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Epidemiologic and etiologic aspects of primary infertility in the Kashmir region of India

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Objective: To assess the magnitude of primary infertility and to study its etiologic aspects in India.

Design: After proper randomization, 10,063 married couples were interviewed to ascertain the prevalence of primary infertility. A definitive protocol was followed to determine the etiology of primary infertility in 250 consecutive couples.

Setting: Tertiary care medical center in the Kashmir valley of India.

Patient(s): Couples married for ≥1 year; 250 consecutive couples attending an endocrine clinic for primary infertility.

Intervention(s): A logical investigative protocol was followed to identify the etiology of infertility.

Main Outcome Measure(s): Magnitude of primary infertility in the community as well as the male, female, or combined etiology of infertility.

Result(s): Fifteen percent of the couples interviewed had primary infertility, among whom 4.66% had unresolved infertility at the time of the survey. The etiology of infertility in 250 consecutive couples revealed a female factor in 57.6%, a male factor in 22.4%, combined factors in 5.2%, and an undetermined cause in 14.8%.

Conclusion(s): Primary infertility is as common and distressing a problem in India as in other parts of the world. Semen abnormalities (22.4%), anovulation (17.2%), ovarian failure (8.8%), hyperprolactinemia (8.4%), and tubal disease (7.2%) are common causes of infertility. The pattern of infertility in India is the same as in other parts of the world, except that infertile couples report late for evaluation. (Fertil Steril® 1997;68:637–43. © 1997 by American Society for Reproductive Medicine.)

Key Words: Primary infertility, azoospermia, oligospermia, anovulation, hyperprolactinemia, ovarian failure

Fertility has been one of man's desired attributes since the beginning of recorded history and remains a driving need for young couples today. Most adults have life plans that include children. When those who want children find their efforts unsuccessful, frustration, despair, and helplessness are common, with debilitating consequences (1). Infertility is a common problem the world over. Surveys conducted by the National Center for Health Statistics have shown that in the United States in 1988, 8.4% of the women 15–44 years of age, or 4.9 million women, had an impaired ability to have children; of these, 2.2 million had primary infertility and 2.7 million had secondary infertility (2). The mean worldwide incidence of infertility has been projected to be 16.7%; the number of infertile women throughout the world has been approximated at 90 million on the basis of demographic and health services data in 1991 (3).

The level and patterns of infertility apparently vary widely and are different in developed countries than those in developing regions of the world (4). The magnitude of infertility and its tremendous psychosocial and economic impact on its sufferers inspired us to conduct this study on the epidemiology

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and etiologic spectrum of primary infertility in the valley of Kashmir, India. The data should be representative of the Indian subcontinent as a whole and of similarly developing countries.

MATERIALS AND METHODS

This study was carried out in two parts. In the first part, a sample population of 10,063 couples was studied for the epidemiology of primary infertility; in the second part, 250 consecutive infertile couples were studied for the etiology of their infertility.

Epidemiology

The study on epidemiology was carried out on a sample of 10,063 married couples in the reproductive age group of 15–44 years. The sample was drawn through a multistage sampling procedure. At the first stage, the valley was divided into six predefined districts. At the second stage, the list of *tehsils* (administrative subunits) in each district was procured, and a sample of one *tehsil* from each district was drawn on a random basis. At the third stage, a sample of thirty villages/*mohallas* was drawn randomly from each *tehsil*. Finally, at the fourth stage, we obtained and approached a sample of 10,063 eligible cooperative couples, married for ≥ 1 year, who were chosen by proper randomization. Each of the selected couples was interviewed about age, duration of marriage, conjugal relationship, time period after marriage when the first conception occurred, and children from a previous marriage (if any).

Etiologic Aspects

The study on the etiologic spectrum of primary infertility was carried out at the endocrine division of the Institute of Medical Sciences, Srinagar, Kashmir, India. Two hundred fifty consecutive couples attending the infertility clinic for primary infertility were the subjects of the study. Primary infertility was defined as failure to conceive after 1 year of unprotected sexual intercourse in a couple trying to achieve a pregnancy who had not previously conceived. (5). Girls <18 years or women >40 years at the time of marriage were excluded. Subjects with clinical or investigative evidence of any significant systemic disease also were excluded.

A complete history was taken and a complete physical examination was performed for all patients. In the men, particular attention was paid to the pattern of pubertal development, cryptorchidism, inguinal surgery, mumps, orchitis, testicular torsion, viral illness, and sexually transmitted diseases. A history of exposure to occupational chemicals and a history of intake of drugs or hormones also were taken. In the women, the emphasis in history was on the pattern of pubertal development, menstrual history, galactorrhea, any virilization or defeminization, and drug or hormone intake. Sexual history focused on libido, erectile function, frequency and timing of intercourse, pain during intercourse, use of any lubricants, and any unusual sex practices.

A detailed systemic examination was performed for each patient. In men, particular attention was paid to anthropometry and secondary sexual characteristics such as habitus, beard, and moustache as well as axillary, pubic, and body hair. The external genitalia were examined for number, site, and size of the testes; size of the phallus; and presence of varicocele and any other congenital or acquired defect. The size of the testes was assessed using a Prader's orchidometer.

In the women, specific attention was focused on anthropometry; secondary sexual characteristics such as habitus, breast development, and pubic hair; presence of galactorrhea; and any evidence of virilization or defeminization. A detailed gynecologic examination was carried out to ascertain cervical causes of infertility such as cervical stenosis, abnormal cervical mucus, or diseases such as endometriosis. The pubic hair and breast development were graded according to Tanner staging.

Investigation Protocol

Routine investigations performed for both partners included a complete hemogram, urine analysis, and chest roentgenogram; in addition, the levels of fasting blood sugar, blood urea nitrogen, serum creatinine, serum bilirubin, and alkaline phosphatase were obtained.

Male Partner

Specific investigations performed for the male partner included semen analysis, testicular biopsy, hormone estimations, and scrotal exploration with vasography (where indicated). Three semen analyses were performed according to the method described in the World Health Organization laboratory manual (6). Oligospermia was defined as a sperm density of $<20 \times 10^6$/mL; azoospermia was defined as total absence of sperm in the semen. Semen cultures were taken in relevant cases. Genital infections with *Chlamydia* or *Mycoplasma* species were particularly sought.

Hormone estimations consisted of LH, FSH, prolactin, and TSH. Testosterone was measured in relevant cases. Testicular biopsy was done for patients with an abnormal seminogram who had normal gonadotropin values and no obvious cause for semen

abnormality. Scrotal exploration was performed for one patient with significant varicocele.

Female Partner

The specific investigations performed for the female partner included tests for documentation of ovulation, tests for tubal patency, hormone estimations, postcoital test (PCT), laparoscopy, cultures and serology, karyotyping, and computed tomography (CT) scan. The last six investigations were done wherever indicated.

For documentation of ovulation, a woman with regular, predictable, painful menstrual cycles was presumed to be ovulating. However, ovulation also was documented by two or more of the following methods: [1] basal body temperature chart (a biphasic temperature chart was taken as indicative of ovulation); [2] endometrial biopsy, obtained between days 20 and 22 of the cycle (a biopsy showing normal secretory changes was taken as indicative of ovulation); [3] serum P (a midluteal phase serum P level of $\geq$10 ng/mL was taken as a definite indication of ovulation); and [4] ultrasonography (serial evaluations of ovarian follicular growth were done in some patients to look for ovulation) (5). In most patients, endometrial biopsy and serum P estimation were used to document ovulation. In addition to P estimation, serum LH, FSH, prolactin, and TSH (in relevant cases only) were measured.

Tubal patency was assessed by Rubin's test, dye test, and hysterosalpingography. The latter was performed 2–5 days after the cessation of menstrual flow. Laparoscopy was performed to study tubal disease and to look for endometriosis. However, the procedure was carried out only in few cases.

The PCT was performed around the expected period of ovulation. Between 2–3 hours after coitus, cervical mucus was removed with a tuberculin syringe and examined. A stretchability (spinnbarkeit) of the mucus of >6 cm was taken as normal. The postcoital test was considered positive if there were five or more motile sperm per high-power field (5). Cultures and serology to study genital infections were done in relevant cases. Karyotyping was done in a few cases, and CT scan was done wherever indicated.

Radioimmunoassay

All hormone assays were performed by specific RIA. Blood samples for hormone estimations were taken in the morning. Three samples, at an interval of 20 minutes, were taken from all patients and the sera were pooled. Samples were stored at −20°C until assayed. Serum concentrations of TSH and LH were estimated with use of commercially available kits (Bharat Radiation and Isotope Technology, Bombay, India). The rest of the hormones were estimated using RIA kits obtained from Diagnostic Products Corporation (Los Angeles, CA).

Table 1 Prevalence of Infertility in Various Districts of Kashmir Valley

	No. of couples screened	No. of infertile couples after 1 y of marriage	No. of infertile couples at the time of survey
Anantnag	1,498	201 (13.42)	60 (4.0)
Baramulla	1,165	169 (14.51)	58 (4.98)
Badgam	1,106	202 (18.26)	51 (4.61)
Kupwara	1,298	172 (13.25)	56 (4.31)
Pulwama	1,246	160 (12.84)	41 (3.29)
Srinagar	3,750	613 (16.35)	203 (5.41)
Total	10,063	1,517 (15.07)*	469 (4.66)†

Note: Values in parentheses are percentages.
* χ^2 df_5 = 21.35, P <0.001.
† χ^2 df_5 = 12.13, P <0.05.

Both partners were investigated concurrently. On discovery of a definite cause of infertility in either partner, the investigation of that partner was stopped. However, the investigation of the other partner continued.

Statistical analysis included standard methods for rates and proportions and comparisons among variables. A two-tailed P value <0.05 was used for calculating statistical significance.

RESULTS

Epidemiology

A sample population of 10,063 couples from all six districts (administrative units) of the Kashmir valley were interviewed for primary infertility. Of these 10,063 couples, 1,517 (15.07%) couples had infertility, including those couples who had conceived >1 year after marriage despite unprotected sexual intercourse. Of the 1,517 infertile couples, 469 (4.66%) had infertility that was unresolved at the time of the survey. Table 1 gives the details of total and unresolved infertility from the various districts.

The age distribution and infertility pattern of the 250 couples were as follows. The mean age (±SD) of the men was 32.45 ± 4.8 years (range, 22–56 years), and the mean age (±SD) of the women was 28.86 ± 4.18 years (range, 20–40 years). Most (42%) of the men were in the age group of 30–34 years, whereas most women (44%) were in the age group of 25–29 years (Fig. 1). The mean duration (±SD) of infertility at the time of presentation to endocrine services was 5.04 ± 3.69 years (median, 4 years). Some couples (14.4%) were concerned about infertility after just 1

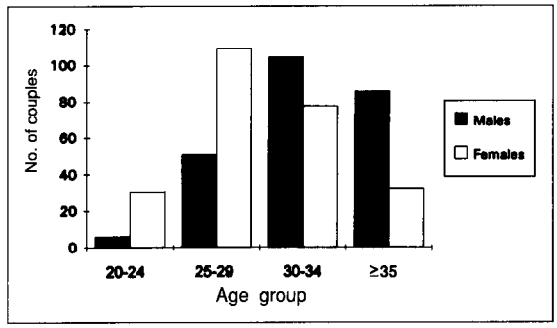

Figure 1 Number of couples in the Kashmir region in India with primary infertility by age group.

year, whereas 19% of the couples sought help ≥8 years after marriage. The majority (50.4%) of couples had infertility of 2–6 years' duration.

Etiology

Of the 250 couples studied, 56 (22.4%) had infertility due to a male factor, 144 (57.6%) had infertility because of a female factor, and in 37 (14.8%), the cause remained unexplained. In 13 (5.2%) cases, a male as well as a female factor was identified. Table 2 shows the etiology of infertility in the 250 studied couples.

Semen factor was the most common identifiable etiologic factor, documented in 66 (26.4%) of all couples. Of these 66 cases, it was the sole etiologic factor in 56 (22.4%) couples, whereas in 10 couples, an additional female factor was found. Of the 66 men with a semen abnormality, 54 had azoospermia and 12 had oligospermia. Their age at presentation, duration of infertility, body height, and coital frequency were not significantly different from those of men with normal semen analysis.

Thirty-six (66.7%) men with azoospermia and 4 (33.3%) men with oligospermia had an elevated FSH level, suggesting failure of spermatogenesis, whereas 9 (16.7%) men with azoospermia had raised LH and FSH levels, suggesting testicular failure. Seventeen subjects with seminal abnormalities had normal gonadotropin values and were subjected to testicular biopsy. The cause of semen abnormality was spermatocyte arrest in 11 (16.67%), cryptorchidism in 4 (6.06%), mumps in 4 (6.06%), orchitis in 2 (3.03%), semen volume problem in 2 (3.03%), varicocele in 1 (1.51%), obstruction in 1 (1.51%), and irradiation in 1 (1.51%). In 40 men (60.61%), no cause could be ascertained.

Anovulation was the second most common etiologic factor of infertility, recognized in 54 (21.6%) couples; it was the sole etiologic factor in 43 (17.2%) cases. In 4 cases, it was associated with an additional male factor, and in the remaining 7 an additional female factor was identified. The various clinical and hormonal parameters of the women with anovulation are given in Table 3. The mean LH-FSH ratio in these women was 1.7. Twenty-five (46.3%) of these women had definitive evidence of polycystic ovary syndrome (PCOS) (on ultrasonography, and/or LH-FSH ratio >3).

Hyperprolactinemia was documented in 26 women. Of these, 24 (92.3%) had amenorrhea-galactorrhea, and 2 had amenorrhea alone. Among 7 women with galactorrhea alone (without menstrual abnormality), none had hyperprolactinemia (idiopathic galactorrhea). In 21 cases, hyperprolactinemia was the sole etiologic factor, whereas in 5 cases, an additional etiologic factor was identified.

Twenty-four patients presented with clinical and biochemical features of premature ovarian failure (POF) (Table 3). Their age at presentation, age at menarche, and duration of infertility were not significantly different from those of other women. Their mean (±SEM) values of FSH and LH were 75.28 ± 7.02 and 31.69 ± 4.24 IU/L, respectively (conversion factors to SI units, 1.00 and 1.00). Twenty-nine women had tubal disease, which constituted a sole etiologic factor in 18 women; in the remaining 11, additional contributory factors were identified. Women with tubal disease had infertility of a longer duration ($P < 0.05$) than women with other causes of infertility.

Seven women with primary infertility were found to have primary amenorrhea. These women sought medical assistance for infertility rather than for primary amenorrhea. These women were relatively younger ($P < 0.05$). Two each of these patients were confirmed to have müllerian anomalies, hypogonadotropic hypogonadism, and POF, whereas one pa-

Table 2 Etiology of Infertility

Etiology of infertility	No. of couples (%)
Semen factor	56 (22.4)
Anovulation	43 (17.2)
POF	22 (8.8)
Hyperprolactinemia	21 (8.4)
Tubal damage	18 (7.2)
Cervical factor	14 (5.6)
Endometriosis	4 (1.6)
Luteal phase insufficiency	3 (1.2)
Coital	3 (1.2)
Miscellaneous*	7 (2.8)
Multiple	22 (8.8)
Unexplained	37 (14.8)
Total	250 (100)

* These included 2 women each with tubercular endometritis, müllerian anomaly, and hypogonadotropic hypogonadism, and 1 woman with hypothalamic amenorrhea.

Table 3 Various Parameters of Women With Anovulation and POF

Parameter	Anovulation (n = 54)	POF (n = 24)
Age (y)	28.71 ± 4.09 (20–40)	30.86 ± 3.04 (25–35)
Duration of infertility (y)	5.07 ± 3.81 (1–18)	6.20 ± 4.10 (1.5–15)
Age at menarche (y)	14.14 ± 0.97 (12–16)	13.95 ± 1.00 (12–16)
Body mass index (kg/m^2)	22.44 ± 2.52 (17.8–30.8)	21.42 ± 2.49 (17.6–28.4)
LH level (mIU/mL)	22.94 ± 3.92 (3.12–129.9)	31.69 ± 4.24 (30–62)
FSH level (mIU/mL)	13.63 ± 1.43 (2.84–40.0)	75.28 ± 7.02 (28.6–100.5)

Note: Values are means ± SD, with range in parentheses. Conversion factors to SI unit: LH, 1.00; FSH, 1.00.

tient was suspected to have functional hypothalamic amenorrhea.

In 22 (8.8%) couples, the infertility was of multiple origins. This group included 10 couples in whom the infertility was of combined (male and female) etiology and 12 couples in whom two or more female factors were present. Thirty-seven (14.8%) couples had unexplained infertility. Their age, duration of infertility, and age at menarche were not significantly different from those of the other subjects.

DISCUSSION

This is the first detailed study of the epidemiologic and etiologic aspects of primary infertility in the Kashmir valley. It has described infertility in a defined, predominantly Muslim population in the valley. This study should be representative of similarly developing areas in general and the Indian subcontinent in particular.

The study was done in two parts. In the first part, data were collected by interviewing a stratified random sample of 10,063 couples from six districts of the Kashmir valley about the prevalence of infertility, both resolved and unresolved. In the second part, 250 consecutive couples with primary infertility were evaluated for the etiology of infertility.

The estimates of prevalence and/or incidence of infertility are based on either demographic data or health service statistics. These sources often produce diverse assessments. As reported by health services, the incidence of infertility has been calculated as approximately 16.7% (3). In this study, the prevalence of infertility (defined as failure to conceive after 1 year of unprotected sexual intercourse in a couple trying to achieve pregnancy) was 15.07%. Of 1,517 infertile couples, 469 (4.66%) were childless and the remaining 1,048 (10.41%) had resolved infertility at the time of the survey.

The World Health Organization (7) collected and carefully analyzed 392 publications concerning the incidence of infertility in 89 countries on five continents. Depending on the geographic area, type of population, source of data, and methods of assessment, the incidence of infertility was estimated to range from 0.4% to 66.6%, and that of childlessness from 0.6% to 55.8%.

A recent study estimated the prevalence of unresolved infertility at about 7.5% (8). Our estimate of unresolved infertility (4.66%) falls well within this range. According to the United Nations Population Division, the world population in 1991 was 5,384 million. Assuming that half of the world inhabitants are women (2,692 million), 20% of the women are in the reproductive age group (538 million), and the mean worldwide incidence of infertility is 16.7%, then the number of infertile women throughout the globe should be approximately 90 million (3).

The two major factors determining fertility rates appear to be the length of time during which the couple has been attempting to conceive and the age of the woman (5). In our study group, the mean age (±SD) of the male partner was 32.45 ± 4.80 years and the mean age (±SD) of the female partner was 28.36 ± 4.50 years. In contrast to other studies, only 12% of the women in our study were ≤24 years. Studies from developed countries have reported that about 25% of the women seeking infertility services are ≤24 years, whereas 22%–42% of the women seeking infertility services in developing countries are ≤24 years (4).

In our study, 12% of women seeking infertility services were aged ≤24 years, and 44% of the women were aged 25–29 years. The women in our study are older than women in other studies because most of the couples report late to us due to lack of awareness and because most of the couples consult gynecologists initially. For the same reason, the duration of infertility was longer (5.04 ± 3.69 years) for our subjects. About 19% of our couples had infertility of ≥8 years, whereas in developed countries, only 7% have infertility of ≥8 years (4).

The causes of infertility can be divided into four major categories: female factor, male factor, combined factors, and infertility of undetermined cause. In our study, a female factor was found in 57.6%, a male factor in 22.4%, and combined factors in 5.2%; in 14.8%, the cause remained undetermined. Most studies have reported a male factor in 30%–40% and a combined etiology in 10%–30% (1, 5, 9, 10).

The proportion of male factor in our study is probably lower than in other studies because many of the couples in whom the male partner suspected or knew that he was at fault escaped evaluation. In this male-dominated community, the female partner rarely complains about her male counterpart. While reviewing male infertility, Dubin and Amelar (11) commented that the entire problem of subfertility is extremely shocking to the male ego, and many patients will try to escape from the problem.

Estimations of the incidence of different infertility causes vary widely among reported series. Lunenfeld and Insler (3) summarized the diagnostic categories established in 6,549 infertile couples managed by different investigators on five continents. The incidence of tubal factor ranged from 11.0%–76.7%; ovulation disturbances were detected in 10.9%–42.9%; the incidence of cervical or uterine causes of infertility ranged between 3.2% and 48.0%; male infertility ranged from 26.2%–46.2%; and the cause remained unknown in 3.5%–22%. Our results are remarkably similar to these except for a lower incidence of tubal factor.

The etiology of male infertility revealed a similar spectrum of causes as found by other studies (11, 12). However, only one patient had varicocele. In the literature, varicocele has been reported to be present in 20%–40% of men with infertility (13), although some studies have reported it in only 6.9% (12). This grossly decreased incidence of varicocele in our subjects could be due to the fact that all those patients who had symptomatic varicocele and were not concerned about infertility were referred to the urology clinic of the institute. In most patients (57.6%), the cause of male infertility remained unknown. These findings are in agreement with those of Baker et al. (14), who reported that the cause of male infertility cannot be established for most men with reduced semen quality and that even with severe disorders of the seminiferous epithelium, recognizable causes are present in only about 40%.

Anovulation was the second most common cause of infertility in our study and the most common etiologic factor in females. We have used the term "anovulation" to describe cases of ovulation failure without any obvious cause. Dor et al. (15) reported ovulation disturbances in 33.4% of 655 infertile couples studied. Collins et al. (16) found ovulatory failure in 30% of infertile couples, a finding similar to that in our study. However, some studies have reported ovulatory failure in up to 50% of infertile couples (9).

In most of these cases of anovulation, we suspected polycystic ovary syndrome (PCOS). Levels of several hormones have been used as diagnostic criteria for PCOS, e.g., elevated LH, LH-FSH ratio of >3, and elevated androgens (17). The mean LH-FSH ratio in our patients with anovulation was 1.7, and only 30% had an LH-FSH ratio of >3. Our observation is similar to that of Robinson et al. (17), who found a mean LH-FSH ratio of 1.6 and a ratio of >3 in only 21% of patients with suspected PCOS.

Hyperprolactinemia was the second most common cause of infertility in women and was found in 26 (10.4%) of the couples; in 21 (8.4%), it was the sole etiologic factor. Of 31 women with galactorrhea, 24 had hyperprolactinemia. Only 2 of 26 patients did not have galactorrhea. Thomas and Forrest (9) found hyperprolactinemia in 9 (3.1%) of the women in 291 infertile couples. Less than one-half of patients with hyperprolactinemia have galactorrhea on clinical examination, even when this examination is repeated after confirming hyperprolactinemia (18).

Twenty-four (9.6%) of our patients had POF. The age and duration of infertility in these women were not significantly different from those in the other groups. All of these women had secondary amenorrhea with grossly elevated gonadotropin levels. Most studies have included POF under the category of ovulatory failure and have not commented separately on this etiologic factor. In one study, POF was found in only 1.4% of all infertile couples (9).

The apparently higher incidence of POF in our study needs further elucidation. Tubal disease was found in 29 (11.6%) of our infertile couples, being the sole factor in 18 (7.20%). Other studies have reported tubal factor as the sole cause of infertility in 12%–16% of couples (1). It is interesting to note that seven of our female patients who had primary amenorrhea of various etiologies reported for infertility (after an average duration of 6 years of infertility) rather than for primary amenorrhea. This shows their low level of understanding as a result of nonexistent sex education in this part of the world.

Abnormalities of the cervix and its secretions are reported to be responsible for infertility in approximately 15–30% of women, but among properly investigated infertile couples, the incidence is probably not greater than 5%–10% (19). We found a cervical factor in 14 (5.6%) of our couples whose male partner had a normal semen analysis. Cervical factor was diagnosed by PCT. However, the role of PCT has been questioned recently, and cervical factor continues to be a controversial etiologic factor (1).

Endometriosis has been reported to be a clearly documented cause of infertility and has been found in 5%–25% of women with infertility (1). The causal role of endometriosis in infertility also has been questioned, as the prevalence of endometriosis in fertile women found incidentally at laparoscopy is reported to be 2.5%–5.0% (20). The incidence of endometriosis (1.6%) in our series was probably lower than that in

other studies because we did not vehemently look for it (because of lack of proper expertise).

Luteal phase defect (LPD), another controversial etiologic factor, is characterized by the failure to develop fully mature secretory endometrium. We found evidence of LPD in only 1.2% of women. This defect is widely reported to be an etiologic factor in approximately 3%–5% of infertile women, with some sources reporting an incidence of up to 10% (21). Hypothyroidism has been mentioned routinely as a cause of infertility, possibly by causing anovulation. It is surprising that we did not find any case of hypothyroidism, even though the Kashmir valley is iodine deficient (22) and hypothyroidism is quite common here.

In 23 (9.9%) of our couples, the etiology of infertility was multifactorial: 10 couples had a cause in both partners and 12 had more than one cause in the female partner alone. The prevalence of multiple causes of infertility has been reported to be 15%–28% (1). It is possible that the proportion of couples with multiple etiologies would have been higher if we pursued additional causes after finding one cause for infertility. It is important to be aware of the multifactorial etiology while treating couples with infertility because failure to respond to an otherwise effective mode of treatment for a particular problem may indicate coexisting infertility factors in either partner.

It has been estimated that even after proper investigations, no cause of infertility will be found for 10%–20% of couples (23). The incidence of unexplained infertility in our study was 14.8%. The criteria for assigning couples to the category of unexplained infertility were [1] normal history and examination of both partners; [2] normal semen analysis; [3] regular ovulation; [4] normal uterus, patent tubes, and absence of significant pelvic disease; and [5] a normal PCT.

Collins and Rowe (24) observed that the proportion of couples with unexplained infertility ranged from 0%–26% and that this variability could reflect differences in diagnostic protocols and test interpretation or changes in the composition of infertile samples because of changes in child-bearing behavior. Drake et al. (23) used laparoscopy in all cases of otherwise unexplained infertility and found that 75% of these women had abnormal findings.

This study has provided some vital data about the epidemiologic and etiologic aspects of primary infertility in this part of the world. It has shown that despite a massive increase in the population in general, infertility is as important a health problem here as elsewhere in the world.

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