

## Research Article

## Vaginal pH of Menopausal Women is Related to the Duration of Menopause

### *Keasaman Vagina Perempuan Menopause Berhubungan dengan Lamanya Menopause*

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#### Abstract

**Objective:** To determine the correlation between vaginal pH in menopausal women with the age and duration of menopause.

**Methods:** This was a descriptive-analytic study conducted on 32 menopausal women in the obstetrics and gynaecology department of a teaching hospital in Kendari, Southeast Sulawesi. The data collection used a questionnaire comprising sociodemographic data, history of menstruation, menopausal symptoms, and medication. Measurement of vaginal pH was using a pH strip. We carried the interpretation out by matching the colour change on the strip with the rating indicator on a calorimetric scale. Statistical analysis used the Chi-square test with a significance level of  $p < 0.05$ .

**Result:** Most respondents were 50-55 years old. The majority of menopausal ages were 52 years, and the mean age of menopause was  $50.31 \pm 2.63$  years. Vaginal pH  $\geq 6$  was found at  $>55$  years (66.7%), menopausal age  $<50$  years (58.8%), and duration of menopause  $>2$  years (82.4%). There was no relationship between women's age and menopausal age with vaginal pH ( $p = 0.701$  and  $p = 0.732$ ). There was a relationship between the duration of menopause and vaginal pH ( $p = 0.002$ ).

**Conclusions:** The vaginal pH of menopausal women is related to the duration of menopause. Vaginal pH  $\geq 6$  can be used as an alternative indicator to determine the duration of menopause.

**Keywords:** duration of menopause, menopause, vaginal pH.

#### Abstrak

**Tujuan:** Mengetahui hubungan antara pH vagina pada perempuan menopause dengan usia dan lamanya menopause.

**Metode:** Penelitian ini bersifat deskriptif analitik, dilakukan pada 32 perempuan menopause di Poliklinik Obstetri dan Ginekologi Rumah Sakit Pendidikan di Kendari, Sulawesi Tenggara. Pengumpulan data menggunakan kuesioner, terdiri dari data sosiodemografi, riwayat haid, gejala menopause, dan pengobatan. Pemeriksaan pH vagina menggunakan strip pH. Interpretasi hasil dilakukan dengan membandingkan perubahan warna yang terbentuk pada strip dengan indikator penilaian pada skala kalorimetrik. Analisis statistik menggunakan uji Chi-square dengan tingkat kemaknaan  $p < 0,05$ .

**Hasil:** Mayoritas responden berusia 50-55 tahun. Sebagian besar mengalami menopause pada usia 52 tahun, dengan rerata usia menopause adalah  $50.31 \pm 2.63$  tahun. Kadar pH vagina  $\geq 6$  sebagian besar pada ibu yang berusia  $>55$  tahun (66.7%), usia menopause  $<50$  tahun (58.8%), dan lama menopause  $>2$  tahun (82.4%). Tidak terdapat hubungan antara usia ibu dan usia menopause dengan pH vagina ( $p=0.701$  dan  $p=0.732$ ). Terdapat hubungan antara lamanya menopause dan pH vagina ( $p = 0.002$ ).

**Kesimpulan:** pH vagina perempuan menopause berhubungan dengan lamanya menopause. pH vagina  $\geq 6$  dapat menjadi petunjuk alternatif untuk menentukan lamanya menopause.

**Kata kunci:** lama menopause, menopause, pH vagina.

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## INTRODUCTION

Symptoms of menopause can affect the physical, psychological, and quality of life of menopausal women.<sup>1,2</sup> During menopause, a woman experiences endocrine, somatic, and psychological changes. These changes can start before menstruation stops, and last for an average of 2 to 5 years.<sup>3,4</sup>

Currently, the management of menopausal symptoms is hormone replacement therapy, although estrogen has been reported to have long-term side effects.<sup>5</sup> Several studies on phytoestrogen, as natural estrogens derived from plants, have been carried out to treat menopausal symptoms.<sup>6</sup> The phytoestrogen can induce the proliferation and maturation of the epithelium on the vaginal surface, which plays an important role in the vagina's defence against pathogenic bacteria.<sup>6,7</sup>

Loss of estrogen production from the ovaries causes menopausal women to experience symptoms of atrophic vaginitis.<sup>8</sup> Estrogen deficiency results in changes in epithelial cell maturation so that the glycogen content will decrease.<sup>9</sup> A decrease in glycogen in the vaginal epithelium of menopausal women causes an increase in the pH of the vagina to become more alkaline, which increases the risk of vaginal infection or atrophic vaginitis.<sup>8,10</sup> Glycogen is a source of nutrition for microorganisms in the vagina which metabolize and form lactic acid. Lactobacillus converts glycogen into lactic acid and produces an acidic pH in the vagina, inhibiting the growth of pathogenic bacteria.<sup>11,12</sup>

Currently, there is a lack of publication on factors related to vaginal acidity in menopausal women, especially those related to menopausal syndrome. Therefore, this study aimed to determine the relationship between vaginal acidity of menopausal women with the age and duration of menopause. So, it will provide basic information for the development of menopausal syndrome management.

## METHODS

This was a descriptive-analytic study that has been carried out in the Obstetrics and Gynecology Department of the teaching hospital at Kendari, Southeast Sulawesi, in October 2020. A total of the respondents were 32 menopausal women. The inclusion criteria were having a uterus and signing an informed consent form.

The exclusion criteria were taking antibiotics and drugs in the vagina within the last 24 hours, having sexual intercourse within 3 days, and having gynecological malignancy.

The instruments were questionnaires and pH strips. The questionnaire comprised sociodemographic data, menstrual history, menopausal symptoms, and medication. Measurement of vaginal pH was using a pH strip. We carried interpreting out by matching the colour change on the strip with the indicators on the calorimetric scale. Statistical analysis used the Chi-square test with a significance level of  $p < 0.05$ .

The ethical clearance had approved by the Health Ethics Commission of Faculty of Medicine, Universitas Halu Oleo.

## RESULTS

This study was conducted on 32 respondents with the characteristics shown in table 1.

**Table 1.** Characteristics of Respondents

Characteristics	n	%
<b>Age</b>		
<50	5	15.6
50-55	18	56.3
>55	9	28.1
<b>Occupation</b>		
Housewife	16	50.0
Self-employees	3	9.4
Employees	13	40.6
<b>Education levels</b>		
Low	6	18.8
Middle	13	40.6
High	13	40.6
<b>Parity</b>		
<4	16	50.0
≥4	16	50.0

Most respondents in this study were aged 50-55 years (56.3%) and as housewives (50.0%). There were respondents with low education (18.8%), medium and high education (40.6% respectively). Respondents in this study have varying parity evenly. (See table 1).

**Table 2.** Mean of Women's Age, Age of Menopause, and Duration of Menopause

Characteristics	Minimum	Maximum	Mode	Mean±SD
Age	47	68	53	54.13±4.97
Age of menopause	46	55	52	50.31±2.63
Duration of menopause	1	11	1	3.34±2.72

In this study, the mean of women's age was 54.13 ± 4.97 years, the minimum age was 47 years and the maximum age was 68 years. Most respondents experienced menopause at 52 years, and the mean age of menopause was 50.31

± 2.63 years. Some respondents experienced menopause at 46 years and 55 years. The mean duration of menopause in this study was 3.34 ± 2.72 years. (See table 2).

**Table 2.** Mean of Women's Age, Age of Menopause, and Duration of Menopause

Characteristics	pH				Total		P-value
	<6	%	≥6	%	n	%	
<b>Age</b>							
<50	2	40.0	3	60.0	5	15.6	0.701
50-55	9	50.0	9	50.0	18	56.3	
>55	3	33.3	6	66.7	9	28.1	
<b>Age of menopause</b>							
<50	7	41.2	10	58.8	17	53.1	0.730
≥50	7	46.7	8	53.3	15	46.9	
<b>Duration of menopause</b>							
≤2	11	73.3	4	26.7	15	46.9	0.002
>2	3	17.6	14	82.4	17	53.1	

In Table 3, vaginal pH ≥ 6 was found at > 55 years (66.7%). The statistical test showed no relationship between women's age and vaginal pH (p = 0.701). The vaginal pH ≥ 6 was found at menopausal age <50 years (58.8%), but statistically, there was no relationship between menopausal age and vaginal pH (p = 0.730). Based on the duration of menopause, vaginal pH ≥ 6 was found in respondents with a duration of menopause > 2 years (82.4%). There was a relationship between the duration of menopause and vaginal pH (p = 0.002).

## DISCUSSION

Menopause is characterized by the cessation of menstruation and decreased levels of estrogen because of loss of activity of ovarian follicles. Menopause begins at different ages around 50 years.<sup>3</sup> This study found that the mean age of menopause was 50.31 ± 2.63 years, with the majority experiencing it at 52 years. Several other studies found that the mean age of menopause was 47.8 ± 4.1<sup>13</sup> and 47.42 ± 3.64.<sup>14</sup>

Estrogen affects vaginal epithelial cells to synthesize and collect glycogen. Lactobacillus bacteria will metabolize glycogen into lactic acid which causes a low pH in the vagina, which is around 4.5.<sup>15</sup> Decreased estrogen levels cause

vaginal epithelial thinning resulting in decreased lactobacilli colonization. This causes an increase in vaginal pH to become more alkaline.<sup>16,17</sup> In this study, a more alkaline vaginal pH was found at menopause conditions of over 2 years. There is a significant relationship between vaginal pH and the duration of menopause. Several menopausal symptoms occur because of hormonal changes during menopause. These changes start before menstruation stops, persisting for an average of 2 to 5 years.<sup>3,4</sup>

Vaginal pH is closely related to age and menopausal status. This study showed a more alkaline vaginal pH was obtained at age > 55 years, although statistically there was no relationship between age and vaginal pH. The vaginal pH value increases with age and indicates a vaginal pH > 6.00 can be used as a marker of menopausal status.<sup>14</sup>

This study found that vaginal pH > 6 was the majority at menopausal age <50 years, but statistically, there was no relationship between menopausal age and vaginal pH. A study reported that the sensitivity of vaginal pH to determine the diagnosis of menopause is 90% with a pH limit value > 4.5.<sup>18</sup> Another study reported that if there was no vaginitis, a vaginal pH > 4.5 indicated menopause with a sensitivity of 74%.<sup>19</sup>

## CONCLUSION

Based on this study, we conclude that vaginal pH is related to the duration of menopause, so that vaginal pH > 6 can be used as an alternative method of determining the duration of menopause.

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