

Esimai and Esan [21] conducted a study to document menstrual abnormalities experienced by female college students, their awareness and health seeking behavior. The students were interviewed using semi-structured self-administered questionnaire. The mean age at menarche was 14.18 years. Irregular menstrual cycles were reported in 9.0%. Dysmenorrhea was present in 62.5%, and 12.5% reported school absenteeism. They also reported that only 10.5% decided to seek help for menstrual abnormalities, and awareness of menstrual abnormalities was poor among students. The awareness of students on menstrual abnormalities was significantly influenced by their age; however, age at menarche and level of study did not influence their awareness. History of dysmenorrheal and academic disturbance had significant influence on the health seeking behavior of the students. The authors concluded

that, there was a general lack of information about menstrual issues and when to seek help, for which there is a need to educate female college students about menstrual issues.

Conclusion

The available literature indicates, majority of these student population experiences menstrual related symptoms and disorders of various degrees. These symptoms can have unbearable effects on student quality of life and daily activities. However, race, ethnicity and culture may influence expression of menstrual symptoms and their severity. The data generated from the present study concludes that majority of adolescents with menstrual disorders in their study had menorrhagia, short cycles or prolonged menstruation. Less frequently they had secondary amenorrhea, dysmenorrhea, oligomenorrhea, and primary amenorrhea. They suggested that long-term follow up and management is necessary for adolescents with menstrual disorders.

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