

Original Research Article

PREVALENCE AND CLINICAL DETERMINANTS OF PELVIC INFLAMMATORY DISEASE(PID)-A CROSS-SECTIONAL STUDY ON PID AT A TERTIARY CARE CENTER IN SOUTH INDIA

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ABSTRACT

Background: Pelvic inflammatory disease (PID) is frequently under-recognised because symptoms may be mild, non-specific, or absent. Evidence from Indian tertiary-care settings is limited, particularly among women without a documented sexually transmitted infection (STI). We estimated the clinic-based prevalence of clinically diagnosed PID and examined associated demographic, reproductive, procedural, and hygiene-related factors.

Materials and Methods: This analytical cross-sectional study enrolled 150 consecutive non-pregnant women aged 18 years or older at a tertiary teaching hospital from 1 November 2025 to 31 January 2026. Clinical PID was defined by pelvic or lower abdominal symptoms, no more plausible alternative diagnosis, and at least one pelvic-examination criterion: cervical motion tenderness, uterine tenderness, or adnexal tenderness. Supportive inflammatory, discharge, laboratory, and ultrasonographic findings were considered where available. Women with a known or laboratory-documented STI, recent childbirth or miscarriage, pregnancy, or an alternative diagnosis explaining the presentation were excluded. Prevalence was reported with a Wilson 95% confidence interval (CI). Associations were examined using Fisher's exact test and a prespecified multivariable logistic regression model.

Results: Clinical PID was identified in 56 of 150 participants (37.3%; 95% CI 30.0%–45.3%). Among women with PID, the most frequent symptoms were lower abdominal or pelvic pain (91.1%), abnormal vaginal discharge (73.2%), dysmenorrhoea (58.9%), and dyspareunia (44.6%). In the adjusted model, marriage before 20 years (adjusted odds ratio [aOR] 3.64, 95% CI 1.55–8.53), previous uterine instrumentation (aOR 3.19, 95% CI 1.12–9.11), previous pelvic surgery (aOR 4.04, 95% CI 1.46–11.14), suboptimal menstrual hygiene (aOR 5.74, 95% CI 2.33–14.11), and intravaginal cleansing or douching (aOR 3.91, 95% CI 1.60–9.53) were independently associated with clinical PID.

Conclusion: More than one-third of this selected gynaecology outpatient sample met a standardised clinical definition of PID despite having no documented STI. Structured pelvic assessment and careful documentation of reproductive procedures and intravaginal practices may improve recognition. The clinic-based, cross-sectional design and reliance on clinical diagnosis preclude population-level or causal interpretation.

Keywords: clinical diagnosis; cross-sectional study; gynaecology; pelvic inflammatory disease; reproductive health; South India.

INTRODUCTION

Pelvic inflammatory disease (PID) comprises infection-associated inflammation of the upper female genital tract, including endometritis, salpingitis, tubo-ovarian abscess, and pelvic peritonitis.^[1,2] Its clinical importance extends beyond the acute episode: delayed recognition and recurrent disease may result in tubal-factor infertility, ectopic pregnancy, chronic pelvic pain, and repeated healthcare use.^[2,3] Although global age-standardised prevalence rates have declined modestly, the absolute burden remains substantial and important geographic and socioeconomic disparities persist.^[4]

PID is a syndromic diagnosis rather than a single microbiological entity. *Neisseria gonorrhoeae* and *Chlamydia trachomatis* remain important pathogens, but many clinically diagnosed cases are non-gonococcal and non-chlamydial. Anaerobic and bacterial-vaginosis-associated organisms, enteric organisms, respiratory pathogens, and *Mycoplasma genitalium* may contribute to its polymicrobial spectrum.^[1,5,6] Therefore, the absence of a documented conventional STI does not exclude upper-genital-tract inflammation. Diagnosis remains difficult because mild or subclinical disease is common and because pelvic pain, vaginal discharge, dyspareunia, and menstrual symptoms overlap with endometriosis, urinary infection, ovarian pathology, and lower-genital-tract disorders.^[2,7]

The US Centers for Disease Control and Prevention recommends a deliberately sensitive clinical threshold: presumptive treatment should be considered in an at-risk woman with pelvic or lower abdominal pain, no more plausible explanation, and at least one of cervical motion, uterine, or adnexal tenderness. Additional inflammatory, microbiological, or imaging findings increase diagnostic specificity.^[1] Epidemiological estimates based on these criteria depend strongly on the population sampled, the rigour with which mimics are excluded, and the availability of laboratory confirmation.

Evidence from socially conservative settings is limited. A Jordanian study reported a high frequency of PID-related symptoms and associations with parity, contraceptive exposure, and uterine procedures, suggesting that clinically important pelvic morbidity may be underestimated when sexual exposure is assumed to be the only relevant pathway.^[8] However, symptoms alone cannot establish PID, and Indian tertiary-care data integrating symptom profiles, pelvic findings, and non-STI-associated histories remain scarce.

We therefore conducted an analytical cross-sectional study among women attending a tertiary gynaecology outpatient clinic in South India. The primary objective was to estimate the clinic-based prevalence of clinical PID using a standardised examination-based definition. Secondary objectives were to describe symptom and examination patterns and to

assess demographic, reproductive, procedural, and hygiene-related factors associated with clinical PID among women without a documented STI.

MATERIALS AND METHODS

Study design, setting, and reporting: This analytical cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Alluri Sitarama Raju Academy of Medical Sciences (ASRAM Medical College, Hospital and Research Centre), a tertiary teaching hospital in Eluru, Andhra Pradesh, India. Recruitment occurred from 1 November 2025 through 31 January 2026. The study is reported in accordance with the Strengthening of Reporting of Observational Studies in Epidemiology (STROBE) recommendations for cross-sectional studies.^[9]

Participants and sampling: Consecutive women aged 18 years or older who attended the gynaecology outpatient clinic with pelvic or lower abdominal symptoms or another gynaecological complaint were screened during clinic hours. Consecutive sampling was used to reduce investigator discretion and to approximate the clinical case mix encountered during the study period.

Eligible participants were non-pregnant, provided written informed consent, and underwent standardised history-taking and examination. Exclusion criteria were refusal to participate; childbirth or miscarriage within the preceding six months; known or laboratory-documented STI; pregnancy; and a more plausible alternative diagnosis explaining the presentation, including candidiasis, bacterial vaginosis, endometriosis, symptomatic ovarian cyst, adnexal torsion, urinary infection, appendicitis, or ectopic pregnancy. Alternative diagnoses were evaluated clinically and, where indicated, using microscopy or culture, pregnancy testing, blood counts, inflammatory markers, urinalysis, and ultrasonography. Exclusion of a documented STI did not establish a non-sexually transmitted microbial aetiology.

Sample-size determination: The minimum sample size was calculated using Cochran's formula for a single proportion, $n = Z^2 p(1-p)/d^2$. A planning prevalence of 75%, drawn from a study by Al-Kuran O et al [8], was combined with a 95% confidence level ($Z = 1.96$) and an absolute precision of 7%. The calculated sample size was 147, rounded to 150 to account for incomplete records. Because the source estimate was clinic-based, it was treated as a planning parameter rather than an expected population prevalence.

Clinical assessment and outcome definition: Data were recorded on a piloted case-record form covering sociodemographic characteristics, reproductive history, prior pelvic procedures, contraceptive history, menstrual and intravaginal hygiene practices, symptoms, pelvic-examination findings, selected laboratory results, and ultrasonography findings.

Symptoms included lower abdominal or pelvic pain, pelvic heaviness, dysmenorrhoea, menorrhagia, dyspareunia, abnormal vaginal discharge, urinary symptoms, infertility or subfertility, and recurrent miscarriage.

The primary outcome was clinical PID. A participant was classified as having clinical PID when all three of the following were present: (1) pelvic or lower abdominal symptoms; (2) no alternative diagnosis judged more likely after assessment; and (3) at least one minimum pelvic-examination criterion—cervical motion tenderness, uterine tenderness, or adnexal tenderness. Supportive findings included temperature above 38.3 °C, mucopurulent cervical or vaginal discharge, leukocytosis, elevated erythrocyte sedimentation rate (ESR) or C-reactive protein (CRP), and ultrasonographic evidence of thickened or fluid-filled tubes, free pelvic fluid, a tubo-ovarian complex, or another pattern considered consistent with upper-genital-tract infection [1]. The study definition was used for classification and did not replace clinician-directed diagnosis or treatment.

Exposures and covariates: Prespecified candidate factors were age, rural residence, educational attainment, socioeconomic stratum, marriage before 20 years, parity of three or more, previous uterine instrumentation (dilatation and curettage, evacuation and curettage, hysteroscopy, hysterosalpingography, or other transcervical instrumentation), previous pelvic surgery, current or previous intrauterine contraceptive device exposure, diabetes mellitus, suboptimal menstrual hygiene, and intravaginal cleansing or douching.

Suboptimal menstrual hygiene was defined operationally as inconsistent access to clean absorbent material, reuse without adequate washing and sun-drying, or changing absorbent material less frequently than every eight hours during moderate or heavy flow. Intravaginal cleansing was defined as the intentional insertion of water, antiseptic, soap, herbal product, or another preparation into the vagina for cleansing.

Bias control and data quality: The same structured form and outcome definition were used throughout recruitment. Clinicians received a brief orientation on pelvic-tenderness criteria and exclusion of common mimics. Records were checked daily for completeness and logical consistency. Outcome classification was completed before multivariable analysis. Candidate predictors were selected a priori from the protocol and literature rather than by automated stepwise procedures. No participant had missing data for the variables included in the analysis.

Statistical analysis: Data were analysed using IBM SPSS Statistics version 22. Continuous variables were summarised using mean and standard deviation or median and interquartile range, as appropriate. Categorical variables were summarised as frequencies and percentages. Clinical PID prevalence was estimated with a two-sided Wilson 95% CI.

Participant characteristics

Group comparisons used Welch's independent-samples t test for age and Fisher's exact test for categorical variables.

Crude odds ratios (ORs) and 95% CIs were calculated for candidate factors. A prespecified multivariable logistic-regression model included age, marriage before 20 years, previous uterine instrumentation, previous pelvic surgery, suboptimal menstrual hygiene, and intravaginal cleansing. Results are reported as adjusted odds ratios (aORs) with 95% CIs. Tests were two-sided, and $P < 0.05$ was considered statistically significant. Given the exploratory nature and modest sample size, interpretation emphasised effect estimates and precision rather than P values alone.

Ethics statement: The study protocol was approved by the Institutional Ethics Committee of Alluri Sitarama Raju Academy of Medical Sciences (approval no. [insert exact approval number], dated [insert exact approval date]). All participants provided written informed consent before enrolment. Study procedures conformed to the Declaration of Helsinki and applicable national ethical guidance.

RESULTS

Participant flow and prevalence of clinical PID: Of 182 women assessed for eligibility, 32 were excluded and 150 were enrolled and included in the complete-case analysis [Figure 1]. Clinical PID was identified in 56 participants, corresponding to a clinic-based prevalence of 37.3% (95% CI 30.0%–45.3%). The mean age of the study population was 32.0 years (SD 6.1; range 18–49 years), and 88 (58.7%) participants resided in rural areas.

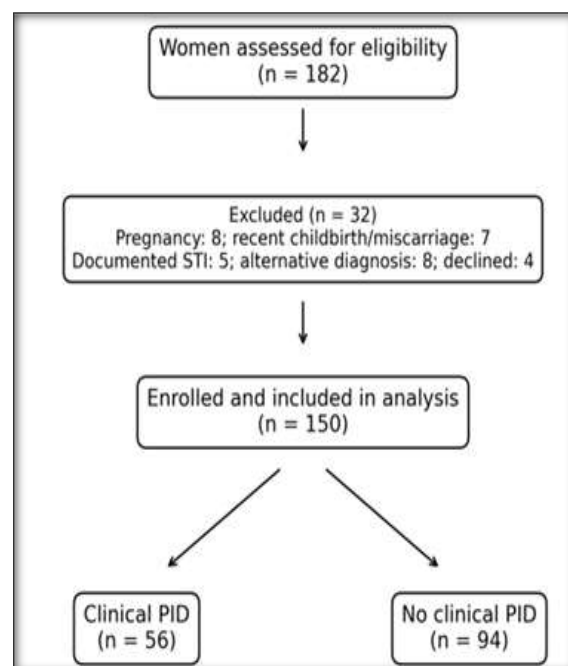


Figure 1: Participant-flow diagram. STI, sexually transmitted infection.

Table 1: Participant characteristics according to clinical PID classification.

Characteristic	Overall (n = 150)	Clinical PID (n = 56)	No clinical PID (n = 94)	P value
Age, years	32.0 ± 6.1	32.2 ± 6.2	31.9 ± 6.1	0.709
Rural residence	88 (58.7)	38 (67.9)	50 (53.2)	0.088
Secondary education or less	87 (58.0)	30 (53.6)	57 (60.6)	0.494
Lower socioeconomic stratum	71 (47.3)	29 (51.8)	42 (44.7)	0.499
Employed	32 (21.3)	12 (21.4)	20 (21.3)	1.000
Marriage before 20 years	51 (34.0)	29 (51.8)	22 (23.4)	<0.001
Parity ≥3	41 (27.3)	18 (32.1)	23 (24.5)	0.346

Values are mean ± standard deviation or n (%). P values are from Welch's t test for age and Fisher's exact test for categorical variables.

Symptom profile and examination findings:

Lower abdominal or pelvic pain was the most frequent symptom among women classified with clinical PID, followed by abnormal vaginal discharge and dysmenorrhoea. Dyspareunia, pelvic heaviness,

menorrhagia, infertility or subfertility, and fever were also more frequent in the PID group. Recurrent miscarriage and urinary symptoms did not differ clearly between groups [Table 2].

Table 2: Presenting symptoms according to clinical PID classification.

Symptom	Overall (n = 150)	Clinical PID (n = 56)	No clinical PID (n = 94)	P value
Lower abdominal/pelvic pain	93 (62.0)	51 (91.1)	42 (44.7)	<0.001
Abnormal vaginal discharge	75 (50.0)	41 (73.2)	34 (36.2)	<0.001
Dysmenorrhoea	64 (42.7)	33 (58.9)	31 (33.0)	0.002
Dyspareunia	41 (27.3)	25 (44.6)	16 (17.0)	<0.001
Pelvic heaviness	32 (21.3)	20 (35.7)	12 (12.8)	0.002
Menorrhagia	36 (24.0)	19 (33.9)	17 (18.1)	0.032
Infertility/subfertility	23 (15.3)	14 (25.0)	9 (9.6)	0.018
Recurrent miscarriage	12 (8.0)	5 (8.9)	7 (7.4)	0.763
Fever	10 (6.7)	9 (16.1)	1 (1.1)	<0.001
Urinary symptoms	32 (21.3)	14 (25.0)	18 (19.1)	0.416

Values are n (%). P values are from Fisher's exact test.

Among women with clinical PID, cervical motion tenderness was present in 44 (78.6%), adnexal tenderness in 35 (62.5%), and uterine tenderness in 28 (50.0%). Mucopurulent discharge and elevated inflammatory markers were frequent supportive findings, whereas ultrasonography supported the

diagnosis in a smaller subset [Table 3]. Because pelvic tenderness formed part of the study case definition, these findings are presented descriptively and should not be interpreted as independent diagnostic-accuracy estimates.

Table 3: Examination, laboratory, and imaging findings according to clinical PID classification.

Finding	Overall (n = 150)	Clinical PID (n = 56)	No clinical PID (n = 94)
Mucopurulent cervical/vaginal discharge	38 (25.3)	28 (50.0)	10 (10.6)
Cervical motion tenderness	53 (35.3)	44 (78.6)	9 (9.6)
Uterine tenderness	35 (23.3)	28 (50.0)	7 (7.4)
Adnexal tenderness	40 (26.7)	35 (62.5)	5 (5.3)
Leukocytosis	30 (20.0)	17 (30.4)	13 (13.8)
Elevated ESR and/or CRP	44 (29.3)	31 (55.4)	13 (13.8)
Ultrasonographic features supporting PID	20 (13.3)	14 (25.0)	6 (6.4)

Values are n (%). ESR, erythrocyte sedimentation rate; CRP, C-reactive protein.

Factors associated with clinical PID: In unadjusted analyses, marriage before 20 years, previous uterine instrumentation, previous pelvic surgery, suboptimal menstrual hygiene, and intravaginal cleansing or

douching were associated with higher odds of clinical PID. Current or previous intrauterine contraceptive device exposure was not significantly associated with the outcome [Table 4].

Table 4: Crude associations with clinical PID.

Candidate factor	Clinical PID n (%)	No clinical PID n (%)	Crude OR (95% CI)	P value
Rural residence	38 (67.9)	50 (53.2)	1.86 (0.93–3.71)	0.088
Secondary education or less	30 (53.6)	57 (60.6)	0.75 (0.38–1.46)	0.494
Lower socioeconomic stratum	29 (51.8)	42 (44.7)	1.33 (0.68–2.58)	0.499
Marriage before 20 years	29 (51.8)	22 (23.4)	3.52 (1.73–7.14)	<0.001
Parity ≥3	18 (32.1)	23 (24.5)	1.46 (0.70–3.04)	0.346
Previous uterine instrumentation	16 (28.6)	13 (13.8)	2.49 (1.09–5.68)	0.033
Previous pelvic surgery	19 (33.9)	16 (17.0)	2.50 (1.16–5.42)	0.027
Current or previous IUCD exposure	13 (23.2)	17 (18.1)	1.37 (0.61–3.09)	0.528
Suboptimal menstrual hygiene	32 (57.1)	24 (25.5)	3.89 (1.92–7.86)	<0.001

Intravaginal cleansing/douching	28 (50.0)	19 (20.2)	3.95 (1.91–8.16)	<0.001
Diabetes mellitus	4 (7.1)	10 (10.6)	0.65 (0.19–2.17)	0.571

OR, odds ratio; CI, confidence interval; IUCD, intrauterine contraceptive device. P values are from Fisher's exact test.

After simultaneous adjustment, all five substantive exposure variables remained independently associated with clinical PID, whereas age was not

associated with the outcome [Table 5; Figure 2]. The confidence intervals were relatively wide, reflecting the modest sample size.

Table 5: Prespecified multivariable logistic-regression model for clinical PID.

Variable	Adjusted OR	95% CI	P value
Age, per year	1.01	0.94–1.08	0.760
Marriage before 20 years	3.64	1.55–8.53	0.003
Previous uterine instrumentation	3.19	1.12–9.11	0.030
Previous pelvic surgery	4.04	1.46–11.14	0.007
Suboptimal menstrual hygiene	5.74	2.33–14.11	<0.001
Intravaginal cleansing/douching	3.91	1.60–9.53	0.003

OR, odds ratio; CI, confidence interval.

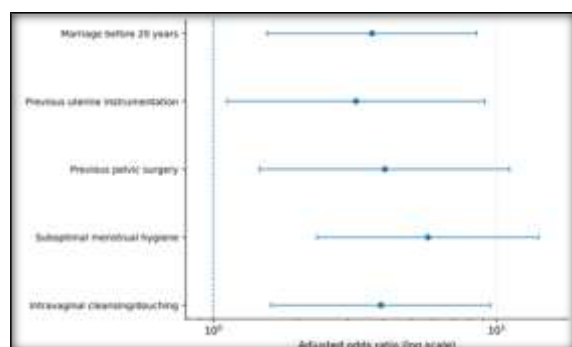


Figure 2: Adjusted associations with clinical PID. Points indicate adjusted odds ratios and horizontal bars indicate 95% confidence intervals. Age was included in the model but is omitted because the estimate was expressed per year.

DISCUSSION

Principal findings: In this tertiary-clinic sample of women without a documented STI, slightly more than one-third met a standardised clinical definition of PID. Lower abdominal or pelvic pain, abnormal vaginal discharge, dysmenorrhoea, and dyspareunia were the dominant symptoms, while cervical motion and adnexal tenderness were the most frequent minimum examination criteria. Early marriage, prior uterine instrumentation, prior pelvic surgery, suboptimal menstrual hygiene, and intravaginal cleansing or douching were independently associated with clinical PID.

The prevalence estimate represents the proportion of a selected, symptomatic gynaecology outpatient population meeting a clinical case definition and should not be interpreted as general-population prevalence. Population-based estimates are usually much lower; for example, United States survey data estimated self-reported lifetime PID at approximately 4% among sexually experienced women of reproductive age.^[10] Conversely, symptom-based studies in conservative settings have documented a substantial burden of pelvic and reproductive symptoms.^[8] The higher estimate in the present study is therefore compatible with referral and spectrum

effects: tertiary gynaecology clinics are enriched for persistent pain, discharge, menstrual disturbance, infertility, and previous procedures.

The symptom profile reinforces the clinical heterogeneity of PID. Pain and discharge were common, but neither is specific, and fever was absent in most cases. This accords with guidance that recommends a low diagnostic threshold because upper-genital-tract inflammation may be mild or clinically subtle.^[1,2] The strong separation in pelvic tenderness and supportive inflammatory findings partly reflects the study definition; these results describe the clinical phenotype used for classification and are not independent diagnostic-accuracy estimates.

Interpretation of associated factors: Marriage before 20 years remained associated with PID after adjustment. This variable should not be interpreted as a biological cause. In this setting, it may act as a composite marker of earlier reproductive exposure, cumulative parity, socioeconomic disadvantage, limited autonomy in healthcare seeking, or unmeasured sexual and reproductive factors. Residual confounding is likely. Future studies should measure age at sexual debut, partner-level exposures, condom use, reproductive coercion, and access to preventive services using culturally sensitive methods.

Previous uterine instrumentation and pelvic surgery were independently associated with clinical PID. Transcervical procedures can transiently facilitate ascending infection, while surgery may reflect previous gynaecological disease, adhesions, or repeated healthcare exposure. The cross-sectional design cannot establish whether the procedures preceded the inflammatory episode, were performed because of symptoms caused by pre-existing PID, or shared an underlying indication. Nevertheless, a careful procedural history is clinically useful when evaluating chronic or recurrent pelvic symptoms.

Suboptimal menstrual hygiene and intravaginal cleansing or douching showed the largest adjusted associations. Intravaginal practices may alter the vaginal microenvironment and have been associated

with bacterial vaginosis and upper-genital-tract morbidity, although directionality and confounding by symptoms are difficult to separate.^[11,12] Women may begin cleansing in response to discharge or odour, creating reverse causation. These findings support non-stigmatising counselling that discourages intravaginal irritants and promotes access to clean, affordable menstrual materials, but they do not establish that hygiene practices caused PID.

Current or previous intrauterine contraceptive device exposure was not significantly associated with PID. Current guidance indicates that any device-related increase in PID risk is concentrated around the first weeks after insertion rather than persisting throughout use.^[1] The broad exposure definition used here did not capture insertion timing, aseptic technique, or pre-insertion infection screening, which may have attenuated an association.

Clinical and public-health implications: PID should not be excluded solely because a woman reports no known STI or is perceived to have low sexual risk. A respectful and confidential history, focused abdominal and pelvic examination, pregnancy testing, assessment for common mimics, and appropriate microbiological testing remain essential. Women diagnosed with PID should be tested for gonorrhoea, chlamydia, HIV, and syphilis, and treatment should not be delayed when the clinical threshold is met.^[1]

At the service level, a standardised outpatient pathway could improve consistency: document symptom duration and severity; screen for red flags and pregnancy; assess cervical motion, uterine, and adnexal tenderness; obtain targeted laboratory or imaging support; and record previous instrumentation, surgery, and hygiene practices. Patient education should emphasise that PID can be clinically subtle, treatment prevents progression but cannot reverse established tubal damage, and reassessment is required when improvement is not evident within 72 hours.^[1,13]

Strengths and limitations: Strengths include consecutive clinic recruitment, an explicit clinical case definition aligned with international guidance, structured capture of symptoms and pelvic findings, exclusion of important mimics, complete data for the analysed variables, and reporting of effect estimates with confidence intervals. The analysis also distinguishes clinic-based from community prevalence and avoids interpreting the absence of a documented STI as proof of a non-sexual aetiology. Several limitations should be considered. First, cross-sectional data cannot determine temporal sequence or causality, and reverse causation is especially plausible for hygiene behaviours. Second, clinical PID has no single non-invasive gold standard; without endometrial biopsy, laparoscopy, or comprehensive molecular testing, both false-positive and false-negative classification are possible. Third, exclusion was based on known or documented STI rather than universal nucleic-acid amplification

testing; undetected *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Mycoplasma genitalium*, or other organisms may therefore have been present. Fourth, single-centre recruitment of symptomatic tertiary-care attendees creates spectrum and referral bias and limits generalisability. Fifth, the modest sample produced wide confidence intervals and constrained the number of variables that could be estimated reliably. Sixth, early marriage, menstrual hygiene, and intravaginal practices were self-reported and are vulnerable to recall and social-desirability bias. Finally, the adjusted model could not account for all potentially relevant sexual, partner-level, microbiological, and healthcare-access factors.

CONCLUSION

Clinical PID was common among symptomatic women attending a South Indian tertiary gynaecology clinic despite the absence of a documented STI. Lower abdominal pain, abnormal vaginal discharge, dysmenorrhoea, dyspareunia, and pelvic tenderness characterised the presentation. Early marriage, previous uterine instrumentation, previous pelvic surgery, suboptimal menstrual hygiene, and intravaginal cleansing or douching were associated with clinical PID; however, the cross-sectional design precludes causal inference. Standardised clinical assessment, appropriate STI testing, and non-stigmatising reproductive-health counselling are warranted.

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