Acceptability of the vaginal contraceptive ring among adolescent women

By: Lekeisha R. Terrell, Amanda E. Tanner, Devon J. Hensel, Margaret J. Blythe, and J. Dennis Fortenberry

L Terrell, DJ Hensel, A Tanner, M Blythe, JD Fortenberry. (2011). Acceptability of the vaginal contraceptive ring among adolescent women. Journal of Pediatric and Adolescent Gynecology 23 (2), 204-210.

Made available courtesy of Elsevier: https://doi.org/10.1016/j.jpag.2011.02.003

Abstract:

Study Objective: Although underutilized, the vaginal contraceptive ring has several advantages over other contraceptive methods that could benefit adolescents. We examined factors that may influence willingness to try the vaginal ring including: sexual and contraceptive history, genital comfort, and vaginal ring characteristics.

Design: Cross sectional

Setting: Midwestern adolescent health clinics

Participants: Adolescent women (N = 200; 14–18 years; 89% African-American)

Interventions/Main Outcome Measures: All participants received education about the vaginal ring and viewed pictures demonstrating insertion; they then completed a visual/audio computer-assisted self interview. The primary outcome variable, willingness to try the vaginal ring, was a single Likert-scale item.

Results: Over half the participants reported knowledge of the vaginal ring with healthcare providers identified as the most important source of contraceptive information. Comfort with one's genitals, insertion and removal, using alternative methods of insertion, and knowing positive method characteristics were significantly associated with willingness to try the vaginal ring. A decreased willingness to try the vaginal ring was related to concerns of the ring getting lost inside or falling out of the vagina.

Conclusions: Willingness to try the ring was associated with positive feelings about genitals (e.g., comfort with appearance, hygiene, function). Thus, to increase willingness to try the vaginal ring among adolescents, providers should make it common practice to discuss basic

female reproductive anatomy, raise awareness about female genital health and address concerns about their genitals. Providers can offer alternative insertion techniques (e.g., gloves) to make use more accessible. These strategies may increase vaginal ring use among adolescents.

Keywords: Vaginal ring | Adolescent | Contraception | Acceptability | Genital comfort

Article:

Introduction

High rates of unintended adolescent pregnancy and birth are significant public health issues[1, 2] underscoring the need for a variety of contraceptive options. Contraceptive methods that are not coitus-dependent, do not involve daily administration, and do not require injections could offer improved convenience and increased adherence. An option that may be more acceptable and used more successfully by adolescents is the vaginal contraceptive ring (NuvaRing, Organon USA, Roseland, NJ). The vaginal ring is a contraceptive method that is inserted once a month and is a combination of ethinyl estradiol (15 mcg/day) and etonogestrel (120 mcg/day) contained in a soft flexible 54 mm diameter silicone ring. Instructions recommend that the ring be placed in the vagina between days 1 and 5 of the menstrual cycle; it does not require placement in a specific location in the vagina—an advantage over the diaphragm. Vaginal rings are used continuously for three consecutive weeks and are then removed and discarded; ring removal allows for withdrawal bleeding during the subsequent seven days, after which a new ring is inserted.[3]

The vaginal ring has several advantages over other contraceptive methods that may allow for more consistent and sustained use. It has been shown to be as effective as other combined hormonal methods, but with lower dose of estrogen leading to fewer side effects such as breakthrough bleeding, headache, and nausea.[4] In contrast to the diaphragm, which requires specific vaginal insertion, skill in specific vaginal placement is not necessary with the vaginal ring. Additional benefits include monthly administration, easy self insertion and removal, option for continuous cycling, quick return to normal cycling after removal, low incidence of weight gain, and increased privacy and confidentiality because once the vaginal ring is placed it is not visible.[5, 6, 7, 8, 9, 10, 11, 12] Currently under investigation is the use of the vaginal ring for delivery of topical microbicides for the prevention of sexually transmitted infections (STIs), including HIV. This would place an added benefit in favor of the vaginal ring as a single method that could be used for both pregnancy and disease prevention. In a comparison study, adult women used different methods of microbicide delivery; 52.9% of women had a preference for the vaginal ring over an applicator (36.4%) and diaphragm (10.7%).[13] An advantage the ring has over the applicator and diaphragm is that insertion does not have to be timed with the sexual encounter, thus not affecting sexual spontaneity.[13]

Vaginal ring acceptability studies have primarily been conducted with adult women (18 years and older). In large scale studies in North America and Europe, the vaginal ring has been established as a method of contraception with high compliance, safety, convenience, acceptability, comfort, and satisfaction.[5, 7, 8, 9, 11, 14, 15] Recent work indicates that the vaginal ring is an acceptable contraceptive option for adolescent women with some barriers reported (e.g.,

method of insertion).[15, 16, 17, 18, 19] However, it remains an underutilized form of hormonal contraception among adolescents since it was approved by the FDA in 2001. Reported vaginal ring use among adolescents has ranged from 0.6% to 6%,[16, 20, 21] compared to 61% use of oral contraceptive pills and 20% use of the depot medroxyprogesterone (Depo-Provera).[7, 22]

Accordingly, the purpose of this study was to identify factors that might facilitate the uptake and use of the vaginal ring more broadly by adolescent women. Specifically, we examined adolescent women's willingness to try the vaginal ring after receiving standard educational information about the vaginal ring. Factors that may affect vaginal ring use and acceptability included: sexual and contraceptive history, genital comfort, and vaginal ring characteristics (e.g., method of insertion).

Materials and Methods

Participant Recruitment

Between July 2009 and January 2010, 200 adolescent women were recruited to participate in a cross-sectional survey from five primary care adolescent medicine clinics in Indianapolis, Indiana. These clinics serve urban areas characterized by high rates of early unintended pregnancy and poverty. Inclusion criteria included female gender between 14 and 18 years old and English speaking. Study participants were eligible regardless of having or not having a medical indication for hormonal management of menses or prior history of sexual activity, because hormonal methods may be discussed with anticipation of future needs for contraception and for other reasons, such as menstrual problems. Previous use of a hormonal method, including previous vaginal ring use did not exclude participation. While understanding of vaginal ring acceptability among non-English speaking ethnic minorities is important, the majority of adolescent ethnic minorities speak English in the Indianapolis and Marion County area.

Using an IRB-approved protocol (Indiana University and Purdue University at Indianapolis-Clarian), young women were recruited weekly from the primary care clinics. Prior approval from the primary care physicians to approach their patients was obtained and potential study participants were approached in the exam room while waiting for their primary care physician. Before obtaining consent, the study was explained in detail, including procedure and duration. The study participants were informed that they could start the study while they waited for their primary care physician to enter the exam room and if they were unable to complete it in that time, they could complete it later. A waiver of parental permission was approved by the IRB for enrollment of participants because the study posed minimal risk and because the focus of the study was on contraceptive care. Under Indiana law, minors are not prohibited from seeking their own confidential health care pertaining to reproductive health care services. Overall, there were only five refusals; one refused to participate because she was not interested and four refused due to lack of time.

Study Design and Procedures

After informed consent was obtained, participants completed a one-time visual/audio computer-assisted self interview (VA-CASI) on a laptop computer. The adolescent women answered by

themselves questions they saw on the computer as well as heard through headphones. Advantages of computer-assisted data collection techniques over paper self-administered questionnaires include: improved validity of reports of sensitive behaviors, alleviated literacy issues with the audio component, greater protection of participant confidentiality because no written record exists, and decreased response errors and data entry errors for complex skip patterns.[23, 24, 25] The questionnaire completion time ranged from 20–30 minutes and each participant received $20 as compensation for their time and effort.

Study Measures

The measures assessed demographics, sexual and contraception history, genital comfort, knowledge of the vaginal ring, and comfort with insertion and removal of the ring. Each participant received educational information about the vaginal ring on the computer which included mechanism of action, how it was used, common side effects, and benefits. Participants viewed pictures demonstrating insertion of the vaginal ring then were asked questions related to the importance of method characteristics as well as acceptability and willingness to try the vaginal ring.

Demographics

Using a multiple-choice format, we inquired about the participant's age, race, ethnicity, education, sexual orientation, and relationship status. Participants also answered 21 multiple-choice questions regarding their *sexual behaviors*, including: age at first sex, number of sexual partners, types of sexual behaviors (oral, vaginal, anal, and masturbation); *pregnancy history* including number of times being pregnant and number of deliveries; and *contraceptive experience* including: prior and current use of a variety of hormonal and non-hormonal methods.

Vaginal Ring, Vaginal Product Use, Genital Comfort

To assess knowledge of the vaginal ring, comfort with insertion and removal as well as genital comfort, a four-point Likert rating scaled was used (strongly disagree to strongly agree). Specifically, each study participant was asked if they had ever heard of the vaginal ring and who influenced their contraceptive choices using six items. Level of comfort with vaginal ring insertion and removal was assessed using two items, for example: "I feel comfortable with the idea of inserting (removing) the vaginal ring with my fingers." Alternative methods of insertion were used to assess changes in level of comfort inserting the vaginal ring using the following two items, "I would be willing to try the vaginal ring if I could insert it with an applicator" and "I would be willing to try the vaginal ring if I could put a rubber glove on my hand before inserting it." Experience with pelvic exams and vaginal product use (e.g., tampons, vaginal lubricants, douche, vaginal yeast infection medications) was assessed. In addition, a validated genital comfort scale[26] was utilized to further assess the adolescent's comfort in the appearance, hygiene and function of their genitals and included such items as: "I am not embarrassed about my genitals" and "I think my genitals work the way they are supposed to work." To expand further on comfort with genital anatomy we included two items as: "I am worried the vaginal ring will get lost inside of me" and "I am worried the vaginal ring will fall out."

Method Characteristics

To examine the influence of specific vaginal ring characteristics on willingness to try the vaginal ring, the adolescent women were asked about efficacy, side effects (e.g., weight gain), use, and privacy with seven items on a similar Likert rating scale such as: "I would use the vaginal ring because I only have to remember it once a month." Although there is not a current dual method vaginal ring that protects against both pregnancy and sexually transmitted infections, it is under development.[27] Thus, to assess the vaginal ring used as a dual method a single item (strongly disagree to strongly agree) was employed, "I would be willing to try the vaginal ring if it could also protect against sexually transmitted infections." Finally, because intention to try a product has been correlated to health related behaviors,[28] our outcome, vaginal ring acceptability, was measured with a single item: "I would be willing to try the vaginal ring."

Data Analysis

Descriptive statistics were conducted to examine demographic variables. For most of the Likert scale measures the response categories were collapsed to create dichotomous response of agree/disagree. For the primary outcome of "I would be willing to try the vaginal ring," the responses were not combined. Chi-square tests were used to assess relationships between attitudes toward willingness to use the vaginal ring and sexual and contraceptive history, genital comfort, vaginal ring insertion, and method characteristics. Data management and analysis were performed using SPSS 17.0. Statistically significant effects were considered at $P < 0.05$.

Results

Demographic and Behavioral Characteristics

On average the adolescent women (N = 200) who completed the VA-CASI were 16.2 years (SD = 1.02); the majority identified as African-American (89.0%) and heterosexual (90.5%). Of the adolescent women, 67% had engaged in coitus with the mean age at first coitus 14.4 years (SD = 1.47). Approximately 10% of the study participants had been pregnant at least once with at least one pregnancy resulting in a delivery. More than half of the study participants reported experience using tampons (57.0%) and vaginal yeast infection medications (54.5%). Only about one third (29.5%) of the study participants reported having had a speculum pelvic exam. The demographic and behavioral characteristics of study participants are shown in Table 1.

Table 1. Study Participants' Characteristics (N = 200)

Demographics	**N (%)***
Age (range 14–18 years), mean (SD)	16.2 (1.02)
Race/ethnicity	
African American	178 (89.0)
White	15 (7.5)
Hispanic/Latina	2 (1.0)
Other (Asian/Pacific Islander, American Indiana)	5 (3.5)
Education	
Middle school (6^{th}, 7^{th} 8^{th})	49 (24.5)
High school (9^{th}, 10^{th}, 11^{th}, 12^{th})	149 (74.5)
Some college	2 (1.0)

Demographics	N (%)*
Sexual preference	
Men	181 (90.5)
Women	8 (4.0)
Men and Women	11 (5.5)
Relationship status	
One person for > 6 months	72 (36.0)
One person for < 6 months	45 (22.5)
More than 1 person	4 (2.0)
Not dating or in relationship	79 (39.5)
Vaginal product use (ever)	
Tampons	114 (57)
Vaginal lubricants	20 (10)
Douche	34 (17)
Yeast infection medications	109 (54.5)
Had pelvic exam with speculum	59 (29.5)
Sexual history	
Age at first sex (in years), mean (SD)	14.4 (1.48)
Never had sex	60 (30)
Lifetime sexual partners	
1	42 (31.3)
2	30 (22.4)
3–5	42 (31.4)
> 6	20 (14.9)
Sexual behaviors (ever)	
Vaginal sex	134 (67)
Anal sex	20 (10)
Oral sex (giving)	49 (24.5)
Oral sex (receiving)	87 (43.5)
Masturbated	45 (22.5)
Sexual behaviors (Last sex)	
Vaginal sex	115 (85.8)
Anal sex	5 (2.5)
Oral sex (giving)	24 (12.0)
Oral sex (receiving)	56 (28.0)
Ever pregnant	
Never	180 (90.0)
Once	17 (8.5)
Twice	2 (1.0)
Three times	1 (0.5)
Given birth	
Once	20 (10.0)
Contraceptive history	
Never	54 (27.0)
Depo provera	96 (48.0)
Oral contraceptive pills	62 (31.0)
Transdermal patch	35 (17.5)
Vaginal ring	3 (1.5)
Emergency contraception	5 (2.5)
Male condoms	70 (35.0)
Female condoms	3 (1.5)
IUD	1 (0.5)
Spermicides	4 (2.0)
Avoid sex at certain times of month	16 (0.08)

∗Except as otherwise indicated

Contraceptive Behaviors and Knowledge

More than two thirds (73.0%) of the study participants reported using some form of hormonal contraception; 27% of adolescent women had no experience with hormonal contraceptive. Close to half (48.0%) of the study participants had used Depo-Provera, , 31% oral contraceptive pills, 17.5% the transdermal patch, and 1.5% the vaginal ring. Adolescents' history of using male condoms was 35% while 1.5% reported using female condoms.

About two thirds (66.0%) of the study participants stated they had heard of the vaginal ring. Adolescents learned about the vaginal ring from advertisements and TV (69.0%), their doctor (43.9%), a friend (22.0%), a family member (16.7%), or their partner (0.8%). In order of priority, participants indicated the strongest influences on their choice of a birth control method were their doctor (55.8%), family (52.3%), and friends or media (22.0%).

Willingness to Try the Vaginal Ring

When asked if they would be willing to try the vaginal ring, 6.5% of women strongly agreed and 29.5% agreed. Conversely, a majority of the adolescents disagreed: 29.0% strongly disagreed and 35.0% disagreed that they would be willing to try the vaginal ring.

Willingness to try the vaginal ring was associated with previous use of the contraceptive patch ($P < 0.05$). No other associations were detected between willingness to try and experience with other contraceptive methods. Contraceptive, sexual history, vaginal product use, and pelvic exam results are shown in Table 2.

Table 2. Contraceptive, Sexual History, Vaginal Product Use and Pelvic Exam and its Association with Willingness to Try the Vaginal Ring (N = 200)

Demographics	**χ^2 (df)**	***P* value**
Vaginal Product Use (ever)		
Tampons	5.38 (3)	0.146
Vaginal lubricants	2.31 (3)	0.511
Douche	0.31 (3)	0.958
Yeast infection medications	6.46 (6)	0.374
Had pelvic exam with speculum	0.07 (3)	0.995
Sexual History		
Age at first sex (in years), mean + SD	36.72 (27)	0.100
Never had sex	1.89 (3)	0.594
Lifetime sexual partners	17.75 (15)	0.276
Sexual Behaviors (ever)		
Vaginal sex	1.74 (3)	0.629
Anal sex	1.95 (3)	0.582
Oral sex (giving)	2.72 (3)	0.437
Oral sex (receiving)	1.05 (3)	0.789
Masturbation	1.90 (3)	0.594
Contraceptive History (ever)		
Never	5.12 (3)	0.163
Depo provera	7.19 (3)	0.066
Oral contraceptive pills	0.12 (3)	0.989
Transdermal patch	8.65 (3)	0.034*
Emergency contraception	3.58 (3)	0.310

Demographics	χ^2 (df)	*P* value
Male condoms	1.45 (3)	0.695
Female condoms	1.97 (3)	0.579
IUD	2.40 (3)	0.493
Spermicides	0.99 (3)	0.805

*$P < .05$

When examining associations between adolescent women willing and not willing to try to vaginal ring with genital comfort, vaginal ring insertion and removal, and method characteristics; several factors were statistically significant (see Table 3). For each measure, Table 3 highlights the differences among the four categories of willingness to try the vaginal ring—strongly agree, agree, disagree, and strongly disagree; the largest differences are seen between the agree and disagree categories.

Table 3. Factors and Associations with Willingness to try the Vaginal Ring: Frequencies and Chi-square Test Results

Willing to Try Vaginal Ring						
Measure	**Strongly Agree**	**Agreed**	**Disagreed**	**Strongly Disagree**	**Chi-Square χ^2 (df)**	***P* value**
	(N = 13)	**(N = 59)**	**(N = 70)**	**(N = 58)**		
	N (%)	**N (%)**	**N (%)**	**N (%)**		
Genital Comfort Scale questions						
Think their genitals smell fine	13 (100.0)	56 (94.9)	66 (94.3)	53 (91.4)	18.45 (9)	0.030*
Feel positive about their genitals	12 (92.3)	55 (93.2)	64 (91.4)	51 (87.9)	17.14 (9)	0.046*
Satisfied with the appearance of my genitals	10 (76.9)	54 (91.5)	64 (91.4)	53 (91.4)	15.46 (9)	0.079
Comfortable with sexual partner look at genitals	7 (53.8)	33 (55.9)	35 (50.0)	30 (51.7)	16.16 (9)	0.064
Comfortable with provider examine genitals	10 (76.9)	41 (69.5)	48 (68.6)	40 (69.0)	20.38 (9)	0.016*
Not embarrassed about my genitals	12 (92.3)	47 (79.7)	60 (85.7)	50 (86.2)	20.19 (9)	0.017*
Belief genitals work like they should	13 (100.0)	57 (96.6)	67 (95.7)	57 (98.3)	15.94 (9)	0.068
Extra Genital Comfort questions						
Worried it will get lost inside of me	6 (46.2)	35 (59.3)	56 (80.0)	43 (74.1)	50.59 (9)	0.000**
Worried the ring will fall out	6 (46.2)	34 (57.6)	44 (62.9)	41 (70.7)	32.08 (9)	0.000**
Vaginal Ring Insertion and Removal questions						
Comfortable inserting the ring with fingers	12 (92.3)	37 (62.7)	15 (21.4)	10 (17.2)	147.73 (9)	0.000**
Comfortable removing the ring with fingers	9 (69.2)	37 (62.7)	12 (17.1)	9 (15.5)	114.93 (9)	0.000**
Provider inserts ring the first time and I practice removing it in the clinic	6 (46.1)	36 (61.0)	18 (25.7)	8 (13.8)	66.20 (9)	0.000**
Insert it with an applicator	12 (92.3)	43 (72.9)	30 (42.9)	11 (19.0)	138.68 (9)	0.000**
Insert it using a rubber glove	9 (69.2)	39 (66.1)	26 (37.1)	9 (15.5)	80.58 (9)	0.000**
Method Characteristics questions						
Used only once a month	13 (100.0)	58 (98.3)	42 (60.0)	19 (32.8)	113.00 (9)	0.000**
Effective in preventing pregnancy	13 (100.0)	57 (96.7)	51 (72.9)	21 (36.2)	95.73 (9)	0.000**
Can control my periods	12 (92.3)	51 (86.4)	32 (45.7)	19 (32.8)	92.23 (9)	0.000**
Lower amount side effects than other hormonal contraceptive methods	13 (100.0)	56 (94.9)	40 (57.1)	19 (32.8)	127.02 (9)	0.000**
Does not cause weight gain	13 (100.0)	51 (86.4)	44 (62.9)	21 (36.2)	84.50 (9)	0.000**
Private and partner does not know I am using it	13 (100.0)	57 (96.6)	47 (67.1)	22 (37.9)	82.26 (9)	0.000**
Should not feel it once it is inserted	13 (100.0)	56 (94.9)	43 (61.4)	18 (31.0)	123.02 (9)	0.000**
What if it could protect against STIs	13 (100.0)	65 (94.9)	50 (71.4)	24 (41.4)	73.98 (9)	0.000**

* $P < 0.5$

** $P < 0.001$

Although there was not a significant relationship between willingness to try the vaginal ring, and the overall genital comfort scale ($F[15,184] = 1.21$, $P = 0.268$), there were significant relationships with individual items in the scale. Willingness to try the vaginal ring was significantly associated with feeling positive about one's genitals and thinking one's genitals smelled fine. The preference for not feeling the ring once it is inserted and not being worried the ring would get lost inside of them were characteristics more likely to be reported by those who agreed they would be willing to try the vaginal ring compared to those who disagreed. Those who agreed they were willing to try the vaginal ring were more likely to report not being embarrassed about their genitals compared to those who disagreed, even though it was not statistically significant. Willingness to try the vaginal ring was also significantly associated with overall comfort with insertion and removal as well as using alternative methods of insertion such as using an applicator or a rubber glove. When comparing those adolescents who agreed to try the vaginal ring to those who disagreed, positive benefits and method characteristics of the vaginal ring (e.g., being used only once a month, lower amount of side effects than other hormonal contraceptives, and providing privacy), were significantly related to willingness to try. Additionally, there was varying levels of interest in a potential vaginal ring that could protect against pregnancy and sexually transmitted infections (in addition to its other benefits); see Table 3.

Discussion

This study explored factors associated with willingness to try the vaginal ring among adolescent women aged 14–18 years. Recent work indicates that the vaginal ring is an acceptable contraceptive option for adolescent women;[16, 17, 18, 29] our results align with current trends of the vaginal ring as an underutilized (and potentially underappreciated) form of contraception, as only 3 (1.5%) adolescent women reported use.[16, 18, 20, 21, 29] However, over one third of the adolescent women indicated that they were willing to try the vaginal ring after receiving educational materials and healthcare providers were identified as the most important source of information influencing contraceptive choices highlighting the important role of providers in contraceptive decision making for young women.

Extant research describes genital comfort in the context of receiving multiple pelvic exams, using vaginal products, and frequent tampon use;[16, 17, 19] our results did not detect an association between these factors and willingness to try the vaginal ring. Our findings suggest that genital comfort is more related to feeling positive about genitals—comfort with genital appearance, hygiene, and function. The 'genital discomfort' notion has been noted in some cross-cultural literature, with some women reporting they do not like to touch their genitals or insert products (e.g., tampons) vaginally.[30] Our study findings confirm and extend this research that the main barrier to vaginal ring use and acceptability among adolescents is related to method of insertion and being comfortable with their genitals.[17, 20, 29] In order to use the vaginal ring, adolescent women need to become comfortable with their genitals, thus highlighting the importance of education and practice in clinical and nonclinical settings.

It is reported that adolescent women who had used the vaginal ring had concerns about insertion method, cleanliness, and touching the vagina.[16, 17, 20] Our study uniquely explored these ideas by offering alternative insertion techniques, such as inserting the vaginal ring with a tampon

applicator, instructions to insert the vaginal ring while wearing a rubber glove, or having the healthcare provider insert the vaginal ring for the adolescent women in the office the first time and have them practice removing it before they leave. All of these alternative insertion techniques resulted in higher percentages of willingness to try the vaginal ring among the adolescents.

Fear of pain, injury, not being able to remove the item, losing it inside the body, or introducing an infection to the vagina have been cited as additional reasons for reluctance to use the vaginal ring.[30] Similarly, our results suggested a decreased willingness to try the vaginal ring related to concerns the ring getting lost inside the vagina or falling out. Healthcare providers may need to focus their discussions on basic female reproductive anatomy and specifically address why the ring will not travel up through their body and how the vaginal muscles keep the vaginal ring in place.

Previous research associated vaginal ring acceptability with older age which was hypothesized to be related to increased sexual experiences;[16] our results did not detect associations between age, sexual experiences, and willingness to try the vaginal ring. However, similar to other work,[29] we did detect an association in willingness to try to the vaginal ring with contraceptive patch use, which may be related to adolescent women preferring alternative and more convenient contraceptive methods over oral contraceptive pills. Our study found no relationships with any other sexual health variables. For these young women willingness to try the vaginal ring was related to genital comfort, method of insertion, and information regarding the positive benefits and method characteristics.

The practice of vaginal douching and use of tampons for menstrual hygiene are common practices among adolescent women[31] suggesting that many adolescent women have overcome negative feelings about touching their genitals or inserting products vaginally.[30] An area of active research involves the use of intravaginal rings—similar to those described above—for delivery of topical antimicrobial drugs for the prevention of STIs, including HIV.[32, 33, 34] This would place an added benefit in favor of the vaginal ring as a single method that could be used for both pregnancy and disease prevention; many of the adolescent women reported a preference for this option. More than half of those who were unwilling to try the vaginal ring and more than 95% of those who were willing to try the ring reported they would try the ring if it could protect against STIs.

The use of VA-CASI allowed collection of data as well as the delivery of educational information about the ring comparable to the information and counseling a patient would receive from a provider. However, the participants were not given a chance to ask questions for either clarification or further information. In addition, due to the nature of the clinics in which these women were recruited, incidence of sexual intercourse as well as experiences with pregnancies and birth might be greater than in the general population; for this reason, their preferences may not be reflective of the larger population. Although willingness to try a product has been used as a proxy measure for behaviors, it is unclear if this willingness to try contraceptives leads to behavioral action.[28] Finally, while the vaginal ring is covered in our state by Medicaid, this may not be true for other states. One barrier to access of the vaginal contraceptive ring is cost and the vaginal ring not being available in generic form, resulting in high co-pays or self pay.[16, 35] The

cost may prevent an adolescent from using it even if it is their preferred method of contraception. If the vaginal ring becomes available as a generic, this barrier will be reduced.

In summary, this study provides new information on the association between willingness to try the vaginal ring and genital comfort, method of insertion, and method characteristics. To help improve acceptability to adolescents about this effective, convenient, nondaily hormonal contraceptive method as well as increase the adolescent patients' willingness to try the vaginal ring, healthcare providers should focus on offering alternative insertion techniques such as having their patient try inserting it with a tampon applicator, instructing them to insert the vaginal ring while wearing a rubber glove, as well as having the patients insert and remove the ring during the office visit. Healthcare providers may also help improve acceptability of this contraceptive method by making it common practice to raise awareness with their adolescent patients about their genitals and addressing any anatomical or contraceptive concerns. Assisting adolescent women with their contraceptive choice is essential for improving the adolescents understanding and motivation of specific contraceptive options, reducing unintended pregnancies, and promoting sexual and reproductive health.

Acknowledgments

The authors would like to thank Latoy Brooks for programming the VA-CASI questionnaire and Pat Brooks for her support on this study. Dr. Terrell was supported in part by the MCH Leadership Education in Adolescent Health HRSA/T71 MC00008-15-00. Dr. Tanner was supported in part by the W.K. Kellogg Community Health Scholar Fellowship (Johns Hopkins University Bloomberg School of Public Health).

References

1. Kirby D: National Campaign to Prevent Teen Pregnancy: Emerging Answers: Research Findings on Programs to Reduce Teen Pregnancy. Washington, DC, National Campaign to Prevent Teen Pregnancy, 2001

2. Klein JD: American Academy of Pediatrics Committee on Adolescence: Adolescent pregnancy: current trends and issues. Pediatrics 2005; 116:281

3. Timmer CJ, Mulders TM: Pharmacokinetics of etonogestrel and ethinylestradiol released from a combined contraceptive vaginal ring. Clin Pharmacokinet 2000; 39:233

4. Victor I, Fink RA: Comparing patient telephone callback rates for different hormonal birth control delivery systems. Am J Ther 2006; 13:507

5. Brucker C, Karck U, Merkle E: Cycle control, tolerability, efficacy and acceptability of the vaginal contraceptive ring, NuvaRing: Results of clinical experience in Germany. Eur J Contracept Reprod Health Care 2008; 13:31

6. Miller L, Verhoeven CHJ, Hout J: Extended regimens of the contraceptive vaginal ring: a randomized trial. Obstet Gynecol 2005; 106:473

7. Ahrendt H-J, Nisand I, Bastianelli C, et al: Efficacy, acceptability and tolerability of the combined contraceptive ring, NuvaRing, compared with an oral contraceptive containing 30 microg of ethinyl estradiol and 3 mg of drospirenone. Contraception 2006; 74:451

8. Dieben TO, Roumen FJ, Apter D: Efficacy, cycle control, and user acceptability of a novel combined contraceptive vaginal ring. Obstet Gynecol 2002; 100:585

9. Novak A, de la Loge C, Abetz L, et al: The combined contraceptive vaginal ring, NuvaRing: an international study of user acceptability. Contraception 2003; 67:187

10. Oddsson K, Leifels-Fischer B, de Melo NR, et al: Efficacy and safety of a contraceptive vaginal ring (NuvaRing) compared with a combined oral contraceptive: a 1-year randomized trial. Contraception 2005; 71:176

11. Roumen FJ, Apter D, Mulders TM, et al: Efficacy, tolerability and acceptability of a novel contraceptive vaginal ring releasing etonogestrel and ethinyl oestradiol. Hum Reprod 2001; 16:469

12. Milsom I, Lete I, Bjertnaes A, et al: Effects on cycle control and bodyweight of the combined contraceptive ring, NuvaRing, versus an oral contraceptive containing 30 microg ethinyl estradiol and 3 mg drospirenone. Hum Reprod 2006; 21:2304

13. Hardy E, Hebling EM, Sousa MH, et al: Delivery of microbicides to the vagina: difficulties reported with the use of three devices, adherence to use and preferences. Contraception 2007; 76:126

14. Roumen FJ, op ten Berg MM, Hoomans EH: The combined contraceptive vaginal ring (NuvaRing): first experience in daily clinical practice in The Netherlands. Eur J Contracept Reprod Health Care 2006; 11:14

15. Gilliam ML, Neustadt A, Kozloski M, et al: Adherence and acceptability of the contraceptive ring compared with the pill among students: a randomized controlled trial. Obstet Gynecol 2010; 115:503

16. Carey AS, Chiappetta L, Tremont K, et al: The contraceptive vaginal ring: female adolescents' knowledge, attitudes and plans for use. Contraception 2007; 76:444

17. Epstein LB, Sokal-Gutierrez K, Ivey SL, et al: Adolescent experiences with the vaginal ring. J Adolesc Health 2008; 43:64

18. Stewart FH, Brown BA, Raine TR, et al: Adolescent and young women's experience with the vaginal ring and oral contraceptive pills. J Pediatr Adolesc Gynecol 2007; 20:345

19. Tepe M, Mestad R, Secura G, et al: Association between tampon use and choosing the contraceptive vaginal ring. Obstet Gynecol 2010; 115:735

20. Raine TR, Epstein LB, Harper CC, et al: Attitudes toward the vaginal ring and transdermal patch among adolescents and young women. J Adolesc Health 2009; 45:262

21. Falah-Hassani K, Kosunen E, Shiri R, et al: The use of the vaginal ring and transdermal patch among adolescent girls in Finland. Eur J Contracept Reprod Health Care 2010; 15:31

22. Abma JC, Martines GM, Mosher Wd, Dawson BS. Teenagers in the United States: Sexual activity, contraceptive use, and childbearing, 2002. Vital Health Stat 2004; 23(24):1e48

23. Kissinger P, Rice J, Farley T, et al: Application of computer-assisted interviews to sexual behavior research. Am J Epidemiol 1999; 149:950

24. Richman WL, Kiesler S, Weisband S, et al: A meta-analytic study of social desirability distortion in computer-administered questionnaires, traditional questionnaires, and interviews. J Appl Psychol 1999; 84:754

25. Turner CF, Ku L, Rogers SM, et al: Adolescent sexual behavior, drug use, and violence: increased reporting with computer survey technology. [see comment]. Science 1998; 280(5365):867.

26. Herbenick D, Recce M: Development and validation of the female genital self-image scale. J Sex Med 2010; 7:1822

27. Sieving RE, Bearinger LH, Resnick MD, et al: Adolescent dual method use: relevant attitudes, normative beliefs and self-efficacy. J Adolesc Health 2007; 40:275.e15

28. Armitage CJ, Conner M: Efficacy of the Theory of Planned Behaviour: a meta-analytic review. Br J Soc Psychol 2001; 40(Pt 4):471

29. Gilliam M, Holmquist S, Berlin A: Factors associated with willingness to use the contraceptive vaginal ring. Contraception 2007; 76:30

30. Hardy E, de Padua KS, Hebling EM, et al: Women's preferences for vaginal antimicrobial contraceptives. V: attitudes of Brazilian women to the insertion of vaginal products. Contraception 2003; 67:391

31. Simpson T, Merchant J, Grimley DM, et al: Vaginal douching among adolescent and young women: more challenges than progress. J Pediatr Adolesc Gynecol 2004; 17:249

32. Malcolm RK, Woolfson AD, Toner CF, et al: Long-term, controlled release of the HIV microbicide TMC120 from silicone elastomer vaginal rings. J Antimicrob Chemother 2005; 56:954

33. Woolfson AD, Malcolm RK, Toner CF, et al: Potential use of vaginal rings for prevention of heterosexual transmission of HIV: A controlled-release strategy for HIV microbicides. Am J Drug Deliv 2006; 4:7

34. Abdool Karim Q, Abdool Karim SS, Frohlich JA, et al: Effectiveness and safety of tenofovir gel, an antiretroviral microbicide, for the prevention of HIV infection in women. Science 2010; 329:1168

35. Leeman L: Medical barriers to effective contraception. Obstet Gynecol Clin North Am 2007; 34:19