

# The relationship between genital hygiene behaviors and genital infections among women: A systematic review



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## ABSTRACT

**Introduction:** Genital hygiene is an important part of women’s health and is essential for protecting reproductive health. Women adopt many genital hygiene behaviors, which will have direct and indirect effects on genitals and possible sexually transmitted infections. This systematic literature review aimed to know the types of genital hygiene behaviors practiced by women and assess the relationship between genital hygiene behavior and genital infection.

**Methods:** A systematic search of the electronic databases, PubMed, Ovid, Web of Science, Scopus, ScienceDirect, JSTOR, and SAGE, for literature published between January 2001 and 2021. The keywords used were “genital hygiene behavior” AND “genital infections” AND “women OR female.” The inclusion criteria focused on genital hygiene behavior and the incidence of genital infection. The included full papers with observational research methods followed the PRISMA guidelines. After reading the full content of the included studies, key themes and concepts were extracted and synthesized.

**Results:** In total 383 articles were screened. Five articles met the inclusion criteria and were analyzed. The analysis revealed four categories related to genital hygiene behavior among women: underwear hygiene, bathing habits, menstrual hygiene, and coital hygiene. Genital infections included bacterial vaginosis, trichomoniasis, and vulvovaginal candidiasis. The review showed that incorrect and inadequate genital hygiene behavior increases the risk of vaginal infection.

**Conclusion:** A higher incidence of genital infections occurred in women with improper genital hygiene practices. It is necessary for health professionals to educate women about good genital hygiene practices in order to reduce the rate of genital infections.

**Keywords:** genital hygiene behaviors; genital infection; systematic review; women’s health

## Introduction

Genital hygiene plays a key role in preventing genital infections. Early identification of genital infections, appropriate treatment measures, and necessary preventive measures are essential to protect and improve women's health (Hamed, 2015). Genital infection is a serious female health problem, which is related to a negative impact on sexual and family life (Sevil et al., 2013). In this case, genital infection has become a serious public health problem, which is common in both developed and developing countries. About 1 million

women around the world suffer from genitourinary system infections, such as urinary tract infections and bacterial vaginosis, and 75% of them have had genital infections. The prevalence of bacterial vaginosis (BV) has been found to be 8%–75%, the prevalence of vulvar vaginal candidiasis (VVC) is 2.2%–30%, and the prevalence of trichomoniasis (VT) is 0%–34% (Karadeniz, 2019). More than one million Sexually Transmitted Infections (STIs) are spread worldwide every day (World Health Organization, 2021).

The factors that cause female genital infections vary widely. The closeness of the urethra, vagina, and anus to



each other is the most important factor in the susceptibility to genital infection, and certain factors will increase the risk of its occurrence (Calik et al., 2020). The understanding of reproductive health issues varies greatly among countries, societies, and individuals. Socioeconomic status, race, religious belief, and education level all affect women's views and behaviors on reproductive health. In particular, feminine hygiene habits are different among women with a high prevalence of behavioral defects, and these behavioral defects easily make them susceptible to vulvovaginitis (Attieh et al., 2016). Genital infections do not always threaten women's lives, but their symptoms can lead to serious illnesses (Hilber, Francis, et al., 2010). These infections can lead to ectopic pregnancy, sepsis, cervical cancer, infertility and congenital infections of the newborn (Centers for Disease Control and Prevention, 2019).

Care and treatment of women's vagina and genitals can reduce their susceptibility to sexually transmitted infections (STIs) and other sexual and reproductive diseases (Myer et al., 2005). A qualitative study has linked women's intravaginal practices and sexuality, and demonstrates that women in the four countries. Indonesia, Mozambique, South Africa, and Thailand, actively use a variety of practices to achieve a desired vaginal state. Moreover, that study discusses types of vaginal practices, products used in vaginal practices and health consequences arising from these practices (Hilber, Hull, et al., 2010).

The data obtained indicated that the prevalence rate of BV is relatively high and could be influenced by hygiene

behavior and certain socio-demographic characteristics, which indicated that genital behavior needs attention (Bahram et al., 2009). Behavioral factors such as vaginal douching or menstrual hygiene practices have been suggested as important factors that might influence vaginal infections (Cottrell, 2001; Cottrell & Close, 2008; Ott et al., 2009). Differences in vaginal practices, exposure measurements, study design, study populations, and statistical analysis definitions and classifications can explain these conflicting results (Brown & Brown, 2000; Hilber, Francis, et al., 2010; Hilber, Hull, et al., 2010). Various personal hygiene methods can be very harmful to health (9). In this case, unhealthy and dangerous practices can be attributed to improper cleaning of the genital area after using the toilet and poor handwashing habits. Frequent genital cleaning, lack of adequate underwear, insufficient attention to menstrual hygiene, sterile childbirth or artificial abortion as a method of family planning can increase the risk of genital infections (Felix et al., 2020; Karadeniz, 2019).

To get a contextual understanding of the genital hygiene behavior needed to be carried out by women, a simple brief information sheet and knowledge of what behaviors need to be considered is needed. Although there are a few studies on women's specific hygiene habits in the United States, Egypt and Turkey and other countries, they are still rare (Attieh et al., 2016). Information about the literature review toward genital hygiene behavior is lacking. Therefore, we conducted the current study with a systematic literature review with the following objectives: (1) to determine what types of

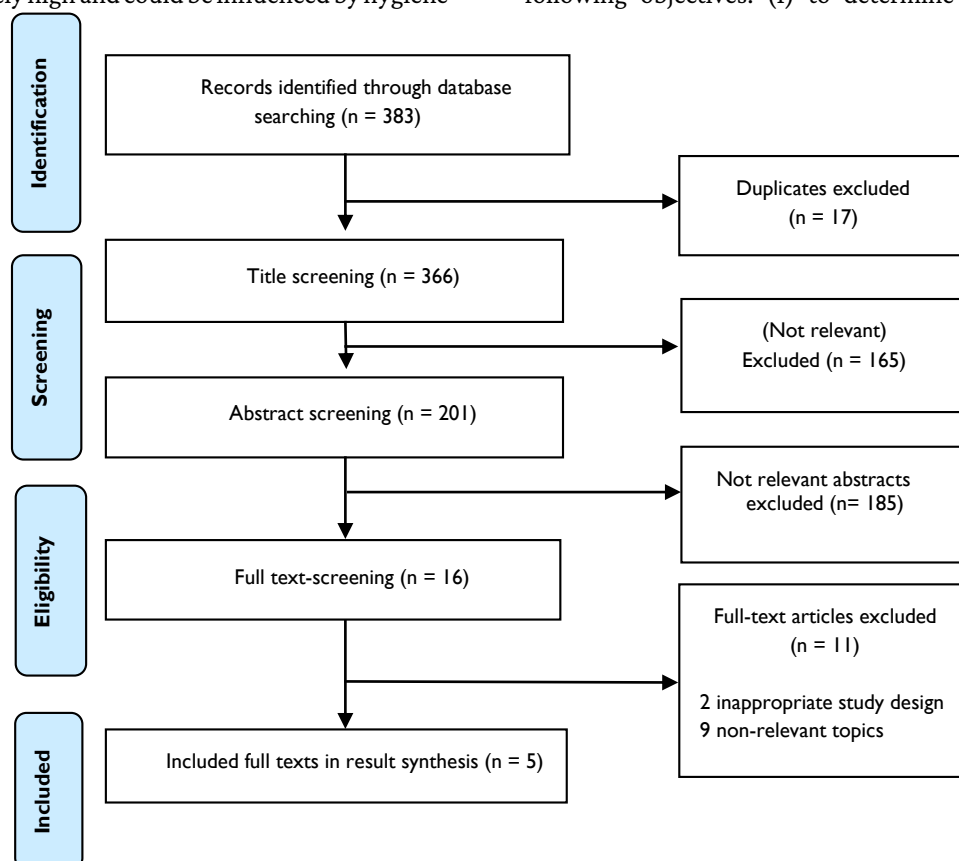


Figure 1 PRISMA flow of the selection process.

genital hygiene behaviors are practiced by women; (2) the relationship between genital hygiene behavior and genital infection.

## Materials and Methods

### Search Strategy

The primary question guiding this review was: “How does OSS enhance physical activity among adolescents?” Meanwhile, the secondary question was: “What are the characteristics of OSS utilised to enhance physical activity among adolescents?” The present systematic review was conducted in accordance with the PRISMA flow diagram guidelines (Moher et al., 2015). The authors searched electronic databases for literature published between 2001 and January 2021, only articles published in English were considered. A high-sensitivity search strategy was used to search the following databases: PubMed; Ovid; Web of Science; Scopus; ScienceDirect; JSTOR and SAGE. Relevant articles, which included the search term (genital hygiene behavior) AND (genital infections OR Sexually Transmitted Infections) AND (women OR female) in the title, were identified. Keywords were combined with the Boolean operator AND to limit the searches. An overview of the search terms can be found in [Table 1](#).

### Inclusion and Exclusion Criteria

The inclusion criteria were full paper articles with observational research methods. The exposure given was genital hygiene behavior, the research subjects were

women with genital infection. The exclusion criteria in this study were non-observational studies, female populations under 15 years, the articles were not full text and were not published in English.

### Operational Definition of Variable

A Genital hygiene behavior: a behavior or method of individual care to maintain cleanliness and health of their reproductive organs to achieve physical and psychological well-being. Genital hygienic practices include external washing, intra-vaginal cleansing, pre- and post-coital care, menstrual hygiene, and external application.

Genital infections can be caused by bacteria, fungi, parasites, or viruses growing in and around vagina and vulva (the area surrounding the vagina). Symptoms are such as soreness, itchiness, and an unusual vaginal discharge. Common types of vaginal infections are yeast infections, bacterial vaginosis, and trichomoniasis, a sexually transmitted infection.

### Procedure

The studies were assessed according to the eligibility criteria and the selection process was divided into two phases. Data were managed by transferring references to a reference management tool (Mendeley). For further documentation the Review Manager, Covidence.org (The Cochrane Collaboration, Melbourne, Australia), was used (Helfer et al., 2015). Documentation of the selection process was done with management tools. As a first step, the duplicates from the initial search results were removed. The initial search results were filtered by title

Table 1 Overview of the search terms

#Genital Hygiene Behaviors	#Genital Infections	#Related
Genital Hygiene Behaviors	Sexually Transmitted Diseases	Associated
Genital Hygiene Practices	Vulvovaginal Health	Impacts
Reproductive Health Practices	Vulvovaginal Disorder	Outcomes
Intimate Feminine Hygiene	Genital Problems	
Feminine Hygiene Practices	Genital Infection	
Vaginal Hygiene Practices	Reproductive Health	
Intravaginal Practices		

Table 2 Quality assessment

First author (year)	Study purpose <sup>1</sup>	Literature <sup>2</sup>	Design	Sample			Outcome		Exposure <sup>7</sup>	Result			Conclusion <sup>11</sup>
				N	Describe <sup>3</sup>	Size <sup>4</sup>	Measure <sup>5</sup>	Valid <sup>6</sup>		Statistical <sup>8</sup>	Analysis <sup>9</sup>	Clinical <sup>10</sup>	
Sevil (2013)	Y	Y	cross-sectional	1057	Y	N/A	Y	Y	Y	Y	Y	Y	Y
Bahram (2009)	Y	Y	cross-sectional	500	Y	N/A	Y	Y	Y	Y	Y	Y	Y
Bitew (2017)	Y	Y	cross-sectional	210	Y	N/A	Y	Y	Y	Y	Y	Y	Y
Calik (2019)	Y	Y	cross-sectional	266	Y	N/A	Y	Y	Y	Y	Y	Y	Y
Hamed (2015)	Y	Y	case-control	200	Y	N/A	Y	Y	Y	Y	Y	Y	Y

<sup>1</sup> Was the purpose stated clearly?; <sup>2</sup> Was relevant background literature reviewed?; <sup>3</sup> Was the sample described in detail?; <sup>4</sup> Was sample size justified?; <sup>5</sup> Were the outcome measures reliable?; <sup>6</sup> Were the outcome measures valid?; <sup>7</sup> exposure was described in detail?; <sup>8</sup> Results were reported in terms of statistical significance?; <sup>9</sup> Were the analysis method(s) appropriate?; <sup>10</sup> Clinical importance was reported?; <sup>11</sup> Conclusions were appropriate given study methods and results.

and abstract. After comparison and approval of the first screening process, the full text that met the requirements was analyzed. Playback of the title, abstract, and full text were reviewed. If no full text was available, the article was excluded. The process was tracked in flow diagram according to PRISMA (Figure 1).

### Quality Assessment

The authors independently rated the methodological quality of selected studies using the Critical Review Forms which, developed by CanChild (McMaster University, Canada), is a tool for conducting critical reviews of outcome measures and journal articles (Law et al., 1998a, 1998b). The quality of the studies was assessed with several questions with the answers "yes / no / not addressed" according to the criteria of the CanChild Critical Review Form (Law et al., 1998a, 1998b). After careful analysis of the quality related to results, the articles containing the highest quality and content for the work were included. The quality assessment of the studies can be found in [Table 2](#). One researcher undertook this assessment independently, with a random 10% of the articles reviewed by a second researcher. There were no discrepancies in the application of the risk of bias assessment found when the random sample of articles was compared by a second reviewer.

### Data Analysis

This systematic review adopted thematic synthesis. The five studies were read thoroughly to identify critical points and themes. We found the theme, which was type of genital hygiene behavior commonly practiced by women, and subtheme, which was underwear hygiene, bathing habits, menstrual hygiene and coital hygiene. For the analysis of the themes, we followed the Braun and Clark approach (Braun and Clarke, 2006). The first phase, familiarization, entails the reading and re-reading of the entire dataset. This is necessary to be able to identify appropriate information that may be relevant to the research question. In the second phase, we did the coding on the subthemes found. The coding process was performed to produce concise descriptive or interpretive labels that may be relevant to the research question. Phase three was generating themes, namely the type of genital hygiene behavior commonly practiced by women. Phase four reviewed potential themes, wherein we did not find any other potential themes. Phase five was defining and naming the theme while phase six involved producing the report in which we wrote and reported the findings from a review of the analyzed articles ([Table 3](#)).

The papers were synthesized under the following subheadings: Author, research aims, design and data collection, sample number and characteristics, type of genital hygiene behavior, type of genital infection, and research findings ([Appendix 1](#)). Independent reviewers extracted the data related to genital hygiene behavior

Table 3 Types of hygiene behavior performed by women

Theme	Type of Genital Hygiene Behavior
Subthemes	Underwear hygiene Bathing habits Menstrual hygiene Coital hygiene

carried out by women as well as STIs, or symptoms associated with genital infections

### Results

The search identified 383 publications. After duplicates were excluded ( $n = 17$ ), a total of 366 publications was identified according to the search strategy. Some irrelevant titles were excluded ( $n = 165$ ) and 185 abstracts did not meet the criteria, so they needed to be excluded. Examples of articles that did not meet the following criteria were not available in full text, use a language other than English, and not quantitative research. The full text was obtained for the remaining 16 articles which were eligible. After a detailed review, only five articles were found to meet the inclusion criteria and were selected for analysis. Of the eleven excluded articles, two had inappropriate study designs and the others had irrelevant topics. See Figure 1 for the selection process PRISMA flow.

### Description of Study

A total of five studies were included in the review. The studies consisted of four cross-sectional studies, and one case-control study. The total sample analyzed was 2,233 respondents, from women aged 15 years to more than 60 years. The target population was students, married women, and non-pregnant women, as well as female patients undergoing treatment at the gynecology department. The studies were conducted in Turkey with the number of sample 1,057 female students with the mean age of  $21.03 \pm 1.70$  years and another study from Turkey showed 266 married women, the mean age of  $38.5 \pm 7.9$  (min = 20, max = 49); in Iran 500 non-pregnant women aged between 15 and 45 (mean age 36 years) were enrolled; in Ethiopia the respondents were 210 female patients aged between 15 and 64 years, and the last study conducted in Egypt was a case control study with a total 200 women. A study conducted by Bahram (2009) showed that 16.2% of women experienced BV, 6.6% VT, and 4.8% VVC. Meanwhile, Bitew et al.'s study (2017) showed that 48.6% of women experienced BV and 51.4% did not experience.

### Type of Genital Hygiene and Genital Infections

Eight Most of the data collection techniques were carried out by questionnaires to assess genital hygiene behavior. It was found that several types of genital hygiene behavior were carried out by women, specifically underwear hygiene, bathing habits, menstrual hygiene,



and coital hygiene practices ([Appendix 1](#)). In addition, to determine genital infection, women had a history of genital infection that had been diagnosed by a physician with a genital infection within the past six months (Hamed, [2015](#); Sevil et al., [2013](#)). A diagnosis was made to determine genital infection through a Pap smear test (Calik et al., [2020](#)) and specimen collection for genital infection culture (Bahram et al., [2009](#); Bitew et al., [2017](#)).

Genital infectious diseases obtained from the review were bacterial vaginosis, trichomoniasis, and vulvovaginal candidiasis (Bahram et al., [2009](#); Bitew et al., [2017](#)) ([Appendix 1](#)). Some studies did not explain in detail the types of genital infections suffered by women, they only explained that women had experienced genital infections (but did not specify what type of disease) (Sevil et al., [2013](#)) and the symptoms experienced by women, such as pathological vaginal discharge (Calik et al., [2020](#)) and vaginal infections (Hamed, [2015](#)).

## Outcomes

From the five studies, four themes related to genital hygiene behavior were identified: underwear hygiene, bathing habits, menstrual hygiene, and coital hygiene. Meanwhile, three types of genital infections were identified based on data obtained from respondents: bacterial vaginosis, trichomoniasis, and vulvovaginal candidiasis ([Appendix 1](#)).

Sevil et al. ([2013](#)) examined the relationship between genital hygiene practices and genital infections in a group of university students, including 1057 female students aged between 17 and 27 years old. This study used a questionnaire developed in line with the purpose of the study to evaluate the relationship between genital hygiene practices and genital infection in a group of university students.

Some of the questions that respondents were asked about genital hygiene were (a) underwear hygiene and bathing habits, which consisted of five questions including the type of underwear used (hosiery/cotton, satin/flannel), the frequency of changing underwear (once a week, twice-three times a week, daily), daily pads (yes, none), bathing position (standing, sitting, sometimes sitting, sometimes standing), bathing frequency (daily/once every 2-3 days, weekly/once every fifteen days); (b) the toilet hygiene practice had six questions, which were genital area cleaning, type of genital area cleaning, agent used for genital area cleaning (water, soaps, cosmetics), drying genital area, material used for drying the genital area (toilet roll, cloth), frequency of cleaning genital hair, hand washing; (c) menstrual hygiene, consisting four questions, including the materials used during menstruation (pad, cloth), the frequency of changing materials during menstruation (per day), bathing during menstruation (yes, no) and the use of perfume for unpleasant odors during menstruation. Students who were diagnosed with genital

infections by a physician in the past six months were considered "students with a history of genital infections." Of the 1,057 female students included in this study, there were 137 (13.0%) who had a history of genital infections.

An assessment of underwear and bathing habits of students with genital infection history did not demonstrate any relationships between the frequency of changing underwear and infection history ( $\chi^2 = 5.404$ ;  $p = 0.067$ ). The frequency of genital infections was higher among those who used hosiery/cotton underwear and daily pads ( $\chi^2 = 5.602$ ;  $p = 0.018$  and  $\chi^2 = 8.490$ ;  $p = 0.004$ , respectively). History of genital infections was significantly more common among those who bathed in the sitting position and in those who bathed once a week ( $\chi^2 = 49.570$ ;  $p < 0.001$  and  $\chi^2 = 25.534$ ;  $p < 0.001$ , respectively).

Genital infection was significantly less common among those who told that they practiced genital cleaning ( $\chi^2 = 62.263$ ;  $p < 0.001$ ), while they were more common among those who described that they cleaned the genitals randomly ( $\chi^2 = 14.350$ ;  $p = 0.001$ ), used soap ( $\chi^2 = 10.170$ ;  $p = 0.004$ ), did not dry the genital area ( $\chi^2 = 48.657$ ;  $p < 0.001$ ), used cloth for drying ( $\chi^2 = 30.006$ ;  $p < 0.001$ ), performed frequent genital area cleaning with materials such as razor ( $\chi^2 = 15.918$ ;  $p < 0.001$ ) and did not always pay attention to hand washing ( $\chi^2 = 12.733$ ;  $p = 0.002$ ). The frequency of genital infections was significantly higher among those who used cloth and those who did not bathe during menstruation ( $\chi^2 = 46.042$ ;  $p < 0.001$  and  $\chi^2 = 8.984$ ;  $p = 0.003$ , respectively).

The cross-sectional study by Bahram et al. ([2009](#)) included 500 non-pregnant women between the ages of 15 and 45 years. This study aimed to determine the prevalence of BV and the effects of sexual and genital hygiene practices and sociodemographic in non-pregnant women. To diagnose BV, vaginal swabs were heat-fixed, gram-stained and examined with an oil immersion objective (1000x magnification) and analyzed according to the standardized quantitative morphological classification method of Nugent. The diagnosis of vulvar vaginal candidiasis has been suggested in women who presented with symptoms and/or signs of vaginitis, e.g., vaginal discharge, itching, external dysuria, and vulvovaginal erythema. Trichomoniasis was diagnosed by visualizing mobile trichomonads in the wet dissection smear immediately after sampling. All laboratory evaluations were carried out by microbiologists.

The questions on genital hygiene were (a) menstrual hygiene (bathing during menstruation, genital douching during menstruation, use of sanitary napkins, changing sanitary napkins after each urination, sexual abstinence during menstruation); (b) individual vaginal hygiene (regular underwear changing, underwear washing with hot water, use of loose underwear, ironing underwear, front-to-back cleaning of genitalia, use of private

bathroom, personal bathroom amenities, bathroom hygiene, sun drying bathroom amenities, shaving genital hair); (c) hygiene during intercourse (genital douching before intercourse, urination after intercourse, frequency of intercourse).

The prevalence of RTIs was 27.6%, including 16.2% for BV, 6.6% for VT, and 4.8% for VVC. There was a significant correlation between menstrual and individual vaginal hygiene and BV ( $p < 0.01$  and  $p < 0.001$ ). In contrast to coital hygiene, no significant correlation was observed between BV and coital hygiene. The data obtained suggest that the prevalence rate of BV is relatively high and could be influenced by hygienic behaviors and certain socio-demographic characteristics.

Bitew et al. (2017) conducted a cross-sectional study among 210 patients to assess the relationship between the prevalence of BV and genital hygiene behavior. Gram-stained vaginal swabs were examined microscopically and sorted by the Nugent method; Bacteria causing aerobic vaginitis were characterized and their antimicrobial susceptibility pattern determined.

Questionnaires on genital hygiene behavior included the number of pants worn daily (1-2 pants/day, one pants for 2-4 days); frequency of vaginal baths/day (1-3,  $\geq 4$ ). The overall prevalence of BV was 48.6%. The prevalence of BV was lower among patients who changed pants more frequently (two per day) than among those who changed their pants less frequently (one pants for 2-4 days) (AOR = 0.367; 95% CI = 0.201 to 0.672;  $p = 0.001$ ). Patients who bathed their vaginal region more frequently were less affected than those who did not bathe their vaginal area as much (AOR = 1.847; 95% CI = 1.013 to 3.370;  $p = 0.045$ ). This study found that the prevalence of BV was high and was affected by individual hygiene.

A cross-sectional study by Calik et al. (2020) recruited 66 married women aged 20 to 49 years. The data were collected using a questionnaire, the Genital Hygiene Behavior Inventory (GHBI), a gynecological examination and the Pap smear test. A specialist performed a Pap smear for the gynecological examination of the women and the results were recorded by the researcher after 20 days.

This study used a questionnaire in the form of GHBI and with a four-level item, and was developed by Ege and Eryilmaz (2005) to determine the genital behaviors of women aged between 15 and 49 years of age. The inventory was single-dimensional and included 24 positive and three negative items, consisted of three subdimensions including "general hygiene," "menstrual hygiene", and "abnormal finding awareness." Each item contained the alternative answer "never", "sometimes", "frequently", and "always". In the inventory, the lowest and highest total points were 27 and 108 points, respectively. The high total points indicated good behavior in term of genital hygiene.

Of the women who reported having vaginal discharge (54.9%), 45.1% had abnormal discharge and odor (34.6%)

and burning sensation (35%); speculum examination showed that 42.6% had a pathological discharge and the incidence of genital infections in vaginal cytology was 79%. It was found that 71.4% of women had pathological or non-pathological discharge; the mean GHBI score for women was  $70.27 \pm 10.05$ . It was found that the average GHBI value for women was slightly above the moderate value and that improper genital hygiene practices increased the risk of vaginal infection in women. At the same time, a significant relationship was found between genital discharge complaints and GHBI score hygiene behaviors ( $p = 0.009$ ).

Hamed (2015), in his case-control study, evaluated the impact of genital hygiene practices on the incidence of vaginal infections and developed a care factsheet as a prevention message for women at risk, and not pregnant. Case group: women diagnosed with vaginal infection ( $n = 100$ ). Control group: women without vaginal infection ( $n = 100$ ).

Respondents were asked to complete a genital hygiene behavior questionnaire, which consisted of the following questions: (a) genital hygiene practices (type of underwear, frequency of underwear changes, external washing of the genital area, daily use of pads, drying after going to the toilet; (b) menstrual hygiene practices (bathing during menstruation, hand washing before and after using the toilet, type of material used during menstruation, frequency of changing pads, procedures for treating dirty sanitary pads); (c) sexual intercourse hygiene practices (genital care before intercourse, genital care after intercourse, use of local contraceptives, use of chemicals and lubricants during intercourse, use of douching after intercourse).

To assess the gynecological history, this was based on the presence of symptoms associated with a vaginal infection, the history of contraceptives and the presence of gynecological problems. Per-vaginal examination and investigations were done to obtain pertinent data about vaginal infection. The diagnosis of vaginal infection was determined by a physician. The results of this study show that women who suffered from vaginal infection were less likely to use cotton underwear and changed them less frequently ( $\chi^2 = 10.1$ ;  $p = 0.006$  and  $\chi^2 = 20.7$ ;  $p = 0.001$ , respectively). Meanwhile, they were more apt to use the incorrect technique in washing the genital area ( $\chi^2 = 26.5$ ;  $p = 0.001$ ), use intra-vaginal cleansing or douching ( $\chi^2 = 7.3$ ;  $p = 0.007$ ) keeping their genital area moist or using reused cloth for drying it ( $\chi^2 = 7.3$ ;  $p = 0.007$ ).

Women in the study group were less likely to bathe themselves, washing hands before and after using the toilet and used reusable cloth to absorb menstrual blood ( $\chi^2 = 6.7$ ;  $p = 0.009$ ,  $p = 0.010$  and  $p = 0.001$ , respectively). Meanwhile, almost one-fourth (24.0%) of the respondents in the case group less frequently changed their perineal pad and washed their reused cloth (37.0%) ( $p = 0.023$  and  $p = 0.001$ , respectively). Almost one third

of women in the case group did not perform pre- or post-coital care compared to those in the control group ( $\chi^2 = 33.8$ ;  $p = 0.001$ , and  $\chi^2 = 26.8$ ;  $p = 0.001$  respectively).

## Discussion

The minimum age in this review is 15 years at which age a young girl can choose self-care, both personal hygiene and female organs. Adolescence is a period of the rapid growth of physical and emotional changes (Michael et al., 2020). It is the stage of life when a person enters puberty, but adolescents are found to lack basic information about their bodies. It is still regarded as taboo in a developing country, but today's young people are caught between the conservative culture and the fascinating Western culture due to the influence of the media (Deshmukh & Chaniana, 2020).

### Underwear Hygiene

In this review, three of the five papers reviewed asked questions related to underwear hygiene behavior. The questions often arising regarding the cleanliness of underwear are type of underwear used and frequency of changing underwear. The type and cleanliness of underwear and the frequency of replacement are essential factors determining the risk of genital infection (Sevil et al., 2013). Many women who use underwear follow the trend where the type of material used cannot absorb sweat. It is a business trend to make nylon and synthetic lingerie more attractive, especially for young women (Ruiz et al., 2019). However, Felix et al. (2020) argued that nylon absorbs less sweat than cotton underwear, makes the crotch damp, and increases the risk of reproductive tract infections, so women must be wise in choosing the type of fabric in daily use. Cotton underwear is preferable to synthetic materials because cotton is breathable and allows air to circulate the external genitals. The ventilation helps to prevent the buildup of microorganisms and helps maintain healthy skin around the vaginal area (Hamed, 2015). However, one article in this review stated that the frequency of genital infections was higher in those who wore the hosiery/cotton type of underwear (Sevil et al., 2013).

The use of underwear is significant and needs to be considered. Based on the Middle East and Central Asia (MECA) guidelines on female genital hygiene recommends wearing loose-fitting cotton underwear, minimizing wearing tight clothes, and changing underwear frequently (Arab, Almadani, Tahlak, Chawla, Ashouri, Tehranian, Ghasemi, Taheripanah, Gulyaf, & Khalili, 2011; Chen et al., 2017). Likewise, the Royal College of Obstetricians and Gynecologists (RCOG) guidance on vulvar skincare provides recommendations for women to wear loose-fitting silk or cotton underwear and avoid close-fitting clothes (Chen et al., 2017; Hilber, Francis, et al., 2010). Clothing is one of the critical factors in the prevention of vulvovaginitis. Bacteria and yeast

thrive in moist or damp places. Therefore, clothing that increases local heat and moisture, such as nylon underwear and tight-fitting garments, including leotards, tights, rubber pants, skintight jeans, nylon underclothing, and tight-fitting diapers, can contribute to vaginal infections and prepubertal vulvovaginitis (Klebanoff et al., 2010).

### Bathing Habits

Three studies stated that genital hygiene practices include bathing and toilet habits, such as bathing frequency, bathing position, agent used for genital area cleaning, and the material used for drying the genital area (Bahram et al., 2009; Bitew et al., 2017; Sevil et al., 2013). The female genitals are constantly exposed to factors that affect homeostasis and especially the pH of the skin; these interfering factors include endogenous or physiological factors and exogenous or iatrogenic factors; endogenous factors are moisture, sweat (sweat), sebum secretion, anatomical wrinkles, genetic predisposition, and age; exogenous factors include soap, cosmetics, tight clothing, bathing habits, shaving, and applying topical creams or powders to the skin (Arab et al., 2011).

A study by Sevil showed that history of genital infections was significantly more common among those who bathed in the sitting position. This result is supported by Demir et al. (2020) that it is one of the personal hygiene habits that also contribute to genital cleansing. Women who often take a bath in the form of showers do not need additional applications in genital hygiene. Bathing by sitting on the stool may induce vaginal infection and urinary tract infection if the stool sitting is not hygienic (Demir et al., 2020). On the other hand, Bahram et al. (2009) stated there was a significant correlation between bathing in standing position and the incidence of bacterial vaginosis. In addition to bathing positions affecting the incidence of genital infections, other possibilities can also be influenced by cleaning materials or products such as soap/shampoo used when bathing because changes in the pH of hygiene products will affect the pH of the vagina.

Women who bathed their vaginal region more frequently were less affected by bacterial vaginosis than those who did not bathe their vaginal area as much (Bitew et al., 2017). Routine washing of the vulva is desirable to prevent the accumulation of vaginal discharge, sweat, urine, and fecal contamination to prevent offensive body odor. Although vulvar cleansing may be a helpful adjunct to medical treatment, vulvar cleansing products are not designed to treat infections. There has, however, been a surge in intimate hygiene products for cleanliness and odor control. Still, some may upset pH in the vulvovaginal area, which will affect the composition of the normal vulvovaginal microbiota needed for protection against infection (Chen et al., 2017).



## Menstrual Hygiene

Current studies classify menstrual hygiene practices, including the material used during menstruation, frequency of changing the material during menstruation (per day), bathing during menstruation, genital douching during menstruation (Bahram et al., 2009; Hamed, 2015; Sevil et al., 2013). The frequency of genital infections was significantly higher among those who used cloth and those who did not want a bath during menstruation ( $p < 0.001$  and  $p = 0.003$ , respectively) (Bahram et al., 2009). Similar results from Torondel et al. (2018) showed that women who used reusable sanitary napkins were more likely to get *Candida* and BV infections than women who used disposable sanitary napkins. In addition, regular body washing during menstruation was associated with a lower risk of BV. Unhygienic menstrual hygiene management (MHM) practices can create abnormally moist conditions in the vulvovaginal area, which can promote opportunistic infections such as *Candida*. Once infected, it can be difficult to remove *Candida* from clothing without proper cleaning and drying. Menstrual blood causes changes in vaginal pH (alkaline pH), but the relationship between vaginal microbiology and menstruation is complex. In one study, it was stated that the menstrual sample had been shown to contain the highest number of bacteria at the lowest concentration (Amabebe & Anumba, 2018).

Good menstrual hygiene helps protect the intimate health of bacterial infections, skin irritation and other health problems. Research conducted by Anand et al. (2025) on Reproductive Tract Infections (RTI) shows that the causes of RTI symptoms may be different and are not limited to unhealthy menstrual practices, although this can be one of the causes of reproductive morbidity. Awareness, accessibility, and confidentiality are some of the main concerns that require immediate attention to promote the use of sanitary napkins during menstrual periods (Anand et al., 2015). During menstruation, the blood vessels in the uterus are very susceptible to infection because blood and sweat come out and stick to the vulva, which can cause the genital area to become moist. In moist conditions, fungi, and bacteria in the genital area will thrive, this causes itching and infection in the area. One of the complaints felt during menstruation is itching caused by *Candida* fungi, which will thrive during menstruation and can cause vaginal discharge and which can be caused by wearing cloth pad or disposable sanitary napkins.

## Coital Hygiene

From the synthesis on coital hygiene, it was found that several female behaviors that are often practiced are genital douching before and after intercourse, urination after intercourse, and frequency of intercourse. Hamed (2015) said, in his case-control study, that almost one-third of women in the case group did not perform pre or

post-coital care compared to those in the control group with statistically significant difference ( $p = 0.001$ ). Moreover, Bitew et al. (2017) argued that genital hygiene behaviors such as douching before and after intercourse significantly affect the incidence of vaginal infections. According to Verstraelen et al. (2010), the simplest explanation for this coital effect on the vaginal microflora is that unprotected sexual intercourse changes the physicochemical environment of the vagina and, thus, also influences the vaginal microflora. In particular, the alkaline prostate content of the ejaculate increases the vaginal pH, which remains elevated for up to eight hours after intercourse (Verstraelen et al., 2010). Post-coital intravaginal cleansing (IVC) could counteract the protective effect of a vaginal microbicide (Gafos et al., 2013). The female genitals are conducive to allowing bacteria, secretions, sweat, menstruation, urine, and feces to pass into the vagina during intercourse. The lack of ventilation can lead to infection; it is important to be careful in this zone (Amabebe & Anumba, 2018). Post-coital intravaginal cleansing is an important practice for some women in terms of managing their sexual health and sexuality (Hilber et al., 2012) to increase their confidence with their partner and manage unwanted vaginal odor. The practice of coital hygiene is very dependent on the individual and their partner. Support from the sexual partners is needed to improve good coital hygiene behavior in the prevention of genital infections among women (Umami et al., 2021).

This systematic review found that the incidence of genital infections is more common in women with inadequate genital hygiene (Bahram et al., 2009; Bitew et al., 2017; Calik et al., 2020; Hamed, 2015; Sevil et al., 2013). The prevalence of bacterial vaginosis is high and is influenced by individual hygiene (11,26). Inappropriate genital hygiene practices (Calik et al., 2020) increased the risk of vaginal infection in women. The present systematic review shows that clothing can cause alterations in the vaginal microbiota due to temperature variation, local humidity (Calik et al., 2020; Sevil et al., 2013), and compromised ventilation of the external genitalia, altering the genital ecosystem and causing irritation, an allergic reaction, or discharge (Felix et al., 2020). Sexual intercourse leads to BV if the sexual partner's natural genital chemistry changes the balance of the vagina and causes bacteria to grow.

## Limitation

Limitation of this study included the search was restricted to English and full text. There may be relevant information that is published in other languages. This evidence synthesis is based on observational studies only. Cross-sectional data often lack directionality and do not provide information on mechanistic associations or causal effects between genital hygiene behavior and genital infection. In addition, poor data quality is a concern, such as the lack of diagnostic data regarding



genital infections, and some studies only state genital infection from symptoms, prior history of genital infection based on physician diagnoses. Due to the small number of papers, the five studies we reviewed were not strong enough to provide evidence of an association between genital hygiene and genital infection. There is a possibility of publication bias because we only used articles in English, presenting the possibility that articles using other languages also discuss the same topic as this study. However, we believe that the research protocol was methodologically strong to ensure a reliable study selection. For further research, it is hoped that more articles can be reviewed so as to reduce publication bias by including articles in both English and non-English languages and can use meta-analysis to find out better evidence in analyzing the relationship between genital hygiene and genital infection. For professional health workers, in health services, clinics and community, they can provide health education for women, especially in implementing good and correct genital hygiene behaviors.

## Conclusion

Hygiene behaviors that are often practiced by women such as underwear hygiene, bathing habits, menstrual hygiene, and coital hygiene seem to be an important factor associated with the incidence of genital infections in women. Women need to practice proper personal hygiene to avoid harmful behavior in order to prevent the rate of genital infections due to wrong hygiene practices. These factors are in line with treatment goals centered on personal and reproductive hygiene care.

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## References

Amabebe, E., & Anumba, D. O. C. (2018). The vaginal microenvironment: The physiologic role of Lactobacilli. *Frontiers in Medicine*, 5(JUN), 1–11. <https://doi.org/10.3389/fmed.2018.00181>

Anand, E., Singh, J., & Unisa, S. (2015). Menstrual hygiene practices and its association with reproductive tract infections and abnormal vaginal discharge among women in India. *Sexual and Reproductive Healthcare*, 6(4), 249–254. <https://doi.org/10.1016/j.srhc.2015.06.001>

Arab H, Almadani L, Tahlak M, Chawla M, Ashouri M, Tehranian A, Ghasemi A, Taheripanah, Gulyaf M, Khalili A, H. E. (2011). The Middle East And Central Asia Guidelines On Female Genital Hygiene. *B M J Middle East*, 19(April).

Attieh, E., Maalouf, S., Roumieh, D., Abdayem, P., Abitayeh, G., & Kesrouani, A. (2016). Feminine hygiene practices among female patients and nurses in Lebanon. *Reproductive Health*, 13(1), 1–6. <https://doi.org/10.1186/s12978-016-0182-4>

Bahram, A., Hamid, B., & Zohre, T. (2009). Prevalence of bacterial vaginosis and impact of genital hygiene practices in non-pregnant

women in Zanjan, Iran. *Oman Medical Journal*, 24(4), 288–293. <https://doi.org/10.5001/omj.2009.58>

Bitew, A., Abebaw, Y., Bekele, D., & Mihret, A. (2017). Prevalence of bacterial vaginosis and associated risk factors among women complaining of genital tract infection. *International Journal of Microbiology*, 2017(ii). <https://doi.org/10.1155/2017/4919404>

Brown, J. E., & Brown, R. C. (2000). Brown 2000\_traditional intravaginal practices and the heterosexual transmission of disease a review.pdf. *Sexually Transmitted Diseases*, 27(4), 183–187.

Calik, K. Y., Erkaya, R., Ince, G., & Yildiz, N. K. (2020). Genital Hygiene Behaviors of Women and Their Effect on Vaginal Infections. *Clinical and Experimental Health Sciences*, 10, 210–216. <https://doi.org/10.33808/clinexhealthsci.565845>

Centers for Disease Control and Prevention. (2019). STDs in Women and Infants - 2018 Sexually Transmitted Diseases Surveillance.

Chen, Y., Bruning, E., Rubino, J., & Eder, S. E. (2017). Role of female intimate hygiene in vulvovaginal health: Global hygiene practices and product usage. *Women's Health*, 13(3), 58–67. <https://doi.org/10.1177/1745505717731011>

Cottrell, B. H. (2001). Vaginal Douching. *Journal of Obstetric Gynecologic and Neonatal Nursing*, 32(1), 12–18. <https://doi.org/10.1177/0884217502239796>

Cottrell, B. H., & Close, F. T. (2008). Vaginal douching among university women in the southeastern United States. *Journal of American College Health*, 56(4), 415–421. <https://doi.org/10.3200/JACH.56.4.415-422>

Demir, İ., Öztürk, G. Z., & Uzun, A. (2020). Analyzing the Relationship Between Genital Hygiene Behaviors in Women and Urinary Tract Infection in Any Period of Life. *Ankara Medical Journal*, 20(4), 982–992. <https://doi.org/10.5505/amj.2020.37640>

Deshmukh, D. D., & Chaniana, S. S. (2020). Knowledge About Sexual and Reproductive Health in Adolescent School-Going Children of 8th, 9th, and 10th Standards. *Journal of Psychosexual Health*, 2(1), 56–62. <https://doi.org/10.1177/2631831819898916>

Ege, E., & Eryilmaz, G. (2005). Development of Genital Hygiene Behaviors (GHBI). *Journal of Anatolian Nursing Health*, 67–75.

Felix, T. C., Borges De Araújo, L., Von Dolinger De Brito Röder, D., Dos, R., & Pedroso, S. (2020). Evaluation of Vulvovaginitis and Hygiene Habits of Women Attended in Primary Health Care Units of the Family. *International Journal of Women's Health*, 12, 49–57. <https://doi.org/10.2147/IJWH.S229366>

Gafos, M., Pool, R., Misiwe, •, Mzimela, A., Beauty, H., • N., McCormack, S., & Elfrod, J. (2013). The Implications of Post-coital Intravaginal Cleansing for the Introduction of Vaginal Microbicides in South Africa. <https://doi.org/10.1007/s10461-013-0676-9>

Hamed AG. (2015). The Impact of Genital Hygiene Practices on the Occurrence of Vaginal Infection and the Development of a Nursing Fact Sheet as Prevention Massage for Vulnerable Women. *IOSR Journal of Nursing and Health Science*, 4(6), 55–64. <https://doi.org/10.9790/1959-04655564>

Hilber, A. M., Hull, T. H., Preston-Whyte, E., Bagnol, B., Smit, J., Wacharasin, C., & Widyantoro, N. (2010). A cross cultural study of vaginal practices and sexuality: Implications for sexual health. *Social Science and Medicine*, 70(3), 392–400. <https://doi.org/10.1016/j.socscimed.2009.10.023>

Hilber, A. M., Kenter, E., Redmond, S., Merten, S., Bagnol, B., Low, N., & Garside, R. (2012). Vaginal practices as women's agency in Sub-Saharan Africa: A synthesis of meaning and motivation through meta-ethnography. *Social Science & Medicine*, 74(9), 1311–1323. <https://doi.org/10.1016/j.socscimed.2011.11.032>

Karadeniz, H. (2019). The Analysis of Genital Hygiene Behaviors of Women Who Applied to Women's Illnesses and Birth Policlinic. *Erciyes Medical Journal*, 41(4), 402–408. <https://doi.org/10.14744/etd.2019.37132>

Klebanoff, M. A., Nansel, T. R., Brotman, R. M., Zhang, J., Yu, K. F., Schwebke, J. R., & Andrews, W. W. (2010). Personal hygienic behaviors and bacterial vaginosis. *Sexually Transmitted Diseases*, 37(2), 94–99. <https://doi.org/10.1097/OLQ.0b013e3181bc063c>

Law, M., Stewart, D., Pollock, N., Letts, L., Bosch, J., & Westmorland, M. (1998a). *Critical Review From Quantitative Studies*.

Law, M., Stewart, D., Pollock, N., Letts, L., Bosch, J., & Westmorland, M. (1998b). *Guidelines for Critical Review Form - Quantitative Studies*.

Michael, J., Iqbal, Q., Haider, S., Khalid, A., Haque, N., Ishaq, R., & Saleem, F. (2020). Knowledge and practice of adolescent females about menstruation and menstruation hygiene visiting a public healthcare institute of Quetta, Pakistan. *BMC Women's Health*, 20(4), 1–8. <https://doi.org/10.1186/s12905-019-0874-3>

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., Stewart, L. A., & Group, P.-P. (2015). Preferred reporting items for systematic review and meta-analysis protocols

- (PRISMA-P) 2015 statement. <https://doi.org/10.1186/2046-4053-4-1>
- Myer, L., Denny, L., Telerant, R., De Souza, M., Wright, T. C., & Kuhn, L. (2005). Bacterial vaginosis and susceptibility to HIV infection in South African women: A nested case-control study. *Journal of Infectious Diseases*, 192(8), 1372–1380. <https://doi.org/10.1086/462427>
- Ott, M. A., Ofner, S., & Fortenberry, J. D. (2009). Beyond Douching : Use of Feminine Hygiene Products and STI Risk among Young Women. *Journal of Sexual Medicine*, 6, 1335–1340. <https://doi.org/10.1111/j.1743-6109.2008.01152.x>
- Ruiz, C., Giraldo, P. C., Sanches, J. M., Reis, V., Beghini, J., Laguna, C., & Amaral, R. L. (2019). Daily genital cares of female gynecologists: A descriptive study. *Revista Da Associacao Medica Brasileira*, 65(2), 171–176. <https://doi.org/10.1590/1806-9282.65.2.171>
- Sevil, S., Kevser, O., Aleattin, U., Dilek, A., & Tijen, N. (2013). An Evaluation of the Relationship between Genital Hygiene Practices, Genital Infection. *Gynecology & Obstetrics*, 03(06), 187. <https://doi.org/10.4172/2161-0932.1000187>
- Umami, A., Sudalhar, S., Lufianti, A., Paulik, E., & Molnár, R. (2021). Factors Associated with Genital Hygiene Behaviors in Cervical Cancer Patients in Surakarta , Indonesia. 11(April), 94–103.
- Verstraelen, H., Verhelst, R., Vaneechoutte, M., & Temmerman, M. (2010). The epidemiology of bacterial vaginosis in relation to sexual behaviour. *BMC Infectious Diseases*, 10. <https://doi.org/10.1186/1471-2334-10-81>
- World Health Organization. (2021). Sexually transmitted infections (STIs).

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Appendix I Summary of articles included in the systematic review

Author Year Country	Aims	Design and Data collection	Sample number and characteristics	Type of Genital Hygiene Behavior	Type of STIs/Genital infection	Research findings
Sevil et al. (2013) Turkey	To evaluate the relationship between genital hygiene practices and genital infection in a group of university students	Cross-sectional study; questionnaire	1,057 female students. A mean age of 21.03 ± 1.70 years.	<ol style="list-style-type: none"> <li>Underwear hygiene and bathing habits (type of underwear used, frequency of changing underwear, daily pads, bathing position, bathing frequency).</li> <li>Toilet hygiene practices (genital area cleaning, type of genital area cleaning, agent used for genital area cleaning, drying genital area, material used for drying the genital area, frequency of cleaning genital area hair, hand washing)</li> <li>Menstrual hygiene practices (material used during menstruation, frequency of changing the material during menstruation (per day), bathing during menstruation, using perfume for malodor during menstruation).</li> </ol>	In this study, students diagnosed by a physician with a genital infection within the past six months were considered as “students with history of genital infection” with the answers “yes/no	<ol style="list-style-type: none"> <li>An assessment of underwear and bathing habits of students with genital infection history did not demonstrate any relationships between the frequency of changing underwear and infection history (<math>\chi^2=5.404</math>; <math>p=0.067</math>). Frequency of genital infections was higher among those who used hosiery/cotton underwear and daily pads (<math>\chi^2=5.602</math>; <math>p=0.018</math> and <math>\chi^2=8.490</math>; <math>p=0.004</math>, respectively). History of genital infections was significantly more common among those who bathed in the sitting position and in those who bathed once a week (<math>\chi^2=49.570</math>; <math>p&lt;0.001</math> and <math>\chi^2=25.534</math>; <math>p&lt;0.001</math>, respectively)</li> <li>Genital infection was significantly less common among those who told that they practiced genital cleaning (<math>\chi^2=62.263</math>; <math>p&lt;0.001</math>), while they were more common among those who described that they cleaned the genital randomly (<math>\chi^2=14.350</math>; <math>p=0.001</math>), used soap/shampoo (<math>\chi^2=10.170</math>; <math>p=0.004</math>), did not dry the genital area (<math>\chi^2=48.657</math>; <math>p&lt;0.001</math>), used cloth for drying (<math>\chi^2=30.006</math>; <math>p&lt;0.001</math>), performed frequent genital area cleaning with materials such as razor (<math>\chi^2=15.918</math>; <math>p&lt;0.001</math>) and did not always pay attention to hand washing (<math>\chi^2=12.733</math>; <math>p=0.002</math>)</li> <li>The frequency of genital infections was significantly higher among those who used cloth and those who did not bathe during menstruation (<math>\chi^2=46.042</math>; <math>p&lt;0.001</math> and <math>\chi^2=8.984</math>; <math>p=0.003</math>, respectively)</li> </ol>
Bahram et al. (2009) Iran	To determine the prevalence of bacterial vaginosis and impact of sexual and genital hygiene practices	Cross-sectional study; Questionnaire; Gynecological examination	500 non-pregnant women aged between 15 and 45 (mean age 36 years)	1. Menstrual hygiene (bathing during menstruation period, genital douching during menstruation period, using sanitary pad, pad change after each urination, sexual abstinence during menstruation period)	Reproductive Tract Infection (RTI) (27.6%); Bacterial Vaginosis (BV) (16.2%), Trichomoniasis (6.6%), Vulvovaginal Candidiasis (VVC) (4.8%).	There was a significant correlation between menstrual and individual vaginal hygiene and BV ( $P<0.01$ and $P<0.001$ ) respectively. In contrast, no significant correlation was

	and socio-demographic characteristics in non-pregnant women			<p>2. Individual vaginal hygiene (regular underwear changing, underwear washing with hot water, sunlight drying of underwear, use of loose underwear, ironing underwear before use, dryness of underwear during day, front to back douching and cleaning of genital area, use of private bathroom, use of personal bathing equipment, sanitation of bathroom before use, bathing in standing position, sun drying of bathing equipment, shaving of genital hair)</p> <p>3. Coital hygiene (genital douching before intercourse, urination after intercourse, frequency of intercourse (less than 7 times a week))</p>		observed between BV and coital hygiene
Bitew et al (2017) Ethiopia	To determine the prevalence of bacterial vaginosis and associated risk factors among women attending gynecology and antenatal clinics	Cross-sectional study; face-to-face interviews using a structured questionnaire	210 female patients aged between 15 and 64 years.	<p>1. Number of pants used per day (1-2 pants/day; one pants for 2-4 days)</p> <p>2. Frequency of vaginal bathing per day (1-3; <math>\geq 4</math>)</p>	Bacterial vaginosis (n=102 (48.6%)); Non-Bacterial vaginosis (n= 108 (51.4%))	<p>1. The prevalence of bacterial vaginosis was lower among patients who changed pants more frequently (two per day; 36.9%) than among those who changed their pants less frequently (one pants for 2–4 days; 57.6%) AOR= 0.367 CI 95% 0.201-0.672; <math>p=0.001</math></p> <p>2. Patients who bathed their vaginal region more frequently were less affected than those who did not bath their vaginal area as much (prevalence rate of 40.2% versus 53.9%) AOR= 1.847 CI 95% 1.013-3.370; <math>p=0.045</math></p>
Calik et al. (2019) Turkey	Identifying women's genital hygiene behaviors and the effects of these behaviors on vaginal infections	Cross-sectional study; face-to-face interviews, and a questionnaire of the Genital Hygiene Behavior Inventory (GHBI)	266 married women, the mean age of $38.5 \pm 7.9$ (min: 20, max: 49)	The Genital Hygiene Behavior Scale, which was designed as a self-report measure in the 5-point Likert scale, consisted of three subdimensions including "general hygiene," "menstrual hygiene," and "abnormal finding awareness" with 27 items in total. The highest score that can be gotten from the test form is 108 and the lowest score is 27. The high total points showed good behavior related to genital hygiene	<p>1. Genital discharge complaints 146 women (54.9%); No genital discharge complaints 120 women (45.1%)</p> <p>2. The speculum examination showed that 42.6% had pathological discharge and the incidence of genital infection was 79% in the Pap smear</p> <p>3. PAP-Smear test results:</p> <ol style="list-style-type: none"> <li>Candida</li> <li>Trichomonas Vaginalis</li> <li>Bacterial Vaginosis</li> <li>Mixed Infections</li> <li>Normal discharge</li> </ol>	<p>1. The mean GHBI score of the women in the study was found to be <math>70.27 \pm 10.05</math></p> <p>2. At the same time, a significant relationship was found between genital discharge complaints and GHBI score hygiene behaviors (<math>p=0.009</math>)</p> <p>3. The study showed that incorrect and inadequate genital hygiene behavior increases the risk of vaginal infection.</p>
Hamed A.G. (2015) Egypt	To assess the impact of genital hygiene practices on the occurrence of vaginal infection, and to develop a	Case-control study; a structured interview and assessment sheet	Total 200 women. I. Case group: women diagnosed as having vaginal infection (n=100) a mean age of $27.7 \pm 6.3$	I. Genital hygienic practices (type of underwear, frequency of underwear change, internal vaginal cleaning or douching, external washing of the genital area, cleansing genital area with hand, direction of cleaning the genital area, use daily pads, drying after using toilet	Vaginal infection (the presence of symptoms associated with vaginal infection)	1. Women who suffered from vaginal infection were less likely to use cotton underwear and changed them less frequently ( $\chi^2= 10.1$ ; $p=0.006$ and $\chi^2= 20.7$ ; $p=0.001$ , respectively). Meanwhile, they were more apt to use



	<p>nursing fact sheet as a prevention message for vulnerable women</p>		<p>2. Control group: women free from vaginal infection (n=100) a mean age of 25.5±4.8</p>	<p>2. Menstrual hygienic practices (bathing during menstrual period, washing hands before and after using the toilet, type of material used during menstrual period, frequency of changing pads, method of dealing with dirty pad) 3. Coital hygienic practices (genital care before intercourse, genital care after intercourse, using of local contraceptive, use of chemical substance and lubricant during intercourse, use of vaginal douching after sexual intercourse)</p>	<p>Symptoms: Vaginal discharge (80%); dysuria, offensive odor, and dyspareunia (62%, 60% and 54% respectively)</p>	<p>the incorrect technique in washing the genital area (<math>\chi^2= 26.5</math>; <math>p=0.001</math>), use intra-vaginal cleansing or douching (<math>\chi^2= 7.3</math>; <math>p=0.007</math>) and keeping their genital area moist or using reused cloth for drying it (<math>\chi^2= 7.3</math>; <math>p=0.007</math>)</p> <p>2. Women in the study group were less likely to bath themselves, washing hands before and after using the toilet and used reusable cloth to absorb menstrual blood (<math>\chi^2= 6.7</math>; <math>p=0.009</math>, <math>p=0.010</math> and <math>p=0.001</math>, respectively). Meanwhile, almost one fourth (24.0%) of the respondents in the case group less frequently changed their perineal pad and washes their reused cloth (37.0%) (<math>p= 0.023</math> and <math>p=0.001</math>, respectively)</p> <p>3. Almost one third of women in the case group did not perform pre- or post-coital care compared to those in the control group (<math>\chi^2= 33.8</math>; <math>p=0.001</math>, and <math>\chi^2= 26.8</math>; <math>p=0.001</math> respectively)</p>
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