Research Report

Effect of contraception on vaginal acidity among Indonesian women

Efek kontrasepsi terhadap keasaman vagina pada perempuan Indonesia

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Abstract

Objective: There were only few studies about the characteristic of vaginal pH among contraception user in Indonesia. This study aimed to determine the effect of contraception on vaginal pH among Indonesian women.

Method: This study is a cross-sectional study. The target population was Indonesian women aged 15 - 50 years. The samples consisted of 492 people. Based on the method of contraception, subjects were grouped into 4 groups, subjects with combination hormonal contraceptives, progestin only, condoms/IUDs, and subjects with no contraception or sterile. Vaginal acidity (pH) was examined by Dip-Stick (Merck®).

Result: The average age was 30.9 ± 8.27. The methods of contraception the subjects used were combination hormonal contraception (18.0%), progestin-only (29.5%), condom/IUDs (5.1%) and no contraception/sterile (47.4%). Most subjects had vaginal pH <5 (65.45%) with an average of 5.0 (3.0 - 10.0). Contraception users had lower vaginal acidity level than those without contraception (combination hormonal 65.2%, progestin-only 72.4%, IUD/condom 76.0%, no contraception/sterile 60.1%). In multivariate analysis, after controlling age and marital status, all types of contraception did not show significant association to vaginal pH.

Conclusion: The average pH of the vagina in this study was 5.0 (3.0 to 10.0). There was no significant association between any methods of contraception and vaginal pH.

[Indones J Obstet Gynecol 2010; 34-2: 69-72]

Keywords: vaginal pH, contraception

Abstrak

***Tujuan**: Di Indonesia masih sedikit penelitian yang membahas hubungan karakteristik kontrasepsi dan tingkat keasaman vagina. Tujuan penelitian ini adalah untuk mengetahui pengaruh kontrasepsi terhadap tingkat keasaman vagina pada perempuan Indonesia.*

***Metode**: Penelitian ini merupakan studi potong lintang. Populasi target adalah semua perempuan Indonesia yang berusia 15 - 50 tahun. Jumlah sampel 492 orang. Berdasarkan penggunaan kontrasepsi, subjek dikelompokkan menjadi subjek dengan kontrasepsi hormonal kombinasi, progestin saja, kondom/AKDR, dan subjek yang tidak berkontrasepsi/steril. Pemeriksaan tingkat keasaman (pH) vagina dengan tes celup (Merck®).*

***Hasil**: Subjek memiliki usia 15 - 25 tahun (26,8%), 26 - 40 tahun (59,2%), > 40 tahun (14,0%). Usia rerata adalah 30,9 ± 8,27 tahun. Status pernikahan subjek adalah belum menikah (16,9%), menikah 1x (76,4%), dan menikah > 1x (6,7%). Semua subjek berusia > 40 tahun sudah menikah atau menikah > 1x. Karakteristik kontrasepsi subjek adalah kontrasepsi hormonal kombinasi (18,0%), progestin saja (29,5%), kondom/AKDR (5,1%) dan subjek yang tidak kontrasepsi/steril (47,4%). Mayoritas subjek memiliki pH vagina < 5 (65,45%) dengan rerata 5,0 (3,0 - 10,0). Pengguna kontrasepsi memiliki tingkat keasaman vagina yang lebih rendah dibandingkan tidak menggunakan kontrasepsi. (hormonal kombinasi 65,2%, progestin saja 72,4%, IUD/kondom 76,0%, tidak KB/steril 60,1%). Pada analisis multivariat dengan mengendalikan variabel usia dan status pernikahan, penggunaan seluruh jenis kontrasepsi tidak menunjukkan hubungan yang bermakna terhadap pH vagina.*

***Kesimpulan**: Rerata pH vagina pada penelitian ini adalah 5,0 (3,0 - 10,0). Tidak terdapat hubungan yang bermakna antara penggunaan seluruh jenis kontrasepsi dengan tingkat keasaman vagina.*

[Maj Obstet Ginekol Indones 2010; 34-2: 69-72]

***Kata kunci**: tingkat keasaman (pH) vagina, kontrasepsi*

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INTRODUCTION

Physiologic vaginal acidity is important to protect the vagina from infection.[1] In women of reproductive age, estrogen contributes to vaginal acidity by stimulating ectocervical and vaginal epithelial cells to produce acid secretion.[2] *Lactobacillus sp*, a predominant vaginal normal flora, also plays its role in maintaining physiologic acidity state.[3] Estrogen also affects vaginal epithelial cells to become thicker and produce glycogen, which will be fermented by *Lactobacillus sp*. These resulted in the physiologic acidic vaginal conditions.[4]

Normal flora and vaginal acidity are two related factors for maintaining the physiologic vaginal state.[1] Vaginal acidity affects the balance of normal vaginal flora, while the balance of normal vaginal flora is one of significant factor that maintain vaginal acidity.[4] Changes in the balance of normal vaginal flora may cause bacterial vaginosis.[5]

Age and menstrual status are dominant factors affecting the acidity of the vagina.[4] Other factor affecting the acidity of the vagina include the use of contraception. Hormonal contraceptives tend to be protective on maintainity vaginal acidity, while IUDs are

among the risk factor for bacterial vaginosis.[6] In Indonesia, studies on use of contraception and vaginal acidity is still limited. In fact, female contraception is the most selected method of family planning.[7] Therefore, this study was conducted to determine the effect of contraception on vaginal acidity among Indonesian women.

METHODS

This is a cross-sectional study conducted in Puskesmas Krawang, Pedes, Cikampek, Tempuran, Krawang District, Klinik Batalyon 201 Cijantung and Laboratory of Microbiology, Faculty of Medicine University of Indonesia in the period of May 2008 - February 2009. By consecutive sampling technique, 492 samples were obtained from the population of Indonesian women aged 15 - 50 years. Exclusion criteria were pregnancy, menstruating, tumors or infections of the reproductive organs. The mechanism of data collection was:

1. Interviews and questionnaires to determine the distribution of demographic and medical characteristics data.
   Demographic characteristic data of age, education, employment, and marital status were recorded. Characteristic of contraception were recorded. Based on the use of contraception, subjects are grouped into subjects with combination hormonal contraceptives, progestin-only, condoms/intrauterine devices (IUDs), and subjects with no contraception or sterile. Recorded medical characteristic data were parity, reproductive tract complaints, history of Diabetes Mellitus, history of sexually transmitted diseases, use of antibiotics, husband circumcision status, use of panty liners, and use of vaginal soap.
2. Examination of vaginal pH using dip sticks (Merck®), which has a range of 3-10.
   Vaginal pH examined by attaching a dip stick (Merck) in the vaginal canal or in the vaginal introitus on not-married subjects. Vaginal pH levels were assessed by comparing the kit color to the scale color.

RESULTS

Demographic characteristics

There were 492 women involved in this study. The average age was 30.9 ± 8.27 years old. Most subjects were 26 - 40 years old (59.1%). Most subjects were married (76.4%). All subjects > 40 years old were either married or married >1. Most subjects' occupation was housewife (69.2%) and education level was high school (46.3%).

Table 1. Demographic characteristics (n=492)

Demographic characteristics	n	%
Age (years old)		
15-25	132	26.8
26-40	291	59.2
≥ 40	69	14.0
Marital status		
Not married	83	16.9
Married	376	76.4
Married > 1	33	6.7
Education level		
Elementary	64	13.0
Junior high	74	15.0
Senior high	228	46.3
≥ Senior high	126	25.6
Occupation		
Housewife	340	69.1
Student	71	14.4
Others	81	16.5

Contraception and Medical Characteristics

The number of subjects using contraception was than that with no contraception [259 (52.6%) vs. 233 (47.4%)], with the majority using progestin-only contraceptives (145, 55.9%). Based on the medical characteristics, 74.4% parity of subjects was 1-5.

Table 2. Contraception and Medical characteristics

Medical characteristic	n	%
Use of contraception		
Hormonal/Combination	89	18.0
Progestin-only	145	29.5
Condom/IUD	25	5.1
No/steril	233	47.4
Parity		
0	118	24.0
1-5	366	74.4
> 5	8	1.6
Reproductive tract complaint		
Yes	190	38.6
No	302	61.4
History of DM		
Yes	1	0.2
No	473	96.1
Unknown	18	3.7
History of STIs		
Yes	10	2.0
No	439	89.2
Unknown	43	8.7
Use of antibiotics		
Yes	9	1.8
No	483	98.2

Table 3. Association of Contraception Characteristic and Vaginal Acidity

	Contraception method				
	Combination hormonal	**Progestin-only**	**Condom/IUD**	**No contraception/ sterile**	**Total**
			n (%)		
pH ≤ 5 (n=322)	65.2 %	72.4 %	76.0 %	60.1 %	322
pH > 5 (n=170)	34.8 %	27.6 %	24.0 %	39.3 %	170
Total	89	145	25	233	492
Unadjusted OR					
p	0.402	0.015	0.127	Ref	
OR	1.24	1.74	2.10	Ref	
95% CI	0.75 - 2.07	1.11 - 2.73	0.81 - 5.46	Ref	
Adjusted OR					
p	0.368	0.829	0.990	Ref	
OR	1.267	0.943	0.993	Ref	
95% CI	0.75 - 2.12	0.55 - 1.61	0.34 - 2.92	Ref	

Adjusted OR obtained after controlling age and marital status

Vaginal Acidity

The average vaginal pH in this study was 5.0 (3.0 - 10.0). Most of subjects had vaginal pH <5 (65.45%). In bivariate analysis, the trend was contraceptive users had lower vaginal pH than no contraception/sterile, but only progestin-only group was statistically significant. In multivariate analysis after controlling age and marital status, there was no significant association between contraceptives use and vaginal acidity.

DISCUSSION

Average vaginal pH in this study was 5.0 (3.0 to 10.0) and most was <5 (65.45%). It is very difficult to find publications on vaginal-acidity study in Indonesia. Donders et al in Belgium found the average vaginal pH was 4.6.[8] Most reproductive age women with regular menstrual cycles and no reproductive tract complaint have a vaginal pH <4.5.[9] Vaginal pH elevation from 5.0 to 6.0 may indicate bacterial infection or decreasing serum estradiol.[10]

In multivariate analysis after controlling age and marital status, there was no association between contraceptives use and vaginal acidity. Factors correlated to contraception and vagina acidity are estrogen level, epithelial thickness, and normal vaginal flora.[2,3] Eschenbach et al found that combination oral contraception did not affect vaginal acidity, epithelial thickness, and normal vaginal flora.[11] Mauck et al found that the use of progestin-only also did not affect epithelial thickness.[12]

Despite its statistic in significance, contraception group had lower vaginal acidity than no contraception/sterile group (combination hormonal 65.2%, progestin-only 72.4%, IUD/condom 76.0%, no contraception/sterile 60.1%). Similar study by Ildgruben et al found that both combination and single hormonal contraception increased vaginal epithelium thickness.[13] Physiologic vaginal epithelium thickness is a conducive state for *Lactobacillus sp* to maintain vaginal acidity.

Vaginal acidity usually increases due to infections, including bacterial vaginosis (BV).[14] Joesoef MR et al in Manado found that IUD was one risk factor for BV.[15] Calzolari et al also found that IUDs increased the incidence of BV, but condoms did not.[16] This study found no significant association between the use of contraceptive condom/IUDs and vaginal acidity.

CONCLUSION

The average pH of the vagina in this study was 5.0 (3.0 to 10.0). The use of contraception did not alter the vaginal acidity.

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REFERENCES

1. Melis GB, Ibba MT, Steri B, Kotsonis P, Matta V, Paoletti AM. Role of pH as a regulator of vaginal physiological environment. Minerva Ginecol. 2000; 52(4): 111-21.
2. Gorodeski GI, Hopfer U, Liu CC, Margles E. Estrogen acidifies vaginal pH by up-regulation of proton secretion via the apical membrane of vaginal-ectocervical epithelial cells. Endocrinology 2005; 146(2): 816-24.
3. Yan DH, Lu Z, Su JR. Comparison of main lactobacillus species between healthy women and women with bacterial vaginosis. Chin Med J (Engl) 2009; 122(22): 2748-51.
4. Galhardo CL, Soares JM Jr., Simoes RS, Haidar MA, Rodrigues de LG, Baracat EC. Estrogen effects on the vaginal

pH, flora and cytology in late postmenopause after a long period without hormone therapy. Clin Exp Obstet Gynecol 2006; 33(2): 85-9.
5. Luni Y, Munim S, Qureshi R, Tareen L. Frequency and Diagnosis of Bakterial Vaginosis. JCPSP 2005; 15: 270-2.
6. Rifkin SB, Smith MR, Brotman RM, Gindi RM, Erbelding EJ. Hormonal contraception and risk of bacterial vaginosis diagnosis in an observational study of women attending STD clinics in Baltimore, MD. Contraception 2009; 80(1): 63-7.
7. Schoemaker J. Contraceptive use among the poor in Indonesia. Int Fam Plan Perspect 2005; 31(3): 106-14.
8. Donders GGG, Caeyers T, Tydhof P, Riphagen I, Van Den Bosch T, Bellen G. Comparison of two types of dipsticks to measure vaginal pH in clinical practice. Euro J Obstet Gynecol Repro Biol 2007; 134(2): 220-4.
9. Ledger WJ, Witkin SS. Microbiology of The Vagina. In: Vulvovaginal Infections. London: Manson Publishing Ltd, 2007: 9-11.
10. Caillouette JC, Sharp J, Zimmerman GJ, Roy S. Vaginal pH as a marker for bacterial pathogens and menopausal status. Am J Obstet Gynecol 1997; 176(6): 1270-7.
11. Eschenbach DA, Patton DL, Meier A, Thwin SS, Aura J, Stapleton A, et al. Effects of oral contraceptive pill use on vaginal flora and vaginal epithelium. Contraception 2000; 62(3): 107-12.
12. Mauck CK, Callahan MM, Baker J, Arbogast K, Veazey R, Stock R, et al. The effect of one injection of Depo-Provera" on the human vaginal epithelium and cervical ectopy. Contraception 1999; 60(1): 15-24.
13. Ildgruben AK, Sjberg IM, Hammarstrm ML. Influence of hormonal contraceptives on the immune cells and thickness of human vaginal epithelium. Obstet Gynecol 2003; 102(3): 571-82.
14. Brabin L, Roberts SA, Fairbrother E, Mandal D, Higgins SP, Chandiok S. Factors affecting vaginal pH levels among female adolescents attending genitourinary medicine clinics. Sex Transm Infect 2005; 81(6): 483-7.
15. Joesoef MR, Karundeng A, Runtupalit C, Moran JS, Lewis JS, Ryan CA. High rate of bacterial vaginosis among women with intrauterine devices in Manado, Indonesia. Contraception 2001; 64(3): 169-72.
16. Calzolari E, Masciangelo R, Milite V, Verteramo R. Bacterial vaginosis and contraceptive methods. Int J Gynecol Obstet 2000 1; 70(3): 341-6.